

Originally Processed With FOIA(s):
S

FOIA Number:
S

FOIA MARKER

**This is not a textual record. This is used as an
administrative marker by the George Bush Presidential
Library Staff.**

Record Group/Collection: Donated Historical Materials
Collection/Office of Origin: Frieden, Lex, Collection
Series: Related Materials
Subseries: Conferences

OA/ID Number: 52071
Folder ID Number: 52071-005

Folder Title:

"Official Program: American Academy of Physical Medicine and Rehabilitation, 38th Annual Assembly,
November 7-10, 1976"

Stack:

Row:

Section:

Shelf:

Position:

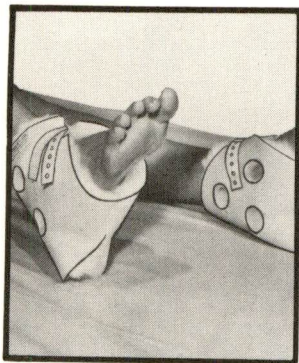


OFFICIAL PROGRAM

AMERICAN ACADEMY OF PHYSICAL MEDICINE AND REHABILITATION

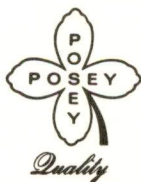
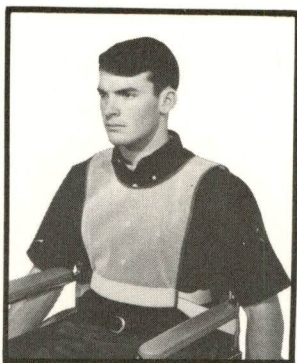
38th ANNUAL ASSEMBLY NOVEMBER 7-10, 1976

TOWN & COUNTRY HOTEL — SAN DIEGO, CALIFORNIA



The Posey "Swiss Cheese" Heel Protector has new hook and eye fasteners for easy application and sure fit. Available in convoluted porous foam or synthetic fur lining. #6121 (fur lining), #6122 (foam), \$5.40/pr.

The Posey Poncho Comfortable Posey vest for bed or wheelchair. Loops in back secure over push-handles of wheelchair to help prevent slumping forward. Available in cool Breezeline or cotton. Washable. #5163-3611 (with ties), \$10.20



J.T. Posey Company

39 South Altadena Drive • Pasadena, California 91107

(213) 795-7767



American Academy of
PHYSICAL MEDICINE and REHABILITATION

30 North Michigan Avenue Chicago, Illinois 60602
Telephone: (312) 236-9512

NOVEMBER 1976

Dear Academy Fellows:

Welcome to the 38th Annual Assembly of the American Academy of Physical Medicine and Rehabilitation.

This Annual Assembly, always a highlight of our Academy year, has become an increasingly important event in our lives as the need grows for physicians to expand and update their knowledge.

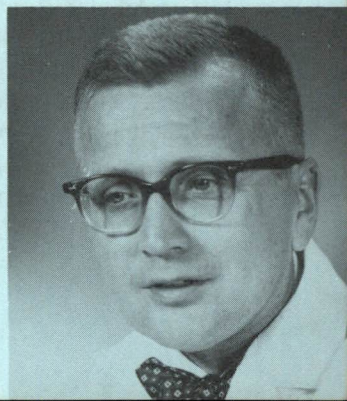
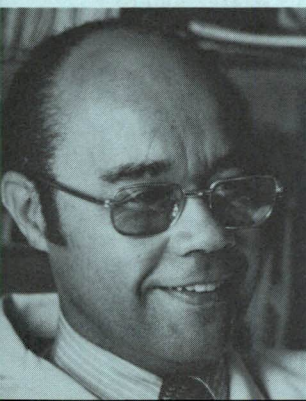
Over the next six days, some 27 accredited courses will be presented, offering you the opportunity to earn up to 41 hours of credit in Category I of the AMA's Physician's Recognition Award program. In addition to these accredited courses, there are scores of other sessions from which you can take new information and new ideas.

Please don't overlook the educational value of our scientific and technical exhibits. We have more technical exhibitors this year than in any other year in our history. We urge you to show your appreciation of their support of our meetings by visiting with them as often as it is possible for you to do so during exhibit hours.

We look forward to greeting you personally in the days to come.

Carl V. Granger, M.D.
President
AAPM&R

Ernest W. Johnson, M.D.
President-Elect
AAPM&R



GENERAL INFORMATION

REGISTRATION

The Registration Desk is located in the convention center of the Town & Country Hotel, Convention Foyer. All persons attending the annual sessions of the American Academy of Physical Medicine and the American Congress of Rehabilitation Medicine must be registered and must be wearing an official badge to gain admission to the meeting areas. The meetings are closed to the general public.

REGISTRATION FEES

ACADEMY/CONGRESS Members	\$45.00
GENERAL REGISTRATION Non-Members	\$55.00
SINGLE DAY Registration	\$20.00

NOTE: Medical and Allied Health Profession Students, Interns and Residents in PM&R will be registered **WITHOUT PAYMENT OF FEES** upon the presentation of proper identification.

MEAL FUNCTIONS

1. Academy **BREAKFAST DISCUSSION GROUPS**\$3.00 per breakfast
2. Academy **ZEITER LECTURE Luncheon**\$6.75 per person
3. Academy **PRESIDENT'S/AWARDS Luncheon** ..\$6.75 per person
4. Congress **BREAKFASTS: Meet the Expert**\$3.00 per breakfast
5. Congress **COULTER LECTURE/AWARDS Luncheon**\$6.75 per person

REGISTRATION HOURS

Saturday, November 6	3:00 p.m. until 6:00 p.m.
Sunday, November 7 through	
Thursday, November 11	8:00 a.m. until 6:00 p.m.
Friday, November 12	8:00 a.m. until 10:00 a.m.

BUSINESS SESSIONS

The Annual Business Meeting of the American Academy of PM&R will be held on Monday, November 8 at 4:15 p.m. in the California Room.

The Annual Business Meeting of the American Congress of Rehabilitation Medicine (first session) will be held on Wednesday, November 10 at 5:00 p.m. in the Golden West Room.

The second session of the Congress Annual Business Meeting will be held on Thursday, November 11 at 4:30 p.m. in the California Room.

The **AUXILIARY** will hold its Annual Business Meeting at 8:00 a.m. in the Tiki Hut. Coffee and Danish will be served.

SPECIAL EVENTS

- Monday, November 8—Academy BREAKFAST DISCUSSION GROUPS,
7:00 a.m.
- Monday, November 8—Academy ZEITER LECTURE Luncheon,
12:15 p.m.
- Monday, November 8—Academy PRESIDENTIAL RECEPTION,
6:30 p.m.
- Tuesday, November 9—Academy BREAKFAST DISCUSSION GROUPS,
7:00 a.m.
- Tuesday, November 9—Academy Annual AWARDS/PRESIDENTIAL
Luncheon, 12:15 p.m.
- Wednesday, November 10—Congress CANDLELIGHT ROUNDTABLES,
7:30 p.m.
- Thursday, November 11—Congress BREAKFASTS: Meet the Expert,
7:00 a.m.
- Thursday, November 11—Congress COULTER LECTURE/AWARDS
Luncheon, 12:15 p.m.
- Thursday, November 11—Congress PRESIDENTIAL RECEPTION,
6:30 p.m.
- Friday, November 12—Congress BREAKFASTS: Meet the Expert,
7:00 a.m.

SCIENTIFIC EXHIBITS

Scientific Exhibits will be on display beginning Tuesday, November 9 and continuing through Thursday, November 11 at 2:00 p.m. Medals will be awarded to those exhibits that are adjudged outstanding by the Committee on Awards for Scientific Exhibits. The awards will be announced and presented at the Congress luncheon on Thursday, November 11.

TECHNICAL (Commercial) EXHIBITS

Technical Exhibits will be open from 9:00 a.m. to 4:30 p.m. Tuesday, November 9 through Wednesday, November 10, and from 8:30 a.m. to 2:00 p.m. on Thursday, November 11 in the Convention Center, Town & Country/San Diego Hall. The scientific program sessions have been arranged to allow time for visiting and inspecting the exhibits. All registrants are urged to set aside time for complete tours of the exhibits.

SCIENTIFIC FILMS THEATER

Scientific Films will be shown continuously Tuesday, November 9 from 9:00 a.m. to 1:00 p.m.; and Thursday, November 11 from 9:00 a.m. to 1:00 p.m. in the Committee Room. The schedule for showing, listing of titles, day and hour is published in the back of this program.

BOOK FAIR

The rehabilitation medicine BOOK FAIR provides registrants an opportunity to browse through the latest books and publications of special interest to

the rehabilitation professionals. A member of the Academy/Congress Staff will be present to take orders on publications you may wish to purchase. The BOOK FAIR is located in the Convention Center Exhibit Hall, and will be open during the regular exhibit hours, 9:00 a.m. to 4:30 p.m. on Tuesday and Wednesday, and 8:30 a.m. to 2:00 p.m. on Thursday.

AUXILIARY to CONGRESS/ACADEMY

The hospitality lounge of the Auxiliary, located in the TIKI HUT at the swimming pool area, will be open from 8:30 a.m. until 10:30 a.m. on Monday, November 8, and continuously through Thursday, November 11. Members and their guests are invited to stop off at the lounge for a coffee break from 8:30 a.m. to 9:30 a.m., or for information concerning social activities, tours, and other events.

HEADQUARTERS/PRESS ROOM

The convention Headquarters is located at the South Foyer of the Convention Center, and the Press Room at the North Foyer. Every attempt will be made to provide copies of the scientific papers presented at the meeting to the members of the working press only.

CONVENTION MANAGER

Creston C. Herold

DIRECTOR, PRESS RELATIONS

Marvin A. Schroder

CONVENTION COORDINATORS

Susan D. Archias

Amelia J. Bender

Barbara A. Bogel

MaryJohn Green

Kathleen R. Sorich

Official Program

AMERICAN ACADEMY OF PHYSICAL MEDICINE AND REHABILITATION

38th Annual Assembly



**November 7-9, 1976
TOWN & COUNTRY HOTEL
SAN DIEGO, CALIFORNIA**

AMERICAN ACADEMY OF PHYSICAL MEDICINE AND REHABILITATION
30 North Michigan Avenue, Chicago, Illinois 60602

OFFICERS AND BOARD OF GOVERNORS

President—Carl V. Granger Boston, MA
 President-Elect—Ernest W. Johnson Columbus, OH
 Vice-President—Joseph Goodgold New York, NY
 Secretary—Robert W. Boyle Wauwatosa, WI
 Treasurer—Joel S. Rosen Chicago, IL
 Executive Director—Creston C. Herold Chicago, IL
 Past President—Eugene Moskowitz Valhalla, NY
 Members-at-Large—Frederick J. Kottke Minneapolis, MN
 Joseph C. Honet Detroit, MI
 William M. Fowler, Jr. El Macero, CA

COMMITTEES

MEMBERSHIP COMMITTEE

James R. Swenson, *Chairman*
 Carlos T. Armstrong-Ressy
 James A. Bailey

SCIENTIFIC PROGRAM COMMITTEE

Paul J. Corcoran, *Chairman*
 Myron M. La Ban
 Bruce B. Grynbaum
 Theodore M. Cole
 Barry Miller
 Sam C. Colachis, Jr. (*ex-officio*)

NOMINATING COMMITTEE

Paul A. Nelson, *Chairman*
 Dominic A. Donio
 Rene Cailliet

BY-LAWS COMMITTEE

Arthur S. Abramson, *Chairman*
 Kenneth C. Archibald
 Lawrence I. Kaplan
 Joseph N. Schaeffer
 Robert P. Christopher
 Walter C. Stolov

COMMITTEE ON FINANCE

Charles Long, II, *Chairman*
 William M. Fowler, Jr.
 Arthur A. Rodriguez
 Joel S. Rosen, *Treasurer*

COMMITTEE ON MEDICAL PRACTICE

William E. Staas, Jr., *Chairman*
 Carol E. Goodman
 Herbert E. Johnson
 Gerald J. Herbison
 James I. Porter
 Stuart I. Holtzman
 Lionel A. Walpin
 Ali A. Khalili
 John J. Vasile

COMMITTEE ON EQUIPMENT AND FACILITIES

Justus F. Lehmann, *Chairman*
 Sam C. Colachis, Jr.
 Malcolm C. McPhee
 Martin Grabois
 Margaret Kennrick
 Catherine N. Hinterbuchner
 Leonard F. Bender
 Arthur E. Grant
 J. D. Henriksen

COMMITTEE ON CONTINUING EDUCATION

Joseph L. Feldman, *Chairman*
 George H. Kraft
 Lawrence W. Friedmann
 John F. Ditunno, Jr.
 Joel S. Rosen
 Richard S. Materson
 Joachim L. Opitz

**AD HOC SUBCOMMITTEE ON
CONTINUING EDUCATION
COURSES**

George H. Kraft, *Chairman*
James T. Demopoulos
Henry H. Stonnington
Randall L. Braddom
March Enders
Lewis A. Leavitt
Joseph L. Feldman

**AD HOC SUBCOMMITTEE ON
SELF-ASSESSMENT EXAMINATION**

Joachim L. Opitz, *Chairman*
Milton Lowenthal
Sam C. Colachis, Jr.
John B. Redford
Jessie K. M. Easton
Lester S. Dewis
Barry Miller
Malcolm C. McPhee
Sidney M. Dinsdale
Victor Cummings

**ACADEMY/CONGRESS LIAISON
(LINK)**

Carl V. Granger, *Chairman*
Eugene Moskowitz
Ernest W. Johnson
G. Keith Stillwell
Creston C. Herold (ex-officio)

COMMITTEE ON AWARDS

Joseph Goodgold, *Chairman*
Frederic J. Kottke
Arthur S. Abramson

**AD HOC COMMITTEE ON
PEER REVIEW**

John L. Melvin, *Chairman*
Ram Parvesh Bhala
Julie G. Botvin
Thomas P. Anderson
Walter C. Stolov
Dorothea D. Glass
Leon Reinstein
Carl V. Granger (ex-officio)

**COMMITTEE ON REHABILITATION
OF CHILDREN**

Gabriella E. Molnar, *Chairman*
Robert R. Sawtell
George H. Koepke
Leon Greenspan
Leonard F. Bender
Gloria E. Eng
Barry L. Bowser
George A. Lentz
Phoebe Saturen

**AD HOC COMMITTEE ON
LEGISLATION**

Leonard F. Bender, *Chairman*
Carl V. Granger
Asa P. Ruskin
Arthur S. Abramson
Richard E. Verville, *Consultant*
Frederic J. Kottke
Justus F. Lehmann

**AD HOC COMMITTEE ON
METHODS OF RESOURCES
MANAGEMENT AND USE OF
COMPUTERS IN PRACTICE**

Lewis Cohen, *Chairman*
Vincent D. Stravino
William T. Blessum

**AD HOC COMMITTEE ON AGING
AND LONG-TERM CARE**

Leon M. Rothman, *Chairman*
Stuart I. Holtzman
Halisey J. Kennedy

**AD HOC COMMITTEE ON
UNDERGRADUATE CORE
CURRICULUM**

James T. Demopoulos, *Chairman*
Catherine N. Hinterbuchner
Randall L. Braddom
Josephine M. Fuhrmann
Martin Grabois
Ian C. MacLean
B. Stanley Cohen
Leonard D. Policoff
Barbara J. Delateur
John A. Downey
Alvin Glass

**AD HOC COMMITTEE ON
GERIATRICS**

John B. Redford, *Chairman*
Shelly E. Liss
R. Claude Rogers
Stuart I. Holtzman
Franz U. Steinberg
Janet J. Whitmore

**AD HOC LIAISON COUNCIL OF
PM&R SOCIETIES**

F. E. H. Lightbody, *Chairman*
Benigno Fernandez
Sidney Alpert

PAST PRESIDENTS

*John S. Coulter, 1938-1939
*F. H. Ewerhardt, 1939-1940
*William Bierman, 1940-1941
*Frank H. Krusen, 1941-1942
*K. G. Hansson, 1942-1943
*William H. Schmidt, 1943-1944
Fred B. Moor, 1944-1945
Fred B. Moor, 1945-1946
William D. Paul, 1946-1947
Earl C. Elkins, 1947-1948
Arthur E. White, 1948-1949
Charles O. Molander, 1949-1950
Miland E. Knapp, 1950-1951
Frances Baker, 1951-1952
*Walter S. McClellan, 1952-1953
Donald L. Rose, 1953-1954
Harold Dinken, 1954-1955
*Ben L. Boynton, 1955-1956
Murray B. Ferderber, 1956-1957
*Deceased

George D. Wilson, 1957-1958
Louis B. Newman, 1958-1959
Clarence W. Dail, 1959-1960
Ray Piaskoski, 1959-1960
Robert W. Boyle, 1961-1962
Max K. Newman, 1962-1963
Morton Hoberman, 1963-1964
*Herman L. Rudolph, 1964-1965
A. B. C. Knudson, 1965-1966
*Michael M. Dacso, 1966-1967
Robert C. Darling, 1967-1968
G. Keith Stillwell, 1968-1969
Herman J. Bearzy, 1969-1970
Glenn Gullickson, Jr., 1970-1971
Arthur S. Abramson, 1971-1972
Justus F. Lehmann, 1972-1973
Leonard F. Bender, 1973-1974
Eugene Moskowitz, 1974-1975

ZEITER LECTURES

Frank H. Krusen, 1968
Paul A. Nelson, 1969
Stanley W. Olson, 1970
George H. Koepke, 1971

Sidney Licht, 1972
Frederic J. Kottke, 1973
Donald L. Rose, 1974
Arthur S. Abramson, 1975

FRANK H. KRUSEN AWARD RECIPIENTS

Frank H. Krusen, 1972
Howard A. Rusk, 1973

Sidney Licht, 1974

LIAISON REPRESENTATIVES

American Academy for Cerebral Palsy

Gloria D. Eng

Patrick J. Fazzari, *Alternate*

American Academy of Neurology

George H. Kraft

Walter J. Treanor, *Alternate*

American Academy of Orthotists and Prosthetists/American Orthotic and Prosthetic Association

Lawrence W. Friedmann

Walter C. Stolov, *Alternate*

American Academy of Pediatrics

Daniel Halpern

Elizabeth W. Edmond, *Alternate*

American Association of

Electromyography and Electrodiagnosis

Myron M. LaBan

John L. Melvin, *Alternate*

American Board of Physical Medicine and Rehabilitation

Carl V. Granger

Ernest W. Johnson

Creston C. Herold, *Staff*

American Hospital Association

Arthur A. Rodriguez

Eugene Moskowitz, *Alternate*

AMA Interspecialty Committee

Frederic J. Kottke

Robert W. Boyle, *Alternate*

AMA House of Delegates

Joseph L. Koczur, *Delegate*

George H. Koepke, *Alternate*

AMA Committee on the Medical Aspects of Sports

John P. Utz, III

Donald J. Erickson, *Alternate*

American Rheumatism Association

Robert L. Swezey

Robert P. Christopher, *Alternate*

AMA Section Council on PM&R

Gordon M. Martin

George H. Koepke

Association of Academic Physiatrists

Ernest W. Johnson

Joseph Goodgold, *Alternate*

Association of American Medical Colleges

John F. Ditunno, Jr.

Alicia Hastings, *Alternate*

Commission on Rehabilitation Medicine

Justus F. Lehmann

Consultant to the President on Aging

Leon M. Rothman

Council on Medical Specialty Societies

Frederic J. Kottke

Robert W. Boyle, *Alternate*

International Federation of PM&R

Carl V. Granger, *Spokesman*

William J. Erdman, II

Leonard F. Bender

National Easter Seal Society for

Crippled Children and Adults

Leonard F. Bender

Eugene Moskowitz, *Alternate*

EDITORIAL BOARD

G. Keith Stillwell, *Chairman*

Arthur S. Abramson, *Associate Editor*

Paul J. Corcoran

Gerald J. Herbison

Robert H. Jebsen

Walter C. Stolov

**AMERICAN ACADEMY OF
PHYSICAL MEDICINE AND REHABILITATION
38th Annual Assembly**

Schedule of Daily Activities

Friday, November 5

- 8:00- 6:00 Convention HEADQUARTERS—South Press Room
8:00- 6:00 Convention PRESS—North Press Room

Saturday, November 6

- 8:00- 6:00 Convention REGISTRATION—South Foyer
8:00- 6:00 Convention HEADQUARTERS/AUDIO VISUAL
READY—South Press Room
8:00- 6:00 Convention PRESS—North Press Room

Sunday, November 7

- 7:00- 8:30 ACADEMY COMMITTEE BREAKFAST MEETINGS
SCIENTIFIC PROGRAM—Council Room
MEDICAL PRACTICE—Chamber Room
EQUIPMENT AND FACILITIES—Cabinet Room
CONTINUING EDUCATION—Forum Room
GERIATRICS—Committee Room
AMA SECTION COUNCIL ON PM&R—Senate Room
8:00- 6:00 Convention REGISTRATION—South Foyer
8:00- 6:00 Convention HEADQUARTERS/AUDIO VISUAL
READY—South Press Room
8:00- 6:00 Convention PRESS—North Press Room
8:30- 9:15 SESSION 1—California Room
Seminar on *Non-Surgical Management of the Remaining
Leg of an Amputee*
8:30-10:00 SESSION 2—Golden West Room
Seminar on *Clinical Electromyography*
9:15-10:00 SESSION 3—California Room
Seminar on *Rehabilitation After Sports Injuries*
10:00-10:30 COFFEE BREAK
10:30-11:15 SESSION 4—California Room
Instructional Seminar on *A Reconsideration of Common
Attitudes About Completed Stroke*
10:30-12:00 SESSION 5—Golden West Room
Workshop on *Continuing Education and Recertification:
Progress Report*
11:15-12:00 SESSION 6—California Room
Instructional Seminar on *The Adult With Cerebral Palsy*
12:00- 1:30 LUNCH INTERMISSION
12:00- 1:30 LIACOM LUNCHEON MEETING—Committee Room
1:30- 3:10 SCIENTIFIC PAPER SESSIONS
SESSION 7—Cabinet Room
SESSION 8—Council Room

- SESSION 9—Chamber Room
 SESSION 10—Senate Room
 1:30- 3:00 SESSION 11—California Room
 Seminar on *Hand Rehabilitation*
 1:30- 3:00 SESSION 12—Golden West Room
 Seminar on *Malpractice*
 3:00- 3:30 COFFEE BREAK
 3:30- 4:15 SESSION 13—California Room
 Seminar on *Cardiac Rehabilitation*
 3:30- 5:30 SCIENTIFIC PAPER SESSIONS
 SESSION 14—Council Room
 SESSION 15—Chamber Room
 SESSION 16—Cabinet Room
 SESSION 17—Senate Room
 4:15- 5:00 SESSION 18—Golden West Room
 Instructional Seminar on *Cancer Rehabilitation*
 5:00- 6:30 LIAISON COUNCIL OF PM&R SOCIETIES
 MEETING—Committee Room
 7:00- 9:00 ASSOCIATION OF ACADEMIC PHYSIATRISTS:
 Business Meeting—Senate Room
- Monday, November 8**
- 7:00- 8:30 ACADEMY BREAKFASTS: DISCUSSION GROUPS
 (advance registration—limited to 30 people per)
 SESSION 19—Council Room
 SESSION 20—Chamber Room
 SESSION 21—Cabinet Room
 SESSION 22—Forum Room
 SESSION 23—Senate Room
 SESSION 24—Committee Room
 8:00- 8:00 SET UP EXHIBITS—Town & Country/San Diego Rooms
 8:00- 6:00 Convention REGISTRATION—South Foyer
 8:00- 6:00 Convention HEADQUARTERS/AUDIO VISUAL
 READY—South Press Room
 8:00- 6:00 Convention PRESS—North Press Room
 8:00-12:00 Auxiliary HOSPITALITY—Tiki Hut
 8:30-10:00 SESSION 25—California Room
 Instructional Seminar on *Evaluation and Management of*
 Low Back Pain Syndromes
 8:30- 9:15 SESSION 26—Golden West Room
 Seminar on *Head Injury Rehabilitation: State of the Art*
 9:15-10:00 SESSION 27—Golden West Room
 Instructional Seminar on *Evaluation of the Handicapped*
 Driver
 10:00-10:30 COFFEE BREAK
 10:30-11:15 SESSION 28—California Room
 Instructional Seminar on *Radiology of the Back*
 10:30-12:00 SESSION 29—Council/Chamber Room
 Seminar on *A Review of the Reaction of Skeletal Muscle*
 to Physiological and Pathological Factors

- 11:15-12:00 SESSION 30—California Room
Seminar on *Electromyography and Low Back Pain*
- 12:15- 2:15 ACADEMY ZEITER LECTURE LUNCHEON—
Golden West Room
- 2:25- 4:05 SCIENTIFIC PAPER SESSIONS
SESSION 31—Cabinet Room
SESSION 32—Forum Room
SESSION 33—Senate Room
- 4:15- 6:00 ACADEMY ANNUAL BUSINESS MEETING—
California Room
- 6:30- 8:00 ACADEMY PRESIDENTIAL RECEPTION—
Convention Center Foyer
- Tuesday, November 9**
- 7:00- 8:30 ACADEMY BREAKFASTS: DISCUSSION GROUPS
SESSION 34—Cabinet Room
SESSION 35—Forum Room
SESSION 36—Senate Room
SESSION 37—Towne Room
SESSION 38—Esquire Room
SESSION 39—Sunset Room
- 8:00- 6:00 Convention REGISTRATION—South Foyer
- 8:00- 6:00 Convention HEADQUARTERS/AUDIO VISUAL
READY—South Press Room
- 8:00- 6:00 Convention PRESS—North Press Room
- 8:00-12:00 Auxiliary HOSPITALITY—Tiki Hut
- 8:30-10:00 SESSION 40—California Room
Instructional Seminar on *Prosthetic Rehabilitation*
- 8:30- 9:15 SESSION 41—Council/Chamber Room
Instructional Seminar on *Decubitus Ulcers*
- 9:00- 4:30 EXHIBITS OPEN—Town & Country Room
- 9:00- 1:00 SCIENTIFIC FILM THEATER—Committee Room
(continuous showings)
- 9:15-10:00 SESSION 42—Council/Chamber Room
Seminar on *Functional Outcome Assessment:
An Overview*
- 10:00-10:30 COFFEE BREAK/VISIT EXHIBITS
- 10:30-12:00 SESSION 43—California Room
Instructional Seminar on *Rehabilitation of the
Neurogenic Bladder*
- 10:30-12:10 SCIENTIFIC PAPER SESSIONS
SESSION 44—Forum Room
SESSION 45—Senate Room
SESSION 46—Cabinet Room
- 10:30-12:00 SESSION 47—Council/Chamber Room
Seminar on *Practical Aspects of Treating the Elderly
Patients With Special Reference to Patients With
Hip Fractures*
- 12:15- 2:15 ACADEMY ANNUAL AWARDS/PRESIDENTIAL
LUNCHEON—Golden West Room

- 2:15- 2:45 Intermission/Visit Exhibits
 2:45- 5:45 JOINT ACADEMY/CONGRESS SCIENTIFIC
 SESSION 49—California Room
 Symposium on *New Concepts in the Management of
 Rheumatoid Arthritis*
 5:45- 7:00 ACADEMY BOARD OF GOVERNORS MEETING—
 Senate Room
 8:00-10:00 SESSION 50—Council/Chamber Room
 Workshop on *Establishing Yourself in Private Practice in
 PM&R: A Practice Management Forum*
 8:00-11:00 TASK FORCE MEETING on SEXUALITY and
 DISABILITY PROGRAMS—Senate Room

* * *

Friday, November 12 - Sunday, November 14

Continuing Education Course meeting the criteria for 31 hours of credit in Category I for Physician's Recognition Award of the American Medical Association.

**"PHYSICAL DISABILITY, SEXUAL ATTITUDES AND
 COUNSELING PROGRAM"**

(Advance Registration Only)

* * *

CONTINUING MEDICAL EDUCATION ACCREDITED COURSES

The following courses, to be presented at the 1976 combined meetings of the American Congress of Rehabilitation Medicine and the American Academy of Physical Medicine and Rehabilitation, have been designated as *accredited courses* under *Category I* of the American Medical Association's *Continuing Medical Education Program*. To receive credit for attendance at these courses, **YOU MUST COMPLETE AN ATTENDANCE CARD FOR EACH COURSE ATTENDED**. The attendance cards will be distributed at the conclusion of each course and must be completed and returned to the presiding chairman/cochairman of that course.

Date	Session	Course Title	Credit Hours
11/7	1	Non-Surgical Management of the Remaining Leg of an Amputee	1
11/7	2	Clinical Electromyography	1½
11/7	3	Rehabilitation After Sports Injuries	1
11/7	4	A Reconsideration of Common Attitudes About Complete Stroke	1
11/7	5	Continuing Education and Recertification: Progress Report	1
11/7	6	The Adult With Cerebral Palsy	1
11/7	11	Hand Rehabilitation	1½
11/7	12	Malpractice	1½
11/7	13	Cardiac Rehabilitation	1
11/7	18	Cancer Rehabilitation	1
11/8	25	Evaluation and Management of Low Back Syndromes	1½
11/8	26	Head Injury Rehabilitation: State of the Art	1
11/8	27	Evaluation of the Handicapped Driver	1
11/8	28	Radiology of the Back	1
11/8	29	A Review of the Reaction of Skeletal Muscle to Physiological and Pathological Factors	1½
11/8	30	Electromyography and Low Back Pain	1
11/9	40	Prosthetic Rehabilitation: Upper and Lower Extremity	1½
11/9	41	Decubitus Ulcers	1
11/9	42	Functional Outcome Assessment: An Overview	1
11/9	43	Rehabilitation of the Neurogenic Bladder	1½
11/9	47	Practical Aspects of Treating the Elderly Patients With Special Reference to Patients With Hip Fractures	1½
11/9	49	New Concepts in the Management of Rheumatoid Arthritis (Part I)	3
11/9	50	Establishing Yourself in Private Practice in PM&R: A Practice Management Forum	2
11/10	51	New Concepts in the Management of Rheumatoid Arthritis (Part II)	3
11/10	56	Relevance of Rehabilitation to the Consumers	2
11/11	64	Athletic Competition by the Disabled	3
11/12	82	Basic and Clinical Research and What's New in Spinal Cord Injury	3

Official Program
AMERICAN ACADEMY
OF PHYSICAL MEDICINE
AND REHABILITATION

38th Annual Assembly

NOTE: ☆ This star indicates that the Session is an accredited course. See page 14 for the official listing of Accredited Courses under Category I of the AMA Continuing Medical Education Program.

Sunday, November 7

8:30- 9:15 ☆ SESSION 1—California Room
Non-Surgical Management of the Remaining Leg of an Amputee

HEINZ I. LIPPMANN, M.D., Professor, Department of Rehabilitation Medicine, Albert Einstein College of Medicine, Bronx, NY

Chairman—

LEONARD F. BENDER, M.D., Detroit, MI

Co-Chairman—

CAIRBRE B. MC CANN, M.D., Portland, ME

8:30-10:00 ☆ SESSION 2—Golden West Room
Techniques of Teaching Clinical Electromyography

Moderator—

GEORGE H. KRAFT, M.D., Professor, Department of Rehabilitation Medicine, University of Washington School of Medicine, Seattle, WA

Panelists—

JOSEPH GOODGOLD, M.D., Professor of Rehabilitation Medicine, New York University School of Medicine; Director of Training, Institute of Rehabilitation Medicine, New York University Medical Center, New York, NY

ERNEST W. JOHNSON, M.D., Professor and Chairman, Department of Physical Medicine, College of Medicine, The Ohio State University, Columbus, OH

JOEL A. DE LISA, M.D., Instructor, Department of Rehabilitation Medicine, University of Washington School of Medicine, Seattle, WA

What is the best way to teach clinical electromyography? Can it best be taught through clinical experience and continuing education courses, books and journals, or the newer

Sunday A.M.

techniques of TV teaching tapes, films and other audiovisual aids? The panel will discuss the techniques which can best be used for initial teaching of clinical electromyography, and the teaching of more advanced techniques to more experienced students. A new 42-minute TV teaching tape will also be shown.

Chairman—

JOHN L. MELVIN, M.D., Milwaukee, WI

Co-Chairman—

JOSEPH B. ROGOFF, M.D., New York, NY

9:15-10:00 ☆ SESSION 3—California Room

Rehabilitation After Sports Injuries

VOJIN N. SMODLAKA, M.D., SC.D., Director, Department of Rehabilitation Medicine, The Methodist Hospital; Associate Clinical Professor of Rehabilitation Medicine, Downstate Medical Center, State University of New York College of Medicine, Brooklyn, NY

The number of athletic injuries is increasing steadily. They are mild, moderate, severe and occasionally lethal. Organized first-aid, good treatment and dynamic rehabilitation are needed to help the athlete preserve and regain his athletic condition. Early mobilization of the injured part and conditioning of the rest of the body are necessary to prevent deconditioning. Methods to improve strength and endurance, during the process of rehabilitation of different injuries, will be discussed.

Chairman—

LEONARD F. BENDER, M.D., Detroit, MI

Co-Chairman—

CAIRBRE B. MC CANN, M.D., Portland, ME

10:00-10:30 Coffee Break

10:30-11:15 ☆ SESSION 4—California Room

A Reconsideration of Common Attitudes About Completed Stroke

THOMAS P. ANDERSON, M.D., Associate Professor, Department of PM&R, University of Minnesota School of Medicine, Minneapolis, MN

An attempt will be made to dispel old myths such as rehabilitation of stroke is not worth the cost, the people do not live long enough to make it worthwhile, that the gains made in rehabilitation of stroke are not maintained by the patient, that the older patients do not do as well in stroke rehabilitation as the younger ones, and many more.

Chairman—

WILLIAM J. ERDMAN, II, M.D., Philadelphia, PA

Co-Chairman—

GABRIELLA E. MOLNAR, M.D., Mamaroneck, NY

10:30-11:15 ☆ SESSION 5—Golden West Room

*Seminar on Continuing Education & Recertification:
Progress Report*

The purpose of this panel is to present to the members a progress report relating to the expanding continuing education program of the American Academy and the volun-

tary recertification process of the American Board. The action of other certifying Boards and compelling reasons for voluntary recertification in Physical Medicine and Rehabilitation will be reviewed. The Continuing Education Program of the Academy has responded to the need for assistance in preparing for voluntary recertification in form of the syllabus for home study, the self-assessment examination and the instructional courses. The panel will outline the present state of continuing education in Physical Medicine and Rehabilitation and plans for the future. Further a general description of the recertification process as it is being planned will be discussed.

Moderator—

CARL V. GRANGER, M.D., President, American Academy of PM&R

Panelists—

Recertification—Why?

GLENN GULLICKSON, JR., M.D., PH.D., Chairman, American Board of PM&R

Syllabus for Home Study

JOHN F. DITUNNO, JR., M.D., Chairman, Ad Hoc Sub-Committee on Syllabus for Home Study

Academy Courses

GEORGE H. KRAFT, M.D., Chairman, Ad Hoc Sub-Committee on Continuing Education Courses

Self-Assessment Examination

JOACHIM L. OPITZ, M.D., Chairman, Ad Hoc Sub-Committee on Self-Assessment Examination

Recertification—How?

GLENN GULLICKSON, JR., M.D., PH.D., Chairman, American Board of PM&R

Discussion

ERNEST W. JOHNSON, M.D., President-Elect, American Academy of PM&R

11:15-12:00 ☆ SESSION 6—California Room

The Adult With Cerebral Palsy

DANIEL HALPERN, M.D., Associate Professor, Department of PM&R, University of Minnesota School of Medicine, Minneapolis, MN

The adult with cerebral palsy faces a unique set of problems, many of which stem from the origin of the handicapping condition early in life. Probably the most serious of the problems is: 1) The limited social experience giving rise to naive social attitudes, egocentricity, and deficient social skills. A vicious cycle is thus set up contributing to persistent social isolation over and above the factors in society already present creating such segregation. 2) All people need a life style containing a sufficient level of social interaction with peers and community to enhance social maturity and maintain self-esteem. While the vocational potential of handicapped individuals is grossly underutilized, even more devastating to the self-respect of the individual is the absence in most communities of an organized individualized program of avocational activity for handicapped adults. 3) A number of physical or medical maintenance problems also present themselves. These require experience, and thoughtful alertness in management. In summary, the adult with cerebral palsy presents a challenging problem which requires prolonged, professional case management capable of an active interventionist role at

Sunday P.M.

appropriate junctures in the life of each individual. The broadest range of community, educational, social, medical, and advocacy services need to be made available and integrated into a life support plan specifically meeting each individual's special requirements in appropriate perspective to his or her life style pattern and ability, and the community resources. In view of the present state of therapeutic resources and availability of community facilities, an aggressive approach needs to be maintained to seek to maximize both individual abilities and to increase the availability of community programs.

Chairman—

WILLIAM J. ERDMAN, II, M.D., Philadelphia, PA

Co-Chairman—

GABRIELLA E. MOLNAR, M.D., Mamaroneck, NY

12:00- 1:30 Luncheon Intermission

1:30- 3:10 SCIENTIFIC PAPER SESSIONS
SESSION 7—Cabinet Room

Chairman—

HERMAN J. BEARZY, M.D., Kettering, OH

Co-Chairman—

ELEANOR BENDLER, M.D., Philadelphia, PA

1:30 **Carotid Bruits: Their Significance in the Cervical Radicular Syndrome Treated With Cervical Traction**

Routine physical examination of 600 patients referred with complaints of neck and/or shoulder pain included routine auscultation of both carotid and subclavian arteries. A treatment regime including consideration of therapeutic cervical traction was precluded in 11 patients when unilateral carotid bruits were heard. Subsequent testing including radioisotopic carotid blood flow studies and arteriography demonstrated 2 lateral thyroids; 2 thoracic outlet syndromes; 1 arteriovenous malformation; 1 scarring secondary to radical neck dissection; and 5 partial carotid occlusions secondary to intra-arterial plaque formation. Successful surgery in three of the thrombotic patients and in the one case of arterio-venous malformation aborted what might have otherwise culminated in a less satisfactory outcome. A review of the literature would indicate that vascular insufficiency as a sequelae of therapeutic cervical traction is an infrequent complication. However, our recent experience in this regard would suggest that a prudent and thorough examination of patients presenting with cervical radicular pain should always include carotid artery auscultation before a prescription for therapeutic cervical traction is executed.

MYRON M. LA BAN, M.D., Division of PM&R, William Beaumont Hospital, Royal Oak, MI

KAREN JOHNSTONE, R.P.T., Division of PM&R, Department of Physical Therapy, William Beaumont Hospital, Royal Oak, MI

1:50 **Effect of Rotational Manipulation of the Lumbosacral Paravertebral Area on Straight Leg Raising Tests**

In a controlled prospective clinical trial, we have confirmed the results of Fisk's recent uncontrolled retrospective trial (N Zealand Med J 81:557-560, 1975). He reported that rotational manipulation of the L5, S1 paravertebral area tended to produce increases in straight leg raising in individuals with abnormally low initial results, especially when pelvic rotation rather than pain was used as the end point of the

straight leg raising test. Using a large protractor to measure the angle of leg raising, we have confirmed his report and compared the effects of rotational manipulation with those of soft-tissue massage. The mean and standard error of the effects of these two lumbosacral treatments on straight leg raising measured in degrees, when pelvic rotation and pain are used as end points, are as follows:

	Pelvic Rotation	Pain
Manipulation:	4.44 $\pm$ 1.27	4.89 $\pm$ 1.15
Massage:	1.59 $\pm$ 0.96	1.41 $\pm$ 1.31

According to a t-test, the increments in both measures due to manipulation are significant at $p < 0.01$, and the increments due to massage are not significant ($p > 0.1$). When pelvic rotation is used as the end point, the difference between manipulation and massage is significant at the $p = 0.029$ level, according to a Mann-Whitney U test; this difference is not significant if pain is used as the end point. These results are among the first suggesting that manipulation is statistically superior to a placebo treatment when an objective measure of improvement is used. They will now have to be confirmed in an exploratory double-blind clinical trial.

JEROME S. TOBIS, M.D., Professor and Chairman, Manipulation Project, Department of PM&R, California College of Medicine, University of California, Irvine, CA

A. A. BUERGER, PH.D., Assistant Professor, Manipulation Project, Department of PM&R, California College of Medicine, University of California, Irvine, CA

2:10

Rhabdomyolysis: Report of Four Cases

Hidden in a painful, swollen, hot extremity, the classical signs of acute thrombophlebitis can be rhabdomyolysis. The latter diagnosis should be particularly considered when there is a history of unconsciousness, crush injury, alcohol or drug abuse, or exertion in high temperature and high humidity. The striking laboratory findings of rhabdomyolysis were myoglobinuria and extreme high elevation of muscle enzymes in the serum. Early diagnosis is important for management of complications such as renal tubular necrosis which frequently requires hemodialysis, peripheral nerve compression which can result in permanent disability, or venous compression which could lead to further complications.

LEOPOLD SUNGA, M.D., The New York Hospital, Cornell Medical Center, New York City

HERMINA BENJAMIN, M.D., The New York Hospital, Cornell Medical Center, New York City

WILLIBALD NAGLER, M.D., The New York Hospital, Cornell Medical Center, New York City

RONALD F. GREEN, M.D., The New York Hospital, Cornell Medical Center, New York City

2:30

Biomechanics in the Etiology and Prevention of Tennis Elbow

More than 100 patients suffering from tennis elbow were followed over a 3-year period. The painful lesion was either located at the lateral condyle, the musculotendinous junction, or the medial condyle. The patients received various forms of therapy for these lesions. A detailed history was elicited from the patient. The kinesiological factors of the tennis stroke were analyzed with EMG examinations. No body or joint type, like tight or loose joints, could be identified as being more vulnerable to tennis elbow. The factors related to the occurrence of tennis elbow were: (1) formation of a subtendinous space between the ages of 16 and 18—there is no incidence of tennis elbow below this age; (2) position of the leading elbow at ball impact; (3) frequency of backhands and net play; (4) continuation of a firm grip at the racket

Sunday P.M.

handle before and after ball impact; (5) off-center hitting of the ball, weakness of grip strength of the leading hand. The more the patients played tennis, the lower the incidence of tennis elbow. Impairment of the interosseous branch of the radial nerve occurred only after frequent bouts of tennis elbow (lateral epicondylitis). In preventing recurrence, a change of the tennis stroke, increasing the strength of grip and wrist extensor muscles, and a change of tennis racket were more influential than any other form of medical therapy.

WILLIBALD NAGLER, M.D., Physiatrist-in-Chief, The New York Hospital, Cornell Medical Center, New York City

2:50

A New Approach to Management of Tennis Elbow

Pain about the attachment of the wrist extensors on the lateral epicondyle of the humerus has been termed "tennis elbow" or lateral epicondylitis. A better term might be enthesitis. While there may be other causes of pain at the elbow—for example, radio-humeral arthritis—the diagnosis of tennis elbow is made by producing the pain as the wrist extensors are resisted, by local tenderness over the lateral epicondyle, and by abolishing the pain by novacaine injection at this specific area. Our thesis is that the condition is produced by fraying of the fibrous attachments of the extensor carpi radialis longus into the periosteum (Sharpey's fibers) and a resultant inflammatory reaction. Admittedly, the condition is usually self-limited; however, a rational approach would be a mechanism to produce dense collagenous scar in this area. Probably this is what occurs after traumatic injections and surgery. We selected 10 persons who met our criteria for diagnosis and prescribed progressive resistance exercise to the wrist extensors. Twenty repetitions, maximum, were done twice daily. All patients reported exacerbation of pain for 7 to 10 days, and after 4 weeks, all patients were free of discomfort. Pain early in the program was managed with infrared heat (250 w) at home and with aspirin. We suggest this approach as a rational treatment for other sites of enthesitis, that is, supraspinatus tendon, Achilles tendon, and so forth.

ERNEST W. JOHNSON, M.D., Professor and Chairman, Department of Physical Medicine, The Ohio State University, College of Medicine, Columbus, OH

F. RICHARD FLETCHER, M.D., Resident, Department of Physical Medicine, The Ohio State University, College of Medicine, Columbus, OH

JOHN JUMP, M.D., Resident, Department of Physical Medicine, The Ohio State University, College of Medicine, Columbus, OH

SESSION 8—Council Room

Chairman—

KENNETH C. ARCHIBALD, M.D., San Francisco, CA

Co-Chairman—

SIMON C. BEAUDET, M.D., Long Beach, CA

1:30

Continuous 24 Hour Direct Arterial Pressure Recording in Ambulatory Hypertensive Patients: Effect of Exercise

Ten patients with mild hypertension, off therapy, were studied, using new methods to evaluate the effect of physical exercise on the cardiovascular system. The EKG and intraarterial blood pressure were continuously recorded for 24 hours, using a small intraarterial catheter, a portable miniaturized perfusion-pump-blood pressure-transducer unit and analog tape recorder. Beat by beat, direct systolic (SAP) and diastolic (DAP) arterial pressure measurements were obtained. A standardized protocol was followed that included: lifting a 10 lb weight, climbing 20 steps, tilting, and treadmill

exercise. Lifting a dumbbell raised SAP from a mean of 174 mmHg $\pm$ 27 to 210 mmHg $\pm$ 24 ($P < 0.001$), while the DAP went from a mean of 102 mmHg $\pm$ 12 to 137 mmHg $\pm$ 21 ($P < 0.001$). Walking up 20 steps changed SAP from 177 mmHg $\pm$ 24 to 212 mmHg $\pm$ 36 ($P < 0.001$) while DAP went from 106 mmHg $\pm$ 8 to 129 mmHg $\pm$ 2 ($P < 0.001$). Treadmill exercise raised SAP from 160 mmHg $\pm$ 19 to 203 mmHg $\pm$ 29 and DAP from 96 mmHg $\pm$ 10 to 143 mmHg $\pm$ 29. The use of continuous intra-arterial pressure measurements permits a better regulation of the level of physical activity tolerated in rehabilitation programs and offers a new perspective in therapeutic control of hypertension.

LOTHAR WERTHEIMER, M.D., Professor of Clinical Medicine,
New York Medical College, Bird S. Coler Hospital, Roosevelt
Island, NY

IONEL BANDU, M.D., Instructor, New York Medical College,
Bird S. Coler Hospital, Roosevelt Island, NY

1:50

The Assessment of Peripheral Vascular Diseases With Doppler Flow Meter and Pedalator

The Doppler ultrasonic blood flow study before and after treadmill exercise is a standard form of assessment for occlusive arterial diseases of lower extremities in many clinical vascular laboratories. However treadmilling is difficult in patients with poor motor coordination or ischemic heart disease. Therefore we have considered the use of pedalator and two modalities. First, five healthy volunteers exercised on treadmill and pedalator with increasing workload while their system blood pressure (BP), pulse rate (P), oxygen consumption (VO_2) and EMGs of tibialis anterior and gastrocnemius muscles were monitored. For a comparable degree of VO_2 , the changes in BP and P were similar for two modalities. The EMGs of tibialis anterior and gastrocnemius muscles were greater with the pedalator than with the treadmill. The maximum workload with pedalator was self-limiting because of its mechanical properties. Next, ten subjects with angiographically proven occlusive arterial diseases of lower extremities, who were subsequently operated upon, exercised on both modalities prior to surgery. Ankle pressure (AP), ankle pulse volume (APV), and BP were recorded at rest and following exercises to the point of producing calf pain. Average exercise time required to produce calf pain was 5 minutes (3 to 8 minutes) for pedalator and 3.8 minutes (1 to 14 minutes) for treadmill. Average ankle pressure drop following exercise was 22.7 mmHg (6 to 50) on left and 36.9 mmHg (20 to 60) on right for pedalator and 37.9 mmHg (6 to 122) on left and 46.3 mmHg (28 to 118) on right for treadmill. Pre-exercise ratio of AP over BP was 50.9% (20.6 to 90.8) for left and 61.4 (41.5 to 100) for right. Following exercises with pedalator these shifted to 31.2% (3.8 to 76.9) and 40.9% (10.5 to 105.7) for left and right respectively, whereas with treadmill it was 24.5% (3.7 to 48.9) and 31.7% (5.1 to 100) respectively. It is concluded that the pedalator can be effectively utilized to assess occlusive arterial diseases of lower extremities in place of treadmill. The interpretation of findings requires information on relative differential effects between two modalities as described above. The pedalator appears to be easier to use for the patient with poor motor coordination and safer for the patient with ischemic heart disease.

K. H. LEE, M.D., Clinical Associate Professor, Department of
Rehabilitation Medicine, Veteran's Administration Hospital
and State University of New York at Buffalo, NY

I. Z. GUTIERREZ, M.D., Clinical Assistant Professor, Department
of Surgery, Veteran's Administration Hospital, and
State University of New York at Buffalo, NY

2:10

Psychiatric Management Problems in Patients With Cardiac Pacemakers

Sunday P.M.

Patients referred to rehabilitation and extended care facilities for physical therapy or occupational therapy for fractures, amputations and stroke may have had a permanent cardiac pacemaker inserted earlier. The fact that a pacemaker has been inserted is often overlooked in such facilities. The goals and the assessment by the physiatrist are often unrealistic if the fact of past pacemaker insertion is not taken into consideration. Between September 1975 and March 1976 we saw at least 15 patients with pacemakers. In many instances the fact that the patient had a pacemaker was not documented. The physiatrist needs to know the type of pacemaker and the factors affecting pacemaker function, including pacemaker problems. If this is neglected, the goals set are unrealistic and the patient is subject to an extended stay and unnecessary consultations or studies. Recurrent episodes of syncope and poor progress can mislead the physiatrist into continuing neurological studies or to suspect further cerebral vascular incidents. Pacemaker malfunction can often be mistaken for classical transient ischemic attacks. This paper emphasizes the fact that in rehabilitation and extended care facilities the total patient needs to be evaluated; pacemaker problems are outlined.

VADDADI RAMA RAO, M.D., Assistant Professor, Department of Rehabilitation Medicine, Emory University, School of Medicine, Atlanta

2:30 **Prognostic Possibilities of the Abnormal Early Diagnostic Impedance Waveform on Patients Undergoing A Cardiac Rehabilitation Program**

There is a great need for the development of prognostic factors in the patients recovering from an acute myocardial infarction. These factors, if identified, could be used to modify not only the patients' follow-up but also their cardiac rehabilitation program. An abnormal early diastolic impedance wave form was identified on 30 patients entering the Cardiac Care Unit with diverse acute cardiovascular illnesses. These were compared with 51 patients admitted under similar circumstances who did not show this abnormal wave form. Retrospective analysis of these 81 patients reveals that the ones showing the abnormal wave eventually had a poorer prognosis (66% on Class III and IV) versus 90% of the patients without the abnormality who were eventually classified under Class I and II. More than 50% of the 30 patients who showed the abnormality expired, and 16 out of the 18 who expired belonged to the group who showed the abnormal waveform. From this analysis it appears that the presence of this abnormal early diastolic waveform can be used as a predictor of outcome in post myocardial infarction patients, both in terms of functional disability and death.

MARCOS RAMOS, M.D., Assistant Professor, Department of Rehabilitation Medicine, Boston University School of Medicine, Boston

2:50 **Establishing a Standard of Cardiac Output and Contractility Indices in Response to Low-to-Moderate Level Exercise in Normal Males**

Measurement by impedance cardiography (ZCG) of cardiac output and contractility indices during exercise is a recent addition to exercise testing of the cardiac patient. Until now there has not been a standard of normal responses to exercise at integrals of resting oxygen consumption (METS). Ten normal male subjects between 19 and 24 years of age and of average height and weight underwent measurement by mass spectrometry of basal oxygen consumption (1 MET) under standardized conditions. Over several days the subjects were exercised on a treadmill at 2 METS through 6 METS with monitoring of heart rate, EKG, minute oxygen consumption (VO_2) and ZCG. The exercise routine was then repeated to look for training effect. Results: Values closely approximating presently accepted basal oxygen consumptions were achieved under our standardized, but practical conditions. Cardiac output during sitting, fully

supported rest was slightly higher than that at 2 METS on treadmill owing to higher stroke volume. From 2 METS through 6 METS the curvilinear mean heart rate and stroke volume were almost mirror images, producing a linear mean cardiac output increase which at 6 METS was 145% of basal and 160% of the 2 MET value, while contractility index increased to 217% of basal. Comparison of the two trials revealed no significant training effect.

RALPH MANCINI, M.D., University of Minnesota Hospitals,
Department of PM&R, Minneapolis

WILLIAM KUBICEK, PH.D., University of Minnesota Hospitals,
Department of PM&R, Minneapolis

ROBERT PATTERSON, M.S.E.E., University of Minnesota Hos-
pitals, Department of PM&R, Minneapolis

FREDERIC J. KOTTKE, M.D., PH.D., University of Minnesota
Hospitals, Department of PM&R, Minneapolis

MILDRED OLSON, B.S., University of Minnesota Hospitals,
Department of PM&R, Minneapolis

SESSION 9—Chamber Room

Chairman—

JOSEPH L. FELDMAN, M.D., Chicago

Co-Chairman—

KARL E. CARSON, M.D., Palo Alto, CA

1:30

Problems Associated With Multiple Levels of Spinal Cord Injury: A Frequently Missed Diagnosis

Patients with spinal cord injuries admitted to the Midwest Regional Spinal Cord Injury Care System were reviewed and multiple cases of missed spinal lesions were noted. Previously undiagnosed lesions from 2 to 11 vertebral levels both above and below the primary level of pathology were found. The significance of these missed lesions with regard to unexpected aberrations of bowel, bladder, and sexual function, progressive skeletal deformities, vascular complications, changing motor and sensory patterns; pain syndromes, respiratory complications and sudden death are presented and discussed. A comprehensive literature review of the subject was conducted and is discussed. The proper methods of diagnosis and treatment of this frequent problem in both complete and incomplete lesions are also presented.

JOHN TOERGE, M.D., Resident, Northwestern University
Medical School; Rehabilitation Institute of Chicago, Chicago

JOEL S. ROSEN, M.D., Assistant Professor, Northwestern Uni-
versity Medical School; Assistant Medical Director, Rehabili-
tation Institute of Chicago, Chicago

1:50

The Autonomic Nervous System in Traumatic Quadriplegia: Pharmacological Considerations

Traumatic transection of the cervical spinal cord interrupts somatic and sympathetic neural pathways. Parasympathetic tone remains uncompensated for without central integration and sympathetic activity. As the isolated spinal cord starts to recover there is progressive return of somatic and autonomic reflex activity, but without benefit of appropriate descending inhibition reflex, activity results in spasticity, autonomic dysreflexia and other clinical problems. These neurological events reflect a slow, precarious adaptation to the partial removal of a central nervous system control higher than the spinal cord. To find out if drugs prescribed for quadriplegic patients follow the natural

Sunday P.M.

pattern of adaptiveness, medications given to a group of 12 quadriplegics admitted 1 to 2 weeks after onset were examined. Results showed that (1) parasympathetic blockers were started from 1 day to 6 months after the injury; (2) parasympathomimetics were started from 1 to 7 months after injury; (3) sympatholytic agents were given 2 to 7 months after injury; and (4) sympathomimetics were given 1 week to 5½ months post injury. The conclusion is that this group of quadriplegic patient was given autonomic drugs in a sequence that facilitates and supplements the natural course of autonomic adaptation. Two sources of possible interference with this adaptation were identified: (1) 33% of the patients received sympathetic amines for problems unrelated to their injuries; and (2) insecticide sprays used in the wards commonly contain cholinesterase inhibitors. Implications of these findings are discussed with regard to a "fail safe" system to avoid exposure to physiologically incompatible agents.

JACQUELINE CLAUS-WALKER, PH.D., Departments of Rehabilitation, Biochemistry, Physiology, Community Medicine and Physical Medicine, Baylor College of Medicine, Houston, TX

LAURO S. HALSTEAD, M.D., Departments of Rehabilitation, Biochemistry, Physiology, Community Medicine and Physical Medicine, Baylor College of Medicine, Houston, TX

2:10

Pharmacological Management of Patients With Spinal Cord Injuries

Spinal cord injury frequently results in a major disruption of the somatic, sympathetic and parasympathetic neural pathways. Management of these patients requires a thorough understanding of normal and altered neurophysiology as well as a basic familiarity with the common pharmacological agents used to compensate for interrupted and/or mal-adaptive neural activity. This paper presents a review of our current understanding of the peripheral nervous system with emphasis on the proposed mechanism(s) of action at target organs and effector sites. A classification of autonomic-active drugs used in managing SCI patients is proposed based on clinical indications and pharmacological actions. The prescription experience for 126 SCI patients (76 quadriplegics and 50 paraplegics) undergoing comprehensive rehabilitation during 1975 at Texas Institute for Rehabilitation and Research is reviewed and analyzed with reference to the proposed classification. The 25 most commonly used drugs with a significant autonomic-active effect are listed according to the diagnostic category of patients treated, the clinical indications, frequency of use and total unit dosage per patient and per study population. Actual and potential drug interactions are prescribed based on this experience. Implications for establishing appropriate prospective and retrospective drug surveillance by physicians, pharmacists and nursing staff are discussed.

LAURO S. HALSTEAD, M.D., Assistant Professor, Departments of Rehabilitation, Community Medicine, and Physical Medicine, Baylor College of Medicine and Texas Institute for Rehabilitation and Research, Houston

JACQUELINE CLAUS-WALKER, PH.D., Associate Professor, Department of Rehabilitation, Baylor College of Medicine, Houston

DANIEL J. HRNA, R.P.H., P.D., Director of Pharmaceutical Services, Texas Institute for Rehabilitation and Research; Instructor in Pharmaceuticals, Department of Rehabilitation, Baylor College of Medicine, Houston

2:30

Thermal Aberrations in the Patient With Acute Spinal Cord Injury

Spinal cord injuries are frequently seen in association with complicated thoracic or abdominal injuries. Early operative repair of thoraco-abdominal injuries followed by thermal ablations prompts extensive diagnostic evaluation. Each year an average of 15 patients are seen at the Ben Taub General Hospital with combined thoraco-abdominal and spinal cord injuries. Aggressive early operative intervention for abdominal injuries results in control of these injuries. More than 85% of these patients develop hyperthermia or hypothermia during the first two and three weeks post-operatively. Diagnostic considerations of intra-abdominal, intrapleural, hematogenous, or central nervous system infections have usually been negative. Patients with spinal cord injuries who require thoracic or abdominal operation frequently lose thermo regulating control. Management algorithms have been developed to assist in early rehabilitation of these complex injuries.

KENNETH L. MATTOX, M.D., Attending Surgeon, Texas Institute for Rehabilitation and Research, Houston

ROBERT H. MEIER, III, M.D., Attending Physician, Texas Institute for Rehabilitation and Research, Houston

2:50 The Effects of Use and Disuse on Spinal Reflexes in Paraplegic Monkeys

Four paraplegic rhesus monkeys after complete spinal transection at mid-thoracic level were placed in supine position and received passive exercise and/or electrical stimulation to one hindlimb but not the other. By 5 days, the activated limb as compared to the quiescent limb showed more muscle tone and more active spinal mono- and polysynaptic reflexes with greater magnitude and lower threshold. This difference increased with time throughout the observation period of 4 weeks. Results indicate that activation or training improves the recovery of reflex status following central nervous system damage through protective and probably also facilitatory mechanisms. The training protects the neuromuscular apparatus and thus maximizes the effects of spontaneous recovery. It may also facilitate the rate though may not affect the plateau of reflex recovery as suggested by our previous investigations. Neurophysiologically, this study also indicates an important role of afferent influence on spinal shock. Electron-microscopic observation is being made on the involved spinal segments.

JEN YU, M.D., PH.D., Department of PM&R, The University of Texas Health Science Center, San Antonio, TX

CHAN NAO LIU, PH.D., Department of Anatomy and Institute of Neurological Sciences, University of Pennsylvania, Philadelphia

WILLIAM W. CHAMBERS, PH.D., Department of Anatomy and Institute of Neurological Sciences, University of Pennsylvania, Philadelphia

SESSION 10—Senate Room

Chairman—

ROLF G. BAGINSKY, M.D., Bedford, MA

Co-Chairman—

DOMINIC A. DONIO, M.D., Allentown, PA

1:30 The Structure and Ultrastructure of Mechanoreceptors in Human Muscle Tendon Junction

In therapeutic exercise touch, pressure, vibration and/or stretch are used to facilitate muscle response. Knowledge of the types of receptors should aid in determining which stimuli would be most effective. The Golgi tendon organ continuously monitors tension

Sunday P.M.

in the extrafusal muscle fibers. The authors studied 22 myotendinous junction autopsy specimens taken from subjects without known neurological disease. Both silver impregnation and H & E staining techniques were used. One hundred twenty-six sensory endings were studied. Both encapsulated paciniform endings and spindle-shaped Golgi tendon organs were encountered. The encapsulated endings consist of an outer lamellated capsule of variable thickness and an inner core containing nerve endings of variable complexity with surrounding inner lamellae formed by cell processes. The spindle-shaped tendon organs also exhibit receptor endings of variable complexity which are supported on dense collagen and are supplied by a thick myelinated nerve fiber 15 to 20 microns in diameter. There are structural similarities which these mechanoreceptors share with those in the skin and subcutaneous tissues. The muscle tendon junction possesses receptors able to respond to a variety of stimuli. This variable arrangement and complexity may reflect the sensitivity of these receptors to various gradations of stimuli.

RITA BISTEVINS, M.D., Research Fellow, Department of PM&R, University of Minnesota, Minneapolis

ESSAM A. AWAD, M.D., PH.D., Professor of PM&R, University of Minnesota, Minneapolis

1:50 C14-Leucine Incorporation in Skeletal Muscle Proteins of the Rat During Denervation and Reinnervation

Recent studies have established that the content of sarcoplasmic (SP) and myofibrillar proteins (MP) decreases during the denervation followed by a recovery during the reinnervation phase. In order to study the life cycle plus the synthesis of these proteins, a study was conducted with 72 adult Wistar rats, which were divided into 6 groups with 12 animals each. In each group, half ($n = 6$) of the animals were used for bilateral crush-denervation of the sciatic nerve at the sciatic notch while the remaining 6 animals were used as controls. The groups were designed to be sacrificed at one, two, three, four, five and six weeks after denervation. Each animal then received subcutaneously, an injection of 0.2 ml C^{14} -leucine (specific activity: 5.4 mCi/mmole) daily for five days a week until sacrifice. After sacrifice the gastrocnemius muscles were used for the extraction of SP and MP and subsequently for the measurement of C^{14} radioactivity in a beta scintillation counter. At one week post-crush, the C^{14} activity (per 100 mg. of muscle) decreased 3-38% ($P < 0.01$) in SP and MP, but at two weeks post-crush only the MP decreased (58%: $P < 0.01$), compared to respective control group. Soon after reinnervation the rates of syntheses rose both in SP and MP, until the normal and reinnervated groups were similar at six weeks post-crush. These results, therefore, suggest that the rate of synthesis of SP may not essentially depend upon the nerve, but that of contractile proteins (actin and myosin) may be regulated by the neural influence(s).

M. MAZHER JAWEED, M.S., Research Associate, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia

GERALD J. HERBISON, M.D., Associate Professor, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia

JOHN F. DITUNNO, JR., M.D., Professor and Chairman, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia

2:10 The Effect of Cast Immobilization on the Cytoarchitecture of the Adult Rat Soleus and Plantaris Muscles

It is well known that cast immobilization causes atrophy of type I and II fibers, yet little has been written on its effect on the cytoarchitecture of fast and slow muscle

fibers. In order to evaluate this problem, bilateral cast immobilized soleus and plantaris muscles were compared to normal adult female rats (wt. 200-220 gms.). The knee and ankle joints were fixed bilaterally in the neutral position. Both the normal controls (N = 7) and cast immobilized (N = 7) animals were sacrificed six weeks after the onset of the experimental period and the muscles were sectioned and stained for myosin ATPase (ph 10.4) and trichrome. Fiber splitting, vaculization and targetoid cells were found subsequent to casting in excess of that found in the normal controls. These abnormalities were characteristically found in the type II fibers of the slow soleus muscle more so than in the type I or II fibers of the fast plantaris. Since the type II fibers in the soleus are fast oxidative glycolytic fibers it appears that they were more susceptible to damage following inactivity than the fast muscle. Similar findings have been described in the tenotomized soleus muscle and were thought to be due to muscle shortening in the absence of tension. The results of this study suggest that soleus muscle fibers can be damaged by disuse alone and that factors apart from shortening, in the absence of tension, are responsible.

GERALD J. HERBISON, M.D., Associate Professor, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia

M. MAZHER JAWOOD, M.S., Research Associate, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia

JOHN F. DITUNNO, JR., M.D., Professor and Chairman, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia

2:30 **The Influence of Chronic Electrical Stimulation on Whole Muscle Fatigue Resistance and Fiber Type Distribution**

The flexor carpi radialis in sheep and the anterior tibialis in rabbits were electrically stimulated, chronically, to determine the input necessary for modification of fatigue resistance and fiber type (slow twitch, fast twitch) distribution. Radio controlled electrodes were implanted and sutured about the motor nerve. Frequency was varied between ten and forty pulses per second. Train periods were one second active: five seconds repose; one: one; and continuous activity. Daily bout durations ranged from one to 24 hours a day. The stimulation program lasted one to six months. At termination of the program in situ measurements of fatigue resistance of the stimulated muscle and the contralateral control muscle were made. Biochemical assays were made of phosphorylase, cytochrome oxidase, and alpha glycerophosphate dehydrogenase activities. Vascularity and fiber type distribution were determined histochemically. Fatigue resistance favorably adapted to one: five and one: one periods of activity, regardless of depolarization frequency. Fiber type distribution could be altered only when the neuromuscular system was damaged as in the continuous train period program. Fatigue resistance and fiber type distribution can thus be modified independently; the modification determined by the activity pattern and motor nerve type, and/or viability, respectively. In this study, impulse frequency appeared to have a lesser role.

MALCOLM L. BOND, University of California, Department of Animal Science, Davis, CA

L. DOERR, University of California, Department of Animal Science, Davis, CA

C. R. ASHMORE, University of California, Department of Animal Science, Davis, CA

2:50 **Contractile Properties of Fast and Slow Skeletal Muscles: Effect of Maturation and the Dystrophic Process in Mice**

Sunday P.M.

Controversy exists as to whether fast muscle is damaged earlier and at a more accelerated rate than slow muscles in dystrophic mice. *In vitro* measurements of muscle contractility were performed on the fast extensor digitorum longus (EDL) and slow soleus (SOL) muscles of 32 mice with hereditary dystrophia muscularis (HDM) and 29 littermates (LM) of the dystrophic mice. Our data show that the contractile parameters for EDL are impaired earlier and at a more accelerated rate than SOL. Studies of the effect of fatigue on these muscles indicate that with age EDL from HDM mice become weaker but more resistant to fatigue than comparable muscles from LM. In this respect EDL from HDM mice appear to lose their fast anaerobic (fast fatigue) characteristics and convert to the slow aerobic (fatigue resistant) pattern typical for SOL.

ROBERT G. TAYLOR, M.D., Associate Professor, UCD Sacramento Medical Center, Department of PM&R, Sacramento, CA

WILLIAM M. FOWLER, JR., M.D., Professor and Chairman, University of California at Davis, Department of PM&R, Davis, CA

3:00- 3:30 Coffee Break

1:30- 3:00 ☆ SESSION 11—California Room

Hand Rehabilitation

YASOMA B. CHALLENGOR, M.D., Director, Electrodiagnosis Unit, College of Physicians and Surgeons of Columbia University, New York City

Chairman—

HERMAN J. FLAX, M.D., Guaynabes, P.R.

Co-Chairman—

GLORIA D. ENG, M.D., Chevy Chase, MD

1:30- 3:00 ☆ SESSION 12—Golden West Room

Seminar on *Malpractice*

WALTER J. TREANOR, M.D., Chief of Physical Medicine Department, St. Mary's Hospital and Medical Center, San Francisco; Clinical Associate Professor PM&R, University of California, Irvine, CA

Chairman—

DAVID G. SIMONS, M.D., Huntington Beach, CA

Co-Chairman—

ARIEL BAR-SELA, M.D., Houston, TX

3:00- 3:30 Coffee Break

3:30- 4:15 ☆ SESSION 13—California Room

Cardiac Rehabilitation

FREDERIC J. KOTTKE, M.D., PH.D., Professor and Head, Department of PM&R, University of Minnesota School of Medicine, Minneapolis

The basic physiologic responses of the cardiovascular system to posture, activity and psychological stress will be considered as they relate to the patient who has suffered

a myocardial infarction. These factors will be presented as the basis for a systematic progressive program of cardiac rehabilitation beginning at the time of the infarct and increasing in intensity of activity up to the usual normal level. The techniques of evaluation and management of such a program will be presented. Schedules for evaluation and management will also be demonstrated. Participants will be expected to participate in a pretest and post test.

Chairman—

RENE CAILLIET, M.D., Los Angeles

Co-Chairman—

SIDNEY ALPERT, M.D., Chicago

3:30- 5:30 **SCIENTIFIC PAPER SESSIONS**
SESSION 14—Council Room

Chairman—

JOHN F. DITUNNO, JR., M.D., Philadelphia

Co-Chairman—

BARBARA DELATEUR, M.D., Seattle

3:30 **Metastatic Disease of the Spine: Electromyographic and Histopathologic Correlation in Early Detection**

Electromyographic examination demonstrating marked, segmental compromise of the posterior primary ramus distal to the spinal root with relative sparing of the anterior ramus may be the earliest objective evidence of spinous and paraspinous metastasis. Antecedent studies including roentgenographic, radioisotope and neurologic are often initially normal—failing to reveal the underlying cause of the progressive back pain complaint. Positive nuclear vertebral scans have correlated well with the electromyographic pattern of posterior primary ramus membrane instability featuring segmental 4+ fibrillations limited to the paraspinous muscle. The suggestion of widespread metastasis to both spinal vertebrae and direct invasion of the posterior primary rami in the adjacent paravertebral gutter muscle masses has only recently been verified by histopathological study. This study demonstrated both route of metastasis through the paravertebral plexus of veins draining both vertebral medullary cavities and the adjacent paraspinous muscle masses as well as evidence of direct invasion of the posterior primary ramus by tumor tissue. In these special instances, segmental 4+ fibrillations in the paraspinous are electrophysiologic manifestations of an active process of denervation produced by direct compromise of the posterior primary rami rather than a remote effect of the disease, as has been suggested by others.

MYRON M. LA BAN, M.D., Director, Division of Physical Medicine and Rehabilitation, William Beaumont Hospital, Royal Oak, MI

JOSEPH R. MEERSCHAERT, M.D., Division of Physical Medicine and Rehabilitation, William Beaumont Hospital, Royal Oak, MI

PAUL A. GOODMAN, M.D., Department of Anatomical Pathology, William Beaumont Hospital, Royal Oak, MI

LUISA PEREZ, M.D., Department of Anatomical Pathology, William Beaumont Hospital, Royal Oak, MI

3:50 **Funicular Localization in Partial Median Nerve Injury at the Wrist: A Confirmation of Sunderland's Cross-Section Funicular Arrangement**

Sunday P.M.

With surgical funicular repair of peripheral nerve injuries becoming commonplace, a new interest in the funicular structure of the peripheral nerves has been aroused. Several investigators have studied the subject through the application of various techniques. The methods used were anatomical and histological examination, electrical stimulation of exposed nerves and the study of partial nerve lesions and the distribution of Wallerian degeneration. In 1945 Sunderland reported an extensive study concerning the intraneural funicular pattern and the formation of multiple plexuses along the length of the three major nerves in the upper extremities. The purpose of this study is to try to determine if the clinical and electrodiagnostic findings in partial nerve lesion of the median n. at or near the wrist correlates with the funicular distribution as originally described by Sunderland. Three patients with partial laceration of the median nerve at wrist were studied. In all patients a clinical examination and electrodiagnostic study was carried out by one of the authors. The clinical evaluations included a functional examination of each intrinsic and extrinsic muscle of the hand, as well as a sensory examination delineating the loss of "pin-prick" and "touch" sensation. In addition, the patient underwent an electrodiagnostic evaluation which included: electromyography of most of the intrinsic muscles of the hand, using the techniques previously described and nerve conduction studies of the motor and sensory fibers of the ulnar and median nerve. The clinical and electrodiagnostic findings in the cases presented tend to coincide with Sunderland's original work on funicular distribution in the median nerve at and near the wrist. It also tends to confirm Sunderland's finding that the mixing of nerve fibers from different funiculi does not occur in the peripheral portion of the nerve. The intraneural plexes take place at the more proximal level.

ALDO PEROTTO, M.D., Assistant Professor, Department of Rehabilitation Medicine, Albert Einstein College of Medicine, Bronx, NY

EDWARD F. DELAGI, M.D., Professor, Department of Rehabilitation Medicine, Albert Einstein College of Medicine, Bronx, NY

4:10

Standardization of Ulnar Sensory Fiber Conduction Velocity

Percutaneous stimulations of the ulnar sensory fibers with the elbow in acute flexion were made at three different sites (a point 14 cm proximal to the crease at the base of the fifth digit, a point proximal to and a point distal to the ulnar groove at least 10 cm apart). Sensory nerve conduction velocities were determined in the across elbow and forearm segments. An antidromic method of recording with ring electrodes was used and a statistical analysis of the data was performed. Twenty three normal individuals, 10 males and 13 females ranging in age from 18 to 56 years, were included in the study. The mean conduction velocity for the forearm segment was 61.90 m/sec and 64.02 m/sec in the across elbow segment. A statistical analysis is presented comparing the values obtained in the male and female subjects and their diagnostic significance discussed. A case study is also presented.

NICHOLAS S. CHECKLES, M.D., Associate Professor, Department of Physical Medicine, The Ohio State University, Columbus, OH

MARIO BALMASEDA, M.D., Resident, Department of Physical Medicine, The Ohio State University, Columbus, OH

4:30

Thoracic Outlet Syndrome—F Wave Evaluation

All patients with the clinical diagnosis of thoracic outlet syndrome who were referred to the authors for electrodiagnostic evaluation were investigated by both standard electrodiagnostic and by ulnar nerve F wave techniques. F wave abnormalities were found only in those patients who had experienced symptomatic deterioration following

previous rib resection. The thoracic outlet syndrome is reviewed and current methods of electrodiagnosis for thoracic outlet syndromes critiqued. F wave techniques and normal values are presented.

ROBERT J. WEBER, M.D., Resident, Department of Physical Medicine, The Ohio State University, Columbus, OH

DAVID PIERO, M.D., Resident, Department of Physical Medicine, The Ohio State University, Columbus, OH

4:50 **Evaluation of the H Reflex Latency in Radiculopathy**

Measurement of the H reflex latency has been recently described as a technique to help confirm the presence of a S1 radiculopathy. This H reflex is analogous to an electronically mediated ankle jerk deep tendon reflex in that it measures afferent and efferent conduction along the same reflex arc. Since most standard anatomical textbooks feel that the ankle jerk is mediated not only by fibers originating in the S1 nerve root, but also by fibers originating in the L5 and S2 nerve roots, it might be assumed that the H reflex latency would be abnormal not only in S1 radiculopathies, but also in L5 and S2 radiculopathies. The purpose of this study was to evaluate whether the H reflex latency was of value in detecting and differentiating S1 from L5 radiculopathies. Thirty-two patients were studied; 15 with definite unilateral L5 radiculopathy and 17 with a definite unilateral S1 radiculopathy. Data revealed a mean H reflex latency difference between the affected and unaffected extremities of 0.03 msec (range 0.0-0.3 msec) in the patients with L5 radiculopathy and of 2.88 msec (range 1.3-4.1 msec) in the patients with S1 radiculopathy. The H reflex was also unobtainable in the involved extremity in four of the patients with S1 radiculopathy. It is concluded that H reflex latency testing is a valuable tool in helping to differentiate S1 from L5 radiculopathies.

JOHN A. SCHUCHMANN, M.D., Assistant Chief, Physical Medicine Service, Tripler Army Medical Center, Honolulu

5:10 **Axillary F-Loop Latency and H-Loop Latency: Physiological Meaning and Clinical Implications**

A very simple technique has been developed to measure the conduction time between the axilla and spinal cord. The conduction time, defined as "axillary F-loop latency," includes the antidromic conduction in motor fiber, central delay in spinal cord and orthodromic conduction in motor fiber, covering a total distance of 50 cm. The first 40 median and 40 ulnar nerves studied showed the latency to be 11.76 ± 1.14 ms and 11.16 ± 0.97 ms respectively. Its clinical implications in Guillain-Barre Syndrome (more than 15 ms) brachial plexus lesions, thoracic outlet syndrome, carpal tunnel syndrome, syringomyelia and peripheral neuropathy will be discussed. It has been found that the central delay in human spinal cord is much longer (3-6 ms) than the 1 ms reported in decerebrate cat. Similarly, an axillary H-loop latency has been studied. The mechanism of H reflex and F wave, and the significance of prolonged central delay will be reviewed.

YEONGCHI WU, M.D., Northwestern University Medical School, V.A. Lakeside Hospital; Rehabilitation Institute of Chicago, Chicago

JOSEPH S. STRATIGOS, M.D., Northwestern University Medical School, V.A. Lakeside Hospital, Chicago

SESSION 15—Chamber Room

Chairman—

WILLIBALD NAGLER, M.D., Norwalk, CT

Co-Chairman—

LESTER S. DEWIS, M.D., Wayland, MA

Sunday P.M.

3:30

Management of Spasticity in Spinal Cord and Brain Injured Patients by Percutaneous Radiofrequency Rhizotomy

The purpose of this report is to describe the technique of percutaneous radiofrequency rhizotomy for relief of spasticity and report an experience with twenty three patients over a period of thirteen months, including discussion of the underlying physiology of the technique and advantages over other methods. Twenty three patients with spasticity due to spinal cord or brain injury were subjected to thirty two procedures. Follow up ranged from two to thirteen months. Nineteen patients obtained excellent results, three good results, with one failure. Three patients demonstrated voluntary motor function previously masked by spasticity. The appreciation of or reflex response to noxious stimuli was reduced or eliminated in all patients. Touch and position sense were preserved in seven of eight patients. No alteration in urinary or bowel control was noted in any patient, and functional penile erections in seven males were not affected. Five patients with refractory decubitus ulcers were successfully treated with good healing after the procedure. The procedure consisting of selective thermal rhizotomy, usually at T12, L1,2,3,4,5 and S1, of the fibers carrying pain sensation preserves the fibers of touch, position sense and motor function. The hazards of open surgery are avoided, the procedure well controlled, and the presence of decubitus ulcers no contraindication.

DOUGLAS E. KENNEMORE, M.D., Neurosurgical Consultant to
University of Virginia, Greenville, SC

3:50

Experience with Intramuscular Neurolysis in the Treatment of Spasticity in Children

Ten years' experience with the use of intramuscular neurolysis in children is presented. The method was that of Halpern and Meelhuysen, using 5% phenol solution. The procedure was done to obtain improved function or greater ease of care. Most of the patients had cerebral palsy. Duration of relief of spasticity varied from a few days to one or more years, and the effectiveness of the procedure also varied. More than 50% of the patients treated with intramuscular neurolysis had tendon lengthening performed later. The advantages and disadvantages of intramuscular neurolysis in children are discussed. In the management of spasticity in children, when carried out with proper technique and realistic expectations, intramuscular neurolysis is more specific than injection of peripheral nerves with phenol, and as a conservative measure can be a predictor of whether later surgical tendon lengthening will result in improved function.

JESSIE K. M. EASTON, M.D., Assistant Professor, University
of Minnesota, Department of PM&R, Minneapolis

A. TURKYILMAZ OZEL, M.D., Assistant Professor, University
of Minnesota, Department of PM&R, Minneapolis

DANIEL HALPERN, M.D., Professor, University of Minnesota,
Department of PM&R, Minneapolis

4:10

Further Experiences in Phenol Intramuscular Neurolysis in Children with Spasticity

A previous report of 13 young children dealt with the use of general anesthesia in performing phenol intra-muscular neurolysis for relief of spasticity. This extended study concerns details of the technic of intra-muscular neurolysis and its effects. We describe the equipment and methods that have been used in thirty procedures on twenty-three spastic children. Results of the first 16 procedures are presented in terms of duration and degree of reduction of spasticity, and alterations in levels of physical function. By instilling generous volumes of 5% aqueous phenol into multiple electro-sensitive sites of spastic muscles, we achieved significant relaxation for an average period of six months. Function was usually altered with regard to ambulation. Lower extremity bracing was facilitated and gait patterns improved in most cases. Referring orthopedic

surgeons utilized neurolysis in assessing contractures in spastic children, simplifying stretching of contractures pre-operatively, and abetting post-surgical healing and function. Conclusions are offered concerning indications and expectations of the procedure in the pediatric patient.

ERNEST R. GRIFFITH, M.D., Professor and Chairman, Department of Rehabilitation Medicine, Medical College of Virginia, Richmond, VA

4:30 **Objective Evaluation of Effect of L-Dopa on Muscular Hypertonia of Cerebral Palsy**

Dystonia and spasticity are common problems in cerebral palsy and impede the learning of motor skills by patients with these problems. Levo-dopa has been useful medication in the relief of dystonia in parkinsonism, a condition characterized by deficient inhibitory mechanisms in the basal ganglia, similar to that of many patients with cerebral palsy. A technique, developed, previously at this center, of evaluating hypertonia by identifying the responsiveness of muscle groups to muscle elongation, velocity of elongation, and to influences, most often supraspinal, unrelated to fusimotor system was used to evaluate the effect of L-Dopa in 11 patients with cerebral palsy. Preliminary review of the data shows that L-Dopa diminishes the over-all dystonia and to some extent the responsiveness to lengthening but enhances the responsiveness of the muscle to velocity of stretch, or myotatic reflex. The implications of the findings on physiology and function will be discussed.

A. TURKYILMAZ OZEL, M.D., Assistant Professor, University of Minnesota, Department of PM&R, Minneapolis

JESSIE K. M. EASTON, M.D., Assistant Professor, University of Minnesota, Department of PM&R, Minneapolis

DANIEL HALPERN, M.D., Professor, University of Minnesota, Department of PM&R, Minneapolis

4:50 **Long Term Treatment of Spastic Cerebral Palsied Children With Dantrolene Sodium**

Twenty-two children with spastic hemiplegic, diplegic and quadriparetic cerebral palsy were treated with dantrolene sodium for periods of two weeks to two years. The degree of neuromuscular deficit was graded as mild to moderate. Age varied from six to sixteen years. Measures of evaluation were clinical assessment of hypertonicity, clonus, deep tendon reflexes, passive and active range of motion, specific aspects of hand function and of gait. These parameters were recorded prior to the use of drug and repeated at intervals of two months while the medication was continued. Four children experienced side effects and were discontinued from the treatment. The remaining 18 children showed favorable response although subjective improvement reported by the patients and their parents did not reflect uniformly and unequivocally on objective evaluation. Difficulties inherent in demonstrating subtle changes by clinical functional assessment are discussed and results are compared with those of other studies on the effectiveness of this drug in children with cerebral palsy.

LILIA A. EVANGELISTA, M.D., Assistant Clinical Professor, Departments of Rehabilitation Medicine and Pediatrics, Albert Einstein College of Medicine, Bronx, NY

GABRIELLA E. MOLNAR, M.D., Associate Professor, Departments of Rehabilitation Medicine and Pediatrics, Albert Einstein College of Medicine, Bronx, NY

5:10 **The Effects of Diazepam in Patients With Spasticity**

Sunday P.M.

The effects of diazepam were examined in 15 patients with neurological lesions resulting in spasticity. In the patients with complete spinal lesions diazepam produced no significant alteration in the excitability of the monosynaptic arc and did not enhance presynaptic inhibition. In contrast, in the patients with incomplete lesions, diazepam enhanced presynaptic inhibition; reduced the excitability of the monosynaptic arc and reduced the Tonic Vibration Reflex. Diazepam reduced the compound action potential of the direct muscle response and the isometric twitch tension in both groups. The rationale for the use of the drug in the management of patients with spasticity is discussed.

SIDNEY M. DINSDALE, M.D., PH.D., Chedoke-McMaster Centre, Hamilton, Ontario, Canada

PETER ASHBY, M.D., Chedoke-McMaster Centre, Hamilton, Ontario, Canada

S. MACLEOD, M.D., PH.D., Chedoke-McMaster Centre, Hamilton, Ontario, Canada

MOLLY VERRIER, DIP.P.&O.T., Chedoke-McMaster Centre, Hamilton, Ontario, Canada

SESSION 16—Cabinet Room

Chairman—

NADENE COYNE, M.D., Cleveland

Co-Chairman—

JOEL S. ROSEN, M.D., Chicago

3:30 Trends in Curriculum Development in Rehabilitation Medicine

A survey was conducted of undergraduate medical education in rehabilitation medicine in the past 11 years to identify specific changes which have occurred and to assess the impact of changing medical school curricula on rehabilitation medicine teaching. In addition, the changes which have occurred were analyzed in an effort to determine those desirable features which lend strength to a rehabilitation curriculum. The results suggest that the strength of a program is highly dependent on the number of academic physiatrists available. Larger programs were more liable to emphasize conceptual objectives such as exposure to the concepts of physical medicine and rehabilitation, management skills, and a multidisciplinary team approach. Such programs usually had more teaching hours available, a larger amount of conjoint teaching in the preclinical years and exclusive clerkship teaching in the clinical years. They usually had larger and more comprehensive supportive clinical facilities and services available. The department with a greater number of physiatrists was also found to be more likely to continue to grow or at least to maintain a level of involvement. The impact of rehabilitation medicine on the rearrangement of undergraduate medical school curricula has produced considerable conjoint teaching in conjunction with a large number of basic science and clinical departments. It has also stimulated growth.

STEVEN D. FEINBERG, M.D., Rehabilitation Institute of Oregon, Portland, OR

JUSTUS F. LEHMANN, M.D., Professor and Chairman, Department of Rehabilitation Medicine, University of Washington, Seattle

C. GERALD WARREN, M.P.A., Assistant Professor and Coordinator of Research, Department of Rehabilitation Medicine, University of Washington, Seattle

3:50 Undergraduate Education in Rehabilitation Medicine: Trends and Impact on Specialty Manpower and Delivery of Service

One hundred thirteen medical schools which offered full degree programs were identified and surveyed by questionnaires to obtain information which identified the existence, characteristics and involvement of PM&R programs. Data obtained by this survey were compared with the results of the CEP&R survey of 1963-64. The comparison suggests that major steps should be taken to rectify the lack of growth and impact on undergraduate medical school teaching programs. The effectiveness of the existing teaching programs should be improved, and new programs should be developed in the 32 schools which offer no exposure to rehabilitation medicine in their curricula. The quality of residents recruited into the academic programs should be a major concern, especially in the light of the present influx of foreign graduates. In order to achieve these goals, an increase in financial support for existing programs is essential. Stipend support for undergraduate students should be increased as well as reinstating training programs and stipends for academicians. Support for the development of new training programs should also be provided. Most of this funding will have to be provided through federal sources since local funding is seriously limited at this time.

JUSTUS F. LEHMANN, M.D., Professor and Chairman, Department of Rehabilitation Medicine, University of Washington, Seattle

STEVEN D. FEINBERG, M.D., Rehabilitation Institute of Oregon, Portland, OR

C. GERALD WARREN, M.P.A., Assistant Professor and Coordinator of Research, Department of Rehabilitation Medicine, University of Washington, Seattle

4:10 **Motivational Factors for Selecting the Specialty of Physical Medicine and Rehabilitation**

Physical medicine and rehabilitation is a medical specialty that tends to be ignored in the medical school curriculum and is a field not commonly chosen by the medical school graduate. The objectives of this study were, therefore, to establish and quantify the features of PM&R that tend to attract physicians to this specialty. The data for this study was based on a national survey questionnaire utilizing responses of residents in 16 of the better established PM&R programs, representing a wide geographic distribution. Each PM&R program chairman was contacted by telephone to elicit his cooperation in having his residents participate in the study, thus assuring a maximum response. The questionnaire consisted of: demographic information, method of introduction to PM&R, training background, and professional experience. In addition, motivational variables relevant to the selection of PM&R were rated on a Likert scale to establish the relative importance of each variable to the choice of PM&R as a specialty. The results of this study could be used to identify and actively recruit potential residents to PM&R as a specialty.

IAN C. MACLEAN, M.D., Rehabilitation Institute of Chicago, Chicago

JOHN E. TOERGE, D.O., Rehabilitation Institute of Chicago, Chicago

THOMAS J. REIDY, PH.D., Rehabilitation Institute of Chicago, Chicago

4:30 **Continuing Education in Rehabilitation—Simulated Patients as an Educational Tool**

A seminar on the emotional aspects of multiple sclerosis was held at McMaster University. Ninety-six participants attended and these included nurses, physiotherapists, occupational therapists, vocational counsellors, rehabilitation councilors, psychologists, social workers and physicians. The seminar was designed to assist Community Health

Sunday P.M.

professionals in their interaction with multiple sclerosis patients and their families. This presentation focuses on the methodology employed to meet the educational objectives of the seminar. The format included an orientation lecture, consumer panel, and multidisciplinary groups utilizing simulated patients in order to acquire problem solving skills. The use of simulated patients for educational purposes has been widely employed at McMaster University and we believe that this innovation is an important development for education in rehabilitation. Simulated patients as an educational tool provide reliability and controllability with respect to stable symptoms, signs, and psychosocial factors. Simulated patients also result in instant feedback to the student and his group. An evaluation of this educational format will be presented and this will include data from the seminar faculty, the participants, and the simulated patients. A film will be presented that will demonstrate the advantages in the utilization of simulated patients for education in the field of physical medicine and rehabilitation.

SIDNEY M. DINSDALE, M.D., PH.D., Chedoke-McMaster Centre, Hamilton, Ontario, Canada

MRS. K. MCCAUGHAN, B.SC.N., Chedoke-McMaster Centre, Hamilton, Ontario, Canada

4:50 **Family Medicine Training Program: How Much Rehabilitation Medicine is Included?**

What training in rehabilitation medicine should be included in curricula for residents in family medicine? The answer to this question is a challenging one considering that there are currently 270 approved family medicine residency programs. As a first step in answering this question a survey was made of all approved family medicine residency programs to determine the extent of residents' exposure to rehabilitation medicine. In addition, all university affiliated departments of rehabilitation medicine were contacted to determine the extent of contact with family medicine residents. The results of this survey are presented and implications for both fields are discussed.

DEAN S. HALLAUER, PH.D., Monroe Community Hospital, Rochester, NY

JANET J. WHITMORE, M.D., Monroe Community Hospital, Rochester, NY

5:10 **Chronic Illness and Humanism: Rehabilitation as a Model for Teaching Humanistic Health Care**

Current health care has evolved from two major yet divergent sources: one scientific and technical, the other traditional and humanistic. Over the past several decades, there has been an increasing dominance of scientific medicine at the expense of humanistic health care—an imbalance widely appreciated by the public and now a growing concern of health care providers and educators. Because of its philosophical orientation, rehabilitation medicine has a unique contribution to make in helping restore this imbalance. Rehabilitation embodies many elements of humanism, making it a relevant functioning example of humanistic health care. This paper outlines a conceptual framework for comparing the characteristics of "scientific" and "humanism" medicine and describes a format for presenting this framework in the context of a rehabilitation rotation for final year medical students. Emphasis is placed on rehabilitation as a model for providing humanistic health care for persons with chronic illness and on identifying those scientific and humanistic principles in rehabilitation that can be applied elsewhere in medicine. Experience over the past two years indicates this format provides a useful introduction to rehabilitation principles and practice for students involved in a short-term required rotation. Questionnaire evaluations of this format and student attitudes regarding humanism in medical school are presented. Implications of this experience for curricular change are discussed.

Sunday P.M.

LAURO S. HALSTEAD, M.D., Assistant Professor, Departments of Rehabilitation, Community Medicine and Physical Medicine, Baylor College of Medicine, Texas Institute for Rehabilitation and Research, Houston

MARGARET G. HALSTEAD, M.S., Instructor, Department of Psychiatry, Baylor College of Medicine, Houston

SESSION 17—Senate Room

Chairman—

JEROME S. TOBIS, M.D., Orange, CA

Co-Chairman—

KENNETH M. COLE, JR., M.D., Dallas

3:30

Muscle in Rheumatoid Arthritis: Histological, Histochemical and Ultrastructural Study

The spectrum of muscle involvement in rheumatoid arthritis is of great importance in physiatriic practice. At the Neuromuscular Studies Unit, over the last few years, we have had an opportunity to study muscle biopsies from 30 patients who met the ARA criteria for the diagnosis of rheumatoid arthritis. The clinical picture of these patients varied from moderate to severe proximal and/or distal muscle weakness which was out of proportion to the severity of the arthritic process. In almost all of these cases CPK, aldolase, ANA, rheumatoid factor, and sedimentation rates were elevated. These patients had been variously treated with steroids, aspirin, chloroquin, and/or physical therapy. From the review of these biopsies, the following spectrum of muscle involvement was observed: (1) myositis—diffuse or nodular type; (2) rheumatoid myopathy with preferential involvement of Type II fibers; (3) neurogenic atrophy; and (4) rheumatoid vasculitis. The morphological, histochemical, and ultrastructural findings will be presented and their significance discussed.

VINOD SAHGAL, M.D., Assistant Professor, Departments of Neurology and Rehabilitation Medicine, Northwestern University Medical School, Chicago

HENRY B. BETTS, M.D., Professor and Chairman, Department of Rehabilitation Medicine, Northwestern University Medical School; Vice President and Medical Director, Rehabilitation Institute of Chicago, Northwestern University, Chicago

3:30

The Value of LDH Isoenzymes in Collagen Diseases

Serum lactic dehydrogenase isoenzymes were determined by Agar Gel electrophoresis on 25 patients with rheumatoid arthritis, dermatomyositis, scleroderma and systemic lupus erythematosus. LD-3 isoenzyme was $32.27 \pm 6.97\%$ in patients with connective tissue disorders in contrast to $20.4 \pm 3\%$ in normal controls. Six patients who had positive rheumatoid factor showed higher LD-3 levels. There were also some correlations between the activity of the disease and serum LD-3 level in patients with connective tissue disorders. These findings indicate that the determination of LDH isoenzyme is valuable in the diagnosis and treatment of connective tissue disorders.

A. TURKYILMAZ OZEL, M.D., M.S., University of Minnesota, Department of PM&R, Minneapolis

LLOYD FISH, M.D., University of Minnesota, Department of PM&R, Minneapolis

GUIRGUIS IBRAHIM, PH.D., University of Minnesota, Department of PM&R, Minneapolis

Sunday P.M.

ESSAM A. AWAD, M.D., PH.D., University of Minnesota, Department of PM&R, Minneapolis

4:10

Ectopic Ossification Associated With Neurological Lesions

Ectopic ossification (EO) has been described under many headings in the literature and a number of hypotheses have been put forward to explain the etiology of new bone formation in patients with neurological lesions. The treatment is as controversial as its etiology and to date there is no known method of preventing or stopping the bone formation once the process has started. Over a period of 5½ years (July 1970 to December 1975) 150 patients with acute traumatic lesions of spinal cord were admitted at the UCD-Sacramento Medical Center. Forty percent of these patients developed ectopic bone below the level of neurological lesion, very often bilaterally. Edema, local rise of temperature, erythema, and restriction of motion at the hip and knee joints were the most common clinical findings. Serum alkaline phosphatase and sedimentation were found to be elevated on serial studies. On several occasions increased uptake was noted on diphosphonate radionuclide scan even before the radiographic abnormalities during the acute stage. This paper focuses on clinical features, radiographic abnormalities, and problems in early diagnosis and management of patients with EO. Aetiopathogenesis is also discussed.

L. S. KEWALRAMANI, M.B.B.S., M.S., UCD-Sacramento Medical Center, Sacramento, CA

4:30

Hepatic Porphyria: Its Evaluation and Rehabilitative Treatment

Hepatic porphyria is a group of inherited metabolic disorders. Patients with this type of disease often present with abdominal pain, psychiatric difficulties, skin lesions, or neuropathy. Two patients are reviewed with hepatic porphyria. One patient had acute intermittent porphyria, the other porphyria cutanea tarda. These two people also had past histories of episodic abdominal discomfort and psychiatric difficulties. One patient entered with quadraparesis. The other patient who also had anemia and a myeloproliferative disorder, entered after bilateral strokes and spastic quadraparesis. Both patients had electrodiagnostic and electromyographic evaluations. Both patients had unremarkable nerve conduction values for their upper extremities, but mild bilateral neuropathies of the distal portions of the posterior tibial, peroneal, and sural nerves. These patients responded very well to a vigorous rehabilitation team approach so that they were independent in ADL and were ambulatory by discharge. The details of the rehabilitation therapy as applied to these patients are discussed, and the implications are evaluated. The rehabilitative effort of patients with hepatic porphyria must overcome a diagnostic challenge as well as the obstacles of physical and psychiatric disabilities. Genetic counseling is an important part of this rehabilitative effort.

CHARANJIT S. DHILLON, M.D., Rehabilitation Institute of Chicago, Chicago

PAUL E. KAPLAN, M.D., Rehabilitation Institute of Chicago Chicago

4:50

Malignant Hyperpyrexia and Neuromuscular Disorders

As physiatrists, we see many patients who present with weakness and musculoskeletal anomalies. The possibility exists that these patients have a basic neuromuscular disorder and may have the propensity to develop malignant hyperpyrexia (MH) when subjected to skeletal muscle relaxants and/or potent inhalation anesthetics. The clinical, hereditary, probable pathogenesis and treatment of this syndrome is discussed. Our experience with several patients shows the complexity of the problem focusing on the need for a good pre-operative family history of anesthetic complications, and the value

of muscle enzymes and in vitro studies in patients who may be at risk for malignant hyperpyrexia.

GLORIA D. ENG, M.D., Chief, Department of PM&R, Children's Hospital National Medical Center; Professor, Departments of Child Health and Development and Medicine, George Washington University Medical Center, Washington, DC

5:10 **Pituitary-Gonadal Axis Dysfunction in Spinal Cord Injury**

In order to examine the pituitary-gonadal axis in spinal cord injured subjects, serum concentrations of luteinizing hormone (LH) and testosterone were determined. In 10 paraplegic and 10 quadriplegic subjects with complete neurologic lesions of the spinal cord, weekly blood samples were collected for a period of four months following the date of injury. All were in-patient, male subjects, ranging in age from 19 to 40 years (mean = 25 years). In paraplegic subjects, serum LH levels were significantly lower than those in the age-matched, normal controls from the date of onset until four weeks after the injury. Testosterone concentrations were below normal levels for six weeks following spinal cord trauma. Following the above periods of time, serum concentrations of both hormones were not significantly different from those of the controls. By contrast, in quadriplegic subjects serum LH and testosterone concentrations remained significantly lower than those of the controls during the entire four month testing period. The results suggest that there is a disturbance in the pituitary-gonadal axis in the spinal cord injured patient and that this is more sustained in the high level injury.

N. ERIC NAFTCHI, PH.D., Laboratory of Biochemistry Pharmacology, Institute of Rehabilitation Medicine, New York University Medical Center, New York

ANNA T. VIAU, PH.D., Laboratory of Biochemistry Pharmacology, Institute of Rehabilitation Medicine, New York University Medical Center, New York

G. HEINER SELL, M.D., Institute of Rehabilitation Medicine, New York University Medical Center, New York

EDWARD W. LOWMAN, M.D., Professor of Rehabilitation Medicine, New York University School of Medicine; Clinical Director, Institute of Rehabilitation Medicine, New York

4:15- 5:00 ☆ **SESSION 18—Golden West Room**

Seminar on Cancer Rehabilitation

MYRON M. LA BAN, M.D., Division of PM&R, William Beaumont Hospital, Royal Oak, MI

RONALD S. TAYLOR, M.D., Division of PM&R, William Beaumont Hospital, Royal Oak, MI

KAREN S. JOHNSTONE, R.P.T., Division of PM&R, William Beaumont Hospital, Royal Oak, MI

The remote and near affects of neoplasia associated with the clinical syndromes of hemiplegia, paraplegia, myopathy and neuropathy, remain a continued challenge to the disgnostic treatment skills of the rehabilitation team. Progressive disease may require constant alterations in rehabilitation goals with the "staging" of functional levels of self-care and locomotion, subject to frequent re-evaluation. The myriad of neuromuscular symptomatic manifestations of specific "common" neoplasms including those of progressive pain and weakness, as identified clinically and electromyographically,

Sunday P.M.

will be discussed as they relate to the rehabilitation process. Included, will be a brief physiological review of pain and a discussion of newer methods of control.

Chairman—

BENIGNO FERNANDEZ, M.D., Rio Piedras, P.R.

Co-Chairman—

ADRIAN C. KANAAR, M.D., Poughkeepsie, NY

Monday A.M.

Monday, November 8

7:00- 8:30 **BREAKFASTS: DISCUSSION GROUPS**

SESSION 19—Council Room

Functional Assessment: A Strategy for Its Inclusion in Clinical Rehabilitation

CARL V. GRANGER, M.D., Professor and Chairman, Department of PM&R, Tufts University Medical Center, Boston, MA

Functional assessment is the key method for evaluating the need for and the subsequent benefits from medical rehabilitation services. It forms the basis for a common language between team members. To facilitate measurement status and change in status over time, certain numerical scores have been incorporated. These are the Barthel Index and the PULSES and ESCROW Profiles. By using specifically designed formats the method has been adopted for screening prior to admission, for admission assessment, for early discharge planning, for team conference assessment and for discharge and followup assessments.

SESSION 20—Chamber Room

Malpractice: Current and Future Projection

WALTER J. TREANOR, M.D., Chief of Physical Medicine, St. Mary's Hospital, San Francisco, CA

SESSION 21—Cabinet Room

Prediction of Outcome of Stroke Patients

THOMAS P. ANDERSON, M.D., Associate Professor, Department of PM&R, University of Minnesota School of Medicine, Minneapolis, MN

Among the questions which can be considered are: Are there any predictors on the outcomes of stroke which are statistically significant? What are some of the factors which can serve as hints or indicators of poor or negative outcomes of stroke?—of good or positive outcomes? Have cost benefit studies adequately proven the long term benefits of stroke rehabilitation? What factors are involved in patients' maintaining the gains made in stroke rehabilitation?

SESSION 22—Forum Room

Management of Soft Tissue Injuries to the Neck

SAM C. COLACHIS, JR., M.D., Director of PM&R, St. Luke's Hospital Medical Center, Phoenix, AZ

One of the most common neuromuscular disorders seen in clinical practice is that relating to the hyperextension—flexion injuries of the neck. The important aspect is to restore lost motion and insure normal function as soon as possible. A discussion regarding the early management of soft tissue injuries of the neck will be in an informal setting. The use of various muscle relaxants as well as pain medications will be discussed and also the treatment for various diagnostic entities related to this type of injury.

SESSION 23—Senate Room

Athletic Injuries: Role of the Physiatrist

VOJIN N. SMODLAKA M.D., Director of Rehabilitation Medicine, Methodist Hospital of Brooklyn, Brooklyn, NY

All athletic injuries require physical therapy and rehabilitation. Few require surgical treatment or drug therapy. Rehabilitation begins immediately and ends when the

Monday A.M.

athlete is ready for competition. The physiatrist and his associates—physical and occupational therapists—are best equipped to treat these patients. We have to develop the best methods of conservative treatment and reconditioning of athletic injuries. The physiatrist should be involved in the movement of physical education, sports and recreation to help the members of these organizations when injured.

SESSION 24—Committee Room

Hand Injuries: Role of the Physiatrist

YASOMA CHALLENGER, M.D., Director, Electrodiagnosis Unit, Department of Neurology, Harlem Hospital Center; Director, Department of Rehabilitation Medicine, Blythedale Children's Hospital; Associate Professor Clinical Rehabilitation Medicine, Columbia College of Physicians and Surgeons, New York, NY

When the physiatrist acts as liaison to Orthopedic or Plastic Surgery Hand Clinics, the definitions of and solutions for problems encountered become a joint enterprise. If the physiatrist sees patients at the same time that the surgeon does in a follow up clinic, a joint understanding of typical problems can be reached: "How early is an early referral?; What is the role of the physiatrist in preoperative therapy and particularly in preoperative counselling?; What is the role of the physiatrist in surgical resident education?; What are the typical hand injury problems encountered, and what plans of management foster both surgical and rehabilitation goals?" Exploration of these questions will highlight some suggested approaches for achieving surgeon/physiatrist rapport.

8:30-10:00 ☆ SESSION 25—California Room

Evaluation and Management of Low Back Pain Syndromes

RENE CAILLIET, M.D., Professor and Chairman, Department of Rehabilitation Medicine, University of Southern California School of Medicine, Los Angeles, CA

Evaluation and management of low back pain syndromes will be a pertinent review of functional anatomy and the neurophysiological aspects of all the tissues involved in low back pain. The anatomy, physiology and chemistry relative to the lumbosacral spine will be emphasized as well as the epidemiology of low back pain syndromes. Proper static and kinetic low back biomechanics will be evaluated and the treatment of the acute and chronic phase of low back will be fully evaluated in regards to physical medicine modalities, medication, surgical aspects of management and other modalities such as epidural blocks, nerve blocks, facet injections and transcutaneous electric stimulation as indicated. The summarization will be that of all the etiological factors and their therapeutic interventions, and more important, prevention of recurrences.

Chairman—

PAUL A. NELSON, M.D., Cleveland, OH

Co-Chairman—

WILLIAM C. FLEMING, M.D., Birmingham, AL

10:00-10:30 Coffee Break

8:30- 9:15 ☆ SESSION 26—Golden West Room

Head Injury Rehabilitation: State of the Art

RICHARD A. MC ELWAIN, M.D., Resident in Neurology, The Medical College of Wisconsin, Milwaukee, WI

Monday A.M.

JOAN WILDERMAN, R.N., Department of Rehabilitation Medicine, Santa Clara Valley Medical Center, San Jose, CA

Rehabilitation of the severely head injured is complex, challenging, and offers immense satisfaction. Active commitment of the neurologically oriented physiatrist produces immediate inquiry at the frontiers of neurological science. Clarity of rehabilitation approach is gained through re-examination of many basic principles and habits of rehabilitation health care delivery. The application of these principles to head injury, in the general rehabilitation center setting, will be discussed. The pathology and course of recovery are unique and varied. The concept of "coma" will be re-examined. Research needs and techniques will be suggested.

Chairman—

HENRY H. STONNINGTON, M.D., Rochester, MN

Co-Chairman—

RICHARD A. SULLIVAN, M.D., West Orange, NJ

9:15-10:00 ☆ SESSION 27—Golden West Room

Evaluation of the Handicapped Driver

WILLIAM D. DE GRAVELLES, JR., M.D., Director of PM&R, Younker Memorial Rehabilitation Center, Des Moines, IA
LEROY ROTSCHAFER, B.S., M.S., Instructor for the Handicapped, Des Moines Public Schools, Des Moines, IA

Presentation will consist of methods of evaluating a handicapped person for driver training at the Younker Memorial Rehabilitation Center, Des Moines, Iowa, by both medical and paramedical staff. Discussed will be medical evaluation, evaluations for special equipment and evaluation of the student driver in the instructional phase (and on the road especially). Evaluation forms used will be available.

Chairman—

HENRY H. STONNINGTON, M.D., Rochester, MN

Co-Chairman—

RICHARD A. SULLIVAN, M.D., West Orange, NJ

10:00-10:30 Coffee Break

10:30-11:15 ☆ SESSION 28—California Room

Radiology of the Back

GERALD M. MC DONNELL, M.D., Director, Department of Radiology, Good Samaritan Hospital, Los Angeles, CA

The presentation will include the radiographic anatomy of the normal and abnormal back in specific clinical problems. It will be emphasized that the radiographic procedure does not replace the careful examination and evaluation of the back but rather supplements the patient evaluation. Special techniques of examining the back in clinical abnormality will be covered, and there will be a brief reference to myelography and its relationship to the back problem.

Chairman—

RENE CAILLIET, M.D., Los Angeles, CA

Co-Chairman—

EDWARD F. DELAGI, M.D., Bronx, NY

10:30-12:00 ☆ SESSION 29—Council/Chamber Room

Monday A.M.

A Review of the Reaction of Skeletal Muscle to Physiological and Pathological Factors

WILLIAM M. FOWLER, JR., M.D., Professor and Chairman,
Department of PM&R, University of California, Davis School
of Medicine, Davis, CA

Skeletal muscle is affected by normal physiological as well as pathological factors. The former includes adaptations to maturation, nutritional requirements, hormonal influences and exercise training. A general knowledge of these adaptations is desirable since some of the pathologic responses appear to be either due to deficiencies in these otherwise normal factors or are modifications by them. The differential diagnosis of muscle disorders is primarily concerned with weakness or fatigue, cramps or stiffness, and pain. Muscle can be affected by a multitude of disorders, primary and secondary, many of which are extremely rare. In an attempt to immediately identify a disease, the inexperienced physician can easily get "lost among the trees." If, however, clinical and laboratory findings are grouped according to the predominant clinical finding and placed in their appropriate motor unit compartment, the physician will soon learn that only a few disorders exist for each part of the motor unit. Moreover, each disorder usually has a specific pattern as to time of onset, progression, distribution of weakness and age prevalence. When this information is available, it is then relatively easy to arrive at a diagnosis.

Chairman—

JOHN F. DITUNNO, JR., M.D., Philadelphia, PA

Co-Chairman

JESSIE K. M. EASTON, M.D., Minneapolis, MN

11:15-12:00 ☆ SESSION 30—California Room

Electromyography and Low Back Pain

ERNEST W. JOHNSON, M.D., Professor and Chairman, Department of Physical Medicine, College of Medicine, The Ohio State University, Columbus, OH

HAROLD F. WEINGARDEN, M.D., Assistant Resident, Department of Physical Medicine, College of Medicine, The Ohio State University, Columbus, OH

Electromyography can clarify the causes of low back pain by identifying the precise roots involved. By early and serial examinations, electromyography can assist in prognosis, and thus management, of this common clinical problem. The sequence of electromyographic abnormalities begin with insult to the nerve root as a reduction in number of MUP. After three days, an evoked muscle action potential will identify neurapraxic weakness, and by seven to ten days, positive waves will appear in the paraspinal muscles.

Chairman—

RENE CAILLIET, M.D., Los Angeles, CA

Co-Chairman—

EDWARD F. DELAGI, M.D., Bronx, NY

12:15- 2:15 ACADEMY ZEITER LECTURE LUNCHEON—
Golden West Room

Lecturer—

ERNEST W. JOHNSON, M.D., Professor and Chairman, Department of Physical Medicine, College of Medicine, The Ohio State University, Columbus, Ohio

2:25- 4:05 SCIENTIFIC PAPER SESSIONS
SESSION 31—Cabinet Room

Chairman—

ESSAM A. AWAD, M.D., PH.D., Minneapolis

Co-Chairman—

DOROTHEA D. GLASS, M.D., Philadelphia

2:25 **Exercise-Induced Pathology in Rat Skeletal Muscle**

Five groups of adult albino rats were heavily trained for either an endurance or a strengthening exercise program over a period of 6 weeks to observe the possible, if any, pathologic effects of the stress of exercise in skeletal muscles. The endurance exercises were: (1) *ad lib* running in non-motorized wheels for 16 hrs./day; and (2) treadmill running at 7% grade and a speed of 6.8 meters/min. The strengthening exercises were: (1) weight lifting on a 50° incline ladder, 25 times/day; (2) weight lifting on a treadmill at 35% grade and a speed of 6.8 meters/min.; and (3) isometric climbing in a cylindrical cage. All the experimental groups and a sedentary control were evaluated for the heart, muscle and adrenal weights; the concentration of the sarcoplasmic (SP) and myofibrillar proteins (MP) in the gastrocnemius; and the histochemical activities of myosin ATPase, at pH10.4 and 4.3, succinic dehydrogenase and phosphorylase in the soleus muscles. Of all the groups studied, only *ad lib* and treadmill running and weight lifting produced the consistent histologic evidence of fiber splitting, necrosis, targetoid cells and fiber degeneration. There was no relationship of the exercise induced pathology to cardiac or muscle hypertrophy. No significant increases were witnessed either in the histochemical activities of the enzymes or the concentration of SP. However, the concentration of MP decreased significantly (22%; $P < .01$) in the *ad lib* runners compared to the control group. All three groups showing pathology had increased adrenal weights (18 to 59% over control). It is concluded that the stress of over exercise may disturb the hormone balance which, consequently, might lead to pathologic changes in the muscle fibers.

M. MAZHER JAWEED, M.S., Research Associate, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia

GERALD J. HERBISON, M.D., Associate Professor, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia

JOHN F. DITUNNO, M.D., Professor and Chairman, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia

2:45 **Contractile Properties of Fast and Slow Skeletal Muscles:
Effect of Denervation and Synergistic Tenotomy**

In vitro measurement of muscle contractility was performed on the fast plantaris (PLT) and slow soleus (SOL) muscles to evaluate changes that occur as a result of denervation (DEN) or hypertrophy produced by synergistic tenotomy (TEN) in mice. Mice used were healthy mice of the C57NAB strain, ages 15 to 17 weeks. Control (CON) studies were performed on 25 non-operated mice. Effect of DEN was studied on preparations from 24 mice and effect of TEN on preparations from 23 mice. The

Monday P.M.

preparations were studied at 1, 2 and 3 weeks post surgery. Muscle weight in DEN mice decreased to $< 75\%$ of CON by one week and reached $< 50\%$ of CON values at 3 weeks post surgery. Muscle weight increased in the TEN group to $> 125\%$ of CON at one week and $> 149\%$ for SOL at 3 weeks. PLT did not maintain the increase and at 3 weeks was only 115% of CON. Regression lines calculated for muscle tension as a function of muscle cross-sectional area demonstrate a significance of < 0.001 with a correlation coefficient > 0.9 for SOL and > 0.7 for PLT in muscles inactivated by denervation. The correlation coefficients were significantly less for normal and hypertrophied muscles, suggesting that a "direct" relationship between tension and muscle cross-sectional area exists only when the muscle is inactive. DEN muscles also demonstrated an increased sensitivity to curare which was not observed in CON or TEN muscles.

ROBERT G. TAYLOR, M.D., Associate Professor, UCD-Sacramento Medical Center, Department of PM&R, Sacramento, CA

WILLIAM M. FOWLER, JR., M.D., Professor and Chairman, University of California, Department of PM&R, Davis, CA

3:05

Acute Denervation Atrophy of Muscle Fibers in Red and White Regions of Rat Plantaris

In contrast to generally held opinion that the type I (slow twitch) and type II (fast twitch) skeletal muscle fibers respond differently to denervation, this report will attempt to critically evaluate the discrepancies and establish that the reaction of these two fibers in a homogeneous muscle or muscle region is similar. In two groups ($n = 8$) of adult Wistar rats the sciatic nerve was bisected unilaterally at the sciatic notch and the animals were sacrificed at one and two weeks post-cut. The plantaris, a fast muscle, from the experimental and the contra-lateral control side was evaluated for the muscle weights, fiber diameter and for the histochemical activities of myosin ATPase, at pH9.4, in the "red" (deep, oxidative) and "white" (superficial, glycolytic) regions. The muscle atrophy at one and two weeks was 29% and 40% respectively. Whereas the quantitative atrophy of the type I and type II fibers was similar at one week (10% and 14% respectively) and two weeks (23% and 21%) post-cut in the "red" region, the two fibers varied significantly in their reaction to acute denervation in the "white" region: the type I fiber atrophy was 12% and 21% ($t < .05$) and the type II fiber atrophy was 21% and 25% at one and two weeks post-cut, respectively. It is concluded that quantitatively the atrophy of type I (slow twitch) and type II (fast twitch) fibers during acute denervation is similar in functionally different muscle(s) or muscle regions. A different response of the type I fibers in a heterogeneous muscle, such as plantaris in this study confirms our previous report conclusions that there might be two sub-types of these fibers.

M. MAZHER JAWEED, M.S., Research Associate, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia

GERALD J. HERBISON, M.D., Associate Professor, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia

JOHN F. DITUNNO, M.D., Professor and Chairman, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia

3:25

The Effect of Exercise on Reinnervating Rat Muscle

This study is a continuation of work designed to evaluate the effect of exercise training on the cytoarchitecture and biochemistry and physiology of rat muscle. The sciatic nerves of adult rats were crushed bilaterally and exercise was initiated at two weeks and

three weeks post-crush in two separate groups. Both groups were sacrificed at six weeks post-crush and data were analyzed and compared with the controls for muscle weight, histochemistry, proteins, and electromyography. There was no significant difference between the control and experimental groups in comparing muscle weights and fiber diameters in the soleus and plantaris muscles. The concentration of sarcoplasmic protein in the group exercised between three and six weeks post-crush was significantly less, and the rate of synthesis of myofibrillar protein (C-14 uptake) was significantly greater than control values at six weeks post-crush. Half of the rats in the exercise groups demonstrated high frequency discharges occurring at a rate of from 20 to 50 per second. The potentials varied in amplitude from 30 to 100 microvolts, and their duration was between 4 and 8 milliseconds. These potentials were not found in the control reinnervating group. In summary, exercise initiated at 3 weeks post-crush facilitated the synthesis of myofibrillar proteins and activity induced during the reinnervation phase appeared to stimulate the development of high frequency discharges.

GERALD J. HERBISON, M.D., Associate Professor, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia

M. MAZHER JAWIED, M.S., Research Associate, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia

JOHN F. DITUNNO, M.D., Professor and Chairman, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia

3:45 **Myofibrillar Changes in Rat Skeletal Muscle after Various Types of Exercises**

A large body of knowledge has accumulated showing increased aerobic capacity of mammalian skeletal muscle after prolonged and high-speed treadmill running. Response of myofibrillar protein (MP) has received scant attention. This neglect needs correction as strength is as important a quality of muscle as endurance. We investigated MP concentration in quadriceps and gastrocnemii of different groups of rats subjected to four exercise programs with the following results: swimming and self-regulated wheel running (low force, endurance) unchanged and reduced ($P = 0.01$) respectively; weight lifting (high force), increased ($P = 0.01$); treadmill running (high force plus endurance), increased ($P = 0.05$). Since exercised muscle weights were equal to controls, MP concentration represents absolute changes. According to Wolfe's Law strength is proportional to muscle cross-sectional area, or better, area of myofibrils. It is suggested, therefore, that exercises do not uniformly affect strength. Short (weight lifting) or prolonged bouts (treadmill running) of high force activity augment MP. Low force, high repetitive exercises have the reverse effect or none at all. Clinical practice recognizes the need for high intensity, forceful component to improve strength. Physiological data are needed to confirm these biochemical findings.

EDWARD E. GORDON, M.D., Director, Department of Rehabilitation Medicine, Alexian Brothers Medical Center, Elk Grove Village, IL

KAZIMIERZ KOWALSKI, M.S., Research Biochemist, Michael Reese Medical Center, Chicago

SESSION 32—Forum Room

Chairman—

ARTHUR E. GRANT, M.D., San Antonio

Co-Chairman—

ALFRED EBEL, M.D., Tarrytown, NY

Monday P.M.

2:25 A Psychological Study of Patients with Chronic Obstructive Pulmonary Disease (COPD)

In an effort to study systematically psychological aspects of patients with chronic obstructive pulmonary disease (COPD, emphysema), the Minnesota Multiphasic Personality Inventory (MMPI) was administered to 32 patients (30 male, 2 female) under treatment for chronic obstructive pulmonary disease; the results were then tabulated, and a composite MMPI profile prepared. The only elevated scales were for Hs (Scale 1, Hypochondriasis) and D (Scale 2, Depression). No statistically significant differences between the elevated scales for these subgroups were observed. Some of the implications of these findings were discussed, particularly concerning their relationship to commonly-held beliefs about the psychological adjustment of patients with COPD, and several practical suggestions are made regarding more effective psychological and medical management of these patients.

DANIEL P. GREENFIELD, M.D., M.P.H., Department of Psychiatry, Boston University School of Medicine, Boston

2:45 Correction of Abdominal-Thoracic Discoordination by Breathing Retraining

Coordination between abdominal and thoracic movements during breathing was evaluated in 10 normal subjects and 20 patients with chronic obstructive lung disease by magnetometers. Antero-posterior (A/P) abdominal and lateral thoracic movements during inspiration at rest and immediately after exercise. At rest, 20% of patients had significant abdominal phase lag; this increased to 30% with exercise. Lateral incoordination was present in 30% of patients; this decreased slightly with exercise. Normal subjects did not manifest either lateral thoracic or abdominal phase lag. As part of a breathing retraining program, patients were taught to coordinate abdominal and thoracic movements. Abdominal but not lateral phase lag soon disappeared and has not reappeared during a 6-month followup in those patients originally manifesting abdominal phase lag. Concurrently, exercise tolerance increased considerably. Lateral thoracic phase lag is probably caused by airways obstruction and hyperinflation while abdominal phase lag is probably due to acquired and self-defeating breathing habits which may be corrected by retraining.

A. F. WILSON, M.D., PH.D., Departments of Medicine and PM&R, University of California, Irvine, CA

L. JAASKO, M.D., Departments of Medicine and PM&R, University of California, Irvine, CA

JEROME S. TOBIS, M.D., Departments of Medicine and PM&R, University of California, Irvine, CA

3:05 Mechanical Ventilation in Late-Stage Duchenne Dystrophy

Death in late-stage Duchenne muscular dystrophy is most frequently a consequence of respiratory failure; i.e., terminal pneumonia or CO₂ retention. Since muscles of ventilation become weakened in the late stages of MD, the bellows mechanism fails insidiously. Patients exhibit all the symptoms of ventilation insufficiency, first those associated with CO₂ retention—dyspnea, nightmares, increased heart rate, and increased blood pressure. Fourteen patients with late-stage Duchenne muscular dystrophy have been supplied with mechanical aid for ventilation assistance. Longest survival on such aid has been seven years. With a caring family, these young men can have a meaningful life, though requiring continuous ventilation aid. Fourteen years of age was the earliest in our group of patients. Ventilation aids included positive pressure by mouth, rocking bed, plastic wrap, and specially molded cuirass respiration. Volume respiration via tracheostomy is not an optimal aid for a youngster who wishes to move about in a wheelchair. Several illustrative cases are reported in detail.

Monday P.M.

ERNEST W. JOHNSON, M.D., Professor and Chairman, Department of Physical Medicine, The Ohio State University, Columbus, OH

MICHAEL ALEXANDER, M.D., Chief Resident, Department of Physical Medicine, The Ohio State University, Columbus, OH

JOHN PETTY, M.D., Resident, Department of Physical Medicine, The Ohio State University, Columbus, OH

DONNA STAUCH, R.N., Department of Physical Medicine, The Ohio State University, Columbus, OH

3:25 **The Latissimus Dorsi Syndrome: A Source of Mid-Back Pain**

Pain and tenderness referred from the latissimus dorsi muscle to a region under the inferior angle of scapula of the same side has rarely been described, and is a common but seldom recognized source of mid-back pain. Deep aching pain usually extends somewhat downward across the chest and may be felt in the posterior aspect of the arm, and in severe cases in the hand. On examination, shoulder flexion is slightly restricted. The most common trigger points are found high in the posterior axillary fold, and are confirmed by exquisite tenderness in a ropy muscle, a "jump" sign, and reproduction of the referred pain pattern. In symptom-free subjects, injection of hypertonic saline into the latissimus dorsi muscle at the usual location of these trigger points elicited referred pain and tenderness in similar patterns. Patients with this syndrome were managed with stretch and spray and/or injection of ½ % procaine into the trigger points. Mechanical, metabolic and nutritional perpetuating factors were identified and corrected. In summary, trigger points and irritating saline in the latissimus dorsi muscle consistently produced similar patterns of referred pain. These trigger points respond to the usual treatment of a myofascial pain syndrome.

DAVID G. SIMONS, M.D., Associate Professor, Departments of Medicine and PM&R, University of California, Irvine, CA

JANET G. TRAVELL, M.D., Emeritus Clinical Professor of Medicine, George Washington University School of Medicine, Washington, DC

3:45 **The Quadratus Lumborum Muscle: An Overlooked Cause of Low Back Pain**

Clinical observations show that this flexor-rotator muscle of low back is often strained in diagonal lifting efforts. Ensuing trigger points in medial part of quadratus lumborum muscle refer pain to sacroiliac and mid-buttock regions; from lateral part pain is referred mainly to greater trochanter, groin and thigh. Deep tenderness appears in pain reference zones. Since muscle originates on twelfth rib, its contraction on coughing or sneezing may cause referred pain. Examination discloses list of pelvis, loss of lumbar lordosis, and pain on extending spine. Point tenderness in muscle is missed unless patient is positioned, lying on opposite side, to separate twelfth rib and iliac crest and taughen muscle. During this passive stretch, vapocoolant Fluori-Methane Spray is applied by a specific technic. If trigger points were not thus extinguished, precise procaine injection may be effective. Management of this "pseudo-disc syndrome" includes correction of reactivating factors: (1) postural and structural stresses, especially pelvic tilt with compensatory scoliosis due to disparity in leg length on standing and similarly, to pelvic asymmetry when sitting; (2) systemic factors of chronic infection, metabolic disorders, vitamin and other nutritional deficiencies, and emotional stress. Long term complete recovery occurred in those patients who learned to take preventive care of their muscles.

Monday P.M.

JANET G. TRAVELL, M.D., Emeritus Clinical Professor of Medicine, George Washington University School of Medicine, Washington, DC

SESSION 33—Senate Room

Chairman—

JAMES R. SWENSON, M.D., Salt Lake City

Co-Chairman—

FRANCIS NASO, M.D., Philadelphia

2:25

Intermittent Catheterization: A Four-Year Follow-up

The method of intermittent catheterization was first introduced as a method of bladder rehabilitation by Guttman in England shortly after World War II. Despite his impressive follow-up data, the technique was slow to catch on in the United States. A modified version of Guttman's originally described non-touch technique was begun on spinal cord injured patients in 1972 at University Hospitals in Columbus, Ohio. This study is a retrospective evaluation of 135 patients selected at random from the spinal cord injured patients who either received their initial rehabilitation at our institution between 1972 and 1973 or were re-admitted then for the purpose of catheter removal. Catheterization was carried out by nurses using a non-touch technique; however, they were not surgically scrubbed or gowned. Patients who were able were taught to catheterize themselves by the same technique. One hundred of the patients (74%) underwent intermittent catheterization for catheter removal. All patients had had indwelling Foley catheters from one month to ten years before beginning intermittent catheterization. Of the 35 patients for whom the decision was made not to remove the catheter, 50% were females. All of the catheter-free patients were males. After three to four years of follow-up, 63% were still catheter-free without complication, 21% had failed, and 16% were lost to follow-up. The complications and reasons for failure are discussed.

STANLEY K. YARNELL, M.D., Resident, Department of Physical Medicine, The Ohio State University, Columbus, OH

NICHOLAS S. CHECKLES, M.D., Associate Professor, Department of Physical Medicine, The Ohio State University, Columbus, OH

2:45

Effect of Dantrolene Sodium on Voiding Function in Spinal Cord Injured Patients with Detrusor-Sphincter Dyssynergia

Five male patients with complete transverse traumatic myelopathies at levels from C5 to T10 and with abnormal voiding function due to dyssynergia between the detrusor and the spastic pelvic floor participated in an open label study with dantrolene sodium. Voiding function was evaluated by means of excretory cystometry and simultaneous recording of the electrical activity of the rectal sphincter. Amounts of voided and residual urines were measured, heart rate and blood pressure were recorded periodically. The drug produced in all patients a moderate to significant decrease in the activity of the sphincter during detrusor contractions. The most severely spastic patients required the greatest dosage of dantrolene sodium. Side effects were minor and did not interfere with treatment. With the use of assistive voiding technique all patients showed decrease in residual urines.

MATEI S. ROUSSAN, M.D., Associate Professor, Department of Rehabilitation Medicine, The Albert Einstein College of Medicine, Bronx, NY

AVITAL FAST, M.D., Chief Resident, Department of Rehabilitation Medicine, The Albert Einstein College of Medicine, Bronx, NY

3:05 **The Cystometry and Electrophysiology of the Smooth Muscle of the Human Urinary Bladder in Healthy Patients and in Patients After Spinal Cord Injury**

Fifty consecutive patients, including five control population patients with normal bladders and 45 patients with spinal cord injuries, were evaluated with standard cystometric techniques and with electromyography of the smooth muscle of the bladder wall using techniques previously published. Of the 45 spinal cord injured patients, 26 had uninhibited hypertonic bladders, 14 had BC/AC positive hypertonic bladders, and 5 had BC/AC negative hypertonic bladders. The amplitude, duration, and frequency of the electric potentials was correlated with volume and pressure cystometric measurements. Electric activity of the external sphincter was also recorded. The electrical activity of the external sphincter was reciprocal with that of the detrusor muscle with all patients except those with high external sphincter pressures. In these last patients, electrical activity of the detrusor muscle increased but remained high throughout the evaluation. In hypertonic and normal bladders pressure and volume changes directly correlated with amplitude and frequency and inversely with duration, P less than 0.01. In BC+ or BC- hypertonic bladder pressure and volume directly correlated with amplitude and frequency, P less than 0.01. Duration correlated inversely with volume, P less than 0.01, but did not correlate with pressure. The mean volume, pressure, amplitude, duration and frequency were different for the four different groups of patients. Bladder EMG may be used to quantify the amount of spasticity in upper motor neuron bladders. AC/BC negative, hypertonic bladders have the least amount of electrical activity and may be considered negative control bladders. It is proposed that these electric potentials recorded in the smooth muscle wall are being produced by post-ganglionic neurons terminating in the detrusor muscle.

PAUL E. KAPLAN, M.D., Rehabilitation Institute of Chicago, Chicago

JOHN B. NANNINGA, M.D., Rehabilitation Institute of Chicago, Chicago

S. LAL, M.D., Rehabilitation Institute of Chicago, Chicago

3:25 **Acute Oliguric Renal Failure Following Cystography in Spinal Cord Injury**

An unusual complication, hitherto unreported, after cystographic examination using contrast media, was encountered, in a spinal cord injured patient. This complication of acute oliguric renal failure following cystography in a 26-year-old quadriplegic is presented. Altered renal function, biochemical manifestations, management of the complication by diuretic and fluid regulation will be detailed. In addition, a review of the literature on the complications due to radiocontrast media is presented.

KAGGAL V. UMAKANTHA, M.D., Resident, Northwestern University Medical School, Rehabilitation Institute of Chicago, Chicago

JOEL S. ROSEN, M.D., Assistant Professor, Northwestern University Medical School; Assistant Medical Director, Rehabilitation Institute of Chicago, Chicago

HENRY B. BETTS, M.D., Professor and Chairman, Rehabilitation Medicine, Northwestern University Medical School, Rehabilitation Institute of Chicago, Chicago

Monday P.M.

3:45

Anal Sphincter Relaxation: A Non-invasive Technique to Overcome Dyssynergia: Its Extension to Include Treatment of Quadriplegics

Intermittent catheterization has become a well-accepted method of management of the neurogenic bladder following spinal cord injury. Frequently, bladder emptying fails to reach an acceptable residual urine volume due to bladder-external sphincter dyssynergia. In recent years, much attention has been given to this problem and treatments advocated include antispasticity medication, external sphincterotomy and in some cases, selective neurolysis with phenol or alcohol. We have recently reported success in overcoming the problems of dyssynergia in some patients utilizing a technique called anal sphincter relaxation in which relaxation of the external urethral sphincter is produced by relaxing the external anal sphincter by sustained distention or stretch of this muscle. This has lessened the need for other measures listed above and surprisingly has met with good patient acceptance. Although we have encountered quadriplegics who might have benefited from this technique, until now we could not employ it due to the hand intrinsic muscle function required for the patient to perform it independently. We have updated our results for patients utilizing this technique and present a device which has enabled two C-7 quadriplegics to achieve satisfactory bladder emptying. Two case histories are presented.

WILLIAM H. DONOVAN, M.D., Department of Rehabilitation Medicine, University of Washington, Seattle

DIANA E. CLOWERS, R.N., Department of Rehabilitation Medicine, University of Washington, Seattle

DIANA MACRI, O.T.R., Department of Rehabilitation Medicine, University of Washington, Seattle

MARK D. KIVIAT, M.D., Department of Urology, University of Washington, Seattle

Tuesday A.M.

Tuesday, November 9

7:00- 8:30 BREAKFASTS: DISCUSSION GROUPS

SESSION 34—Cabinet Room

Rehabilitation of Neurogenic Bladder

ANANIAS C. DIOKNO, M.D., Associate Professor, Department of Surgery, Section of Urology, University of Michigan, Ann Arbor, MI

SESSION 35—Forum Room

Evaluation and Management of Low Back Syndrome

RENE CAILLIET, M.D., Chairman and Professor, Department of Rehabilitation Medicine, University of Southern California School of Medicine, Los Angeles, CA

Evaluation and management of low back pain syndromes will be a pertinent review of functional anatomy and the neurophysiological aspects of all the tissues involved in low back pain. The anatomy, physiology and chemistry relative to the lumbosacral spine will be emphasized as well as the epidemiology of low back pain syndromes. Proper static and kinetic low back biomechanics will be evaluated and the treatment of the acute and chronic phase of low back will be fully evaluated in regards to physical medicine modalities, medication, surgical aspects of management and other modalities such as epidural blocks, nerve blocks, facet injections and transcutaneous electric stimulation as indicated. The summarization will be that of all the etiological factors and their therapeutic interventions, and more important, prevention of recurrences.

SESSION 36—Senate Room

Limitations and Precautions with Intermittent Catheterization

INDER PERKASH, M.D., Associate Professor of Surgery and Rehabilitation; Clinical Associate Professor of Urology, Stanford University School of Medicine; Chief, Spinal Cord Injury Center, Palo Alto VA Hospital, Palo Alto, CA

Technique of intermittent catheterization will be reviewed to prevent urethral trauma in difficult catheterization due to excessive pelvic floor spasticity. Limitations of intermittent catheterization in patients with severe detrusor-sphincter dyssynergia and automatic dysreflexia will be discussed. Urodynamic evaluation of patients on intermittent catheterization prone to "Silent Hydronephrosis" and vesico-ureteral reflux will be highlighted. Problems of prolonged intermittent catheterization will also be looked into and a definition of failed intermittent catheterization will be drawn.

SESSION 37—Towne Room

Operant Conditioning in Back Pain Patients

WILBERT E. FORDYCE, PH.D., Professor of Psychology, Department of Rehabilitation Medicine, University of Washington, Seattle, WA

SESSION 38—Esquire Room

Muscle Physiology and Pathology

WILLIAM M. FOWLER, JR., M.D., Professor and Chairman, Department of PM&R, University of California, Davis School of Medicine, Davis, CA

Tuesday A.M.

SESSION 39—Sunset Room

New Developments in Burn Rehabilitation

JOSEPH R. MEERSCHAERT, M.D., Department of PM&R,
William Beaumont Hospital, Royal Oak, MI

8:30-10:00 ☆ **SESSION 40—California Room**

Prosthetic Rehabilitation: Upper and Lower Extremity

"Meeting the Challenge of Partial Hand Amputations"

LEONARD F. BENDER, M.D., M.S., Vice President and Medical
Director, Rehabilitation Institute of Detroit; Professor and
Chairman, Department of PM&R, School of Medicine,
Wayne State University, Detroit, MI

The primary purpose of this seminar is to describe devices which have been fabricated for persons with partial hand amputations. We have attempted to provide both function and cosmesis to many persons with partial hand amputations and have been confronted by a variety of patterns of amputations and many different vocational and avocational needs. We have found it helpful to divide partial hand losses into four categories:

1. Transphalangeal, thumb spared.
2. Thenar, partial or complete.
3. Transmetacarpal, distal; thumb spared or involved.
4. Transmetacarpal, proximal, thumb spared or involved.

"Prosthetic Rehabilitation of the Lower Extremity Amputee"

GEORGE H. KOEPKE, M.D., Director, Department of PM&R,
St. Mary's Hospital, Saginaw, MI

The most common reasons for patients to present themselves to an amputee clinic are complaints due to errors in the alignment and fit of the lower extremity prosthesis. Although modifications of basic prosthetic components may be of functional value to some patients, they can not substitute for errors in appropriate alignment and fit. In most instances, the components of artificial legs for the child are merely scaled down versions of those given to the adult. However, consideration must be given in the prosthetic design to the potential deformity that may develop in the growing child. The increasing success in prosthetic rehabilitation is largely due to research in the application of kinesiological principles to prosthetic design. Regardless of prosthetic improvement, there are some patients who will probably never be candidates for rehabilitation with an artificial leg, therefore, it is essential for those concerned with the rehabilitation of the amputee to understand the medical, vocational and psychological problems of each patient so that the time, effort, and money spent in the rehabilitative process will achieve a practical goal.

Chairman—

HEINZ I. LIPPMANN, M.D., Bronx, NY

Co-Chairman—

ALICIA E. HASTINGS, M.D., Chevy Chase, MD

10:00-10:30 Coffee Break/Visit EXHIBITS

8:30- 9:15 ☆ **SESSION 41—Council/Chamber Room**

Decubitus Ulcers

MICHAEL KOSIAK, M.D., Assistant Professor, Department of
PM&R, University of Minnesota School of Medicine, Minne-
apolis, MN; Director, Department of PM&R, St. Paul -
Ramsey Hospital, St. Paul, MN

Tuesday A.M.

Decubital ulcers, which have afflicted mankind since the beginning of time, continue to present a major problem in patient management and rehabilitation. Though the condition presents as one of the costliest and most debilitating complications of the cord-injured and degenerative-disease patient, medicine has not as yet arrived at a common understanding of the basic etiology and pathology, much less any generally accepted means of prevention and management. The etiology and pathology of decubital ulcers will be reviewed but emphasis will be directed toward discussion of accepted methods of prevention and treatment.

Chairman—

BARRY MILLER, M.D., Ann Arbor, MI

Co-Chairman—

PHILIP E. GORDON, M.D., San Diego, CA

9:15-10:00 ☆ SESSION 42—Council/Chamber Room

Functional Outcome Assessment: An Overview

JAMES T. DEMOPOULOS, M.D., Director, Rehabilitation Medicine, Hospital for Joint Diseases, Beth Israel Medical Center; Professor of Clinical Rehabilitation Medicine, Mount Sinai School of Medicine, New York City

The complexities associated with providing comprehensive rehabilitation services mandates the development and use of precise performance-assessment systems to serve as guidelines for prescribing the appropriate restoration program in the correct physical facility. The seminar will historically review all of the presently known methods used to rate the performance of rehabilitation personnel and assess final patient outcome, ranging from simple progress notes to computer-assisted mathematical models. An extensive bibliography on the subject will be available to participants.

Chairman—

BARRY MILLER, M.D., Ann Arbor, MI

Co-Chairman—

PHILIP E. GORDON, M.D., San Diego, CA

10:00-10:30 Coffee Break/Visit EXHIBITS

10:30-12:00 ☆ SESSION 43—California Room

Rehabilitation of the Neurogenic Bladder

ANANIAS C. DIOKNO, M.D., Associate Professor, Department of Surgery, Section of Urology, University of Michigan, Ann Arbor, MI

The urinary bladder and the posterior or proximal urethra is embryologically and anatomically one unit. The functions of the urinary bladder to store and evacuate urine is made possible by the central and peripheral innervation to the intact bladder and external sphincter. Micturition is a coordinated process between detrusor contraction and periurethral striated muscle relaxation. Continence is achieved by maintenance of a higher intraurethral pressure over intravesical pressure. This is accomplished by the posterior or proximal urethra alone in non-stressful situations but with the aid of the striated pelvic musculature in the stressful situation. Neurogenic bladder is the result of injury or disease to any part of the innervation to the bladder and sphincter. The type of neurogenic bladder will depend on the location, extent and duration of the denervation. Evaluation should be performed and appropriate therapy instituted as soon as possible. Our evaluation includes intravenous urography, combined cystometry and electromyography of the external sphincter, and endoscopy. The treatment modali-

Tuesday A.M.

ties vary according to the type of bladder dysfunction. These include intermittent catheterization, voiding manipulations (reflex, Credé, Valsalva), drug therapy (cholinergic, anticholinergic, adrenergic, sympatholytic), sphincterotomy, electrical stimulation, artificial sphincter, selective denervation and urinary diversion.

Chairman—

ARTHUR S. ABRAMSON, M.D., Bronx, NY

Co-Chairman—

RAYMOND L. MILHOUS, M.D., Burlington, VT

10:30-12:10 SCIENTIFIC PAPER SESSIONS

SESSION 44—Forum Room

Chairman—

JOSEPH GOODGOLD, M.D., New York

Co-Chairman—

GLORIA D. ENG, M.D., Chevy Chase, MD

10:30 **An Analysis of Functional Status Measures in a Comprehensive Stroke Care Program**

Under a coordinated system of care in Fall River, MA, a stroke unit was organized in October 1972, with transfer arrangements made for rehabilitation in a nearby hospital unit and arrangements for follow-up by the visiting nurse after discharge from the rehabilitation unit. Functional status of patients was recorded on precoded data forms called Long-Range Evaluation Summaries. Assessments were made on admission and discharge to the stroke and rehabilitation units and at approximately 6 months after discharge from the rehabilitation unit either at home in the community or in a long-term care facility. Self-care and mobility assessment items were scored according to adaptations of the Barthel index. Over approximately 2 years, 269 patients were followed in this system. This system remains in operation. Approximately 85% of the patients had atherothrombotic brain infarctions. Results showed that from the stroke unit 48% were discharged home with a median length of stay of 2.1 weeks, 16% were transferred to the rehabilitation unit with a median length of stay of 3.8 weeks, 20% were discharged to long-term care facilities with a median length of stay of 4.4 weeks and 16% died with a median length of stay of 0.9 weeks. Seventy-one percent were age 65 years or older. Of those 75 years or over, 65 to 74 years and 38 to 64 years of age, corresponding percentages of 48%, 38% and 15% died or were transferred to nursing homes. Of admission Barthel index scores 0-10, 11-40, 41-60 and 61-100, corresponding percentages of 71%, 37%, 7% and 5% died or were transferred to nursing homes. Of patients discharged home 85% had discharge Barthel index scores of 61 or over and 86% had admission Barthel index scores of 41 or over. Patients discharged to the rehabilitation unit were generally more impaired on admission and at discharge than patients who were discharged home and they were less impaired than those discharged to long-term care facilities. Admission Barthel index range of 11 to 40 was least clear in "predicting" type of discharge. Discharge Barthel index range 41 to 60 was least clear in correlating with type of discharge. The rehabilitation unit discharged 47% to community living after a combined (acute and rehabilitation) length of stay of 9 weeks, 40% to long-term care facilities after a combined stay of 7.7 weeks and 13% returned to acute hospital care after a combined stay of 7.8 weeks. Of patients discharged home 73% had attained discharge Barthel index scores of 61 or over. The visiting nurse assessed 15 patients at home who had an average Barthel index score of 81 (12 scored 61 or over), 12 patients in long-term care facilities who had an average Barthel index score of 26 (10 scored 60 or below), 12 patients had died and 6 patients could not be traced.

CARL V. GRANGER, M.D., Tufts-New England Medical Center Hospital, Boston

Tuesday A.M.

C. C. SHERWOOD, PH.D., Tufts-New England Medical Center
Hospital, Boston

D. S. GREER, M.D., Brown University, Providence, RI

10:50 Factors Influencing Outcome and Length of Stay in Stroke Rehabilitation

A retrospective analysis of 248 stroke patients (average age 67, range 17-98, mode 70) discharged over a 16-month period showed that 80% of these patients (who were not medically screened before admission) were able to return home after an average length of stay (LOS) of only 43 days; 85% were ambulatory, 62% required no help in ADL. Medical and physical factors influencing outcome and LOS are discussed in detail and related to functional status on discharge. Severity of weakness on admission, long onset-admission intervals, the presence of severe perceptual/cognitive dysfunction in addition to a motor deficit, and poor functional status at discharge (inability to walk, urinary/fecal incontinence) were related to unfavorable outcome and increased LOS. Age, the presence of dysphasia or a hemisensory deficit in addition to weakness, or the presence of concurrent diabetes, hypertension, ASHD or hyperlipidemia were unrelated to functional status on discharge, discharge disposition, or LOS. Many patients having "unfavorable prognostic signs" made significant improvement after admission and were subsequently discharged home. Thus, while the factors outlined above may predict patients who can make maximal gains in a short term rehabilitation facility, we feel that most patients do benefit from a comprehensive rehabilitation program and that most applicants should be admitted for a therapeutic trial.

JOEL S. FEIGENSON, M.D., Burke Rehabilitation Center,
White Plains, NY

11:10 Correlation of Functional Status Variables During Stroke Rehabilitation

The stroke service of a rehabilitation hospital has been using Barthel Index to guide the team at weekly meetings. For purposes of this study, data was collected retrospectively from 50 consecutive patient records and prospectively from 50 consecutive records according to predetermined criteria on forms coded for computer analysis. Data analysis correlated independent variables (etiology, age, sex, marital status, occupation prior to onset, living arrangements prior to hospitalization, source of referral, duration between onset and admission to rehabilitation, payment source, side affected, and verbal, hearing and visual abilities) with dependent variables (initial, interval and last Barthel scores, constellation of family members at discharge, degree of support from family members at discharge, financial status of family at discharge, associated medical diagnoses and complications, and discharge disposition). In addition, data from periodic Barthel assessments between admission and discharge were analyzed: (1) to reflect the "rate of change" in functional status; and (2) to demonstrate relationships between Barthel score levels and individual assessment items. Results and conclusions are presented.

CARL V. GRANGER, M.D., Tufts-New England Medical Center
Hospital, Boston

LESTER S. DEWIS, M.D., Newton-Wellesley Hospital, Boston

N. C. PETERS, M.ED., R.P.T., New England Rehabilitation
Hospital, Boston

C. C. SHERWOOD, PH.D., Tufts-New England Medical Center
Hospital, Boston

J. BARRETT, B.A., Tufts-New England Medical Center Hos-
pital, Boston

Tuesday A.M.

11:30

Quality of Care for Completed Stroke Without Rehabilitation: Evaluation by Assessing Patient Outcomes

Using the same method of quality assurance of stroke rehabilitation, developed at the University of Minnesota, by assessing patient outcomes on the basis of a modification of Williamson's functional limitation scale, 84 patients with completed stroke were surveyed 8 months to 13 years following treatment without rehabilitation at Hennepin County General Hospital. Because a greater percentage (42%) than estimated (29%) were deceased, the percentage of those not independent in self care (31%) was less than estimated (46%). These patients were not matched to the group previously studied at the University of Minnesota but were generally less severely involved although older on the average. However, even so, only 47% of those still living were independent in self care in this study contrasted to 69% in the prior group which had the benefit of rehabilitation. Also 42% of this group were in nursing homes or board and care facilities while only 18% of the rehabilitated group were. It became apparent that although the modified functional limitation scale is useful in outcome studies for quality of rehabilitation, it is not sensitive enough to show the full extent of differences in outcomes in a comparative study such as this.

THOMAS P. ANDERSON, M.D., Department of PM&R, University of Minnesota Hospitals, Minneapolis

MAUREEN BALDRIDGE, B.S., Department of PM&R, University of Minnesota Hospitals, Minneapolis

MILTON G. ETTINGER, M.D., Chairman, Department of Neurology, Hennepin County General Hospital, Minneapolis

11:50

Is Stroke Rehabilitation Worthwhile?

The purpose of this study was to compare the differential effectiveness of conventional medical management (control group) vs. comprehensive rehabilitation of stroke patients in a community hospital. A follow-up survey compared the post-hospital status of the two groups at the time of discharge and one year later in regard to: (a) Where they are residing (home vs. ECF); (b) Level of function. Severity of impairment of stroke patients was ascertained from hospital records to establish comparability of the two groups. Comparability of functional status of the two groups within five days of admission was determined by an impairment scale developed for this study (inter-rates reliability 0.98). While the data indicated that the rehab group was significantly more impaired than the control group at the time of admission, post-hospital data indicated that the functional status of the rehab group was either significantly better or equal to that of the control group. For example: 72% of rehab patients were discharged home vs. 54% of the control group. One year after discharge, 69% of the rehab patients were home vs. 43% of the control. Forty-one per cent of the rehab group were able to resume their usual activities one year after discharge as compared with only 19% of the control group. This data supports the contention that rehabilitation care is clearly superior to traditional methods in caring for stroke patients regarding humanitarian values, medical effectiveness, and with implications for cost effectiveness.

FRANCIS G. MACKEY, M.D., Medical Director and Director of Rehabilitation, St. Jude Hospital and Rehabilitation Center, Fullerton, CA

SESSION 45—Senate Room

Chairman—

JESSE A. BOWERS, M.D., San Diego

Co-Chairman—

KARL H. HAASE, M.D., Reseda, CA

10:30 **Multifactorial Assessment of Lower Limb Amputee Gait, Using Computer Generated Display**

With a view to performing detailed studies on a wide population of both above- and below-knee amputees, we have developed a system for obtaining information regarding the temporal variations of hip, knee and ankle angles for ambulating patients. These data are obtained for both the prosthetic and intact limbs. Of specific interest from the point of view of clinical digestibility of the most significant facets of information are representations of the cyclic variations of sets of angles in angle-angle form. For example, hp angle vs. knee angle both in the sagittal plane. Distinctive patterns are generated for different conditions. We anticipate that hard-copy records of data presented by the means indicated above will be of considerable value in the effective follow-up of, and even possibly in training regimens for, amputees. The present experimental system utilizes several specially constructed electrogoniometers whose outputs are fed directly to a PDP 11/10 computer which is programmed to produce the relevant diagrams together with pertinent markers and timing information. We will present the detailed results available from our study which includes an examination and interpretation of the statistics of the diagrams generated and their specific patterns.

S. N. BANERJEE, M.D., F.R.C.P.(C), McMaster University,
Hamilton, Ontario, Canada

C. HERSHLER, B.SC.,(HONS), M.SC., McMaster University,
Hamilton, Ontario, Canada

M. MILNER, PH.D., P.ENG., McMaster University, Hamilton,
Ontario, Canada

T. PAL, M.ENG., McMaster University, Hamilton, Ontario,
Canada

10:50 **Supracondylar Cuff Suspension vs Side Joints-Thigh Corset Suspension in BK Amputees: A Difference in Energy Requirements**

One problem that frequently arises in dealing with below knee amputees is the prescription of the best method of suspension. It is assumed that more proximal suspension lends more stability to the prosthesis. This factor is especially important in the older amputee where safety during ambulation is so vital. This being the case, it is necessary to determine the actual metabolic demands and cardiorespiratory response of the same patient using both supracondylar cuff suspension and side joint thigh corset suspension during the same time period in ambulation training. In order to determine the energy costs of the two methods of suspension, the following was done: (1) ten patients with fresh, healed BK stumps were selected for study; (2) a special prosthetic bucket was fabricated for each patient designed so that supracondylar cuff and side joint-corset suspension could be quickly and easily interchanged on the prosthesis; (3) trials with each method of suspension were carried out and prior to, during and after ambulation, the cardiorespiratory parameters were measured for all patients. Details of the experiments, including prosthetic design are discussed and the data presented.

VICTOR CUMMINGS, M.D., Amputee Service and Ergonomics
Laboratory, Department of Rehabilitation Medicine, Albert
Einstein College of Medicine, Bronx, NY

H. MARCH, M.D., Amputee Service and Ergonomics Labora-
tory, Department of Rehabilitation Medicine, Albert Einstein
College of Medicine, Bronx, NY

L. STEVE, R.P.T., Amputee Service and Ergonomics Labora-
tory, Department of Rehabilitation Medicine, Albert Einstein
College of Medicine, Bronx, NY

Tuesday A.M.

K. ROBINSON, C.P.O., Amputee Service and Ergonomics Laboratory, Department of Rehabilitation Medicine, Albert Einstein College of Medicine, Bronx, NY

11:10 **Prefabricated Sockets for Below Knee Amputees**

Modular components are well established in the fabrication of lower extremity prostheses. One of the components, the socket for below knee amputees, continues to be customized. For three years, a series of eight right and eight left prefabricated plastic laminated sockets have been in clinical use at the Kingston Prosthetic Clinic. The design of the socket is based on anthropometric data collected from 200 below knee amputees. These sockets are patellar tendon bearing and open ended. Supracondylar, suprapatellar suspension is incorporated in the design. The socket may be modified by plastazote padding, grinding or heating and stretching of the socket wall. These prefabricated sockets have been evaluated and the results have been compared with custom sockets when used for amputees with maturing and mature stumps. The evaluation included measures of acceptability developed by Fishman and supplemented by additional parameters. Based on this analysis, prefabricated sockets appear to be as acceptable, as comfortable and as cosmetic as custom sockets. Maturing amputees are found to tire more easily, have a lower level of ambulatory function and require more socket adjustments than mature stump amputees, whether or not they are fitted with prefabricated or custom sockets.

DAVID C. SYMINGTON, M.D., F.R.C.P.(C), Professor and Head, Rehabilitation Medicine, Queen's University, Kingston, Ontario, Canada

JUDITH P. DURANCE, M.D., F.R.C.P.(C), Resident, Rehabilitation Medicine, Queen's University, Kingston, Ontario, Canada

11:30 **Experience with Ischial Weight Bearing Prostheses to Bypass the Below-Knee Stump**

The use of any well fitted BK prosthesis requires that the BK stump is healed. No matter what type of suspension is used there is considerable skin traction, pistoning and pressure on and around the BK stump using a BK prostheses. This being the case, the open, infected or very painful stump contraindicates the use of BK prostheses. One of the authors previously described the use of an ischial bearing prosthesis to bypass the BK stump in three patients. This present report deals with a larger series of patients giving indications for the use of the bypass prostheses and follow-up. The authors contend that the temporary use of an ischial bearing prosthesis can considerably decrease in-hospital time and speed up the rehabilitation process. In some cases the ischial bearing prosthesis might be the permanent prosthesis instead of a temporary one.

VICTOR CUMMINGS, M.D., Amputee Service, Department of Rehabilitation Medicine, Albert Einstein College of Medicine, Bronx, NY

J. IAZZETTI, M.D., Amputee Service, Department of Rehabilitation Medicine, Albert Einstein College of Medicine, Bronx, NY

D. SHAPIRO, M.D., Amputee Service, Department of Rehabilitation Medicine, Albert Einstein College of Medicine, Bronx, NY

N. BODENSTEIN, C.P.O., Amputee Service, Department of Rehabilitation Medicine, Albert Einstein College of Medicine, Bronx, NY

11:50 **Air-Splint and the Geriatric Amputee**

This paper presents further experience with air-splints in the management of 24 lower limb geriatric amputees, from 60 years to 97 years of age, with a median age of 73 years. Thirteen patients had standard below knee amputation, four becoming bilateral amputees. One had a Symes and ten required amputation above the knee, one of the later becoming bilateral amputee. Twenty-three patients were suffering from peripheral vascular disease, and one patient had osteogenic sarcoma. In three patients the air-splint was used as immediate post operative rigid dressing and as early post operative dressing in sixteen patients. Eleven patients used the air-splint as an assessment prosthesis, and eighteen patients as temporary prosthesis. The advantages and disadvantages of air-splint in geriatric amputees are discussed.

TRILOK N. MONGA, M.D., F.R.C.P.(C), Assistant Professor,
Department of Rehabilitation Medicine, Queen's University,
St. Mary's of the Lake Hospital, Kingston, Ontario, Canada
DAVID C. SYMINGTON, M.D., F.R.C.P.(C), Professor and Head,
Department of Rehabilitation Medicine, Queen's University,
Kingston General Hospital, Kingston, Ontario, Canada

SESSION 46—Cabinet Room

Chairman—

GEORGE H. KRAFT, M.D., Seattle

Co-Chairman—

NORMAN A. ROSE, M.D., Tarzano, CA

10:30 **EMG Studies and Idiopathic Scoliosis**

Previous electromyographic studies in idiopathic scoliosis, have alleged the presence of electrical activity in the prone position on the convex side of the prominent curves. In addition, at least one paper has noted the presence of fibrillations and positive waves in 60% of their idiopathic curve studies. These previous studies have led the investigators to conclude that there may be a neurologic etiology in the idiopathic curves. The purpose of this study was to determine the electrical activity of the paraspinals in a relaxed position and in standing in 31 cases of idiopathic scoliosis. In 28 patients, there was no sign of muscular activity in the patient in the prone position. We did note activity in 3 patients. Eighteen patients demonstrated electrical activity while standing on the convex side of the curve with electrical silence on the concave. There was no evidence of insertional irritability either as fibrillation potentials or positive waves in any of the patients studied. Potentials were of normal amplitude and duration and there was not an increased incidence of polyphasicity. Those patients who showed the electrical activity on standing were patients with more severe curves or were unbalanced curves at the time of examination. We believe there is a need for further electromyographic investigation of these patients in standing position in order to assess the balance of the curve and also to investigate an allegation in the literature that may be of help in identifying pseudarthroses, and we do not believe there to be any EMG evidence of neurologic disorder.

M. A. ALEXANDER, M.D., Department of Physical Medicine,
The Ohio State University, Columbus, OH
E. H. SEASON, M.D., Department of Orthopedics, The Ohio
State University, Columbus, OH

10:50 **A Novel Technique for Transcutaneous Nerve Stimulation With Variable Programming**

Transcutaneous nerve stimulation with currently commercially marketed stimulators has been shown to be useful in some cases of pain. However, the price of such stimu-

Tuesday A.M.

lators ranges from \$300 to \$500. These stimulators do not allow any other form of stimulation other than variation in frequency and in amplitude. The extremely sophisticated types of stimulators used in physiology laboratories are obviously extremely expensive. The new technique of transcutaneous stimulation which will be described will be capable of providing not only variation in frequency and in amplitude but would also be capable of providing trains of stimuli for varying periods of time on or off. The entire program for stimulation could be predetermined on a highly sophisticated apparatus and then the portable stimulator could be programmed for optimal relief for any given patient. Should transcutaneous nerve stimulation fail to relieve the pain it is possible with this new technique to provide alternative trains of stimuli using a different program. The capability to switch from one program to another program of stimulation involves only a very nominal cost. In this new technique it is possible to consider devising a stimulation program for each patient on an individual basis and the program itself can be modified at any time in the event of failure. The apparatus and technique are described.

VADDADI RAMA RAO, M.D., Assistant Professor, Department of Rehabilitation Medicine, Emory University, Atlanta

11:10 **Mechanically Provoked Insertional Activity in Normal Limb Muscles**

A mechanical electrode inserter has been designed to allow reproducible electromyographic electrode insertions. In this study, the insertional activity provoked by mechanical insertion is recorded and analyzed in several different muscles of the lower extremity. Teflon coated monopolar electrodes were employed in this study. The anterior tibial, the extensor hallucis longus, and the extensor digitorum brevis muscles were examined. The characteristic injury potentials and wave patterns of electromyographic insertional activity are described in these muscles. The duration of insertional activity following the cessation of electrode movement is analyzed. Variation in the duration and character of insertional activity in these muscles is pointed out to avoid possible confusion with pathological conditions.

DAVID WIECHERS, M.D., Assistant Professor, Department of Physical Medicine, The Ohio State University, Columbus, OH

11:30 **EMG Monopolar Needle Parameters: Testing and Evaluation**

As the sophistication of needle EMG increases, so do the performance constraints on the transducer, i.e., the needle. The mechanical and electrical parameters of greatest significance to today's applications in clinical electromyography can be specified within reachable limits. The more significant measurable parameters are point sharpness, insulation resistance of the shaft teflon, tip exposure, impedance, and spontaneous noise. Each are described in measurement technique, range of values, and significance to the EMG process. The generation of spontaneous noise is singled out for particular attention since these potentials are often both distracting and confusing to the electromyographer. This parameter has not been recognized generally nor dealt with in either the literature or in the manufacturer's specifications. The noise arises from an electrochemical reaction of the needle steel and the constituents of the insulating materials in the presence of the electrolyte, the interstitial fluids in muscle tissue. They are mediated by the impedance parameters of the needle and the input amplifier. Further variations occur in the sterilization process. Typical time histories of noise signals are shown, how they appear sporadic in nature, cause the typically irritating base line movement, and can be mistaken for physiological potentials.

JAMES L. COCKRELL, PH.D., Department of PM&R, University of Michigan Medical Center, Ann Arbor, MI

Tuesday A.M.

11:50

Development of Software Package for Computer Assisted Electrodiagnosis Data Acquisition: A Preliminary Report

In order to minimize misclassifications in electrodiagnosis, efficient data acquisition and storage systems are needed to generate more reliable statistical characteristics of normal and abnormal states. The preliminary phase of exploring the use of computer systems in planning of electrodiagnostic data collection has resulted in a system that allows specification, by a computer novice, of a neuromuscular anatomical model and a branching logic tree. As a part of this feasibility study, the anatomical model and a logic tree for more organized, consistent planning of electrodiagnostic evaluation has been entered, which is now capable of handling a majority of the upper extremity cases referred to this center. When combined with a limited programmed history and physical examination and with the previous work done by others on wave-form analysis, this appears to be a potential tool for increasing the reliability of the electrodiagnostic statistical data base by improving the collection of data in the individual cases and for providing the opportunity to develop statements of confidence limits. Additionally, the ability to enter data unsolicited and the ability to store models of various electrodiagnostic problems provide teaching possibilities with this system.

ROBERT L. MAGNUSON, LCDR, MC, USNR, Chairman, Department of Rehabilitation Medicine, Naval Regional Medical Center, San Diego

LARRY FRIEDMAN, PH.D., Navy Personnel Research and Development Center, San Diego

10:30-12:00 ☆ SESSION 47—Council/Chamber Room

The Elderly Patient With A Hip Fracture: A Challenge to Geriatric Rehabilitation

A panel discussion on all aspects of management of the elderly patient with a hip fracture will be held. Subjects to be reviewed include mental and emotional problems of the elderly and how they relate to causes of hip fracture; physical problems of elderly patients and causes of falls and their prevention; a review of basic causes and pathomechanics of hip fractures in the elderly, advances in the treatment of hip fractures from surgical standpoint, including indications, complications and post-operative management, practical aspects of gait training and mobilizing the elderly hip-fractured patient.

10:30

Mental and Emotional Behavioral Aspects of the Elderly With Particular References to Causes of Falls in the Elderly: A Psychiatrist's Viewpoint

WILLIAM TARNOWER, M.D., Senior Staff Psychiatrist, Menninger Foundation, Topeka, KS

10:50

Physical Problems of the Elderly and Causes of Falls and Their Prevention: Physiatrist's Viewpoint

JOHN B. REDFORD, M.D., Professor and Chairman, Department of PM&R, University of Kansas Medical Center, Kansas City, KS

11:05

Review of Basic Etiology and Pathomechanics of Hip Fractures in the Elderly

R. CLAUDE ROGERS, M.D., Chief of PM&R, All Saints Hospital Rehabilitation Center; Consulting Physiatrist, University of Pennsylvania, Department of PM&R, Philadelphia, PA

Tuesday A.M.

11:15 Surgical Options and Treatment of Hip Fracture, Indications, Complications, Post-Operative Management

FREDERICK RECKLING, M.D., Professor and Chairman, Department of Orthopedic Surgery, The University of Kansas Medical Center, Kansas City, KS

11:25 Practical Aspects of Gait Training and Mobilizing the Elderly Hip-Fractured Patient

SHELLY E. LISS, M.D., Clinical Assistant Professor, Baylor College of Medicine; Director, Department of PM&R, Memorial Hospital; Clinical Director, Department of Rehabilitation Medicine, Rosewood General Hospital, Houston, TX

11:40 Open Discussion

Chairman—

ROBERT W. BOYLE, M.D., PH.D., Wauwatosa, WI

Co-Chairman—

JOSEPH C. HONET, M.D., Detroit, MI

12:15- 2:15 ACADEMY ANNUAL AWARDS/PRESIDENTIAL LUNCHEON—Golden West Room

Presidential Address—

CARL V. GRANGER, M.D., President, AAPM&R, Boston, MA

Chairman—

ROBERT W. BOYLE, M.D., PH.D., Secretary, AAPM&R, Wauwatosa, WI

2:45- 5:45 ☆ JOINT ACADEMY/CONGRESS SCIENTIFIC

SESSION 49—California Room

Symposium on New Concepts in the Management of Rheumatoid Arthritis

Moderator—

ROBERT L. SWEZEY, M.D., Professor of Medicine, UCLA School of Medicine; Chief, Division of Rehabilitation Medicine; Associate Director, Institute of Rehabilitation and Chronic Diseases, UCLA Department of Medicine, Los Angeles, CA

2:45 Mechanisms of Joint Destruction and Rheumatoid Arthritis

HARRY G. BLUESTEIN, M.D., Assistant Professor of Medicine, Rheumatoid Division, UCSD, San Diego, CA

3:45 The Medical Management of Rheumatoid Arthritis

JOHN L. DECKER, M.D., Chief, Arthritis and Rheumatism Branch, National Institutes of Health, Bethesda, MD

4:45 **Advances in the Radiology of Rheumatoid Arthritis**

DONALD L. RESNICK, M.D., Associate Professor of Radiology in Residence, UCSD; Chief, Arthopedic Division, Department of Radiology, VA Hospital, San Diego, CA

8:00-10:00 ☆ **SESSION 50—Council/Chamber Room**

Workshop on Establishing Yourself in Private Practice of PM&R: A Practice Management Forum

This program is tailored to the needs of residents considering private practice should prove of equal value to more senior physiatrists wishing to improve their practice management skills.

8:00 **Introduction**

MYRON M. LA BAN, M.D., Royal Oak, MI

8:05 **Practice Setting—Office Based**

ARIEL BAR-SELA, M.D., Houston, TX

Practice Setting—Private Hospital Based

GEORGE W. WAYLONIS, M.D., Columbus, OH

8:35 **Personnel Problems**

JOHN L. MELVIN, M.D., Milwaukee, WI

8:55 **Patient Flow Techniques**

LIONEL A. WALPIN, M.D., Beverly Hills, CA

9:15 **Paperwork—Clinical**

DENNIS H. HARRIS, M.D., Scottsdale, AZ

9:35 **Legal Problems**

JOSEPH R. MEERSCHAERT, M.D., Royal Oak, MI

9:55 **Keeping Up!**

BARRY MILLER, M.D., Ann Arbor, MI

10:00 **Informal Discussion**

AMERICAN ACADEMY OF PHYSICAL MEDICINE AND REHABILITATION

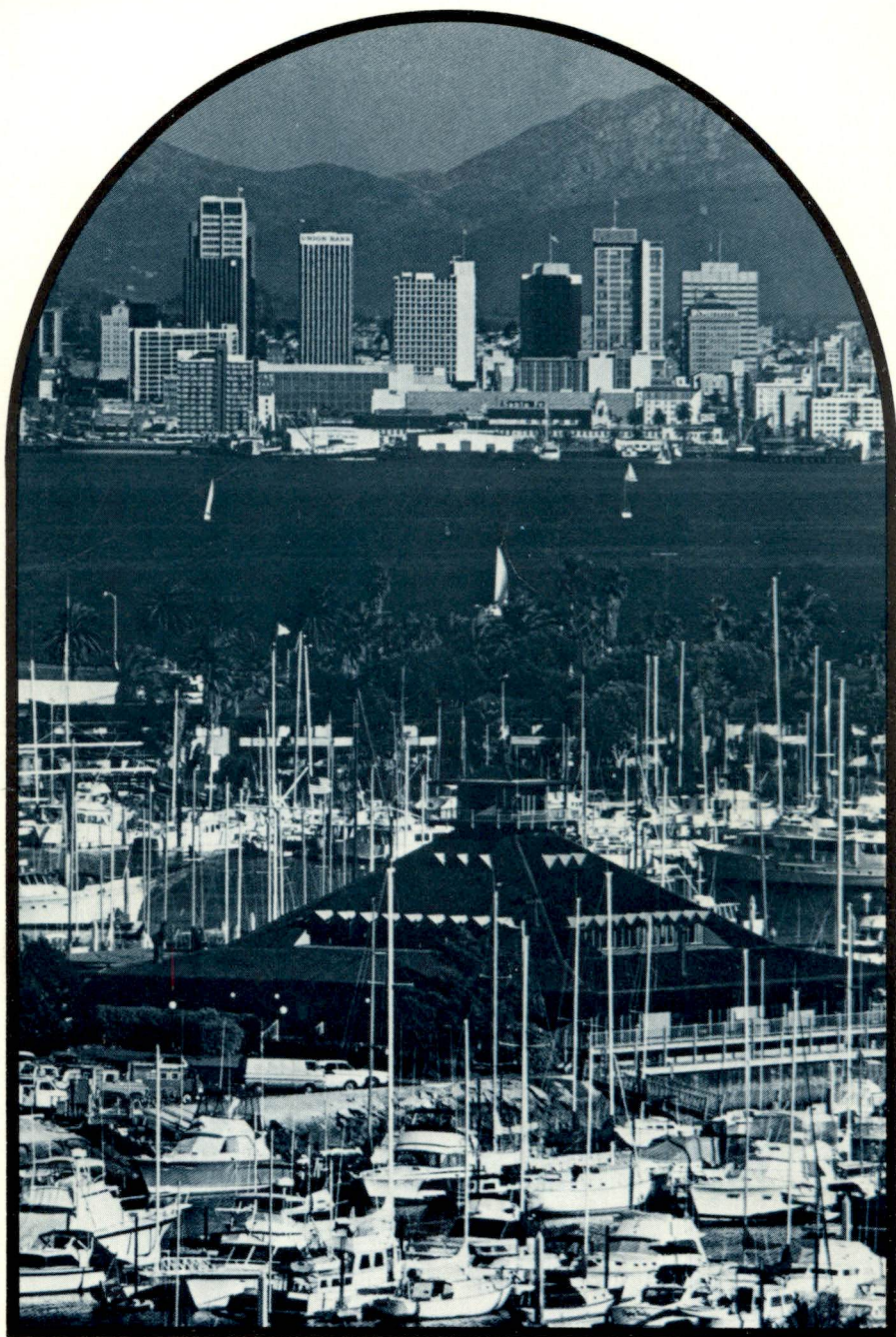
Program Index

ALEXANDER, M., Columbus, OH	49, 61
ANDERSON, T. P., Minneapolis, MN	16, 41, 58
ASHBY, P. Hamilton, Ontario, Canada	34
ASHMORE, C. R., Davis, CA	27
AWAD, E. A., Minneapolis, MN	26, 38
BALDRIDGE, M., Minneapolis, MN	58
BANDU, I., Roosevelt Island, NY	21
BANERJEE, S. N., Hamilton, Ontario, Canada	59
BARRETT, J., Boston, MA	57
BENDER, L. F., Detroit, MI	54
BENJAMIN, H., New York, NY	19
BETTS, H. B., Chicago, IL	37, 51
BISTEVINS, R., Minneapolis, MN	26
BLUESTEIN, H. G., San Diego, CA	64
BODENSTEIN, N., Bronx, NY	60
BOND, M. L., Davis, CA	27
BUERGER, A. A., Irvine, CA	19
CAILLIET, R., Los Angeles, CA	42, 53
CHALLENGER, Y. B., New York, NY	28, 42
CHAMBERS, W. W., Philadelphia, PA	25
CHECKLES, N. S., Columbus, OH	30, 50
CLAUS-WALKER, J., Houston, TX	24
CLOWERS, D. E., Seattle, WA	52
COCKRELL, J. L., Ann Arbor, MI	62
COLACHIS, S. C., Phoenix, AZ	41
COYNE, N., Cleveland, OH	34
CUMMINGS, V., Bronx, NY	59, 60
DECKER, J. L., Bethesda, MD	64
DE GRAVELLES, W. E., Des Moines, IA	43
DELAGI, E. F., Bronx, NY	30
DE LISA, J. A., Seattle, WA	15
DEMOPOULOS J. T., New York, NY	55
DEWIS, L. S., Wayland, MA	57
DHILLON, C. S., Chicago, IL	38
DINSDALE, S. M., Hamilton, Ontario, Canada	34, 36
DIOKNO, A. C., Ann Arbor, MI	53, 55
DITUNNO, J. F., Jr., Philadelphia, PA	17, 26, 27, 45, 46, 47
DOERR, L., Davis, CA	27
DONOVAN, W. H., Seattle, WA	52
DURANCE, J. P., Kingston, Ontario, Canada	60
EASTON, J. K., Minneapolis, MN	32, 33
ENG, G. D., Chevy Chase, MD	39, 59
ETTINGER, M. G., Minneapolis, MN	58
EVANGELISTA, L. A., Bronx, NY	33
FAST, A., Bronx, NY	51
FEIGENSON, J. S., White Plains, NY	57
FEINBERG, S. D., Portland, OR	34, 35
FISH, L., Minneapolis, MN	37
FLETCHER, F. R., Columbus, OH	20
FORDYCE, W. E., Seattle, WA	53

FOWLER, W. M., Jr., Davis, CA	28, 44, 46, 53
FRIEDMAN, L., San Diego, CA	63
GOODGOLD, J., New York, NY	15
GOODMAN, P. A., Royal Oak, MI	29
GORDON, E. E., Elk Grove Village, IL	47
GRANGER, C. V., Boston, MA	17, 41, 56, 57
GREEN, R. F., New York, NY	19
GREENFIELD, D. P. Boston, MA	48
GREER, D. S., Providence, RI	57
GRIFFITH, E. R., Richmond, VA	33
GULLICKSON, G., Jr., Minneapolis, MN	17
GUTIERREZ, I. Z., Buffalo, NY	21
HALLAUER, D. S., Rochester, NY	36
HALPERN, D., Minneapolis, MN	17, 32, 33
HALSTEAD, L. S., Houston, TX	24, 37
HALSTEAD, M. G., Houston, TX	37
HERBISON, G. J., Philadelphia, PA	26, 27, 45, 46, 47
HERSHLER, C., Hamilton, Ontario, Canada	59
HRNA, D. J., Houston, TX	24
IAZZETTI, J., Bronx, NY	60
IBRAHIM, G., Minneapolis, MN	37
JAASKO, L., Irvine, CA	48
JAWEED, M. M., Philadelphia, PA	26, 27, 45, 46, 47
JOHNSON, E. W., Columbus, OH	15, 17, 20, 44, 45, 49
JOHNSTONE K., Royal Oak, MI	18, 39
JUMP, J., Columbus, OH	20
KAPLAN, P. E., Chicago, IL	38, 51
KENNEMORE, D. E., Greenville, SC	32
KEWALRAMANI, L. S., Sacramento, CA	38
KIVIAT, M. D., Seattle, WA	52
KOEPKE, G. H., Saginaw, MI	54
KOSIAK, M., St. Paul, MN	54
KOTTKE, F. J., Minneapolis, MN	23, 28
KOWALSKI, K., Chicago, IL	47
KRAFT, G. H., Seattle, WA	15, 17
KUBICEK, W., Minneapolis, MN	23
LA BAN, M. M., Royal Oak, MI	18, 29, 39
LAL, S., Chicago, IL	51
LEE, K. H., Buffalo, NY	21
LEHMANN, J. F., Seattle, WA	34, 35
LIPPMANN, H. L., Bronx, NY	15
LISS, S. E., Houston, TX	64
LIU, C. N., Philadelphia, PA	25
LOWMAN, E. W., New York, NY	39
MAC KEY, F. G., Fullerton, CA	58
MACLEAN, I. C., Chicago, IL	35
MACLEOD, S., Hamilton, Ontario, Canada	34
MACRI, D., Seattle, WA	52
MAGNUSON, R. L., San Diego, CA	63
MANCINI, R., Minneapolis, MN	23
MARCH, H., Bronx, NY	59
MATTOX, K. L., Houston, TX	25
MCCAUGHAN, K., Hamilton, Ontario, Canada	36

MC DONNELL, G. M., Los Angeles, CA	43
MCEIWAIN, R. A., Milwaukee, WI	42
MEERSCHAERT, J. R., Royal Oak, MI	29, 54
MEIER, R. H., III, Houston, TX	25
MILNER, M., Hamilton, Ontario, Canada	59
MOLNAR, G. E., Mamaroneck, NY	33
MONGA, T. N., Kingston, Ontario, Canada	61
NAFTCHI, N. E., New York, NY	39
NAGLER, W., New York, NY	19, 20
NANNINGA, J. B., Chicago, IL	51
OLSON, M., Minneapolis, MN	23
OPITZ, J. L., Rochester, MN	17
OZEL, A. T., Minneapolis, MN	32, 33, 37
PAL, T., Hamilton, Ontario, Canada	59
PATTERSON, R., Minneapolis, MN	23
PEREZ, L., Royal Oak, MI	29
PERKASH, I., Palo Alto, CA	53
PEROTTO, A., Bronx, NY	30
PETERS, N. C., Boston, MA	57
PETTY, J., Columbus, OH	49
PIERO, D., Columbus, OH	31
RAMOS, M., Boston, MA	22
RAO, V. R., Atlanta, GA	22, 62
RECKLING, F., Kansas City, KS	64
REDFORD, J. B., Kansas City, KS	63
REIDY, T. J., Chicago, IL	35
RESNICK, D. L., San Diego, CA	65
ROBINSON, K., Bronx, NY	60
ROGERS, R. C., Philadelphia, PA	63
ROSEN, J. S., Chicago, IL	23, 34, 51
ROTSCHAFER, L., Des Moines, IA	43
ROUSSAN, M. S., Bronx, NY	50
SAHGAL, V., Chicago, IL	37
SCHUCHMANN, J. A., Honolulu, Hawaii	31
SEASON, E. H., Columbus, OH	61
SELL, G. H., New York, NY	39
SHAPIRO, D., Bronx, NY	60
SHERWOOD, C. C., Boston, MA	57
SIMONS, D. G., Huntington Beach, CA	49
SMODLAKA, V. M., Brooklyn, NY	16, 41
STAUCH, D., Columbus, OH	49
STEVE, L., Bronx, NY	59
STRATIGOS, J. S., Chicago, IL	31
SUNGA, L., New York, NY	19
SWEZEY, R. L., Los Angeles, CA	64
SYMINGTON, D. C., Kingston, Ontario, Canada	60, 61
TARNOWER, W., Topeka, KS	63
TAYLOR, R. G., Sacramento, CA	28, 46
TAYLOR, R. S., Royal Oak	39
TOBIS, J. S., Irvine, CA	19, 48
TOERGE, J., Chicago, IL	23, 35
TRAVELL, J. G., Washington, D. C.	49, 50
TREANOR, W. J., Irvine, CA	28, 41

UMAKANTHA, K. V., Chicago, IL	51
VERRIER, M., Hamilton, Ontario, Canada	34
VIAU, A. T., New York, NY	39
WARREN, C. G., Seattle, WA	34, 35
WEBER, R. J., Columbus, OH	31
WEICHERS, D., Columbus, OH	62
WEINGARDEN, H. F., Columbus, OH	44
WERTHEIMER, L., Roosevelt Island, NY	21
WHITMORE, J. J., Rochester, NY	36
WILDERMANN, J., San Jose, CA	43
WILSON, A. F., Irvine, CA	48
WU, Y., Chicago, IL	31
YARNELL, S. K., Columbus, OH	50
YU, J., San Antonio, TX	25



OFFICIAL PROGRAM

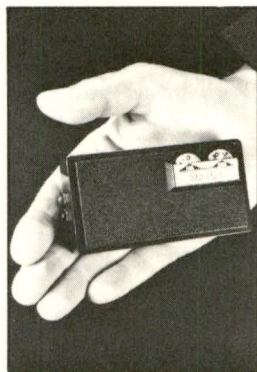
AMERICAN CONGRESS OF REHABILITATION MEDICINE

53rd ANNUAL SESSION NOVEMBER 9-12, 1976

TOWN & COUNTRY HOTEL — SAN DIEGO, CALIFORNIA

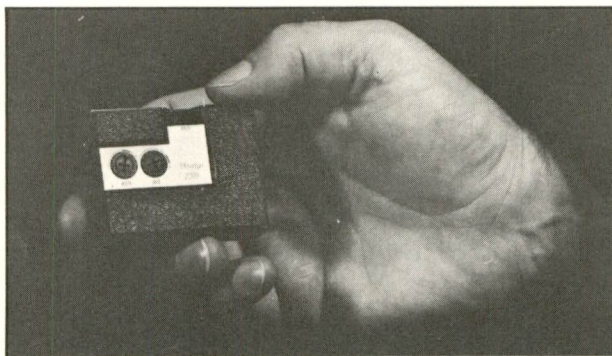
For some time, we have been asking what you were doing about pain.
THIS IS WHAT WE ARE DOING ABOUT PAIN:

The Staodyn 2000 and 4000 TNS units are truly small in size and effective in pain management.

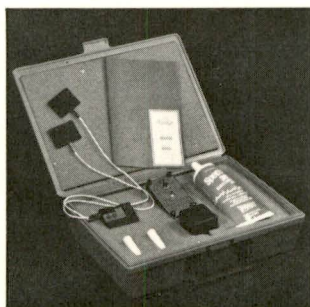


NEW

The Staodyn 2200 is tiny and more effective.



- Accommodative Wave Form (of course).
- Even more effective in managing pain.
- Nominal battery life: 20-24 hours per battery charge.



Naturally, all necessary accessories are provided with the 2200.

Staadynamics, Inc.
601 South Bowen
Longmont, Colorado 80501
(303) 772-3631

See us at Booths 27 & 28.



American Congress of Rehabilitation Medicine

OFFICIAL PUBLICATION: ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION

30 NORTH MICHIGAN AVENUE · CHICAGO, ILLINOIS 60602 · CENTRAL 6-9512

NOVEMBER 1976

Dear Congress Member:

Welcome to San Diego and the 53rd Annual Session of our ever-growing American Congress of Rehabilitation Medicine.

This 1976 convention program focuses on the consumers of the health care services that we provide. The program committee, under Dr. Glenn G. Reynolds, has done a particularly fine job in organizing the popular forums--which this year will examine the relevance of rehabilitation to the consumer, athletic competition by the disabled and current research into spinal cord injury.

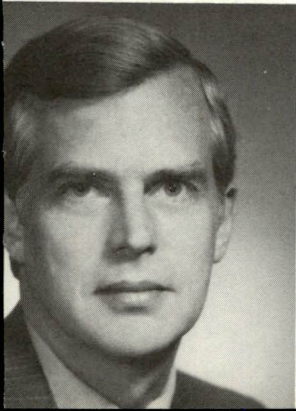
Thumb through the pages that follow and you will find that you can profitably fill every hour of your time at this meeting. A record number of scientific papers will be read, and there will be many opportunities for informal exchanges of opinions and ideas with your peers.

We want to call your attention also to the technical and scientific exhibits. We are extremely pleased and gratified that this 1976 Annual Session attracted the largest number of technical exhibitors in the entire history of our organization. It would be extremely difficult to conduct this yearly meeting without the support of the technical exhibitors; please show your appreciation of that support by making it your business to see what the exhibitors are displaying.

We know that you will profit in many ways from this week in San Diego.

Henry B. Betts, M.D.
President
ACRM

John E. Affeldt, M.D.
President-Elect
ACRM



GENERAL INFORMATION

REGISTRATION

The Registration Desk is located in the convention center of the Town & Country Hotel, Convention Foyer. All persons attending the annual sessions of the American Academy of Physical Medicine and the American Congress of Rehabilitation Medicine must be registered and must be wearing an official badge to gain admission to the meeting areas. The meetings are closed to the general public.

REGISTRATION FEES

ACADEMY/CONGRESS Members	\$45.00
GENERAL REGISTRATION Non-Members	\$55.00
SINGLE DAY Registration	\$20.00

NOTE: Medical and Allied Health Profession Students, Interns and Residents in PM&R will be registered WITHOUT PAYMENT OF FEES upon the presentation of proper identification.

MEAL FUNCTIONS

1. Academy BREAKFAST DISCUSSION GROUPS\$3.00 per breakfast
2. Academy ZEITER LECTURE Luncheon\$6.75 per person
3. Academy PRESIDENT'S/AWARDS Luncheon ..\$6.75 per person
4. Congress BREAKFASTS: Meet the Expert\$3.00 per breakfast
5. Congress COULTER LECTURE/AWARDS Luncheon\$6.75 per person

REGISTRATION HOURS

Saturday, November 6	3:00 p.m. until 6:00 p.m.
Sunday, November 7 through	
Thursday, November 11	8:00 a.m. until 6:00 p.m.
Friday, November 12	8:00 a.m. until 10:00 a.m.

BUSINESS SESSIONS

The Annual Business Meeting of the American Academy of PM&R will be held on Monday, November 8 at 4:15 p.m. in the California Room.

The Annual Business Meeting of the American Congress of Rehabilitation Medicine (first session) will be held on Wednesday, November 10 at 5:00 p.m. in the Golden West Room.

The second session of the Congress Annual Business Meeting will be held on Thursday, November 11 at 4:30 p.m. in the California Room.

The AUXILIARY will hold its Annual Business Meeting at 8:00 a.m. in the Tiki Hut. Coffee and Danish will be served.

SPECIAL EVENTS

- Monday, November 8—Academy BREAKFAST DISCUSSION GROUPS,
7:00 a.m.
- Monday, November 8—Academy ZEITER LECTURE Luncheon,
12:15 p.m.
- Monday, November 8—Academy PRESIDENTIAL RECEPTION,
6:30 p.m.
- Tuesday, November 9—Academy BREAKFAST DISCUSSION GROUPS,
7:00 a.m.
- Tuesday, November 9—Academy Annual AWARDS/PRESIDENTIAL
Luncheon, 12:15 p.m.
- Wednesday, November 10—Congress CANDLELIGHT ROUNDTABLES,
7:30 p.m.
- Thursday, November 11—Congress BREAKFASTS: Meet the Expert,
7:00 a.m.
- Thursday, November 11—Congress COULTER LECTURE/AWARDS
Luncheon, 12:15 p.m.
- Thursday, November 11—Congress PRESIDENTIAL RECEPTION,
6:30 p.m.
- Friday, November 12—Congress BREAKFASTS: Meet the Expert,
7:00 a.m.

SCIENTIFIC EXHIBITS

Scientific Exhibits will be on display beginning Tuesday, November 9 and continuing through Thursday, November 11 at 2:00 p.m. Medals will be awarded to those exhibits that are adjudged outstanding by the Committee on Awards for Scientific Exhibits. The awards will be announced and presented at the Congress luncheon on Thursday, November 11.

TECHNICAL (Commercial) EXHIBITS

Technical Exhibits will be open from 9:00 a.m. to 4:30 p.m. Tuesday, November 9 through Wednesday, November 10, and from 8:30 a.m. to 2:00 p.m. on Thursday, November 11 in the Convention Center, Town & Country/San Diego Hall. The scientific program sessions have been arranged to allow time for visiting and inspecting the exhibits. All registrants are urged to set aside time for complete tours of the exhibits.

SCIENTIFIC FILMS THEATER

Scientific Films will be shown continuously Tuesday, November 9 from 9:00 a.m. to 1:00 p.m.; and Thursday, November 11 from 9:00 a.m. to 1:00 p.m. in the Committee Room. The schedule for showing, listing of titles, day and hour is published in the back of this program.

BOOK FAIR

The rehabilitation medicine BOOK FAIR provides registrants an opportunity to browse through the latest books and publications of special interest to

the rehabilitation professionals. A member of the Academy/Congress Staff will be present to take orders on publications you may wish to purchase. The BOOK FAIR is located in the Convention Center Exhibit Hall, and will be open during the regular exhibit hours, 9:00 a.m. to 4:30 p.m. on Tuesday and Wednesday, and 8:30 a.m. to 2:00 p.m. on Thursday.

AUXILIARY to CONGRESS/ACADEMY

The hospitality lounge of the Auxiliary, located in the TIKI HUT at the swimming pool area, will be open from 8:30 a.m. until 10:30 a.m. on Monday, November 8, and continuously through Thursday, November 11. Members and their guests are invited to stop off at the lounge for a coffee break from 8:30 a.m. to 9:30 a.m., or for information concerning social activities, tours, and other events.

HEADQUARTERS/PRESS ROOM

The convention Headquarters is located at the South Foyer of the Convention Center, and the Press Room at the North Foyer. Every attempt will be made to provide copies of the scientific papers presented at the meeting to the members of the working press only.

CONVENTION MANAGER

Creston C. Herold

DIRECTOR, PRESS RELATIONS

Marvin A. Schroder

CONVENTION COORDINATORS

Susan D. Archias

Amelia J. Bender

Barbara A. Bogel

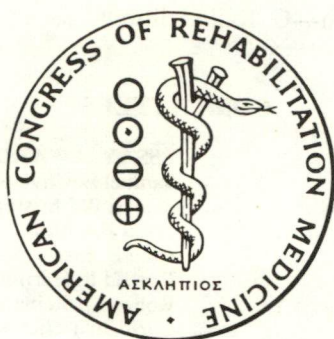
MaryJohn Green

Kathleen R. Sorich

Official Program

**AMERICAN CONGRESS OF
REHABILITATION MEDICINE**

53rd Annual Session



**November 10-12, 1976
TOWN & COUNTRY HOTEL
SAN DIEGO, CALIFORNIA**

AMERICAN CONGRESS OF REHABILITATION MEDICINE
30 North Michigan Avenue, Chicago, Illinois 60602

1975-1976

AMERICAN CONGRESS OF REHABILITATION MEDICINE BOARD OF GOVERNORS AND COMMITTEES

OFFICERS AND BOARD OF GOVERNORS

President—Henry B. Betts Chicago, IL
 President-Elect—John E. Affeldt Los Angeles, CA
 First Vice-President—June S. Rothberg Garden City, NY
 Second Vice-President—Thomas P. Anderson Minneapolis, MN
 Third Vice-President—Wilbert E. Fordyce Seattle, WA
 Fourth Vice-President—Samuel B. Chyatte Atlanta, GA
 Fifth Vice-President—Marcus J. Fuhrer Houston, TX
 Secretary—Victor Cummings New York, NY
 Treasurer—William J. Erdman, II Philadelphia, PA
 Past President—John W. Goldschmidt Chicago, IL
 Executive Director—Creston C. Herold Chicago, IL
 Editorial Board Chairman—G. Keith Stillwell Rochester, MN

COMMITTEES

AWARDS AND PRIZES

John E. Affeldt, *Chairman*
 Thomas P. Anderson
 Samuel B. Chyatte
 Wilbert E. Fordyce
 Marcus J. Fuhrer
 June S. Rothberg

GOLD KEY—SUBCOMMITTEE

June S. Rothberg, *Chairman*
 Thomas P. Anderson
 Samuel B. Chyatte
 Wilbert E. Fordyce
 Marcus J. Fuhrer

COULTER LECTURE— SUBCOMMITTEE

Thomas P. Anderson, *Chairman*
 Rene Cailliet
 Linda Hennig
 Joel S. Rosen
 Martha T. Sarno

SCIENTIFIC EXHIBITS— SUBCOMMITTEE

Marcus J. Fuhrer, *Chairman*
 James L. Cockrell
 Jean A. Cole
 Richard S. Materson
 Lorraine M. Priestley
 Samuel Sherman

ESSAY AWARDS—SUBCOMMITTEE

Samuel B. Chyatte, *Chairman*
 Robert P. Christopher
 Anna B. Coles
 John E. Eisele
 Ronald B. Hartley
 Robert C. Steinman
 Carlo-Jo Tichenor
 John C. Vidoloff
 Shalom E. Vineberg

CONSTITUTION AND BY-LAWS

Frazer Parry, *Chairman*
 Samuel B. Chyatte
 Wilbert E. Fordyce
 John E. Healey, Jr.
 Leonard D. Policoff

LEGISLATION

William A. Spencer, *Chairman*
 John W. Goldschmidt
 Carl V. Granger
 Hunt Hamill
 Justus F. Lehmann
 Michael Mittelmann
 June S. Rothberg
 Asa P. Ruskin
 Paul S. Swarts
 Richard E. Verville, *Consultant*

REHABILITATION PRACTICES

Marjorie C. Becker, *Chairman*
Rita J. Boucher
James T. Demopoulos
Stuart I. Holtzman
Joseph C. Honet
Joseph L. Koczur
Barbara Ann Kos
Michael Mittelman
Marvin A. Spiegel
William E. Staas, Jr.
Leonard V. Wendlund

MEMBERSHIP

Wilbert E. Fordyce, *Chairman*
Dorothy I. Elliott
Marcus J. Fuhrer
Alice L. Garrett
Martin Grabois
John E. Healey, Jr.
Kathryn T. Henning
Helen J. Hislop
Arthur A. Siebens

NOMINATING

John W. Goldschmidt, *Chairman*
Justin Alexander
Gary T. Athelstan
Rene Cailliet
James W. Rae

PROFESSIONAL DEVELOPMENT

Dorothy L. Gordon, *Chairman*
Thomas P. Anderson
Henry B. Betts
Karen R. Breckenridge
James L. Cockrell
Marcus J. Fuhrer
Paul R. Hoffman
Thomas A. Kelley, Jr.
Nancy L. Martin
Martha T. Sarno
Paula C. Skinner
David D. Stock

PROGRAM

Glenn G. Reynolds, *Chairman*
Randall L. Braddom
Alice L. Garrett
Nancye B. Holt
Mary W. McKenzie
John L. Melvin
Martha A. Minter
Don A. Olson
Charles R. Poor
Judith H. Stanton
Carroll J. Wendland
Nancy M. Crewe (ex-officio)

LINK (CONGRESS/ACADEMY) LIAISON

Henry B. Betts, *Chairman*
John E. Affeldt
John W. Goldschmidt
G. Keith Stillwell
Creston C. Herold

HISTORY OF THE CONGRESS

Paul A. Nelson, *Chairman*
Herman J. Flax
Glenn Gullickson, Jr.
Miland E. Knapp
Sidney Licht
James W. Rae

COMMITTEE ON ENVIRONMENTAL AND SOCIAL ASPECTS OF REHABILITATION

Nancy M. Crewe, *Chairman*
Arthur S. Abramson
Gary L. Albrecht
Jack Catlin
Byron B. Hamilton
Edward J. McCarron
Saad Z. Nagi
Marilyn Pires
Glenn Reynolds
David D. Stock
Alfred J. Szumski
Ruth Ann Watkins

AD HOC COMMITTEE ON REHABILITATION OF CHILDREN

Daniel Halpern, *Chairman*
Glenda Ashley
Marjorie A. Katz
Patricia L. Sand
Harold M. Sterling
Thomas E. Strax
Patricia M. Sweeney

EDITORIAL BOARD

G. Keith Stillwell, *Chairman*
Alfred J. Szumski, *Associate Editor*
Wilbert E. Fordyce
William M. Fowler, Jr.
Jacquelin Perry
Carlos Vallbona

LIAISON REPRESENTATIVES

American College of Sports Medicine..... John P. Utz, III
 American Hospital Association..... Joseph N. Schaeffer
 International Association of Rehabilitation Facilities..... William J. Erdman, II
 National Easter Seal Society for Crippled Children and Adults.... Leonard F. Bender

COULTER LECTURERS

Kristian G. Hansson—1951
 Frank H. Krusen—1952
 Otto Glasser—1953
 Walter J. Zeiter—1954
 William H. Schmidt—1955
 Frederic J. Jung—1956
 Fred B. Moor—1957
 Karl Harpuder—1958
 Robert L. Bennett—1959
 Philippe Bauwens—1960
 Donald L. Rose—1961
 Joseph G. Benton—1962
 Charles D. Shields—1963

Paul Dudley White—1964
 Howard A. Rusk—1965
 Verne T. Inman—1966
 Arthur S. Abramson—1967
 Frederic J. Kottke—1968
 William J. Erdman, II—1969
 Sidney Licht—1970
 Jesse L. Steinfeld—1971
 Edward W. Lowman—1972
 Paul A. Nelson—1973
 Henry B. Betts—1974
 James F. Garrett—1975

PAST PRESIDENTS

*Samuel B. Childs, 1923-1924
 *Curran Pope, 1924-1925
 *John S. Coulter, 1925-1926
 *Disraeli Kobak, 1926-1927
 *James C. Elsom, 1927-1928
 *Frank Walke, 1928-1929
 *Norman T. Titus, 1929-1930
 *Roy W. Fouts, 1930-1931
 *Frank H. Ewerhardt, 1931-1932
 *Gustav Kolischer, 1932-1933
 *Albert F. Tyler, 1933-1934
 *William J. Clark, 1934-1935
 *John S. Hibben, 1935-1936
 *William Bierman, 1936-1937
 Frederick L. Wahrer, 1937-1938
 *Frank H. Krusen, 1938-1939
 *William H. Schmidt, 1939-1940
 Nathan H. Polmer, 1940-1941
 *Abraham R. Hollender, 1941-1942
 Fred B. Moor, 1942-1943
 *Kristian G. Hansson, 1943-1944
 Miland E. Knapp, 1944-1945
 Miland E. Knapp, 1945-1946
 *Walter S. McClellan, 1946-1947
 H. Worley Kendell, 1947-1948
 *O. Leonard Huddleston, 1948-1949
 Earl C. Elkins, 1949-1950

Arthur L. Watkins, 1950-1951
 Robert L. Bennett, 1951-1952
 *Walter M. Solomon, 1952-1953
 *William B. Snow, 1953-1954
 William D. Paul, 1954-1955
 William D. Paul, 1954-1955
 Gordon M. Martin, 1955-1956
 A. B. C. Knudson, 1956-1957
 Donald L. Rose, 1957-1958
 Arthur C. Jones, 1958-1959
 Frederic J. Kottke, 1959-1960
 Donald A. Covalt, 1960-1961
 Donald J. Erickson, 1961-1962
 Jerome S. Tobis, 1962-1963
 Charles D. Shields, 1963-1964
 William J. Erdman, II, 1964-1965
 Lewis A. Leavitt, 1965-1966
 Edward W. Lowman, 1966-1967
 Sidney Licht, 1967-1968
 William A. Spencer, 1968-1969
 Jerome W. Gersten, 1969-1970
 Herman J. Flax, 1970-1971
 Leonard D. Policoff, 1971-1972
 James W. Rae, 1972-1973
 Rene Cailliet, 1973-1974
 John W. Goldschmidt, 1974-1975
 *Deceased

AMERICAN CONGRESS OF REHABILITATION MEDICINE

Awards of Merit by the American Congress of Physical Therapy: Decorations, medals, badges and citations have long been in vogue with ruling or military authorities to reward conspicuous service to the state in time of war or peace. Scientific bodies and endowed organizations have adopted similar

measures of award in the form of material emoluments, subsidies, medals or certificates of honor, not only to reward workers in human endeavors for distinguished service to the cause of science, but to stimulate special efforts for the benefit of mankind.

Appreciating that human psychology is such as to crave some form of recognition or distinction for special accomplishments, the Board of Governors of the American Congress of Physical Therapy decided to award annually a gold key or a certificate of merit to such members of the medical and applied professions who have rendered extraordinary service to the cause of Physical Therapy.

—From Archives of Physical Therapy, X-Ray, Radium, September, 1932; p. 554.

GOLD KEY AWARD RECIPIENTS

1932

William L. Clark
Jacques Arsenee d'Arsonval
F. Howard Humphris
Howard Kelly
Gustav Kolischer
Frederick de Kraft
Albert F. Tyler

1933

Gustavus M. Blech
Gustav Bucky
Harvey Cushing
Claudius Regaud
Walter John Turrell

1934

Oscar Bernhard
Henry Bordier
W. W. Coblentz
LeRoy Watkins Hubbard
Franz Nagelschmidt

1935

Friedrich Dessauer
Joel Ernest Golthwait
Stephan Leduc
A. Rollier
Joseph W. Schereschewsky
Willis R. Whitney

1936

Edwin Beer
Sir Henry Gauvain
Stefan Jellinek
Joseph Plotnikow

1937

Kurt Huldshinsky
Louis Edouard Lapicque

1938

Henry C. Bazett
Albert Bessemans
Harry E. Mock

1939

A. Bern Hirsh
James B. Mennell
Joseph A. Riviere
Edward C. Titus

1940

George Washington Crile
Abraham Risel Hollender
Charles F. Kettering
Disraeli Kobak
Malcolm T. MacEachern
William Ferdinand Petersen
Horatio Burt Williams

1941

Bernard M. Baruch
William Bierman
W. S. C. Copeman
Franklin D. Roosevelt

1942

Elizabeth Kenny

1943

John S. Coulter

1944

Herman L. Kretchmer
Frank H. Krusen

1945

No award was made

1946

Ralph Pemberton

1947

Lord Thomas Horder
Andrew C. Ivy
Major General

Norman T. Kirk

1948

Frank Henry Ewerhardt
Richard Kovacs

1949

No award was made

1950

Svend Clemmesen
Kristian G. Hansson
Harry M. Hines

1951

Howard A. Carter
Stafford L. Osborne
Winfred Overholser
Walter J. Zeiter

1952

Basil O'Connor

1953

George C. Deaver
Henry H. Kessler

1954

George Morris Piersol

1955

Robert L. Bennett
Earl C. Elkins
Walter M. Solomon
(Posthumous)

1956

Miland E. Knapp

1957

Karl Harpuder
William H. Schmidt

1958

Howard A. Rusk
Arthur L. Watkins

1959

Fred B. Moor

1960

Philippe Bauwens

1961

Frederic J. Kottke

1962

Donald A. Covalt
A. B. C. Knudson

1963

Louis B. Newman
Eugene J. Taylor

1964

Thomas L. DeLorme
Mary E. Switzer

1965

Glenn Gullickson, Jr.
Paul A. Nelson

1966

Arthur S. Abramson
William J. Erdman, II

1967

Ernest Fischer
W. T. Liberson

1968
Joseph G. Benton
Edward E. Gordon
1969
Elizabeth Licht
Sidney Licht
1970
Ernest W. Johnson
Edward W. Lowman

1971
Paul M. Ellwood, Jr.
Justus F. Lehmann
1972
William A. Spencer
1973
Hubert H. Humphrey
G. Keith Stillwell

1974
Martha T. Sarno
1975
Harriet E. Gillette
Mary Lasker
Mieczyslaw Peszczynski

EXECUTIVE COUNCIL

The Executive Council of the American Congress of Rehabilitation Medicine is composed of all living past presidents of ACRM. Chairman of the Council is the immediate past president. Council secretary is the ACRM president of two years ago. A list of *all* former presidents of the Congress is published annually in the ACRM Membership Directory. Current members of the Executive Council, in alphabetical order, are:

Robert L. Bennett (1951-52)
†Rene Cailliet (1973-74)
Donald A. Covalt (1960-61)
Earl C. Elkins (1949-50)
William J. Erdman, II (1964-65)
Donald J. Erickson (1961-62)
Herman J. Flax (1970-71)
Jerome W. Gersten (1969-70)
*John W. Goldschmidt (1974-75)
Arthur C. Jones (1958-59)
H. Worley Kendell (1947-48)
Miland E. Knapp (1944-46)
A. B. C. Knudson (1956-57)
Frederic J. Kottke (1959-60)
Lewis A. Leavitt (1965-66)
Sidney Licht (1967-68)
Edward W. Lowman (1966-67)

Gordon M. Martin (1955-56)
Walter S. McClellan (1946-47)
Fred B. Moor (1942-43)
William D. Paul (1954-55)
Leonard D. Policoff (1971-72)
Nathan H. Polmer (1940-41)
James W. Rae (1972-73)
Donald L. Rose (1957-58)
Charles D. Shields (1963-64)
William B. Snow (1953-54)
William A. Spencer (1968-69)
Jerome S. Tobis (1962-63)
Frederick L. Wahrer (1937-38)
Arthur L. Watkins (1950-51)

†*Council secretary*

**Council chairman*

AUXILIARY

President	Mrs. Jesse A. (Jeannette) Bowers, San Diego, CA
Vice President	Mrs. Joseph (Ella Rose) Davis, Louisville, KY
Secretary	Mrs. John E. (Nancy) Quast, St. Paul, MN
Membership	Mrs. Creston C. (Dottie) Herold, Glenview, IL
Nominating Committee	Mrs. Samuel (Connie) Sherman, Pittsburgh, PA
	Mrs. David (Rose) Ernstoff, Lake Success, NY

AMERICAN CONGRESS OF REHABILITATION MEDICINE

53rd Annual Session

Schedule of Daily Activities

Wednesday, November 10

- 7:00- 8:30 CONGRESS COMMITTEE BREAKFAST MEETINGS
MEMBERSHIP—Committee Room
ENVIRONMENTAL & SOCIAL ASPECTS—
Senate Room
1977 PROGRAM—Forum Room
- 8:00- 6:00 Convention REGISTRATION—South Foyer
- 8:00- 6:00 Convention HEADQUARTERS/AUDIO VISUAL
READY—South Press Room
- 8:00- 6:00 Convention PRESS—North Press Room
- 8:00-12:00 Auxiliary HOSPITALITY—Tiki Hut
- 8:30-12:00 JOINT CONGRESS/ACADEMY SCIENTIFIC
SESSION 51—California Room
*Symposium on New Concepts in the Management of
Rheumatoid Arthritis*
- 8:30-12:00 SCIENTIFIC PAPER SESSIONS
SESSION 52—Chamber Room
SESSION 53—Cabinet Room
SESSION 54—Council Room
- 10:00-10:30 COFFEE BREAK at EXHIBITS
- 12:00- 1:15 LUNCH INTERMISSION/VISIT EXHIBITS
- 1:15- 5:00 CONGRESS PLENARY SESSION
- 1:15- 2:30 SESSION 55—California Room
PRESIDENTIAL ADDRESS
- 2:30- 3:00 COFFEE BREAK/VISIT EXHIBITS
- 3:00- 5:00 SESSION 56—California Room
Forum on Relevance of Rehabilitation to the Consumers
- 5:00- 6:30 CONGRESS ANNUAL BUSINESS MEETING
(1st Session)—Golden West Room
- 7:30- 9:00 SESSION 57—California Room
CANDLELIGHT ROUNDTABLES
Rehabilitation Practices
Professional Development
Geriatrics
Rehabilitation of Children
Psychologists in Rehabilitation
Scientific Program
Nursing in Rehabilitation
SEAR
Outlook for National Health Insurance

Thursday, November 11

- 7:00- 8:30 CONGRESS BREAKFAST SESSIONS:
MEET-THE-EXPERT
SESSION 58—Senate Room
SESSION 59—Committee Room
SESSION 60—Sunset Room
SESSION 61—Sunrise Room
SESSION 62—Esquire Room
SESSION 63—Towne Room
- 8:00- 6:00 Convention REGISTRATION—South Foyer
8:00- 6:00 Convention HEADQUARTERS/AUDIO VISUAL
READY—South Press Room
- 8:00- 6:00 Convention PRESS—North Press Room
8:00-12:00 Auxiliary HOSPITALITY—Tiki Hut
8:30-12:00 SESSION 64—California Room
Forum on *Athletic Competition by the Disabled*
- 10:00-10:30 COFFEE BREAK/VISIT EXHIBITS
8:30-12:00 SCIENTIFIC PAPER SESSIONS
SESSION 65—Council Room
SESSION 66—Chamber Room
SESSION 67—Cabinet Room
SESSION 68—Forum Room
SESSION 69—Senate Room
- 9:00- 1:00 SCIENTIFIC FILM THEATER—Committee Room
(continuous showings)
- 12:15- 2:15 CONGRESS COULTER LECTURE/AWARDS
LUNCHEON—Golden West Room
- 2:30- 4:30 SCIENTIFIC PAPER SESSIONS
SESSION 70—Council Room
SESSION 71—Chamber Room
SESSION 72—Cabinet Room
SESSION 73—Forum Room
SESSION 74—Senate Room
SESSION 75—Committee Room
- 2:30- 4:00 CONGRESS BOARD OF GOVERNORS MEETING—
Esquire Room
- 4:00- 4:30 COFFEE BREAK
4:30- 6:00 CONGRESS ANNUAL BUSINESS MEETING—
(2nd Session)—California Room
- 6:30- 8:00 CONGRESS PRESIDENTIAL RECEPTION—
Convention Center Foyer

Friday, November 12

- 7:00- 8:30 CONGRESS BREAKFAST SESSIONS:
MEET-THE-EXPERT
SESSION 76—Senate Room
SESSION 77—Committee Room
SESSION 78—Sunset Room

SESSION 79—Sunrise Room
 SESSION 80—Esquire Room
 SESSION 81—Towne Room
 8:00-12:00 Convention REGISTRATION—South Foyer
 8:00-12:00 Convention HEADQUARTERS/AUDIO VISUAL
 READY—South Press Room
 8:00-12:00 Convention PRESS—North Press Room
 8:30-12:00 SESSION 82—California Room
 *Forum on Basic and Clinical Research and What's New in
 Spinal Cord Injury*
 10:00-10:30 COFFEE BREAK
 8:30-11:55 SCIENTIFIC PAPER SESSIONS
 SESSION 83—Council Room
 SESSION 84—Chamber Room
 SESSION 85—Cabinet Room
 * * *

Friday, November 12 - Sunday, November 14

Continuing Education Course meeting the criteria for 31 hours of credit in Category I for Physician's Recognition Award of the American Medical Association.

"PHYSICAL DISABILITY, SEXUAL ATTITUDES AND
 COUNSELING PROGRAM"
 (Advance Registration Only)
 * * *

Wednesday A.M.

OFFICIAL PROGRAM
AMERICAN CONGRESS OF
REHABILITATION MEDICINE

53rd Annual Session

NOTE: ☆ This star indicates that the Session is an accredited course. See page 14 in the Academy program for the official listing of Accredited Courses under Category I of the AMA Continuing Medical Education Program.

Wednesday, November 10

- 8:30-12:00 ☆ **SESSION 51—California Room**
Symposium on New Concepts in the Management of Rheumatoid Arthritis
Moderator—
SAM C. COLACHIS, JR., M.D., Director of PM&R, St. Luke's Hospital Medical Center, Phoenix, AZ
- 8:30 **Selection and Sequence of Lower Extremity Surgery**
F. RICHARD CONVERY, M.D., Associate Professor of Surgery/Orthopaedics; Director of Rehabilitation, Division of Orthopaedics and Rehabilitation, UCSD, San Diego, CA
- 9:30 **Aids and Equipment Adaptions**
KAREN L. CONNETT, O.T.R., Occupational Therapist; Division of Orthopaedics and Rehabilitation, UCSD, San Diego, CA
- 10:00 **COFFEE BREAK/VISIT EXHIBITS**
- 10:30 **Implant Arthroplasty of the Elbow and Wrist**
F. RICHARD CONVERY, M.D.
- 11:00 **New Methods for Patient Evaluation**
MARTHA A. MINTEER, M.D., Assistant Professor of Surgery; Co-Director of Rehabilitation Medicine, Division of Orthopaedics and Rehabilitation; Director of Rehabilitation Services, UCSD, San Diego, CA
- 11:30 **Psychological Aspects of the Juvenile Rheumatoid Arthritic**
SUSANNE EMERSON, O.T.R., M.A., Counseling Services, Division of Orthopaedics and Rehabilitation, UCSD, San Diego, CA
- 11:45 **Home Based Employment**
MICHAEL J. MC GRAW, ED.D., Vocational Counselor, Division of Orthopaedics and Rehabilitation, UCSD, San Diego, CA
- 8:30-12:00 **SCIENTIFIC PAPER SESSIONS**
SESSION 52—Chamber Room

Chairman—

CARROLL J. WENDLAND, PH.D., Los Angeles, CA

Co-Chairman—

NANCY M. CREWE, PH.D., Minneapolis, MN

8:30

Monitoring of Bacterial Habitation of the Urinary Bladder in Patients Undergoing Intermittent Catheterization Following Spinal Cord Injury

Intermittent catheterization has become a well-accepted method of management of the neurogenic bladder following spinal cord injury. Its advantages include the preservation of bladder capacity in many cases; the freedom from an indwelling catheter provides a rationale to rid the bladder of all bacterial growth by treating asymptomatic bacteruria. Many reports in the literature describe sterile urine at discharge or followup evaluations, but few describe the day-to-day relationships of bacterial invasions of the neurogenic bladder. In an effort to improve the program monitoring of our Intermittent Catheterization Team, we reviewed the daily bacteriologic reports of 60 patients throughout the course of their bladder training. As expected, habitation by bacteria frequently did not produce symptomatic urinary tract infection. However, the frequency of habitation and therefore the number of times the bladder was at risk of infection was surprising, and while it varied directly with the length of time the patient was treated, it did not seem related to the frequency of urethral catheterization. This data is presented along with data describing the frequency of reappearance of the same organism, or a new organism in the bladder after discontinuation of antibiotics as well as the appearance of organisms while the patient is on antibiotics.

WILLIAM H. DONOVAN, M.D., Department of Rehabilitation Medicine, University of Washington, Seattle, WA

DIANE E. CLOWERS, R.N., Department of Rehabilitation Medicine, University of Washington, Seattle, WA

MICHAEL R. CLOWERS, PH.D., Department of Rehabilitation Medicine, University of Washington, Seattle, WA

JUSTUS F. LEHMANN, M.D., Department of Rehabilitation Medicine, University of Washington, Seattle, WA

8:50

Effectiveness of Intermittent Catheterization in Reducing Urologic Problems Associated With Neurogenic Bladder—A Ten Year Study of Treatment of Neurogenic Bladder in Spinal Cord Injured Patients

The Rehabilitation Unit at Albany Medical Center Hospital instituted a program of early admission and complete rehabilitation of spinal cord injured patients in 1973, providing immediate access to all rehab modalities by the patient. Emphasis was placed on treatment of neurogenic bladder by early institution of intermittent catheterization with the cooperation of the Department of Urology. Intermittent catheterization is part of the routine daily nursing care. Our staff nurses receive in-service instruction in performing this procedure with strict aseptic technique as developed in our unit, and perform all catheterizations. Before this emphasis on early admission and bladder rehabilitation, we had treated 131 patients with neurogenic bladder secondary to SCI, primarily with indwelling catheter drainage. Voiding "trials" were done depending upon return of neurologic function. Forty percent of these patients were discharged with indwelling catheters; 8% required urinary diversion surgery (ileal conduit). Since 1973; only 16% of the 93 patients included in this program were discharged on catheter drainage. One patient had an "elective" urinary diversion. Problems related to neurogenic bladder—calculi formation, fistulae, infection—were significantly re-

Wednesday A.M.

duced. Self-catheterization was taught to 18 patients. Follow-up indicates that intermittent catheterization is the treatment of choice to minimize urologic problems in SCI patients.

PATRICIA DONAHUE, R.N., B.A., Albany Medical Center Hospital, Albany, NY

ROBERT H. CRESS, M.D., Albany Medical Center Hospital, Albany, NY

9:10

Clinical Evaluation of a New Catheter-Kit for Sterile Non-Touch Intermittent Catheterization

Sterile catheterization using traditional techniques is a multi-step, complex procedure for patients to learn. In addition, it is difficult to perform this procedure out of bed, thus making intermittent catheterization impractical for the mobile person. In order to resolve these problems a new catheter kit consisting of a catheter in a flexible sterile collecting chamber was developed. The technique using the kit eliminates excess equipment, is pocket-sized, may reduce cost, yet provides sterile non-touch catheterization. Clinical evaluation was carried out to confirm ease of learning, efficiency and convenience in using the new kit. Each spinal cord injured male subject performed self intermittent catheterization using the traditional set and the new kit. A nurse observed repeated catheterizations and recorded: (1) degree of difficulty on a numerical scale; (2) length of time for catheterization; (3) place of catheterization (bed or wheelchair). The relative advantages and disadvantages of both methods were determined. Preliminary observations indicate that the new catheter kit is preferred by both patients and nurses because of the simplicity and decreased risk of contamination, in addition to less material and professional time involved. Those subjects who catheterized in the wheelchair were successful and found the kit convenient to use.

YEONG-CHI WU, M.D., Lakeside VA Hospital, Chicago; Rehabilitation Institute of Chicago, Chicago

ROSEMARIE B. KING, R.N., Rehabilitation Institute of Chicago, Chicago

BYRON B. HAMILTON, M.D., PH.D., Rehabilitation Institute of Chicago, Chicago

9:30

Intermittent Bladder Emptying via Urethral Catheterization and a Cystocath: A Comparison Study

Intermittent bladder emptying via a urethral catheter has become the favored method of bladder management following spinal cord injury in recent years. Its advantages over other methods, including indwelling Foley catheter, indwelling suprapubic catheter, and early urinary diversion are generally accepted. An alternate method of providing intermittent bladder emptying is described in this paper. The silastic "cystocath" has been available for some time and has been utilized chiefly to provide bladder drainage in males with problems distal to the bladder neck, and in females following vaginal surgery. This study describes its use as a method of providing intermittent bladder emptying following acute complete spinal cord injury and compares intermittent bladder emptying in this fashion with standard urethral intermittent catheterization. The successes and the complications of both forms of treatment are described as well as the usefulness of the cystocath in allowing the early resumption of intermittent bladder emptying following sphincterotomy for those patients who required this procedure.

WILLIAM H. DONOVAN, M.D., Department of Rehabilitation Medicine, University of Washington, Seattle, WA

MARK D. KIVIAT, M.D., Department of Rehabilitation Medicine, University of Washington, Seattle, WA

Wednesday A.M.

DIANE E. CLOWERS, R.N., Department of Rehabilitation Medicine, University of Washington, Seattle, WA

JUSTUS F. LEHMANN, M.D., Department of Rehabilitation Medicine, University of Washington, Seattle, WA

9:50-10:20 Coffee Break/Visit EXHIBITS

10:20 Training of Second Generation Trainers in Sexuality and Physical Disability

For approximately five years, the University of Minnesota's Program in Human Sexuality and the Department of Physical Medicine and Rehabilitation have been training professionals and rehabilitation practitioners in understanding and working with the sexuality of disabled people. In recent years, several other major rehabilitation centers have also been doing training and research in sexuality and physical disability. Still the demand for training of additional rehabilitation personnel exceeds our abilities to provide that training. In order to meet this need, an exportable training package has been developed to train rehabilitation practitioners to include sexuality with other aspects of their work with physically disabled adults. Training is done in two segments. The first is experimental learning about sexuality and counseling. The second segment is for training of trainers. It teaches the participants awareness, group interactional skills, instructional problem-solving, curriculum options and media selection. The training package includes evaluation procedures and a complete audiovisual kit of movies, slides, video tapes, music, a step-by-step instructor's book and a resource manual. The kit has been field-tested by second generation trainers. Evaluation of the kit and the trainers by participants shows both to be successful. The trainers were rated favorably in the areas of knowledge, accountability, honesty, comfort, confidence, concern and flexibility.

THEODORE M. COLE, M.D., Professor, Department of PM&R, University of Minnesota Medical School, Minneapolis, MN

SANDRA S. COLE, B.A., Coordinator, Program in Human Sexuality, Physical Disabilities Section, University of Minnesota Medical School, Minneapolis, MN

10:40 Sex—A Rehabilitation Issue: What Priority and When?

The purpose of this investigation was to examine the relative importance of sexuality in a rehabilitation hospital as it compares with other rehabilitation issues, and to compare the patients' hierarchy of goals with those of their therapists. It was hypothesized that sex would be less important than such variables as ambulation, ADL, muscle strengthening, pain relief, transfer ability and transportation during the early stages of the rehabilitation program for both patients and therapists, and that sexuality would not increase as a relative priority as the patients progressed through the in-patient rehabilitation program. It was also hypothesized that sexuality would be more important for the psychosocial disciplines than it would be for the medically-oriented disciplines, such as physical therapy, occupational therapy, and physical medicine. One hundred patients ranging in age from 16 to 65 and with a variety of disabilities were asked to rank seven rehabilitation variables early in the program, in the middle of the hospitalization, and just prior to discharge. Therapists treating these patients were also asked to rank what they believed to be the hierarchy of important variables for their patients. Data was analyzed statistically, using the Rank Correlation and the Kruskal Wallis Analysis of Variance. Results and implications are discussed.

PHILIP SPERGER, ED.D., Director of Psychological Services, Moss Rehabilitation Hospital, Philadelphia, PA

DAVID ROSENTHAL, D.O., Assistant Medical Director, Moss Rehabilitation Hospital, Philadelphia, PA

Wednesday A.M.

**BERNARD W. ALBERT, ED.D., Assistant Executive Director,
Moss Rehabilitation Hospital, Philadelphia, PA**

11:00

**Sexual Attitudes, Behavior and Satisfaction for Able-Bodied
and Disabled Participants Attending Workshops in Human
Sexuality**

One of the most effective and widely used educational techniques to help raise the consciousness of health professionals and consumers concerning sexual issues has been the Sexual Attitude Reassessment (SAR) program originally developed by the National Sex and Drug Forum of San Francisco and later adapted for rehabilitation professionals and clients by the University of Minnesota. Over the past four years a similar SAR program has been sponsored by the Texas Institute for Rehabilitation and Research. Although reassessment of personal sexual attitudes is the primary objective of the program, several closely related objectives have emerged: (1) evaluate the impact of the workshop on changing both sexual attitudes and behaviors; (2) evaluate the sexual satisfaction and problem areas of participants with particular reference to persons with physical disabilities; and (3) provide an institute-wide catalyst for initiating programs and services based on newly identified, unmet needs. This paper presents data from 15 workshops with emphasis on comparing the sexual attitudes, behavior and satisfaction between the able-bodied and disabled participants. Of the 650 participants, 98 or 15% were disabled and of this group approximately 75% had spinal cord injury. Comparison of pre-and post-workshop responses to sexual attitude scales showed similar and significant changes on 6 of 9 scales for both the able-bodied and disabled groups. Analysis of sexual behavior and satisfaction by physical status revealed that the disabled participants were less active than the able-bodied participants although both groups reported a similar percentage of satisfaction (44%) with their current level of sexual activity. Lack of partners was cited most frequently by both groups as the major reason for dissatisfaction with current sexual status. Implications of these findings are discussed and compared with similar data in the literature. Specific service and research programs designed to impact on newly identified, unmet needs are described.

**LAURO S. HALSTEAD, M.D., Assistant Professor, Department
of Rehabilitation, Community Medical and Physical Medi-
cine, Baylor College of Medicine, and Texas Institute for
Rehabilitation and Research, Houston, TX**

**M. G. HALSTEAD, M.S., Instructor, Department of Psychiatry,
Baylor College of Medicine, Houston, TX**

**JOYCE T. SALHOOT, M.S.W., Texas Institute for Rehabilita-
tion and Research, Houston, TX**

**DAVID D. STOCK, M.S.W., Texas Institute for Rehabilitation
and Research, Houston, TX**

**R. W. SPARKS, B.S., Texas Institute for Rehabilitation and
Research, Houston, TX**

11:20

**Sexuality and Sexual Attitudes of Congenitally Disabled
Clients—A Parent Education Approach**

Congenitally disabled adults are frequently found to have less than optimum attitudes about their own sexuality and capacity for interpersonal intimacy. Over the past several years methods for dealing in a rehabilitation setting with the sexuality of the disabled persons have been much more successful with people injured as adults or teenagers, than with persons affected since birth or childhood. This study is based on the principle that enabling attitudes regarding sexuality of parents will help with the development of good attitudes in handicapped children. Twenty parent couples of

disabled children were enrolled randomly into one of four methods currently available for dealing with sexual attitudes and disability: The General Disability Sexual Attitude Reassessment Seminar at the University of Minnesota School of Medicine; a parent-couple discussion group meeting weekly for three months; a fathers' group; a mothers' group and a situation where father and mother were in separate but simultaneous groups. Comfort with sexuality, disability and sexual attitudes was assessed before and after the programs. All showed an improvement in comfort level with sexuality; the parent-couple group showed the most.

JOSEPH T. CAPELL, M.D., Assistant Professor, Department of PM&R, University of Minnesota Hospitals, Minneapolis, MN
RONALD BATEMAN, D.O., Medical Fellow, Department of PM&R, University of Minnesota Hospitals, Minneapolis, MN
BARBARA CAPELL, Consultant, Program in Human Sexuality, University of Minnesota Medical School, Minneapolis, MN

11:40

Sexual Potential of Spinal Cord Injured Veterans Living in the Community

Most studies of sexual function in spinal cord injury (SCI) view sexuality as an isolated entity separated from other rehabilitation needs. In contrast, this research presents a multi-dimensional approach to the study of adjustment to disability by examining psycho-social, sexual and vocational factors which are relevant to successful rehabilitation. Data were gathered from interviews conducted by the investigators with 145 SCI out-patients from the Veterans Administration Hospital, Bronx, N.Y. An Index of Sexual Potential was developed based on factors such as adaptation to sexual limitations, partner satisfaction, sexual self-concept and regularity of sexual contact. The Index was correlated with 24 variables permitting a description of significant factors which are related to successful sexual rehabilitation. Higher scores on the Index were significantly and positively associated with better physical function, higher level of income, the roles of provider, worker and community participant, higher morale, injury at an earlier age, current age 30 to 49, positive attitudes of self-acceptance and independence. Abstinence as a form of adjustment is also considered. While the medical definition of sexual potential usually focuses on genital function, sexuality is here viewed as a dynamic learning process where sexual satisfaction is derived through a relationship with a partner. The implications of the findings for professionals concerned with the adjustment of SCI persons living in the community are discussed.

ANNE H. BERKMAN, M.A., Sex Counselor, Spinal Cord Injury Service, VA Hospital, Bronx, NY

MAXWELL FRIELICH, M.ED., Department of Psychology, VA Hospital, Bronx, NY; Instructor, Psychology Department, Fairleigh Dickson University, Fairleigh, NJ

RAY WEISSMAN, M.A., National Child Labor Committee, formerly Department of Rehabilitation Medicine, Albert Einstein College of Medicine, Bronx, NY

SESSION 53—Cabinet Room

Chairman—

NANCY B. HOLT, M.S., R.N., Chicago, IL

Co-Chairman—

JANET K. DUTTARER, M.A., R.P.T., Downey, CA

8:30

The Day Hospital—A New Option in Rehabilitation Medicine

Wednesday A.M.

The Burke Day Hospital, a demonstration project funded by the Department of HEW, was concluded on June 30, 1975. Its primary objective was to test the effectiveness and feasibility of a day hospital for physically disabled adults within rehabilitation hospital. A research population of 153 patients were judged admissible and then randomized with a resulting control group of 75 patients who did not receive services and an experimental group of 78 patients admitted to the day hospital treatment program. A comprehensive evaluation of each patient was done three times during a nine-month period. Resulting data indicate that the experimental group improved significantly over the control group in mental status, physical therapy, activities of daily living, speech and hearing, and in patient rating of own personal life. The day hospital had as its initial goal a maximum daily census of 40 patients over 55 years of age. The program has continued beyond the funding period and is now a self-supporting division of Burke Rehabilitation Center, averaging a daily census of 56 patients in three different levels of care and ranging in age from 15 to 93 years.

CHARLOTTE M. HAMILL, M.A., M.S.S.W., Co-Director, Day Hospital of Burke Rehabilitation Center, White Plains, NY
ROBERT C. OLIVER, M.A., Co-Director, Day Hospital of Burke Rehabilitation Center, White Plains, NY

8:50

The Development of a Rehabilitation Nursing Program within a Medical Center

Nationally, there is a scarcity of nurses with educational preparation and clinical experience in comprehensive physical rehabilitation. The purpose of this presentation is to describe the development of a program in rehabilitation nursing within a university medical center. The nursing component was part of the total development of physical medicine and rehabilitation services in the medical center. The program was designed to respond to both the patients' need for skilled nursing care and staff and students' need for education and clinical experience. Inherent in program design was the unique nature of the appointment of the author within the medical center. A triple appointment was negotiated and attained: rehabilitation nurse clinical specialist to the primary teaching hospital and faculty positions in both the College of Nursing and College of Medicine. Strategies employed within this comprehensive, yet flexible, appointment are analyzed relative to strengths and weaknesses. Outcomes as reflected by staff growth and turnover rate, student evaluations, and follow-up on the pursuit of career goals relevant to rehabilitation nursing over a five-year period are presented.

MARY ANN MIKULIC, M.N., R.N., VA Hospital, Seattle, WA

9:10

Mixing the Sexes on a Rehabilitation Unit

To maximize occupancy, it was decided to mix males and females within the same room on a 16-bed, 3-room rehabilitation unit. To determine patient acceptability, an attempt was made to establish telephone contact with 112 consecutive admissions at a time several months following discharge. Sixty replies were obtained from patients who had been in a mixed sex room. Fifty-five patients considered the arrangement acceptable while only six found it unacceptable. Results have also been tabulated with regard to age and sex. Many patients admitted to having initial apprehension about this arrangement, but 56 stated that they became more comfortable with it during their hospital stay. Based on these positive results, this practice has been continued to a limited degree on a new unit containing 20 beds in 8 rooms.

CHARLES J. GIBSON, M.D., Division of Rehabilitation Medicine, University of Rochester School of Medicine and Dentistry, Rochester, NY

RUTH E. WEISS, M.S.W., Division of Rehabilitation Medicine, University of Rochester School of Medicine and Dentistry, Rochester, NY

Wednesday A.M.

DEAN S. HALLAUER, PH.D., Division of Rehabilitation Medicine, University of Rochester School of Medicine and Dentistry, Rochester, NY

9:30 Eight-Patient Module: A New Approach to Staffing

In an effort to solve problems of expansion in a rehabilitation center, a unique organizational design that provides a new level of comprehensive rehabilitation team care has been tested over a two-year period. Other centers have been organized by departments or patient diagnoses. This system is built around a group of eight patients and appropriate rehabilitation team members in order to provide optimal team identity and individualized care. This "modular" care system reflects the complexity of patient and family treatment needs and maximum responsibility for team members. Analysis of each module's composition, staffing ratios and supervisory requirements will be presented. Staff, patient and family impressions of the quality of patient care and staff communication will be discussed.

JOHN E. EISELE, M.D., Medical Director, Donald N. Sharp Rehabilitation Center, San Diego, CA

MARJORIE MERRILL, R.N., Rehabilitation Nursing Supervisor, Donald N. Sharp Rehabilitation Center, San Diego, CA

ANNA GOMEZ, B.S., R.P.T., Physical Therapy Supervisor, Donald N. Sharp Rehabilitation Center, San Diego, CA

ELEANOR FOWLER, M.A., R.N., Liaison Nurse, Donald N. Sharp Rehabilitation Center, San Diego, CA

9:50-10:20 Coffee Break/Visit EXHIBITS

10:20 The Effect of Diabetes on the Hearing of Stroke Patients

This study investigated the clinical observation that stroke patients with diabetes have greater degree of hearing loss than the general population of stroke patients. Fifty adult-onset diabetic and 69 non-diabetic males and females were included in the study. The patients ranged in age from 42 to 75 years (mean 60 years) and were tested by pure tone audiometry at 250 through 8000 Hz bilaterally. Results by analysis of variance, controlling the factors of age, sex, otologic history and site of hemispheric damage, revealed that at all frequencies in both ears, the pure tone thresholds for the diabetic patients were significantly worse (to the .001 level) than those of the non-diabetic patients. A significantly greater percentage of the diabetic patients had some degree of conductive hearing loss, as compared to the non-diabetic patients. In summary, our diabetic population showed sensori-neural as well as conductive hearing deficits. Conductive hearing loss has not been described in diabetes mellitus.

LYNNE S. LIPTON, M.A., Rehabilitation Institute of Chicago, Chicago

VINOD SAHGAL, M.D., Rehabilitation Institute of Chicago, Chicago

10:40 Family Education Programs: Stroke and Spinal Cord Injury

Rehabilitation medicine today encompasses an ever-increasing need for the total involvement of family members of the severely disabled in the rehabilitation process. In an effort to fill this need, the team at Donald N. Sharp Rehabilitation Center, a 50-bed community rehabilitation facility, has developed an educational program specifically designed for families and friends of disabled patients. This paper presents specific information on the basic philosophy, structure, style and presentation of this team effort. The program explains in detail the unique approach taken by the rehabilitation

Wednesday A.M.

team for a maximally effective educational system for family members. It is geared to acquaint them thoroughly with the specific disability they are dealing with. The paper will show how emphasis is placed on building within each member a feeling for his importance as part of the rehabilitation team. Individual and group approaches are compared. The system of referral, methods of program evaluation, program materials and audiovisual aids, together with goals for future expansion, will be discussed.

JAMES DAGOSTINO, B.S., R.P.T., Staff Physical Therapist,
Donald N. Sharp Rehabilitation Center, San Diego, CA

DENNIS P. LANGTON, B.S., R.P.T., Staff Physical Therapist,
Donald N. Sharp Rehabilitation Center, San Diego, CA

MARJORIE MERRILL, R.N., Rehabilitation Nursing Supervisor,
Donald N. Sharp Rehabilitation Center, San Diego, CA

MINA WINOGRAD, M.S.W., L.C.S.W., Medical Social Worker,
Donald N. Sharp Rehabilitation Center, San Diego, CA

ELIZABETH HINKLE, M.S.W., Medical Social Worker, Donald
N. Sharp Rehabilitation Center, San Diego, CA

JOHN E. EISELE, M.D., Medical Director, Donald N. Sharp
Rehabilitation Center, San Diego, CA

11:00

Family Team Conference: A Dimension of Stroke Rehabilitation

The incidence of a stroke causes considerable anxiety and practical difficulties to family members. There is additional confusion which results from the difference between the acute care and the prolonged rehabilitation. For these reasons, a family team conference was established at the Massachusetts Rehabilitation Hospital. Its purpose was to relieve anxiety and explain the scientific and professional aspects of the team approach to rehabilitation. The family team conference was the essential teaching element and consisted of role descriptions presented by the representatives from the disciplines involved with the stroke rehabilitation program. It was accompanied by instructions to the families and a discussion of individual family-patient problems. The results of a 3-year study were used to evaluate the success of the conference. Records of family attendance were compared to the number of invitations issued. Questionnaires were completed by family members at the conference. It was found that the anxiety level of families was decreased. A better understanding of the team approach was indicated in more than 75% of those participating. More than 70% of the families felt more comfortable visiting their relatives and approaching team members with future questions. The family team conference has proved to be a practical instrument for expanding stroke rehabilitation to include the needs and the participation of the family.

RUTH E. DZAU, R.P.T., Massachusetts Rehabilitation Hos-
pital, Boston, MA

ANITA R. BOEHME, R.P.T., Massachusetts Rehabilitation Hos-
pital, Boston, MA

11:20

Multidisciplinary Stroke Information and Counseling: A One-Year Demonstration Project

This paper reports the evaluation of a program in stroke information and counseling which was designed to serve the families of stroke patients at a large metropolitan hospital. The program was conducted by a multidisciplinary team of rehabilitation specialists and consisted of weekly sessions. Information and counseling were provided at each session. The information portion of the program dealt with the nature, cause, treatment, and prevention of stroke while the counseling portion of the program was devoted to discussing family problems related to stroke. The family members of all new

admissions were invited to attend so that the stroke information portion of a session was repeated each week. The counseling portion of the session varied in content according to the needs of the families participating. Family members were invited to attend sessions whenever they felt the need for further counseling. Both participating families and rehabilitation specialists were asked to complete a questionnaire regarding the value of the program. In general, it was found that the program was effective in increasing the family's knowledge about stroke, reducing the family's anxiety toward the patient, and facilitating communication between family and patient. The rehabilitation specialists indicated that this multidisciplinary program facilitated their role in the rehabilitation of the stroke patient. These findings suggest that a stroke information and counseling program should be an integral part of a stroke rehabilitation.

PAUL R. RAO, M.A., C.C.C., VA Hospital, Fort Howard, MD

11:40

Meeting the Psychosocial and Emotional Needs of Stroke Patients and their families through Stroke Clubs

The patient who has suffered a stroke may have to cope with impaired communication ability, reduced intellectual efficiency, chronic physical disability, increased dependency, reduced memory and sensory deficits. Almost invariably, these problems are complicated by a lowering of emotional threshold and feelings of social isolation. The interaction of physical, emotional and communication problems has led to a holistic approach to rehabilitation involving a number of rehabilitation specialists. An important outgrowth of this multidisciplinary approach has been the development of stroke clubs. The first stroke club was organized in Galveston, Texas in 1968. Since that time, more than 100 clubs have evolved in various communities, both in the United States and abroad. Stroke clubs have proved to be a potent force in stroke rehabilitation because they provide psychosocial and emotional support, even after intensive rehabilitation procedures have been completed. This paper reviews group programs for stroke patients and their families and will present a theoretical model for the implementation of stroke clubs.

JOHN D. TONKOVICH, M.S., University of Tennessee, Department of Audiology and Speech Pathology, Knoxville, TN
THOMAS P. MARQUARDT, PH.D., University of Tennessee, Department of Audiology and Speech Pathology, Knoxville, TN

SESSION 54—Council Room

Chairman—

ALICE L. GARRETT, M.D., West Haverstraw, NY

Co-Chairman—

CHARLES T. BAKER, M.D., San Diego, CA

8:30

Odontoid Fractures Reconsidered

This study reviews the incidence, prevalence and significance of traumatic odontoid fractures both in patients with and without dislocations. Mechanisms of injury, involved structures, and symptoms are presented. An extensive literature review has been undertaken and are reviewed along with specific cases illustrating the different clinical syndromes. The multiple x-ray views needed and specific measurements utilized for diagnosis are discussed. The role of tomography in diagnosis of acute and evaluation of healing fractures is discussed as well as suggestions made for search for odontoid lesions in patients with or without other spinal cord injuries.

JOHN TOERGE, M.D., Resident, Northwestern University Medical School; Rehabilitation Institute of Chicago, Chicago

Wednesday A.M.

JOEL S. ROSEN, M.D., Assistant Professor, Northwestern University Medical School; Assistant Medical Director, Rehabilitation Institute of Chicago, Chicago

8:50

Functional Capacity and Cardiovascular Responses of Paraplegics During Arm Ergometry

Differences in cardiovascular responses to arm and leg exercise have been demonstrated in sedentary and conditioned normals. Little is known of the functional capacity and cardiovascular responses during arm exercise of paraplegics, who depend to a great extent on their upper extremities for transfers and mobility. Understanding of these responses and determination of limiting factors should aid rehabilitation efforts. Fifteen wheelchair paraplegics, whose paraplegia was secondary to traumatic myelopathy, were studied one year or longer after onset, and compared with sedentary controls. Measurements included anthropometric data, pulmonary functions, forearm blood flow, grip strength, oxygen consumption (VO_2), heart rate (HR), cardiac output (Q), stroke volume (V_s), and arteriovenous oxygen difference $[(A-V)\text{O}_2]$. A calibrated bicycle ergometer was modified for arm cranking. Compared with controls, the paraplegics had significant reductions at rest of maximal voluntary ventilation, VO_2 , Q, and V_s . The capacity for arm exercise was significantly less in paraplegics than in sedentary controls; the Q and V_s of the paraplegics were similarly reduced. As a group the long-term paraplegics in this study were deconditioned. Performance of self-care and daily living activities from a wheelchair is not sufficient to maintain high levels of physical conditioning. It would appear that higher intensity conditioning programs will be necessary to accomplish this end.

BARRY MILLER, M.D., Department of PM&R, University of Michigan Medical School, Ann Arbor, MI

GEORGE F. HEIGENHAUSER, PH.D., Department of Physiology, University of Michigan Medical School, Ann Arbor, MI

GREGORY L. RUFF, Medical Student, University of Michigan Medical School, Ann Arbor, MI

JOHN A. FAULKNER, PH.D., Department of Physiology, University of Michigan Medical School, Ann Arbor, MI

9:10

McCormick Loop for Weight Relief in Quadriplegics

The patient with a spinal cord injury may have many problems. Of these, pressure sores can be most troublesome and incapacitating and present a threat of his life and health. Many physical-mechanical modalities have been recommended for preventing pressure sores for example, different types of cushions, ultra-violet light, rubber donuts, etc. Of all the methods advocated, perhaps the one method which is consistently effective is prevention of prolonged pressure. The quadriplegic patient may find it difficult to relieve his weight himself when sitting unless he has triceps. The McCormick loop has been developed at the Rehabilitation Institute of Chicago to help these patients relieve their weight themselves. The construction of the loop and method of use is discussed. The loop has the following advantages: it is simple to construct and is inexpensive; patients find it convenient to use; it permits pressure relief without outside help which may be inconsistent or unavailable; it prevents development of pressure sores and also offers the psychological advantage to the patient of being able to relieve weight independently. It has proved to be of considerable value in preventing pressure sores at the Rehabilitation Institute of Chicago.

BEN AGARWALA, M.D., Staff Physiatrist, Rehabilitation Institute of Chicago, Chicago

TOBY ARNOLD, O.T.R., Occupational Therapist, Rehabilitation Institute of Chicago, Chicago

JUDY VICICH, O.T.R., Occupational Therapist, Rehabilitation
Institute of Chicago, Chicago

9:30

Wheelchair Cushions Effect on Skin Temperature

Wheelchair cushions are used to decrease pressure over the sitting surface. The primary etiologic factors of pressure and time in the pathogenesis of ischemic ulcers have been studied with various wheelchair cushions. However little is known about the cushions effect on the contributing factor of skin temperature. Since metabolism increases 10% for every degree of centigrade rise, this important factor was investigated. Ten normal subjects (5 males and 5 females) between the ages of 20 to 30 years sat quietly on five commonly used wheelchair cushions: four-inch latex rubber with nylon-vinyl cover; four-inch latex rubber with cotton-polyester cover; E & J gel cushion; Minnesota Mining Reston pad; and Jobst water floatation pad. Thermistors were attached to the skin over the ischial tuberosities and middle posterior thighs while the subjects sat on each cushion in a constant temperature room maintained at 25°C. Temperature recordings were obtained during each 30 minute sitting period. Both latex rubber cushions increased the skin temperature in all subjects ($x = +2.4^{\circ}\text{C}.$). The Jobst water floatation pad decreased temperature in all subjects ($x = -3.11^{\circ}\text{C}.$). The gel cushions generally maintained baseline temperatures ($x = -0.14^{\circ}\text{C}.$). The pooled standard error of the mean for all subjects was $0.81^{\circ}\text{C}.$ Since the pressures encountered while using wheelchair cushions surpass capillary blood pressure, the tissues overlying the ischial tuberosities are ischemic while the patient sits. Only relief from pressure can prevent ischemic changes; however, it is suggested that a wheelchair cushion which decreases skin temperature — and thus metabolic demand — might reduce this ischemic damage.

THOMAS E. SZYMKE, M.D., Medical Fellow, University of
Minnesota, Department of PM&R, Minneapolis, MN

STEVEN V. FISHER, M.D., Medical Fellow, University of Min-
nesota, Department of PM&R, Minneapolis, MN

SUNANDA Y. APTE, M.D., Medical Fellow, University of Min-
nesota, Department of PM&R, Minneapolis, MN

MICHAEL KOSIAK, M.D., Assistant Professor, University of
Minnesota; St. Paul Ramsey Hospital, Department of PM&R,
St. Paul, MN

9:50-10:20 Coffee Break/Visit EXHIBITS

10:20

Assessment of Cardiorespiratory Function in Subjects With Spinal Cord Injury Using a Wheelchair Ergometer

Cardiorespiratory function was assessed in spinal cord injury, (S C I) — 6 para-
plegia, 2 tetraplegia and 2 normal subjects using both a conventional arm crank (A.C.)
and a wheelchair (W.C.) ergometer in which the wheels were mechanically linked to
a high inertia flywheel. The relationship of heart rate and ventilation to oxygen uptake
was similar at submaximal and maximal work levels in both types of ergometry. The
maximum oxygen uptake and maximum heart rate attained with W.C. and A.C.
ergometry were 1.48 ± 0.50 , 1.43 ± 0.41 L/min; 165 ± 19 , 169 ± 14 beats/min., respec-
tively. Though mechanical efficiency (power output/oxygen uptake) with A.C. ergo-
metry was similar for all subjects, significant differences were observed with W.C.
ergometry. At submaximal power outputs S.C.I. subjects had lower oxygen uptakes
than normal subjects, and in comparing two internationally competitive W.C. athletes
with the two normal subjects of similar age and maximum oxygen uptake, the former
were able to achieve maximum power outputs almost twice that of the normal subjects.
The difference in mechanical efficiency was related to the applied torque and the W.C.
striking frequency, the latter being linearly related to oxygen uptake and as such a

Wednesday A.M.

critical determinant of mechanical efficiency. This study shows the specificity of W.C. ergometry in assessing W.C. performance as both (1) maximum oxygen uptake and (2) mechanical efficiency of W.C. propulsion can be measured.

J. R. WICKS, M.D., McMaster University Medical Centre,
Hamilton, Ontario, Canada

K. LYMBURNER, M.D., McMaster University Medical Centre,
Hamilton, Ontario, Canada

S. DINSDALE, M.D., McMaster University Medical Centre,
Hamilton, Ontario, Canada

N. L. JONES, M.D., McMaster University Medical Centre,
Hamilton, Ontario, Canada

10:40

Chest Rehabilitation in the Acute Stage of High Level Spinal Cord Injuries

Pulmonary rehabilitation has been one of the most neglected aspects of spinal cord injury rehabilitation. In the last three years we have managed approximately 100 cases of acute spinal cord injury. This report discusses the role of pulmonary rehabilitation in the management especially of the high cervical spinal cord injured patient. The patient is evaluated on admission by a multi-disciplinary team. Neurosurgical procedures are carried out early when indicated and corticosteroid and other therapy are instituted immediately. Immobilization of the patients, plus injury to the neuromusculature involved in breathing, clearly reduce the patient's ability to breathe independently and adequately. In addition, decreased ability to cough can lead to severe and multitudinous complications such as accumulation of secretions leading to atelectasis, infection, hypoxemia, hypercarbia, etc. The various facets of care require participation by the chest internist, ENT, etc., but the function of maintaining the bronchial toilet, improving the patient's ability to breathe independently and efficiently, and assisting in weaning the patient from dependence on mechanical equipment comes under the aegis of pulmonary rehabilitation. To this end, the patient is examined, has pulmonary function studies when feasible, blood gas studies, chest x-ray, blood count, etc. A regimen of IPPB, breathing exercises, assisted cough, and drainage techniques is instituted. We have in most cases been able to avoid serious respiratory complications seen especially during the initial period of respiratory instability. In spite of these measures, some patients have developed atelectasis, infections, and occasionally respiratory failure. Four cases are used to illustrate the above principles of management both in uncomplicated and complicated cases.

JACK SOKOLOW, M.D., Professor of Clinical Rehabilitation
Medicine, NYU Medical Center, New York City

JOSEPH RANSOHOFF, M.D., Professor and Chairman, Department of Neurosurgery, NYU Medical Center, New York City

M. VALLO BENJAMIN, M.D., Associate Professor of Neurosurgery, NYU Medical Center, New York City

JULIE NEWMANN, Coordinator, Spinal Cord Injury Center, NYU Medical Center, New York City

11:00

Effects of Stimulus Intensity on the Habituation of Flexor Withdrawal Activity Mediated by the Functionally Transected Human Spinal Cord

Studies of lower-limb withdrawal reflexes of spinal-cord injured patients have demonstrated that the transected human spinal cord can mediate the elemental form of learning known as habituation, that is, a decrease in response strength resulting from repetitive

afferent stimulation which is not attributable to either sensory adaptation or to effector fatigue. To understand more fully the parametric characteristics of this remarkable adaptive capability of the isolated human spinal cord, the present study focused upon effects of the intensity of the habituating stimulus. Ten patients with a chronic, transverse lesion of the cervical cord were submitted to two daily habituation training sessions, one involving a high intensity habituating stimulus five times the threshold current, and one, a low intensity stimulus two times the threshold current. Stimulation consisted of a 40 msec. pulse train applied unilaterally to a mid-plantar site. After applying 1/10 sec. test stimuli of both high and low intensities to establish baseline responsiveness, either the weak or strong intensity habituating stimulus was presented 100 times at the rate of 1/sec. Lastly, weak and strong test stimuli were reapplied at the rate of 1/10 sec. Integrated electromyographic data from the tibialis anterior muscle and goniometric recordings of ankle excursions indicate that a reliable degree of habituation was obtained for both strong and weak habituating stimuli. Specific differences attributable to the strength of the habituating stimulus depended upon whether results were based upon changes in response amplitude during 1/sec. habituation training or before and after such training.

MARCUS J. FUHRER, PH.D., Texas Institute for Rehabilitation and Research; Department of Rehabilitation, Baylor College of Medicine, Houston, TX

11:20 **Acute Spinal Cord Lesions in a Paediatric Population: Epidemiological and Clinical Features**

Acute traumatic lesions of the spinal cord in pediatric population are considered to be uncommon. Several authors have reported these lesions amount to from 2.5% to 3.3% of all spinal injuries. In all the published reports, the term "incidence" referred only to those persons admitted to a hospital with a diagnosis of spinal injury with or without neurological deficit. The individuals who died prior to hospitalization due to other causes but also had spinal injuries were not included in the analysis in those reports. To our knowledge epidemiological features of acute spinal cord lesions in a pediatric population have not been previously reported in the literature. We conducted an epidemiologic study of acute traumatic spinal cord lesions in 18 Northern California counties. There were 62 cases in the pediatric age group (1 to 15 years) out of 619 persons with a spinal cord injury among the 5.8 million residents. Thirty two patients (51%) were either dead on arrival or died during first 72 hours following the injury and one died after 18 days. Of 29 patients who survived, 24 showed radiographic evidence of injury to spine and all had neurological deficit at the time of admission. The epidemiological and clinical features of this study are presented in detail in this report.

L. S. KEWALRAMANI, M.B.B.S., M.S., Orthopedist, Department of PM&R and Community Health, School of Medicine, University of California, Davis, CA

J. F. KRAUS, PH.D., Department of PM&R and Community Health, School of Medicine, University of California, Davis, CA

H. M. STERLING, M.D., Department of PM&R and Community Health, School of Medicine, University of California, Davis, CA

R. G. TAYLOR, M.D., Department of PM&R and Community Health, School of Medicine, University of California, Davis, CA

11:40 **Hypercalcemia and Hyperuricemia in Young Patients With Spinal Cord Injury**

Wednesday P.M.

Medical records of 96 patients with spinal cord injury admitted to the Midwest Regional Spinal Cord Injury Care System between January, 1972 and December, 1975 were reviewed for this study. The age range was between 12 and 21 years, 16 were females and 80 were males. The patient population was equally divided between quadriplegia and paraplegia. Twenty of these 96 (20.8%) exhibited hypercalcemia with a range of 10.7 to 14.5 mgs% (mean: 11.0 mgs%, average: 10.8 mgs%). The earliest elevation was detected 22 days after injury and maximum duration noted up to 16 months post-injury. None of the patients with hypercalcemia showed gross abnormalities of renal function. All of these patients had normal or low plasma-albumin and total protein values, though three of them showed hyper-gammaglobulinemia. Fifty-three patients showed elevated alkaline phosphatase, 15 of them being hypercalcemic. Fifty-eight patients had high levels of inorganic phosphorous. Of the 20 hypercalcemics, 6 developed bladder stones and 3 had ectopic bone. Twelve of these 96 patients showed hyperuricemia without a family history of gout and, except for one patient, none was on diuretics. Only 6 of these patients belonged to the hypercalcemic group. Hyperuricemia developed late and tended to last longer. Hypercalcemia in young spinal cord injury patients has been sporadically reported but hyperuricemia in a new observation. Significance of these findings is discussed.

SUCHA NAND, M.D., Resident in PM&R, Rehabilitation Institute of Chicago, Northwestern University Medical School, Chicago

JOHN W. GOLDSCHMIDT, M.D., Associate Professor, Department of Rehabilitation Medicine, Northwestern University Medical School; Associate Medical Director and Associate Director of Research and Training, Rehabilitation Institute of Chicago, Chicago, IL

12:00- 1:15 Luncheon Intermission/Visit EXHIBITS

1:15- 2:15 CONGRESS PLENARY SESSION 55—
California Room

Presidential Address

HENRY B. BETTS, M.D., President, ACRM; Professor and Chairman, Department of Rehabilitation Medicine, Northwestern University Medical School; Executive Vice President and Medical Director, Rehabilitation Institute of Chicago, Chicago

2:15- 4:15 ☆ SESSION 56—California Room

Forum on *Relevance of Rehabilitation to the Consumers*

Moderator—

MRS. EPPIE LEDERER, Ann Landers, Syndicated Columnist, Field Newspaper Enterprises, Chicago

Panelists—

MRS. NANCY BECKER KENNEDY, M.S., Coordinator, Project Thresholds, Traditional Living Facility, Rancho Los Amigos Hospital, Downey, CA

EDWARD V. ROBERTS, Director, California State Department of Rehabilitation, Sacramento, CA

KYLE PIERCY, Board of Directors, Organization for After Stroke Resocialization, Glendora, CA

Wednesday P.M.

MRS. ARTHUR NICHOLS, Parent of Handicapped Teen-ager,
Baldwin Park, CA

MRS. BARBARA PETERSON, Parent of Handicapped Child,
Norwalk, CA

4:15- 4:30 OBJECTIVES OF THE WHITE HOUSE CONFERENCE

JACK F. SMITH, Executive Director, White House Conference
on Handicapped Individuals, Washington, D.C.

4:30- 5:00 Coffee Break/Visit EXHIBITS

5:00- 6:30 CONGRESS ANNUAL BUSINESS MEETING—
Golden West Room

7:30- 9:00 SESSION 57—California Room
CANDLELIGHT ROUNDTABLES

Topics of current concern in rehabilitation practice will be discussed at open roundtable sessions. Issues arising in the course of daily professional practice require examination, sharing and comparison in the light of experience of peers. Unstructured participation by all members is invited at the roundtables. Group discussion leadership will be present, but will not dominate. Topics for development will be interdisciplinary and will focus on subthemes of rehabilitation knowledge and practice.

- (1) **Rehabilitation Practices**
- (2) **Professional Development**
- (3) **Geriatrics**
- (4) **Rehabilitation of Children**
- (5) **Psychologists in Rehabilitation**
- (6) **Scientific Program**
- (7) **Nursing in Rehabilitation**
- (8) **Social & Environmental Aspects of Rehabilitation
(SEAR)**
- (9) **Outlook for National Health Insurance**

Thursday A.M.

Thursday, November 11

7:00- 8:30 BREAKFAST SESSIONS: MEET-THE-EXPERT

SESSION 58—Senate Room

Changing the Local Building Code

BYRON B. HAMILTON, M.D., PH.D., and JACK CATLIN of the Rehabilitation Institute of Chicago, Northwestern University, Chicago

We will explore various means which the individual can accomplish in his own community to make building codes consistent with the needs of the physically disabled. Examples of communities in which successful changes have occurred and means of implementing changes in building codes will be explored.

SESSION 59—Committee Room

Psychological Adjustment to Disability

LINDA M. HENNIG, R.N., M.A., Department of Nursing, Mississippi Methodist Rehabilitation Center, Jackson, MS

JOYCE SALHOOT, A.C.S.W., Director, Department of Social Work, Texas Institute for Rehabilitation and Research, Texas Medical Center, Houston, TX

LEONARD V. WENDLAND, PH.D., Professor, Community Medicine and Public Health; Director, Division of Health Related Professions, University of Southern California, Downey, CA

The grief process as it relates to loss of body parts or function will be discussed by an interdisciplinary panel. Emphasis will be on the psychological impact of disability, subsequent stages of grief and their function, how the process affects rehabilitation, and methods health professionals can use to facilitate adjustment for client and family.

SESSION 60—Sunset Room

Quality Control PSRO

JOHN L. MELVIN, M.D., Professor and Chairman, Department of PM&R, Medical College of Wisconsin, Milwaukee, WI

Professional Standards Review Organizations (PSRO) influence who can be admitted to or remain within short stay hospitals. Occasionally these include institutions admitting patients for rehabilitation. National sample screening criteria exist to guide local PSROs in their reviews. For rehabilitation admissions, these generally require problems in mobility, self care or bowel and bladder management. For continued stays, they ask for progress towards independence in these areas. Critical elements during admission include frequent physical or occupational therapy sessions and conferences between physicians and allied health professionals. PSRO activities should significantly influence the future of rehabilitation as reviews extend to all facilities.

SESSION 61—Sunrise Room

Cardiopulmonary Rehabilitation

BRENDA R. LUNSFORD, M.A., R.P.T., Physical Therapy Supervisor II, Rancho Los Amigos Hospital, Downey, CA

SESSION 62—Esquire Room

Rheumatology

Thursday A.M.

F. RICHARD CONVERY, M.D., Associate Professor of Surgery/
Orthopaedics; Director of Rehabilitation, Division of Orthopaedics and Rehabilitation, UCSD, San Diego, CA

8:30-12:00 ☆ SESSION 64—California Room

Forum on *Athletic Competition by the Disabled*

The area of athletic competition has been, in the past, considered a rather remote and relatively unimportant consideration in medical Rehabilitation. Considering the broad fundamental concept of rehabilitation which includes psychological and social aspects as well as physical, it is evident that the possible opportunity of athletic activities offers a great opportunity and offers a relatively unutilized tool in rehabilitation. This session will deal with the basic underlying physiological considerations of sports and athletic activity and implications for the disabled. It will include the description and review of the wide variety of sports activities involving handicapped today. There will be included a special section describing the medical classification process which is a fundamental need in order to allow fair competition among a wide variety of the disabled. An educator will provide a broad perspective on the implications for all levels of education for athletic activities for the disabled and there will be a description of sports for the disabled as an international movement of great significance to all involved in rehabilitation activities.

Moderator—

CAIRBRE B. MC CANN, M.D., Chief, Department of Medical Rehabilitation, Maine Medical Center, Portland, ME

8:30 **Fundamental Physiologic Aspects of Sports for the Handicapped**

STANLEY J. MYERS, M.D., Assistant Professor, Department of Rehabilitation Medicine, College of Physicians and Surgeons, Columbia University; Director Rehabilitation Clinics, Columbia Presbyterian Medical Center, New York, NY

9:00 **Medical Classification of the Wheelchair Athlete: A Prelude to Competition**

CAIRBRE B. MC CANN, M.D., Chief, Department of Medical Rehabilitation, Maine Medical Center, Portland, ME

9:30 **Scope of Wheelchair Sports: Its Application to Rehabilitation**

JOSEPH R. MEERSCHAERT, M.D., Division of PM&R, William Beaumont Hospital, Royal Oak, MI

10:00-10:30 Coffee Break/Visit EXHIBITS

10:30 **Wheelchair Sports: An Educator's Viewpoint and a Historical Review**

TIMOTHY NUGENT, Professor and Director, Rehabilitation Education Center, University of Illinois, Champaign, IL

11:00 **Wheelchair Sports: An International Movement**

PROFESSOR SIR LUDWIG GUTTMANN, C.B.F., M.D., Director, Stoke Mandeville Sports Stadium for the Paralyzed and Other Disabled, Aylesbury, Buckshire, England

Thursday A.M.

8:30-12:00 SCIENTIFIC PAPER SESSIONS

SESSION 65—Council Room

Chairman—

BYRON B. HAMILTON, M.D., PH.D., Chicago

Co-Chairman—

DAVID D. STOCK, M.S.W., Houston

8:30 **Experience With the Problem-Oriented Medical Record in
216 Rehabilitation Institutions**

Since Lawrence Weed introduced the Problem-Oriented Medical Record (POMR) eight years ago, there have been several attempts to adapt it to rehabilitation patients. We have previously demonstrated both the advantages and difficulties of using POMR for rehabilitation. We were interested in learning of the experience of others and surveyed 257 rehabilitation institutions. Two hundred sixteen replied (84%), 123 university-affiliated hospitals (UH) and 93 free-standing rehabilitation centers (RC). Significant differences were found between the UH and RC in the utilization, perceived advantages, familiarity, reasons for not using, plans to implement, and failure of POMR. Fifty-four per cent of the UH presently use POMR, compared to 22% of the RC. The most frequently cited advantage of POMR by UH was "improves record keeping and medical audit," whereas RC most frequently cited "improves patient care" and "improves communication among team members." The most frequently cited reason of UH for not using POMR was "would not improve present method," compared to "not familiar with it" for RC. Thirty-five per cent of UH not using POMR had tried to use it previously but discarded it, compared to 14% of RC. Sixteen per cent of UH plan to implement POMR within one year, compared to 27% of RC. Other areas surveyed included the relationship of POMR utilization to: medical audit, the number of beds in the institution, the mean age of the physicians, and the routine use of computers for patient care. The implications of these findings for patient care, medical education, record keeping, and research, are discussed in detail.

LEON REINSTEIN, M.D., Department of Rehabilitation Medicine, University of Maryland School of Medicine, Baltimore, MD

8:50 **A Case Information Management System for the Storage and
Analysis of Data from Clinical Trials**

We have devised and are implementing a computer-based case information management system which allows the storage, maintenance and analysis of data from any clinical trial. Before the clinical trial begins, the medical and paramedical staff devise and structure a list of questions which are answerable by (1) a series of up to 10 multiple choices; (2) a date; (3) a number; or (4) a phrase or brief sentence. These questions are allotted to forms designed to make the collection of data as efficient as possible; for example, much of a patient's history can be collected by a form which the patient fills out himself. The system is sufficiently simple so that, after a few hours' training, high school or college students are able to enter the data into the computer. The analysis programs allow one to cross-correlate data from the first three types of questions automatically, and to obtain print-outs of histograms and scattergrams of correlating the appropriate types of data. These features make this approach very cost-effective because relatively little time of the medical and paramedical staff is required to organize and implement a clinical trial and because data entry can be performed by previously untrained personnel.

ALFRED A. BUERGER, PH.D., Assistant Professor, California College of Medicine, University of California, Irvine, CA

Thursday A.M.

GERALD C. BRADY, Senior Programmer, California College of Medicine, University of California, Irvine, CA

9:10

Patient-Therapist Interaction Components in Effective Rehabilitation: A Computer Simulation Model

One of the barriers in understanding the rehabilitation process has been the current difficulty in identifying, relating and expressing the body of descriptions and principles that can explain the varying successes of various rehabilitation strategies. Description alone is not sufficient to explain the complex interrelationship between physiological, medical, and psychosocial variables that contribute to rehabilitation effectiveness. Levin (1972) has indicated that computer simulation modeling has considerable potential in exploring such dynamic interrelationships in rehabilitation. The present study uses the computer simulation language, DYNAMO II (Pugh, 1973) to study some of the internal dynamics of patient-therapist interaction in rehabilitation effectiveness. A therapist-patient interaction computer simulation program was written linking 52 rehabilitation-oriented components into 78 structural equations and several computer simulation runs were made wherein a hypothetical quadriplegic patient interacted with a hypothetical occupational therapist. The computer simulation runs pointed out the varying importance of such elements as degree of impairment, patient goals, motivation, therapist competency and amount of help provided and the major components of effective rehabilitation were patient-therapist goal congruence, motivation and extended support. Suggestions are made for the design of an enlarged simulation model, incorporating additional evaluative processes and other therapeutic disciplines.

STEFAN J. HARASYMIW, PH.D., Rehabilitation Research,
Northwestern University Medical School and Rehabilitation
Institute of Chicago, Chicago

MARCIA D. HORNE, ED.D., Special Education, Rhode Island
College, Providence, RI

9:30

The Development of a Rehabilitation Department and a Total Rehabilitation Program in a Geriatric Center

Two years ago, the Philadelphia Geriatric Center, one of our nation's largest housing nearly 1,200 people in the geriatric age group, decided to start a major program within the Center. The Center has a 680-apartment twin towers for housing independent, ambulatory people over 65 years of age. Also included is a 300-bed chronic care facility and a brand new facility which houses 150 severely impaired geriatric patients and a 60-bed modern hospital. This paper discusses the formation of a small rehabilitation department and its growth to where it now offers not only physical therapy, but occupational, speech, social service, psychological services and an inpatient rehabilitation bed service. The paper also discuss some of the special problems of the geriatric rehabilitation patient.

THOMAS E. STRAX, M.D., Assistant Professor, Temple University School of Medicine; Assistant Medical Director, Moss Rehabilitation Hospital, Philadelphia, PA

9:50-10:20 Coffee Break/Visit EXHIBITS

10:20

Vocational Rehabilitation of the Spinal Cord Injured

The purpose of this study was to analyze a group of spinal cord patients who had completed the rehabilitation program and had been followed for a period of time to find common factors which were associated with successful vocational rehabilitation and use these as predictors, to identify problems which prevented them from obtaining employment and to look into solutions for these problems. Thirty-nine patients admitted

Thursday A.M.

to the Rehabilitation Institute of Chicago were studied and the vocational outcome was correlated with etiology, that is, traumatic or non-traumatic, age, employment status prior to injury, level of independence post injury, educational level, level of skilled labor and vocational counseling activity. The study revealed that spinal cord injured patients who had completed high grade levels, were skilled laborers, students or professionals were significantly more motivated for vocational education counseling and placement. Those patients who were unskilled laborers, unemployed and had less than 12 years' education were much poorer candidates for vocational rehabilitation. This is in part due to the lack of existing programs in industry for the unskilled and physically handicapped. The traumatic group of patients did better than the non-traumatic group, but this difference was mainly due to their increased age. Previous vocational development is the single most important predictor of vocational rehabilitation. The fate of the physically severely impaired "disabled" is changing rapidly. Modern technology is providing us with sophisticated self help devices such as sip and puff chairs for the high quadriplegic. Technicological developments, computer terminals, microfilming equipment—can be taken to the homebound who has transportation problems. Governmental regulation in respect to barrier free architectural design as in the "Access Chicago" program will allow access to places of work. Employers may adapt machinery to paraplegic and quadriplegic patients as has been done by Sun Industries in Japan. The severe physical impairment which is considered "disability" today will be disability no more.

JAMES WILLIAMS, Senior Student, Chicago Osteopathic Hospital, Chicago

BEN K. AGRAWAL, M.D., Attending Staff, Rehabilitation Institute of Chicago, Chicago

HENRY B. BETTS, M.D., Medical Director, Rehabilitation Institute of Chicago, Chicago

RAY SAKALAS, Director of Vocational Rehabilitation, Rehabilitation Institute of Chicago, Chicago

10:40

Vocational Problem Solving by Spinal Cord Injured Persons

One of the greatest vocational assets a spinal cord injured person can have is the ability to see through barriers to employment and identify modifications which will make working possible. The quadriplegic who insists on an "ideal" problem-free placement may not only have to wait a long time for work but may have to choose from a very small range of options. The authors interviewed 102 successfully employed spinal cord injured persons and collected data regarding the job seeking process, problems encountered at work, solutions found and residual difficulties. They also examined the published accounts of some 250 other quadriplegic and paraplegic workers. This paper describes the modifications reported in job duties, environment, adaptive equipment, special tools, transportation, human assistance, division of labor, and hours. The types of work represented include the professions, crafts, management, machine work, farming, merchandising, education, entertainment and others.

NANCY M. CREWE, PH.D., Department of PM&R, University of Minnesota Medical School, Minneapolis, MN

GARY T. ATHELSTAN, PH.D., Department of PM&R, University of Minnesota Medical School, Minneapolis, MN

11:00

The Vocational Development, Interests, Values, Adjustment, and Rehabilitation Outlook of Spinal Cord Patients: A Four Year Follow Up

The vocational development and adjustment of 40 patients with traumatic spinal cord injury treated at University Hospital was followed over a four-year interval. Initial measures obtained in the hospital assessed the direction of the patient's voca-

tional development prior to injury. These measures, including scores on vocational plans, educational plans, vocational interests, and work values, were obtained by a semi-structured interview. Prior to discharge, additional measures obtained by interview yielded scores on motivation to return to work, fantasied interests versus realistic interests, and rehabilitation outlook. Four years after first discharge, each patient was contacted by letter and requested to fill out a survey questionnaire. The items on the questionnaire measure independent function, social adjustment, household care activities, and vocational adjustment. The items are placed in ordinal scales, ranking from lower to higher adjustment. Preliminary results indicate that the three measures given prior to discharge, (motivation, interests, and rehabilitation outlook) correlate positively at the .05 level with vocational and social adjustment. Earlier vocational development was predictive of vocational adjustment but did not correlate with independent function after discharge. The results indicated that a patient's vocational development prior to injury can be used to predict the degree of successful vocational and social adjustment in the community.

RICHARD T. GOLDBERG, ED.D., Director of Research, Massachusetts Rehabilitation Commission; Adjunct Professor of Rehabilitation Counseling, Boston University, Boston, MA
MURRAY M. FREED, M.D., Professor of Rehabilitation Medicine, Boston University Medical School; Chief, Department of Rehabilitation Medicine, Boston University Medical School, Boston, MA

11:20

Psychological Adjustment to Spinal Cord Injury as Related to Manner of Onset of Disability

Clinical research and experience have shown that many spinal cord-injured people have behavioral tendencies which place them "at risk" of such injury. For example, in 1964, Fordyce found that people whose injuries were believed to result from "imprudent" behavior were characterized by tendencies toward "acting out" and impulse-dominated behavior. Such traits create problems in the rehabilitation process, and are believed to lead to poor outcomes. This study sought to determine whether personality characteristics, as suggested by the manner of onset of spinal cord injury, have an effect on rehabilitation outcomes and long-term psychological adjustment to the disability. In a follow-up study of 126 people at the University of Minnesota, detailed information concerning present circumstances, psychosocial adjustment, and the manner of disability onset, was gathered by questionnaire and structured interview. Experienced psychologists made independent ratings of psychological adjustment, which were found to correlate with judgments made by our research staff of the degree of "imprudence" evidenced in the circumstances of injury. Contrary to expectations, analysis of variance indicated that "imprudent" subjects tended to be judged "better adjusted" psychologically at follow-up. Interpretations of these findings are discussed and additional data is presented which help to explain the findings.

GARY T. ATHELSTAN, PH.D., Department of PM&R, University of Minnesota Medical School, Minneapolis, MN
NANCY M. CREWE, PH.D., Department of PM&R, University of Minnesota Medical School, Minneapolis, MN

11:40

Ecological Influences on Motivation in Individuals With Spinal Cord Injury

Hospitals have become very efficient at utilizing the latest technical resources to ameliorate the residuals of disease and injury and to rehabilitate individuals with physical disability. However, the amelioration and rehabilitation process occurs over an extended period of time (months) in a setting (hospital) which has an ecological

Thursday A.M.

impact on the patient. New techniques in the social sciences, such as behavioral mapping and behavioral analysis, permit us to evaluate the impact of the patient-treatment environment interaction on the rehabilitation process. Data from studies by Miller and Keith, Vineberg and Willems, and Mikulic are presented to describe parameters of the rehabilitation environment which directly influence patient behavior. Also a behavioral analysis of the impact of spinal cord injury on behavior will be offered to describe the acute psychological reaction to disability. The interaction of these two factors may produce an inert behavior syndrome, also known as the unmotivated patient. If lack of motivation in some patients is an inadvertent by-product of the ecology of the rehabilitation center, then re-motivation may not be as problematical as previously thought to be. Suggestions for modification of our daily procedures to prevent the inert behavior syndrome are offered.

ROBERTA B. TRIESCHMANN, PH.D., Rehabilitation Services
Consultant, Marina del Rey, CA

SESSION 66—Chamber Room
Chairman—

DON A. OLSON, PH.D., Chicago
Co-Chairman—

MARY W. MC KENZIE, B.S., O.T.R., Jackson, MS

8:30

The Role of Hematocrit as a Factor in the Rehabilitation of the Lower Extremity Amputee

It has long been known that mild to moderate anemia may play no role in wound healing in otherwise healthy individuals, but in the individual with a secondard disease, anemia is the cause of defective wound healing. In a study at a University affiliated Veterans Administration Hospital involving more than 100 male patients, some 78% of the amputations associated with local stump problem as the primary factor complicating rehabilitation had hematocrit levels as designated below normal for this institution. Often associated with these low levels of hematocrit were low levels of albumin and protein. In a study comparing black and white patients at this institution it was noted that the same incidence of primary local stump problems occurred in both groups of patients, 41% of black patients versus 37% of white patients with no statistical difference. When one compares the incidence of amputees who have local stump problems associated with below normal hematocrits the incidence among the black population was 69%, the incidence in the white population was 80%. It is a well known fact that local stump problems delay rehabilitation and prolong hospitalization. The mean number of weeks from amputation to rehabilitation is 20.6 and the median is 20. The group of patients suffering from stump problems all had prolonged periods of rehabilitation above the norm. It should be noted that in the study population that group of patients noted with abnormal hematocrits represented 80% of the group that is above the median period for rehabilitation. Among these 80% it represented 84% of the black population and 59% of the white population in this above median group. Problems in wound healing are not always attributable to no femoral or popliteal pulse, but are a part of a more complex problem.

ODEL OWENS, M.D., Department of Surgery, VA Hospital,
West Haven, CT

EMANUEL LERNER, M.A., Statistician, VA Hospital, West
Haven, CT

MORRIS D. KERSTEIN, M.D., Chief, Peripheral Vascular Surgery, VA Hospital, West Haven, CT; Assistant Professor of Surgery, Yale University School of Medicine, New Haven, CT

8:50

Effectiveness of the Use of Videotape in Teaching Amputees to Ambulate—Preliminary Report

The purpose of this study was to attempt to measure whether immediate feedback by means of video tape would improve the degree of motor learning and ambulation performance of amputees. Two (2) groups of amputees were randomly assigned to either a control or an experimental group. Subjects in the experimental group were videotaped for four (4) sessions at weekly intervals and were permitted to view tapes, discuss their performance with the experimenter, to attempt to correct mistakes and to view the second effort again. Members of the Control Group were videotaped at weekly intervals but were not permitted to view the tapes and no attempt was made to discuss their performance. Initial and final tapes of both groups were rated blind by a group of physicians and therapists on an Amputee Gait Rating Scale which consisted of objective, behavioral measures of ambulation. Reliability of ratings were determined and difference scores between the groups were calculated. Results indicate that immediate feedback via television is a valuable adjunct in the teaching process for the amputee.

JUSTIN ALEXANDER, PH.D., R.P.T., Director of Physical Therapy, Bronx Municipal Hospital Center, Bronx, NY

RONALD GOODRICH, M.A., Psychologist, Bronx Municipal Hospital Center, Bronx, NY

9:10

An Effective Counseling/Psychotherapy Approach With a Spinal Cord Injury Population in Rehabilitation

During rehabilitation, traumatically injured spinal cord patients (SCI) are undergoing a complex process of re-adjustment. The patient/family system is pre-occupied with the patient's physical and medical condition. As the SCI patient gains control, knowledge and a sense of security, he is also facing other new challenges (e.g. familiar experiences being re-experienced from a wheelchair). We advocate a particular counseling approach. It is our contention that most SCI patients and their families respond best to an ego supportive counseling approach. This approach parallels some of the thinking in humanistic psychology and some of the existing theories of counseling (client-centered, relationship, phenomenological, organismic). In this method, the counselor slowly develops rapport, builds a therapeutic relationship, obtains a historical perspective of the patient and then deals with the patient mainly in the "here and now". He builds on the patient/family positive qualities, motivation, existing coping skills and strengthens the patient's relationships with his significant others. Such an approach is less ego threatening and less introspective than psychodynamic therapy. It is felt that an ego threatening and introspective approach is possible only after the patient/family system has regained an equilibrium, often months or years after rehabilitation. Evidence from team treatment experiences, case studies and psychological evaluation materials support this approach.

RONALD J. MAKI, Psychologist, Donald N. Sharp Rehabilitation Center, San Diego, CA

MINA WINOGRAD, M.S.W., L.C.S.W., Donald N. Sharp Rehabilitation Center, San Diego, CA

ELIZABETH HINKLE, M.S.W., Donald N. Sharp Rehabilitation Center, San Diego, CA

9:30

Efficacy of Respiratory Therapy Techniques in Pulmonary Rehabilitation

Within a comprehensive outpatient pulmonary rehabilitation program emphasizing respiratory therapy techniques, forty patients were studied in a prospective manner over a two-year period. Among other parameters, pulmonary functions exercise toler-

Thursday A.M.

ance, and capabilities of contending with activities of daily living were measured. Results showed statistically significant improvement in pulmonary function and exercise tolerance as well as a high degree of statistical correlation between these objective measurements and the subjective parameters. When compared with well established criteria for predicting the progression of COPD, it can be reasonably stated that the level of improvement was maintained over the two-year period with a home care program. Since the program emphasized respiratory therapy, it is concluded that bronchial hygiene may be a significant factor in the maintenance of physiologic and subjective improvement.

BARRY A. SHAPIRO, M.D., Medical Director, Department of Respiratory Therapy, Northwestern Memorial Hospital, Chicago

ELIZABETH J. VOSTINAK, R.N., A.R.P.T., Director, Pulmonary Rehabilitation Program, Rehabilitation Institute of Chicago, Chicago

9:50-10:20 Coffee Break/Visit EXHIBITS

10:20 Hydrodynamics of Catheter Drainage

It is generally assumed by nursing and medical personnel working with patients who have indwelling catheters that as long as the catheter and connecting tubing are *patent* the patient has an empty bladder. Much has been written in the literature about the importance and effectiveness of various modifications of urine collecting systems in prevention of infection, but the effectiveness in emptying the bladder has been largely ignored. This study was undertaken to evaluate the hydrodynamic effect on the bladder of various typical situations encountered in the clinical use of catheters. A simulated model of the urinary system was designed to permit observation and measurement of the pressures occurring inside the bladder. The placement of the tubing and collecting bag in relation to the patient was found to have a predictable effect on bladder pressure according to the principles of fluid dynamics. Commonly encountered clinical situations can produce surprisingly high positive or negative pressures inside the bladder. However, once these principles are understood and applied, the pressures can be easily regulated. Further study is needed to determine optimum pressures, and recommendations for design of commercial urine collecting devices applying these principles.

SHIRLEY MC CLUER, M.D., Assistant Professor, University of Missouri School of Medicine, Columbia, MO

10:40 Selective Rehabilitation for the Cancer Patient

The rehabilitation department at the Fox Chase Cancer Center was established in June 1974 on a multidisciplinary approach to rehabilitation. The staff includes the following core of disciplines: occupational therapy, physiatry, physical therapy, psychology, rehabilitation nursing, speech pathology, and social work; it is supplemented by specialists such as a prosthodontist, a pulmonologist, a vocational rehabilitation counselor, and an orthotist. For the most part, patients have been adults, of both sexes, of all ages and with cancers of varying anatomical sites and clinical stages. To date, the department has provided rehabilitative services to approximately 500 patients. Patients referred for rehabilitation are not routinely prescribed a homogeneous multidisciplinary rehabilitation program, as is sometimes the case in rehabilitation of the physically disabled. Our experience in cancer rehabilitation has been that the optimal program is sometimes provided by a single therapist. This paper presents the results of a multi-dimensional analysis of the rehabilitation department's entire caseload over a two-year period in order to delineate the services which the staff felt would promote the maximal level of functional independence consistent with the patient's prognosis. We attempt to define from the perspective of a rehabilitation staff which sees cancer patients exclusively just what is meant by "cancer rehabilitation."

Thursday A.M.

NATHANIEL H. MAYER, M.D., Temple University School of Medicine, Philadelphia, PA

FLORENCE P. BENDER, B.S., Fox Chase Cancer Center, Philadelphia, PA

HERBERT L. FINE, PH.D., Temple University School of Medicine, Philadelphia, PA

11:00

A Survey of Rehabilitation Medicine in the Care of the Cancer Patient

A survey was conducted of 805 randomly selected cancer patients referred to a major health care facility to assess the number and type of their rehabilitation problems. The objectives of the survey were to obtain quantitative information to provide a basis for planning a cancer rehabilitation program, to determine the rehabilitation needs of the cancer patient and to determine the gaps in delivery of rehabilitation services to these patients. Description of the sample included site and type of treatment received. Further data included socio-economic data, health care support and barriers to receipt of the service. The variables, which related to rehabilitation needs and the delivery of care, were correlated with the state of the disease, the age of the patient, and economic resources in terms of health insurance and agency support. The data indicate the level of need, the type of resources necessary to meet these needs and the areas where there are barriers to rehabilitation care.

JUSTUS F. LEHMANN, M.D., Department of Rehabilitation Medicine, University of Washington, School of Medicine, Seattle, WA

C. GERALD WARREN, M.P.A., Department of Rehabilitation Medicine, University of Washington School of Medicine, Seattle, WA

JOEL DELISA, M.D., Department of Rehabilitation Medicine, University of Washington School of Medicine, Seattle, WA

BARBARA J. DELATEUR, M.D., Department of Rehabilitation Medicine, University of Washington School of Medicine, Seattle, WA

PATRICIA BRYANT, PH.D., McClean, VA

CLYDE G. NICHOLSON, M.D., Department of Rehabilitation Medicine, University of Alberta Hospital, Alberta, Canada

11:20

Psychological Factors Which Relate to Successful Outcome in a Cancer Rehabilitation Program

After two years of clinical experience in a Cancer Rehabilitation Project, five sets of patient characteristics were noted to have some relation to ease of management and/or successful rehabilitation outcome of the patients associated with that project. The five patients characteristics were: (1) expression of fear of cancer by the patient; (2) degree to which a patient took an active versus passive role in his or her own rehabilitation program; (3) degree of evasiveness of patients; (4) the tendency of a patient to view his/her locus of control as internal or external; and (5) premorbid adjustment. This paper summarizes two investigations in which these variables are correlated with ease of management and rehabilitation outcome criteria. Pilot data suggests that useful relationships do exist with these criteria. Implementation of these predictor variables in the evaluative process can streamline the process and aid in identifying target areas for intervention by the psychosocial rehabilitation team members in order to enhance the likelihood of more positive outcome.

Thursday A.M.

CHARLES A. KLUGE, PH.D., Southwestern Medical School,
Dallas, TX

CHARLES A. MC ALEER, PH.D., Southwestern Medical School,
Dallas, TX

11:40

Rational Counseling in Cancer Rehabilitation

It is documented in the literature that persons who progress from (1) discovery of a body mass or malfunction to (2) diagnosis of cancer and to (3) treatment and its ramifications, experience emotions that lead to disruption in their everyday activities. It is also documented that persons with cancer are not necessarily doomed to a painful and agonizing death; in fact, more persons with cancer are living longer than ever before. Efforts are being focused upon what interventions are effective in facilitating the adjustment of persons with cancer such that they can live productively in the personal, social, and vocational spheres of life. Rational counseling approaches offer a reasonable alternative because of emphasis on the cause of disruptive emotions. Assumptions of this approach are (1) that events do not occur in the absence of their prerequisites, and (2) that most of what a person feels is caused by what he thinks. The counseling approach based upon these assumptions is discussed. Examples of irrational beliefs that significantly disrupted the lives of three cancer patients, women with brain, breast, and larynx tumors, are presented. The success of rational counseling in developing rational alternatives and consequent more productive emotions in these people is discussed.

G. FRED CROMES, JR., PH.D., Southwestern Medical School,
Dallas, TX

SUSAN PINKERTON, M.S., Southwestern Medical School,
Dallas, TX

SESSION 67—Cabinet Room

Chairman—

WILLIAM H. ANDERSON, M.D., Lansing, MI

Co-Chairman—

JUDITH H. STANTON, M.S., R.N., Downey, CA

8:30

Rehabilitation of the Severely Brain Injured Patient: I. Functional Recovery

All brain injured patients on a 31-bed inpatient rehabilitation service of a county hospital during the year 1975 were studied. The group included 29 patients ranging in age from 10 to 61 years, with a median age of 23 years. Eleven were females. Twenty-four of the patients were involved in vehicular accidents and 5 had been assaulted. Nineteen patients were admitted to the acute services of the county hospital within a few hours of the trauma and later transferred to the PM&R service. Seven patients were treated initially in community hospitals and three patients were direct admissions to PM&R. The average hospital stay was 86 days, of which 36 were required for the care of the acute injuries before an intensive rehabilitation program could be initiated. Rehabilitation care was interrupted in 7 patients because of additional surgical procedures. All 29 had a history of altered mental status of which 26 were comatose at the time of admission to a hospital. Airway problems necessitated endotracheal intubation in 15 patients; 7 were severely hypoxic, 1 patient was in shock. Sixteen patients had sustained multi-system trauma including rib fractures (7), blunt abdominal trauma (4), long bone fractures (7) and cervical spine fracture-dislocations (2). The majority of the patients (25) at the time of discharge were able to perform all activities of daily living and were able to go home. Multiple factors affect the rehabilitation of patients after serious head injury. Analysis of our results including financial considerations are discussed.

Thursday A.M.

JEROME S. TOBIS, M.D., Professor and Chairman, Department of PM&R, University of California, Irvine School of Medicine, Irvine, CA

KASTURI B. PURI, M.D., Assistant Clinical Professor, Department of PM&R, University of California, Irvine School of Medicine, Irvine, CA

8:50

Rehabilitation of the Severely Brain Injured Patient: II. Psychological Performance

Twenty-nine patients on a physical medicine and rehabilitation inpatient service were studied in depth (see "I. Functional Recovery"). Of this group, 23 had mental capabilities analyzed both at admission and discharge. The parameters studied were: (1) orientation; (2) memory—both long term and post traumatic; (3) emotional control and appropriateness; (4) auditory comprehension—words—sentences and paragraph level; (5) verbal formulations; (6) visual—perceptual ability; (7) visual comprehension—words, sentences and paragraph level; (8) graphic formulation; (9) abstract formulation; and (10) higher mathematical skills. Higher mental functions like abstract formulation, reading and writing at paragraph level and mathematical skills were still found to be most severely affected in majority of the patients. Sixteen of the 23 patients still exhibited inappropriate behavior at time of discharge. In spite of the patients level of functional accomplishments in self-care and other neuromuscular performance, there is a significant loss in higher cortical functions.

KASTURI B. PURI, M.D., Assistant Clinical Professor, Department of PM&R, University of California, Irvine School of Medicine, Irvine, CA

JEROME S. TOBIS, M.D., Professor and Chairman, Department of PM&R, University of California, Irvine School of Medicine, Irvine, CA

JANE SHERIDAN, M.A., Speech Pathologist, Department of PM&R, University of California, Irvine School of Medicine, Irvine, CA

9:10

Rehabilitation of the Severely Brain Injured Patient: III. Social Aspects

Detailed analysis of the social factors in 29 severely head injured patients on an inpatient physical medicine and rehabilitation service was carried out. These patients present a select social group with special characteristics suggesting poor coping mechanisms. These special characteristics include the following: (1) eighteen patients were high school graduates; (2) six patients were drop-outs; (3) only 9 of the 29 met premorbid criteria of satisfactory emotional stability and problem solving capacity in their social milieu and goal direction; (4) twelve patients had a positive history of alcohol abuse, 6 of which were under 30 years of age; (5) ten had a poor job history. Interpersonal relationships were unsatisfactory in 13 in relation to the spouse, in 8 in relation to the parents and siblings. Sixteen displayed premorbidly excessive dependency upon others. Evaluation of the patients' external resources indicated a supportive family in 23 patients and helpful friends in 14. The patient's disability was not accepted by 16 of the families. While in the hospital, 13 patients through their families applied for permanent disability under Social Security. The findings suggest that the premorbid social characteristics of these patients may have an important bearing on: (1) the accident and (2) their ability to cope with the additional stress of serious head injury.

KASTURI B. PURI, M.D., Assistant Clinical Professor, Department of PM&R, University of California, Irvine School of Medicine, Irvine, CA

Thursday A.M.

JEROME S. TOBIS, M.D., Professor and Chairman, Department of PM&R, University of California, Irvine School of Medicine, Irvine, CA

9:30 Temporal Orientation of Institutionalized Stroke Patients

The purpose of this study was to determine whether or not the temporal orientation of institutionalized stroke patients is altered by a sensory stimulated environment. Thirty patients in an extended care facility ages 65 or older who had incurred a stroke in the past year were given a Temporal Orientation Test at the beginning of the study. This test requires the patient to provide five types of information: time of day, day of the week, day of the month, month, and year. Stimulation of the auditory and visual senses by means of a wall calendar and verbal reinforcement was provided for a two-week period. The Temporal Orientation Test was repeated to conclude the experiment. Results of the study showed that sensory stimulation does alter the temporal orientation of institutionalized stroke patients. An association was found between the hemispheric location of the lesion and the subject's pretest score; and between the amount of change in temporal disorientation and lesion location. Other factors investigated included the type of room accommodation the patient had, the amount of visitation per week, and the living accommodation prior to the onset of the stroke. Stimulation from the physical environment can provide a linkage between organic deterioration from the stroke and the effects of the institutional environment.

CAROL L. LIPIN, M.S., R.N., Clinical Specialist, Stroke and Head Injury Service, Mississippi Methodist Rehabilitation Center, Jackson, MS

9:50-10:20 Coffee Break/Visit EXHIBITS

10:20 Copying Skills as a Tool in Evaluating the Brain Injured Adult

The purpose of this study was to explore the relationship between a specified copying task, known as the Craig Cards, and level of function attained by a group of brain injured adults. The level of function in three areas, communication, self care and social vocational activities was considered. The total subject group of 187 was comprised of 42 right hemiplegics, 56 left hemiplegics and 89 individuals with diffuse damage. Each patient completed the Craig Cards as a part of his evaluation process. The drawings were assigned a numerical rating on the basis of established criteria by judges from the various rehabilitation disciplines. The outcome measure was obtained by an abstractor who had no knowledge of Craig Card performance. On the basis of information in the medical chart of each subject, she rated their level of function in communication, self care and social vocational activities. Significant negative correlations were demonstrated in the left hemiplegic and diffuse groups between ratings on the Craig Cards and level of function in all three areas. In the right hemisphere group there was no significant correlation between Craig Card ratings and self care. The implications of these findings in relation to previous work in the area are discussed.

A. IRENE ARMITSTEAD, M.A., C.C.C., Director, Speech Department, Craig Hospital, Englewood, CO
JACKIE DE TURK, PH.D., Counseling Psychologist, Craig Hospital, Englewood, CO

10:40 Brain Evoked Potentials and Disability in Head Injured Patients

The relationship between averaged brain evoked potential patterns and degree of disability in patients on a head injury unit was examined. Visual and auditory evoked potentials were obtained. Brain stem, subcortical and cortical activity was recorded both

ipsilaterally and contralaterally. A disability rating scale was developed to measure multiple levels of disability ranging from a persistent vegetative state to near self-autonomy. A chi-square analysis showed that a significant relationship exists between brain function as it is reflected in degree of abnormality of EP patterns and degree of physical, psychological, and functional disability. The averaged evoked potential technique has a promising role to play in physical medicine and rehabilitation activities. It can help identify areas of neuropsychological dysfunction; can assist in refining clinical impressions about the type and degree of sensory deficits exhibited by patients; can assist in planning the most appropriate rehabilitative approaches to patients; and, it can help monitor change in clinical condition. Future work needs to be done to see if evoked potentials can be used to help establish prognosis and to help improve the utilization of limited PM&R resources.

MAURICE RAPPAPORT, M.D., PH.D., Research Department,
Agnews State Hospital, San Jose, CA

GLENN G. REYNOLDS, M.D., Research Department, Agnews
State Hospital, San Jose, CA

RICHARD HAMILTON, M.D., Research Department, Agnews
State Hospital, San Jose, CA

SHELDON BERROL, M.D., Research Department, Agnews State
Hospital, San Jose, CA

KENNETH HOPKINS, M.D., Research Department, Agnews
State Hospital, San Jose, CA

KARYL HALL, Research Department, Agnews State Hospital,
San Jose, CA

TED BELLEZA, M.D., Research Department, Agnews State
Hospital, San Jose, CA

MARY ZAHN, M.D., Research Department, Agnews State Hos-
pital, San Jose, CA

RICHARD A. MC ELWAIN, M.D., Research Department, Ag-
news State Hospital, San Jose, CA

11:00

Heterotopic Ossification in Brain Damage

Ectopic bone formation is an uncommon but significant complication of cerebral disease or injury. Although not as frequent as the para-articular bone formation associated with spinal cord injury, the presence of ectopic ossification further complicates the rehabilitation of the patient with brain damage. In the present study, five cases of ectopic bone formation associated with disease or injury of the brain were reviewed. Etiology included cerebral hemorrhage, carbon monoxide poisoning, and brain trauma. The clinical course, laboratory data, x-ray and bone scan findings and rehabilitation outcome were analyzed. Medical and rehabilitative management were discussed, together with the indications and contra-indications for surgical removal of the ectopic bone. It was found that active bone formation was accompanied by elevated serum alkaline phosphatase and positive radioactive bone scans. Para-articular bone formation which interferes with joint function may be safely treated by surgical excision, but only after active bone formation has stopped and the ectopic bone is mature.

RONALD F. GREEN, M.D., New York Medical College, New
York City

DORA SORRELL, M.D., New York Medical College, New York
City

FELICIDAD TORTOSA, M.D., New York Medical College, New
York City

Thursday A.M.

CATHERINE HINTERBUCHNER, M.D., New York Medical College, New York City

11:20

Vocational Outcomes Following Rehabilitation in Severely Brain Injured Individuals: A Preliminary Report

Fifty consecutive admissions to the Brain Injury Unit of the New England Rehabilitation Hospital between March 1974 and September 1975 were reviewed. Premorbidly all but one patient had been functioning adequately at work or school. Etiology of the neurologic deficit included trauma, infection, vascular accidents, tumor and hypoxia. Forty-nine patients had a nonprogressive lesion. By April 1976 two patients had died and three were lost to follow up. Of the remaining 45, 13 returned to previous level of school or work and another 13 to a lower level of school or work. Ten patients were felt to have potential for modified work or school in the future. Litigation was the only limiting factor in one patient's return to work. Eight patients were judged to be unable to enter a school or work program. Our conclusions suggest that: (a) the majority of patients recovering from severe cerebral dysfunction with a static lesion do have vocational potential; (b) follow-up of vocational outcomes of these 45 and other patients who have undergone rehabilitation on brain injury should be continued; (c) we should attempt to identify the relationship of vocational outcomes to early predictive factors.

ANNA POMFRET, M.D., New England Rehabilitation Hospital, Woburn, MA

MARIAN PHIPPS, M.S., R.N., New England Rehabilitation Hospital, Woburn, MA

SESSION 68—Forum Room

Chairman—

MARTHA A. MINTEER, M.D., San Diego, CA

Co-Chairman—

WILLIAM A. STAAS, M.D., Philadelphia, PA

8:30

Treatment of Arthritic Knees with Fiberglass Casts

Twenty-two patients with arthritis were placed in cylinder knee casts to ascertain the effects of casts and the reasons they are not more widely used. Seven patients immediately refused to wear their casts; 18 were evaluated at 12 months. Fifteen of 18 patients wore casts for from several to nearly 24 hours daily (mean 4.4 months, range 2 to 17 months). Thirteen of 15 noted relief of pain (including 9 of 10 with rheumatoid arthritis). Circumferential limb measurements in 11 patients revealed no muscle atrophy or decreased synovitis. Manual muscle testing in 13 patients revealed no change in strength, and measurement of knee extension in 16 patients was not changed between wearers and non-wearers. The fiberglass polymer casts (Lightcast II) were light, waterproof, quickly applied to outpatients, and very durable. Patients complained the casts slipped, increased pain in the other knee, were difficult to apply and wear while walking and sitting, and cosmetically unacceptable. In conclusion, pain relief occurred in most arthritic patients who wore casts. Lightcast II is an advantageous cast material. Patients refused to wear casts without explanation in seven cases. Fifteen described significant but not insurmountable problems. Lack of physician interest may contribute to the unpopularity of casting inflamed knees.

JOHN J. NICHOLAS, M.D., Chief, Rehabilitation Medicine, Presbyterian-University Hospital; Clinical Associate Professor, Departments of Medicine and Orthopedic Surgery, School of Medicine, University of Pittsburgh, Pittsburgh, PA

GAYLE ZIEGLER, R.N., Research Assistant, Rheumatology, Presbyterian-University Hospital; Research Assistant, Rheumatology, School of Medicine, University of Pittsburgh, Pittsburgh, PA

8:50 **Orthotic Management of the Unstable Knee**

An investigation of the orthotic management of knee instability with or without ankle involvement has been undertaken. The areas of concern were those cases involving mediolateral laxity, buckling, recurvatum, or any combination of these regardless of the etiology. Several cases involved both knee and ankle instability. Conventional bracing with the use of cumbersome, uncosmetic or complicated devices does not apply the most efficient and effective biomechanical force system to control joint instability. The investigators have been utilizing the basic three point system and incorporating it into the fabrication of custom plastic dynamic orthoses. An orthotic device without the inclusion of an angle-foot extension was developed for isolated knee instability. With knee instability and associated ankle involvement the device included an additional molded plastic ankle-foot extension. The design of the orthosis is an extension of the supracondylar-knee concept but it differs functionally. By adding essentially a posterior proximal thigh shell the device has a capacity to prevent flexion as well as hyperextension and mediolateral instability of the knee. In our experience with patients seen and followed at Nassau County Medical Center the results in controlling joint instability were good—definitely superior bio-mechanically and otherwise to the conventional metal bracing.

ARMINIUS CASSVAN, M.D., Department of Rehabilitation Medicine, Nassau County Medical Center, East Meadow, NY

KENNETH E. WUNDER, C.P.O., Department of Rehabilitation Medicine, Nassau County Medical Center, East Meadow, NY

DOUGLAS M. FULTONBERG, C.P., Department of Rehabilitation Medicine, Nassau County Medical Center, East Meadow, NY

9:10 **Control of the Unstable Hemiplegic Knee through Orthotic Application**

As a result of the instability at midstance so often found in the hemiplegic knee, many patients with this problem must delay ambulation until adequate strength is acquired and often never reach a state of functional independence. When the foot comes in contact with the floor, the floor must exert a reaction force equal or greater in the opposite direction. By controlling the angle of this force, a knee which would become flexed at midstance can be stabilized. This paper describes an orthotic application which yields directional control of this floor reaction force by utilizing a combination of static angular control at the ankle, afforded by an ankle-foot poly-propylene orthosis, and/or changes in the positional attitude of the shoe. Such control not only gives more independence to those who never regain adequate knee control, but also makes it possible to begin ambulation at an earlier phase of the rehabilitation process. Case studies of six patients of different age, sex and distribution of disability are discussed, including methods of application, initial results and follow-up procedures.

DENNIS P. LANGTON, B.S., R.P.T., Staff Physical Therapist, Donald N. Sharp Rehabilitation Center, San Diego, CA
TEO SANCHEZ, C.O., Orthotist, Orthomedics, San Diego, CA

Thursday A.M.

9:30

The Trilateral Abduction Orthosis in Legg-Perthes' Disease

Prognosis in Legg-Perthes' Disease relates to the age of onset, the extent of involvement of the femoral head, and the treatment method used. In recent years the old practice of prolonged bed rest has given way to the use of orthotic devices which permit ambulation provided the femoral head is well contained within the acetabulum by positioning it in abduction and internal rotation. The trilateral abduction orthosis first described by Tachdjian achieves this end by use of a specially modified plastic laminated thigh socket with high medial wall attached via a single medial upright to a patten bottom. It is acceptable to the child and allows greater mobility than other commonly used devices such as the Petrie abduction casts or Toronto and Newington orthoses. Six patients, including one with bilateral involvement, for whom the orthosis has been fitted and who have been followed from six months to three years are presented. Problems encountered, including improper gait patterns, need for repairs and adjustments, and costs are discussed. The orthosis is useful in the conservative management of Legg-Perthes' Disease when appropriate criteria for selection of patients are met and adequate fittings, training, and supervision of the patient are available.

PHOEBE SATUREN, M.D., Associate Professor, Department of Rehabilitation Medicine, New York Medical College, New York City

CATHERINE HINTERBUCHNER, M.D., Professor and Chairman, Department of Rehabilitation Medicine, New York Medical College, New York City

JOHN ESCHEN, JR., C.P.O., New York City

9:50

A Comparison of Electromyographic Feedback and Physical Therapy for Neuromuscular Retraining in Hemiplegia

Electromyographic feedback for neuromuscular training has been proposed by various investigators as an effective adjunct, or even a superior or more expedient modality in comparison with physical therapy. This investigation sought to clarify the effects and role of biofeedback in 10 adult patients with hemiplegia. Averaged electromyographic activity and active range of motion were chosen as the dependent variables for study and comparison. Patients were exposed to alternate programs of electromyographic feedback and physical therapy in an experimental design which effectively utilized each patient as his or her own control. Exclusive detailed attention was paid to the factors in each therapeutic situation contributing to the re-learning process of motor control. Biofeedback appeared to be an efficient and effective training modality in specific instances where electromyographic increases or decreases were vital or germane to motor function. Where electromyographic control was not an essential element to motor control, it was possible for this modality to be non-productive, or counter-productive of functional improvement. In comparison to the narrowly restricted framework of objectives and functional achievements of biofeedback, physical therapy makes possible a broad complex interplay of many independently operative factors to be coordinated in the achievement of motor control. Electromyographic biofeedback is thus developed as one single useful modality in a total therapeutic program. The results of this study supported the idea that the factors indigenous to the therapeutic situation as well as the instructional methods associated with the effective use of stimulus modalities are of prime importance in any consideration of rehabilitation techniques.

NANCY MROCZEK, PH.D., Department of PM&R, University of Minnesota, Minneapolis, MN

RICHARD MC HUGH, PH.D., Department of PM&R, University of Minnesota, Minneapolis, MN

DANIEL HALPERN, M.D., Professor, Department of PM&R, University of Minnesota, Minneapolis, MN

9:50-10:20 Coffee Break/Visit EXHIBITS

10:20 Rehabilitation of the Patient with Stroke and Brachial Plexes Injury

Five patients are presented, all of whom had had thrombosis of the middle cerebral artery leading to a hemiplegia on the contralateral side. The age range of the patients was from 53 to 73 years. These patients were evaluated with electromyographic and electrodiagnostic evaluations anywhere from 4 weeks to 4 months after the onset of their strokes. All of the patients had had a flaccid paralysis of the muscles of the shoulder girdle along with the retained voluntary control over protraction of the shoulder and extension of the elbow. All of the electromyographic and electrodiagnostic exams revealed denervation consistent with neuropathies of the upper trunk of the patient's brachial plexes on the side affected by the stroke. All of the patients were involved in intensive rehabilitation team programs involving range of motion, strengthening exercises, the use of night splints and other exercises designed to increase the patient's coordination and functional ability at arm placement. The response of these five (5) patients to this regimen is described. It is proposed that brachial plexes injuries constitute an important contributing factor towards the dysfunction of the patient's upper extremity following a stroke. The significance of this proposition towards the management of the patient with stroke is discussed in detail.

PAUL E. KAPLAN, M.D., Rehabilitation Institute of Chicago, Chicago

GINNY TAFT, O.T.R., Rehabilitation Institute of Chicago, Chicago

JUDY MEREDITH, O.T.R., Rehabilitation Institute of Chicago, Chicago

HENRY B. BETTS, M.D., Rehabilitation Institute of Chicago, Chicago

10:40 Neuromuscular Retraining in Polyradicularneuropathy

This research involved development of an adjunct method of physical therapy for patients with Guillain-Barré Syndrome (GBS). One of the most alarming features of GBS is the lengthy hospitalization involved; this frequently exceeds 12 months. Part of the cause for this is that attempts at accelerating the physical therapy of these patients precipitate an immediate and irreversible relapse. We have used a method which quantitatively maximizes the therapy given to the patient while minimizing the chances of over-exercise and fatigue. A biofeedback device was utilized as an adjunct to the daily physical therapy of patients with GBS. The device (Myotrainer) generates an audio signal with minimal muscle contractions. With increasing activity, a series of five lights can be turned on sequentially. Initially, minimum sensitivity with activation of a single light was used. As rehabilitation proceeded, the sensitivity was adjusted accordingly and the patient activated up to five lights. Fatigue was detectable with diminished audio. Results indicate this adjunct therapy appreciably reduces the hospitalization period, gives greater quantification of the rehabilitation process, allows the therapist to treat several patients simultaneously, and provides incentive by making the rehabilitation process more interesting for the patient.

BERNARD ALLAN COHEN, PH.D., Department of Rehabilitation Medicine, Emory University School of Medicine, Atlanta, GA

REBECCA H. CROUCH, R.P.T., Department of Rehabilitation Medicine, VA Hospital, Decatur, GA

SARA N. THOMPSON, R.P.T., Department of Rehabilitation Medicine, VA Hospital, Decatur, GA

Thursday A.M.

11:20

Human Thumb Adductor Contraction Time, Post Exercise

This study was designed to evaluate the effect of isometric and isotonic training programs, on the speed of contraction of the human thumb adductor muscle group. We have found that high repetition-low intensity training, increased sarcoplasmic proteins, and low repetition-high intensity activities increased the myofibrillar protein concentration. In a separate study we demonstrated that two weight lifting programs, one low and the other high repetition caused, respectively, an increase and a decrease in fast twitch fibers, in rat soleus muscle. The purpose of this study was to apply physiologic technique to the evaluation of isometric and isotonic exercise training programs in two groups of six human subjects per group. Prior to and at the completion of the isometric and isotonic training programs, performed five days a week for six weeks, each group underwent physiologic testing to determine the speed of contraction of the thumb adductors. The isometric training program consisted of six-second contractions, interspersed with two-second rest periods, performed to the point of fatigue, at 100% of the 10 repetition maximum force of contraction. The isotonic subjects contracted their thumb adductors as many times as possible in 30 seconds against 5% of their maximal isotonic 10 repetition maximum. The isometric and isotonic groups increased the speed of contraction by 40% ($P < .05$) and 14% ($P > .05$) respectively. This demonstrates the feasibility of determining twitch contraction times to study exercise training, and that by using this technique the speed of contraction increases, as anticipated from previous animal work.

GERALD J. HERBISON, M.D., Associate Professor, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia, PA

M. MAZHER JAWEED, M.S., Research Associate, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia, PA

MARGUERITE EMDHOFF, M.A., Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia, PA

JOHN F. DITUNNO, JR., M.D., Professor and Chairman, Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia

11:40

Sensory System Influence on Normal Reflex Motor Behavior

The purpose of this study was to determine the influence of the sensory system on normal reflex motor behavior. A rotational joint apparatus located at the Krusen Center for Research and Engineering was used to passively stretch the triceps surae muscle at various magnitudes and velocities in three prone normal male human subjects. Angular displacement of the ankle joint, resultant torque, and reflex EMG latencies were recorded from the triceps surae muscle on visicorder paper and FM magnetic tape. Nerve blocks were performed on the common peroneal nerve (at fibular head) and the tibial nerve (two inches above ankle joint) to remove afferents from the ankle joint, skin of the foot, and the antagonistic muscle system (peroneal innervated musculature) of the triceps surae. Comparison of pre and post block reflex motor responses indicate that the reflex responses of the triceps surae muscle under the aforementioned experimental conditions appear independent of afferent influence from the ankle joint, skin of the foot, or its antagonistic muscle system. How these results may influence basic precepts in various therapeutic exercise programs is discussed.

ERNEST M. BARAN, M.D., M.S., Bioengineer; Assistant Professor of Rehabilitation Medicine and Neurology, Temple

Thursday A.M.

University School of Medicine; Chief Physiatrist, Albert Einstein Medical Center, Northern Division, Philadelphia, PA
WILLIAM FREEDMAN, PH.D., Assistant Professor of Rehabilitation Medicine, Temple University School of Medicine, Philadelphia, PA

EDWARD KRESCH, PH.D., Assistant Professor of Biomedical Engineering, Drexel University, Philadelphia, PA

SESSION 69—Senate Room

Chairman—

VICTOR CUMMINGS, M.D., Bronx, NY

Co-Chairman—

HERBERT KENT, M.D., Long Beach, CA

8:30

The Educational Frame of Reference: An Additional Model for Rehabilitation Medicine

Since much of medical rehabilitation is actually training rather than treatment in the traditional medical sense, and since this training is focused on helping the patient and/or his/her family to become active in the patient's daily care rather than the patient passively receiving care from professionals, the addition of the educational frame of reference can make rehabilitation professionals more effective. In contrasting the educational with the medical-surgical frame of reference already in use, the following questions reveal the advantages of the educational frame. Who performs daily health care of the disabled after discharge—the professional or the patient? Where does the responsibility lie for the daily care of the disabled? With the professional? With the disabled person? With the community? Or is it shared by all three? How does the disabled person learn to change or vary the way he/she plays the sick-role? Which of these two frames of reference leads to better patient compliance with the professional's recommendations? A recommended model for patient-family education has these components: (1) identification of patient-family understanding necessary for dealing with his/her problems or potential problems; (2) assessment of current patient-family knowledge, attitudes, and life style; (3) setting of educational goals based on the individual patient (and family) needs; (4) planning method of achievement of these goals appropriate to the individual learner; (5) implementing the plan; (6) evaluation according to goals.

THOMAS P. ANDERSON, M.D., Associate Professor, Department of PM&R, University of Minnesota School of Medicine, Minneapolis, MN

8:50

Consideration Factors in Patient Compliance

Perhaps more so than in any other chronic illness the diabetic is the prime person responsible for supervision and maintenance of his health; therefore, teaching of this patient does not begin or end with merely an oral and/or visual presentation of material from the lesson plan. The reality of health care maintenance may not be fully appreciated by the patient until hospitalization is required for treatment of a complication. The "reason for admission," in itself, may be the consequence of a gap in the patient's teaching program. In devising a productive teaching program during hospitalization it is necessary to incorporate into the material content consideration of overt and covert psychological "blocks" to the learning process, relevancy of a learning need, a correctly identified motivational and capability level, cultural specifics, and the actual consistency of a staff's follow-up reinforcement of the teaching. These diverse considerations are implemented initially through the nurse responsible for coordination and continuity of patient teaching. It may also be implemented by any professional nurse

Thursday A.M.

preparing herself to instruct a patient in some aspect of his care. Through the efforts of identifying and making an appropriate application of these "considerations," patient response and compliance will be enhanced.

HENRIETTA P. LINCOLN, R.N., Rancho Los Amigos Hospital,
Liaison Nurse, Diabetes Service, Long Beach, CA

9:10 **Education to Improve Patient Care of Urinary Tract: I. Assessment of Need**

Because follow-up of spinal cord injured patients revealed frequent bacteriuria and other evidence of poor urinary care at home, a failure to educate and train these patients during their early rehabilitation was suspected. A survey was made of 54 patients, whose spinal cord injury was at least a year earlier, using interviews, questionnaires, and urine cultures. This information was used to place each patient on one of six levels of Williamson's Functional Limitation Scale (modified). The degree of restriction of usual daily activities due to bacteriuria far exceeded the estimated standards of the maximal acceptable amounts the investigators had set. Only 5.5% of these patients were in the no bacteriuria level, while 68% were in the symptomatic levels with restriction of 10 to 90% of their usual daily activity because of bacteriuria. The remaining 25.9% had asymptomatic bacteriuria without any restriction of activities. Results of patient interviews and questionnaires revealed a lack of knowledge about the care of their urinary tract and the factors that affect the maintenance of good urinary function. Frequently, conflicting information and training from health care personnel was stated by the patients as a reason for their lack of motivation in establishing and using good urinary care procedures. These results indicated needed changes in the educational program and the professionals providing the training.

ELLEN NEWMAN, M.S., Microbiologist; Associate Scientist,
Renal Function Laboratory, Department of PM&R, Uni-
versity of Minnesota, Minneapolis, MN

MARY PRICE, M.D., Assistant Professor and Director, Renal
Function Laboratory, Department of PM&R, University of
Minnesota, Minneapolis, MN

THOMAS P. ANDERSON, M.D., Associate Professor, Depart-
ment of PM&R, University of Minnesota School of Medi-
cine, Minneapolis, MN

9:30 **Education to Improve Patient Care of Urinary Tract: II. Determination of Content**

As a result of the survey of patient outcomes on bacteriuria (Part I), a decision was made to develop a comprehensive education training program. Content of the program was determined from patient responses to interviews and questionnaires, and through brainstorming sessions with personnel of rehabilitation disciplines. A program planning committee with representation of each discipline defined three problem areas contributing to the unacceptable rate of bacteriuria, as patient, environment, and staff. Patient related problems included lack of knowledge about urinary function, proper performance of procedures, and bacteriology; lack of written recipes for procedures in lay language; misinformation; and a prevalent attitude that urinary care is not the responsibility of the patients. Environment related problems included expense of, misinformation about, and difficulty in, obtaining equipment and supplies. Procedures performed at home were felt to be too involved, too time-consuming, (with or without assistance), and lacking in observable rewards. Staff related problems included poor knowledge and failure to observe precautions which had been taught. The program content includes the needs in all three areas. Methods of presenting the program and results will be reported at a later date.

Thursday A.M.

ELLEN NEWMAN, M.S., Microbiologist; Associate Scientist, Renal Function Laboratory, Department of PM&R, University of Minnesota, Minneapolis, MN

MARY PRICE, M.D., Assistant Professor and Director, Renal Function Laboratory, Department of PM&R, University of Minnesota, Minneapolis, MN

THOMAS P. ANDERSON, M.D., Associate Professor, Department of PM&R, University of Minnesota School of Medicine, Minneapolis, MN

9:50-10:20 Coffee Break/Visit EXHIBITS

10:20 **Integrative Rehabilitation: The Patient, the Family and Other Systems**

The literature on the interaction of the patient/client, their family and the rehabilitation process is sparse. This is despite the importance of these interactions in a number of key stages and aspects of any attempt to provide integrated care. Orientation to rehabilitation, feedback of information and its synthesis and use in treatment plans, are obvious examples. Changes over time, the influence of family roles and communication, the disenfranchisement of the family, indirect sabotage, and loss of control issues are less obvious, but just as important to an integrated approach to rehabilitation. A model of family functioning that allows for the above is briefly presented. Clinical examples from the author's experiences as a fulltime psychiatrist in a regional rehabilitation unit and Director of Family Therapy Training Programs for the Department of Psychiatry, McMaster University, are used to highlight aspects of significance to the rehabilitation processes.

DUANE S. BISHOP, M.D., Psychosocial Co-Ordinator, Chedoke-McMaster Regional Rehabilitation Unit, Hamilton, Ontario, Canada

10:40 **SOREFI (Social-Recreation-Fitness — A Specialized Treatment Program Designed to Wean Patients from Unnecessary Therapies)**

The question of excessive use or even abuse of physical therapeutic regimens is an ever existing problem in the delivery of health care to a non-paying patient population. Hunger for human contact and concern forces the patients to use their physical disabilities to demand attention. Yielding to these pressures, unfortunately, does not only disrupt other needed programs, it is not in the best interest of the patient. Discontinuation of unnecessary physical treatment programs, however, frequently does not solve the problem. It ignores the fact that these people do have unanswered needs, even though they are not clearly physical. To offer an optimal solution we have developed Social-Recreation-Fitness (SOREFI), which is a treatment program specifically designed to wean the chronic patient from unnecessary therapies by helping to identify and then fill the needs by more appropriate means. This paper reports the effect on 30 patients successfully discharged through these efforts.

MARGARETE DI BENEDETTO, M.D., Chief, Rehabilitation Medicine Service, VA Hospital, Roxbury, MA; Assistant Professor, Department of Orthopedic Surgery, Harvard Medical School; Director of Physical Medicine, Rhode Island Medical Center, Providence, RI

Thursday A.M.

11:00

Social Constraints Preventing Acceptance of the Disabled into the Community

This paper reports some of the major findings from a large research project, "Reducing Public Barriers Toward the Physically Disabled," which is aimed at changing local building codes and identifying the problems of the disabled in public places and developing innovative communications techniques (videotape) to educate the public about disability and rehabilitation. A total of 126 adult, able-bodied pedestrians encountered on Chicago sidewalks were interviewed about their attitudes, perceptions, knowledge and behavior toward the disabled. Many of the respondents indicated that they knew: someone disabled (43.7%); how to handle a wheelchair (40.5%); and what equipment the disabled needed in order to function (42.7%). They indicated they had positive attitudes toward the disabled but did not see many disabled in public places, could not identify the major physical and social barriers confronted by the disabled, and placed considerable social distance between themselves and the disabled. This perceived social distance varied widely by disability category and is seen as a major impediment to public acceptance of the disabled. Suggestions are made on how to reduce the social distance between the able-bodied and the disabled and thereby encourage community acceptance of the disabled.

GARY L. ALBRECHT, PH.D., Sociology, Department of Organizational Behavior, Graduate School of Management, Northwestern University, Evanston, IL

STEFAN J. HARASYMIW, PH.D., Rehabilitation Research, Department of Organizational Behavior, Graduate School of Management, Northwestern University, Evanston, IL

MARCIA D. HORNE, ED.D., Special Education, Department of Organizational Behavior, Graduate School of Management, Northwestern University, Evanston, IL

11:20

An Analysis of Relocation Stress With Emphasis on Attitudinal and Architectural Factors

During the summer of 1976, 470 Long Term Care patients of the Kingsbrook Jewish Medical Center (formerly Jewish Chronic Disease Hospital) will be transferred from their present accommodations, which are primarily large open wards of 20 to 30 patients, into a new building, The David Minkin Rehabilitation Institute, consisting almost entirely of semi-private accommodations. A smaller group of patients will be transferred from an old semi-private building to equivalent accommodations in the new building. Many parameters of this transfer will be monitored, including the patients' attitude with regard to the transfer, a morbidity index consisting of physiological variables, need for medication and medical care, and overall mortality. A controlled population in a similar institution but not being subject to relocation stress will be used as controls. We will also have preliminary evaluation of the changes in the patients' social organization brought about by the difference in institutional architecture.

ASA P. RUSKIN, M.D., Associate Clinical Professor, Albert Einstein College of Medicine; Director of Rehabilitation Medicine, David Minkin Rehabilitation Institute, Kingsbrook Jewish Medical Center, Brooklyn, NY

JEROLD MIROTZNIK, M.A., Ph.D. Candidate, Rutgers University, New Brunswick, NJ

11:40

Evaluation of Suicide Risk

In one year, 15% (22 of 150) of psychiatric consultations in a medical rehabilitation hospital were related to suicide risk. Most patients undergoing rehabilitation have

suffered a severe loss. When an individual's coping skills are not adequate to deal with this stress, then suicidal thoughts, threats or behavior may occur. The suicidal situation has three general features: a *crisis* with emotional turmoil, presence of *ambivalence* and an effort at *communication*. Assessment of suicide risk requires data from history, present psychosocial situation, observation of the patient, subjective report of the patient and personal reaction of the interviewer to the patient. The following factors point to increased risk: increased specificity, frequency and intensity of suicidal thoughts; access to the means/method to carry out potential suicidal action; poor tolerance for tension and reduced capacity for impulse control; failure of the patient to indicate specifically that he has something or someone to live for. The presence of a secret timetable may be dangerous. Family attitudes may directly or indirectly encourage suicidal behavior. The patient's report that he feels helpless, hopeless and worthless also increases possible risk of acting on suicidal thoughts. The presence of confusional symptoms along with the presence of agitation requires special attention. Patient's customary skills and techniques in coping with severe stress must be assessed by history and their present effectiveness evaluated. Management of the crisis requires defining a specific plan of action with the patient which will remove immediate dangers, allay anxiety, mobilize his social supports, increase his sense of mastery and attempt to decrease his sense of helplessness and frustration. Staff, family members or other sources of support must be informed and mobilized and a specific plan of action agreed upon with them. This focus on coping capacities and their breakdown provides an important approach for evaluation of suicide risk and is one which can help nursing staff, rehabilitation staff and non-psychiatric physicians deal with these patients.

JEROME MISSEL, M.D., Staff Psychiatrist, Massachusetts Rehabilitation Hospital, Boston, MA

12:15- 2:15 **ACRM LECTURE/AWARDS LUNCHEON—**
Golden West Room
The 26th John Stanley Coulter Memorial Lecture—
Creating the Caring Community
Lecturer—

HAROLD H. WILKE, White Plains, NY

2:30- 4:30 **SCIENTIFIC PAPER SESSIONS**
SESSION 70—Council Room
Chairman—

WILBERT E. FORDYCE, PH.D., Seattle, WA

Co-Chairman—

DOROTHY L. GORDON, D.N.SC., R.N., Columbia, MD

2:30 **Rehabilitation of Patients With Chronic Pain**

An in-patient setting designed to help patients function in society despite their plan is described. The "Hard-core" patients admitted to the program were characterized by (a) pain of many years' duration, (b) multiple operations, (c) prolonged disability, (d) compensation factors, (e) dependency on medications, (f) loss of intellectual efficiency. The method was multifaceted, utilizing behavior modification, physical measures, medication management, family member participation, group discussions, biofeedback and relaxation techniques. The data at the time of dismissal (based on 50 patients) show moderate to marked overall improvement in approximately half of the admitted patients with the failure groups including a third of the patients who left the program early. Further analysis of one year follow-up data on these patients is in progress. The Department of Psychiatry and Psychology were the primary service with close and regular coordination with the Physical Medicine and Rehabilitation Service. The amount of psychopathology was considerable in the initial 50 patients and included

Thursday P.M.

(a) delusional states, (b) hypochondriac/hysterical features, (c) depression/anxiety. The greatest success was evident in modifying the patient's communication of pain behavior to others, in reduction of analgesic-sedative drugs and in physical functioning. Positive reinforcement of day to day improvements in strength of muscle groups or other physical treatment goals was utilized extensively.

MALCOLM C. MC PHEE, M.D., Consultant, Mayo Clinic, Rochester, MN

ROBERT R. SAWTELL, M.D., Consultant, Mayo Clinic, Rochester, MN

2:50

The Evaluation of the Effectiveness of a Pain Unit in a Rehabilitation Hospital

This study evaluates the effectiveness of the pain unit at New England Rehabilitation Hospital in increasing functional performance and identifies patient characteristics predictive of successful performance. Twenty-five patients, including 18 with post-operative disc syndrome, 2 with post-operative mastectomy, and 5 with chronic pain syndrome, were given physical therapy, occupational therapy, movement therapy, and group discussions. Initial and final scores were obtained on the following: (1) Physical therapy: number of minutes on bike, number of laps, number of sit-ups; (2) Movement therapy: ten different measures of movement; (3) Behavioral indicators of pain, measured by the number of complaints made by patients and observed by the nurse; (4) Activities of daily living, such as hygiene, travel, household care. *T* tests were conducted to determine significant differences between initial and final scores. Differences at the 0.05 level or better in favor of the pain unit were found for: (1) number of minutes on bike; (2) number of sit-ups; (3) nine out of ten measures of movement therapy; (4) number of complaints about pain; (5) activities of daily living. Predictors of successful performance in two or more therapies were: less medical severity, highest grade completed, sex (males did better in physical therapy, females in occupational therapy). The pain unit contributed to a significant reduction of complaints and increased significantly patient functioning in all measurable areas.

NANCY PETERS, M.ED., Assistant Administrator, New England Rehabilitation Hospital, Woburn, MA

RICHARD T. GOLDBERG, ED.D., Director of Research, Massachusetts Rehabilitation Commission, Boston, MA

BETSY BLACKMER, M.ED., Assistant Professor, Department of Cooperative Education, Northeastern University, Boston, MA

LESTER DEWIS, M.D., Director of PM&R, New England Rehabilitation Hospital, Woburn, MA

BERNARD YUDOWITZ, M.D., Director of Psychiatry, New England Rehabilitation Hospital, Woburn, MA

3:10

Transcutaneous Nerve Stimulator Therapy for Chronic Pain —Experience With Fifty Patients

A brief history of electrotherapy is given with special reference to the history of transcutaneous nerve stimulator (TNS) therapy. A brief description of TNS is given with the method of application, indications and contraindications mentioned. A brief explanation is provided of the two possible modes of action of pain relief by TNS: (1) by acting upon the "gate" in the spinal dorsal grey horn to close the "gate" for painful sensations from reaching the brain; and (2) by increasing local blood supply to wash out the pain producing substances from painful areas. Increased peripheral circulation through use of the microcirculatory correlator is demonstrated. Fifty

patients with twenty different painful conditions were treated with results of 24% excellent (75-100% pain relief), 44% good (50-75% relief), 18% fair (25-50% relief), and 14% poor (0-25% relief). Best results were obtained with amputation stump pains and post herpetic neuralgias and poor results were obtained with mechanical osteoarthritis and post traumatic knee pains. When one considers the fact that most of the patients had already failed with conventional pain treatments and with TNS have obtained 68% good to excellent results, TNS can be recommended as an additional useful modality to be used in the treatment of chronic painful conditions.

RAVI R. MALPE, M.D., St. Luke's Hospital Center, New York City

SHYH-JONG YUE, M.D., St. Luke's Hospital Center, New York City

3:30 **Influence of Wave Shape on the Effectiveness of Electrical Stimulation for Suppressing Experimentally Induced Pain**

Although electrical stimulation for pain suppression has been used widely in recent years, much more systematic data is required to identify the optimal parameters of stimulation. The present study was based upon the hypothesis that dissimilar wave shapes, triangular and rectangular, differ in their perceptual and neural effects, and correspondingly, in their effectiveness when used for pain suppression. In Part I, perceptual differences attributable to the two wave shapes were confirmed by psychophysical data indicating that detection, pain, and tolerance thresholds are higher when electrocutaneous stimulation consists of a triangular wave shape rather than square shape. In Part II, it was confirmed by microneurographic techniques that the two wave shapes differ also with respect to the peripheral afferent sensory nerve fibers that are depolarized. Part III was devoted to studying directly the pain suppressive effects of the two wave shapes. The pain inducing stimulus consisted of discrete electrocutaneous pulse trains applied at successively higher current levels to the distal end of the middle finger. In a within-subject design, one type of stimulus series consisted of applying the pain-inducing stimulus alone. In two other series, continuous pulse trains comprised of either triangular or square wave shapes were applied concurrently with the pain stimulus to each of three different sites, ipsilateral or contralateral to the site of experimentally induced pain. Concurrent stimulation resulted in an elevation of the detection and pain thresholds, and the two wave shapes did not differ in this respect. Both wave shapes were less effective when applied to the extremity contralateral to the site of the experimentally induced pain.

MILAN R. DIMITRIJEVIC, M.D., D.SC., Baylor College of Medicine; Texas Institute for Rehabilitation and Research, Houston, TX; Institute of Clinical Neurophysiology, Ljubljana, Yugoslavia

MARCUS J. FUHRER, PH.D., Baylor College of Medicine; Texas Institute for Rehabilitation and Research, Houston, TX

MARTIN GRABOIS, M.D., Baylor College of Medicine; Texas Institute for Rehabilitation and Research, Houston, TX; Texas A&M University,

3:50 **Effect of Vibration on Pain in Spinal Cord Injured Patients**

Vibration has been used in a number of instances to suppress otherwise intractable pain. This presentation reports results of the use of vibratory stimulation for 12 spinal cord injury patients with pain in a variety of sites. Seven patients with partial to near complete lesions between C3 and T8 and 5 patients with cauda equina lesions were selected for having pain of such a degree as to interfere seriously with daily activities.

Thursday P.M.

Vibratory stimulation was obtained from small attachable vibrators producing up to 1 mm perpendicular displacement at frequencies from 60 to 120 HZ. A direct ratio estimation procedure was used to have patients express the degree of pain relief. The results suggest that vibratory stimulation was a very effective force for reducing pain in many cases. The site of stimulation was a significant variable in determining the effect produced. Stimulation at the site of pain generally had opposite the desired effect. The probable physiological bases for the results are discussed.

JOZE V. TRONTELJ, M.D., D.S.C., Postdoctoral Fellow, Department of Rehabilitation, Baylor College of Medicine; Texas Institute for Rehabilitation and Research, Houston, TX; Institute of Clinical Neurophysiology, School of Medicine, Ljubljana, Yugoslavia

MILAN R. DIMITRIJEVIC, M.D., D.S.C., Visiting Professor of Clinical Neurophysiology, Department of Rehabilitation Medicine, Baylor College of Medicine, Houston, TX

MARTIN GRABOIS, M.D., Assistant Professor, Departments of PM&R, Baylor College of Medicine, Houston, TX

PAUL C. SHARKEY, M.D., Clinical Associate Professor, Department of Rehabilitation, Division of Neurosurgery, Baylor College of Medicine, Houston, TX

4:10

Controlled Study of Acupuncture for the Treatment of Chronic Pain

This is a preliminary report of the research in acupuncture conducted at the Rehabilitation Medicine Service of St. Luke's Hospital Center in New York. In a controlled study, classical accepted-site acupuncture, off-site acupuncture, and conventional physical therapy were compared. Patients who were randomly assigned to these treatment conditions had chronic back or neck pain with objective findings. Improvement was evaluated by a rheumatologist, who was unaware of the type of treatment the patient received; by the treating physician; by range of motion tests; and by the patient, on a specially constructed questionnaire. The patients also participated in a battery of psychiatric and psychological tests including hypnotic susceptibility. Some preliminary findings of interest are: acupuncture was superior to conventional physical therapy; accepted-site acupuncture and off-site acupuncture did not differ significantly; and the score on the Hamilton Psychiatric Rating Scale for Depression accurately predicted the results of acupuncture therapy.

SHYH-JONG YUE, M.D., Director, Rehabilitation Medicine, St. Luke's Hospital Center, New York City

W. CRAWFORD CLARK, PH.D., New York State Psychiatric Institute, New York City

JEAN B. CASE, M.D., St. Luke's Hospital Center, New York City

HARRY LEWIN, B.A., Research Associate, St. Luke's Hospital Center, New York City

SESSION 71—Chamber Room

Chairman—

LAWRENCE W. FRIEDMANN, M.D., Woodside, NY

Co-Chairman—

JAMES L. COCKRELL, PH.D., Ann Arbor, MI

2:30

Biomechanical Evaluation of Plastic Orthoses

In our 5-year experience with 257 plastic lower limb orthoses, we clearly noted advantages in cosmesis, orthotic weight reduction, comfort, maintenance, ease of donning, and functional gains. To delineate other biomechanical benefits, our cardiopulmonary laboratory measured the metabolic cost and cardiac effort of patients wearing highly congruent lower limb plastic orthoses. Additionally, utilizing a recently implemented electromechanical system, we assessed the capability of plastic orthoses to effectively reduce the transmission of ground impact forces to the ankle, knee, and ischial crest. The impact studies of plastic orthoses utilized a pendulum to strike the heel of a patient lying supine, repeating the procedure with the patient wearing an orthosis. A piezoelectric accelerometer is placed at various limb positions to determine the relative attenuation effects occurring at each joint. The accelerometer output is fed through various signal conditioners, producing data that are displayed on an oscilloscope in either the time domain or spectrum analysis mode. The paper describes our methodology and instrumentation, and details our results which indicate that plastic orthoses: (1) reduce metabolic cost; (2) invoke less cardiac stress; (3) are a factor in altering psycho-vocational adjustment scores; and (4) effectively dampen the transmission of ground reaction forces to the ankle, knee, and hip areas.

JAMES T. DEMOPOULOS, M.D., Professor of Rehabilitation Medicine, Mount Sinai School of Medicine; Director, Department of Rehabilitation Medicine, Hospital for Joint Diseases and Medical Center, New York City

JAMES PUGH, PH.D., Director, Biomechanical Laboratory, Hospital for Joint Diseases and Medical Center, New York City

2:50

The Fabrication and Use of a Vacuum Formed, Polypropylene Orthosis in a Hospital Setting

The Physical Therapy Department, Prosthetic and Orthotic Service, at Kessler Institute for Rehabilitation has been fabricating plastic below knee orthoses since March 1973. The original orthosis was hand molded, using Polysar sheet, a thermoplastic compound described in past literature. In November, 1974 we began to use polypropylene and a vacuum forming technique as the method of fabrication. The characteristics of polypropylene are well suited for the below knee orthosis. It is light, strong but flexible, durable, and relatively inexpensive. The vacuum forming procedure provides uniform wall thickness, good contouring, and is easily mastered with little practice. This paper presents the total process of fabrication of the polypropylene orthosis in narrative and pictorial demonstration starting with the initial casting procedures and progressing to the delivery of the final orthotic device. Indications and examples of its use are discussed in full. The paper is presented to show that such orthoses can be provided as a hospital service at minimal cost within a short period of time by a department of physical medicine and rehabilitation as a complement to its comprehensive programs.

ROBERT A. BEDOTTO, R.P.T., Unit Supervisor of Prosthetic and Orthotics, Kessler Institute for Rehabilitation, West Orange, NJ

RICHARD A. SULLIVAN, M.D., Medical Director, Kessler Institute for Rehabilitation; Associate Professor of Rehabilitation Medicine and Acting Chairman, Department of Rehabilitation Medicine, New Jersey College of Medicine and Dentistry, West Orange, NJ

Thursday P.M.

3:10

Comparison of the Biomechanical Function of the Pneumatic and Standard Double Upright Orthoses in Spinal Cord Injury

This study presents a detailed analysis of the biomechanical and physiological functions of the pneumatic orthosis as compared with the standard double upright knee ankle orthosis. The intent was to control the parameters of ambulation with these orthoses so that the differences could be interpreted in biomechanical terms and their clinical significance assessed. The comparison included measurement of energy consumption as it relates to the amplitude of the center of gravity pathway. The center of gravity pathway amplitude was in turn related to angular measurements at the knee and ankle. The energy used during ambulation was also studied in terms of the trunk stability provided by the orthoses. In addition, important physiological parameters such as blood pressure (sitting and standing) and heart rate were monitored. The three patients who participated in the study were selected because their different levels permitted better analysis of the assets and limitations of the orthoses. The results suggest that the primary use of the long pneumatic orthosis be during early mobilization of the patient. In addition, the long pneumatic orthosis provides hip and trunk stabilization for marginal walkers who walk for exercise purposes. It is likely that most long term functional ambulators will choose the standard K.A.O. for home use. The study does not represent a statistical sample; therefore generalization must be limited.

JUSTUS F. LEHMANN, M.D., Department of Rehabilitation Medicine, University of Washington School of Medicine, Seattle, WA

JERRY B. STONEBRIDGE, B.S., Department of Rehabilitation Medicine, University of Washington School of Medicine, Seattle, WA

BARBARA J. DELATEUR, M.D., Department of Rehabilitation Medicine, University of Washington School of Medicine, Seattle, WA

3:30

Functional Evaluation of Cervical Collars and Braces

Five cervical collars and braces were studied on normal volunteer subjects and the halo-body jacket in five patients. Motion was measured at the extremes of flexion, extension, lateral bending and rotation using roentgenograms and axial photographs. The soft collar provided little overall control of the cervical spine. The more rigid appliances provided better control of sagittal plane motion but were less effective in controlling rotation and lateral bending. Only the halo body-jacket provided precise control of all three planes of motion. Flexion and extension were measured at each segmental level to identify whether one brace was more effective in controlling different levels of the spine. As an example, it was found that none of the conventional braces and only the halo controlled the upper spine well. At the C1-2 level, the Somi Brace satisfactorily controlled flexion but not extension. In the middle cervical levels, the four-poster and cervico-dorsal braces were most effective. Each brace was found to have certain advantages and limitations. By knowing these, a brace may be selected which will provide the best stabilization in each clinical circumstance.

ROLLIN M. JOHNSON, M.D., Orthopaedic and Rehabilitation Medical Services, VA Hospital, West Haven, CT; Assistant Professor Orthopaedics, Yale University School of Medicine, New Haven, CT

DENNIS L. HART, R.P.T., VA Hospital, West Haven, CT

EDWIN F. SIMMONS, C.C.T., VA Hospital, West Haven, CT

GALE R. RAMSBY, M.D., VA Hospital, West Haven, CT

WAYNE O. SOUTHWICK, M.D., VA Hospital, West Haven, CT

3:50

Evaluation of an Alternate Home Intermittent Cervical Traction Apparatus

A common result of aging is cervical osteoarthritis and the resultant cervical radiculopathy. These conditions are often associated with pain, numbness, loss of motor function in the arms and loss of cervical mobility. Conventional treatment for this condition usually includes the use of heat applied to the neck and shoulders, the use of anti-inflammatory drugs and cervical traction. In the hospital, cervical traction is usually intermittent in nature and involves a tractive force of 20-40 pounds. This is often applied by an expensive hydraulic apparatus which automatically applies intermittent traction to the cervical vertebrae. When discharged home, the patients may continue therapy with a static, low weight, uninterrupted traction or with intermittent traction using a force equal to 20 to 40 pounds. The home intermittent cervical traction apparatus now commonly available consists of a head harness, rope and pulley system and a counter-weight, usually a water bag. This system is used by suspending the counter-weight to apply tractive force and supporting it to relieve traction. It can, when properly used, be effective and economical. As implied above, however, patients requiring cervical traction tend to be somewhat elderly with variable degrees of upper extremity disability. We have found limited acceptance of these units by small and elderly patients because they can be difficult for the patient to operate by himself. We have had the opportunity to develop and evaluate with Battelle Memorial Institute of Columbus, Ohio, an alternate apparatus for home cervical traction consisting of a head harness and rope and pulley system as in the conventional unit, but with a tractive force supplied by a pneumatic cylinder operated by the patient using a foot pump. This new apparatus has been evaluated on a preliminary basis as to ease of use, patient acceptance, safety, effectiveness in relief of symptoms and economy.

CHARLES F. DENHART, M.D., Resident, Department of Physical Medicine, The Ohio State University, Columbus, OH

JOSEPH WAPENSKI, B.A., Medical Student, The Ohio State University College of Medicine, Columbus, OH

GEORGE W. WAYLONIS, M.D., Associate Professor of Physical Medicine, The Ohio State University School of Medicine, Columbus, OH

4:10

The Besaja Shoulder-Elbow-Wrist (SEW) Sling

The objective of this research was to develop a new Shoulder-Elbow-Wrist (SEW) sling. Evaluation was based upon successful implementation of the design criteria. These included: (1) provide appropriate support to prevent shoulder subluxation; (2) evenly distribute forces over uninvolved shoulder and back with no neck pressure; (3) easily put on with one hand by the patient; (4) capable of dynamic or static support; (5) hand area open for optional movement; (6) comfortable without rubbing on body or arm; (7) lightweight, cool, cleanable and cosmetically appealing. A polypropylene SEW sling was vacuum molded and appropriate shoulder/back support straps attached. Two-inch straps distributed forces across uninvolved shoulder and back. Elastic straps were attached if it was desired to achieve dynamic characteristics. Holes were drilled in the sling for ventilation. Padding was used where necessary for comfort. Clear polypropylene is easily cleanable, lightweight and aesthetically pleasing. The cost of commercial production should be minimal with respect to the obvious potential benefits. The design, development, construction, and implementation is presented. A sample will be available for examination.

BERNARD ALLAN COHEN, PH.D., Assistant Professor of Rehabilitation Medicine, Department of Rehabilitation Medicine, Emory University School of Medicine, Atlanta, GA

SARA N. THOMPSON, R.P.T., Department of Rehabilitation Medicine, VA Hospital, Decatur, GA

Thursday P.M.

JANET R. RAINES, O.T.R., Department of Rehabilitation Medicine, VA Hospital, Decatur, GA

SESSION 72—Cabinet Room

Chairman—

DON A. OLSON, PH.D., Chicago

Co-Chairman—

MARY E. ZAHN, ED.D., San Jose, CA

2:30

Influencing Factors in Setting Criteria for Evaluation of Electronic Devices for the High Level Spinal Cord Injured

During the process of carrying out a program designed to test the suitability of electronic devices in the areas of controls for environment and mobility for the severely disabled spinal cord injured, certain factors developed indicating the need for special investigations. They relate to the parameters of the study, such as patient operation of equipment, equipment performance, and peripheral selection and/or modification. Included are data regarding the use of breath as an interface and its influence on mode of operation, design factors of control units affecting their performance and peripheral design influencing patient satisfaction and acceptance, including accessory equipment such as clamps, holders and other positioning devices. The findings which are presented are not conclusive as the studies are not complete.

MURIEL E. ZIMMERMAN, M.A., O.T.R., Institute of Rehabilitation Medicine, New York University Medical Center, New York City

2:50

Voice Controlled Remote Manipulator

A wheelchair-mounted, voice-controlled remote manipulator has been tested with both normal and quadriplegic subjects. The results of tests with this six-degree-of-freedom manipulator are presented. Several different methods of controlling the manipulator were evaluated: (1) individual motor control, (2) end point position control (for both cartesian and polar coordinates), (3) terminal device directional control, and (4) pre-programmed movement control. The tasks involved in this study involved the manipulation and control of a variety of everyday objects—switches, knobs, handles, glasses, etc. Results of the tests are presented in terms of test scores based on both the time and the number of commands required to perform the tasks.

JAMES A. CLARK, M.S., Department of Electrical Engineering and Computer Science, University of California at Santa Barbara; Santa Barbara Memorial Rehabilitation Foundation, Santa Barbara, CA

ROBERT B. ROEMER, PH.D., Department of Mechanical and Environmental Engineering, University of California at Santa Barbara; Santa Barbara Memorial Foundation, Santa Barbara, CA

3:10

Myoelectric Control Sites in the High Level Quadriplegic

The purpose of this investigation was to determine optimal myoelectric control sites in the C4 and above level quadriplegic. Myoelectric control, while easily demonstrated in the laboratory and in widespread use in the control of prostheses, has yet to be shown to be a functional and effective control mode for the high level quadriplegic in controlling devices such as wheelchairs, environmental control units, and other electromechanical aids. Frederick Miller and his associates, in 1970, have shown some positive results in determining ideal control sites in the C4-5 quadriplegic, studying the frontalis,

platysma, and upper trapezius muscles. Our study includes the evaluation of all intact superficial musculature of the C4 quadriplegic. Important criteria for selecting optimal sites were: (1) the remaining repertoire of movement could be performed by the subject without producing interfering myoelectric activity; (2) adequate myoelectric activity could be produced from underlying musculature; (3) electrical silence at rest over the site could be demonstrated. Eight muscle groups of the head and neck were studied on six high level quadriplegics. Surface EMG was picked up by miniature surface electrodes, and the electrical activity was recorded as an integrated average using a chart recorder. The subjects were asked to perform eleven tasks, including active movements of the head and neck, swallowing, and speaking. Following this, the subjects performed a series of sub-maximal and maximal voluntary contractions. Using the above criteria, we found several sites which would be feasible for functional myoelectric control. Our methods and results are discussed.

DOUGLAS POLLOCK, B.S., R.P.T., Senior Physical Therapist,
Institute of Rehabilitation Medicine, New York University
Medical Center, New York City

G. HEINER SELL, M.D., Assistant Clinical Professor, Institute
of Rehabilitation Medicine, New York University Medical
Center, New York City

3:30

The Emory Detachable Motor Drive for the Standard Wheel-Chair

This research involved development of a self-contained power drive unit for the standard wheelchair. There exists a population of wheelchair users who could benefit from a detachable electric powered device to propel their wheelchairs. These include clients who travel long distances at their work, partial quadri-, para- or hemiplegic clients confined to a wheelchair, or patients prohibited from significant exertions (e.g., those with cardiac problems, asthma, or respiratory ailments). There are great difficulties in transporting a conventional powered wheelchair by automobile or public transportation; a detachable powered drive would not present this additional barrier to the handicapped. In developing the unit, a 20-point design criteria was adhered to. A three-phase testing protocol included in-house testing, field testing in hospitals and health-care facilities, and home testing and evaluation by selected clients. The wheelchair can be a functional aid, a therapeutic device for the patient, or may just present another mechanism which further restricts the functional ability of the disabled patient. The Emory detachable motor drive unit for the standard wheelchair offers the user all of the advantages of both a powered and a non-powered wheelchair.

BERNARD ALLAN COHEN, PH.D., Department of Rehabilitation,
Emory University School of Medicine, Atlanta, GA

ALFRED F. MORRIS, PH.D., Department of Rehabilitation
Medicine, Emory University School of Medicine, Atlanta,
GA

3:50

Reclining Function of Wheelchairs: Evaluation and Design Considerations

Quadriplegic persons commonly complain about the reclining function of their powered wheelchairs. Repeated cycling causes shifts of their body segments which may require them to be repositioned in the chair. Wrinkling and bunching of clothing may also occur, which causes possible areas of pressure concentration. These problems are a result of the differences in alignment between the axes of rotation of the chair and those of the human body. In order to alleviate these problems, a powered reclining mechanism was designed so that its axes of rotation more closely coincide with those of the body. The purpose of this study was to quantify the displacement and shear

Thursday P.M.

between the user and chair in the conventional as well as in the modified designs. The two wheelchairs were instrumented with strain-gage transducers to measure the shear between the person's back and the back of the chair. Displacement of the body in relation to the chair was measured by using single frame multiple exposure photography. The data, taken on three quadriplegic persons whose levels ranged from C8 to C6, indicates that the modified chair considerably reduced the magnitudes of shear and displacement over the conventional design. The data suggests that it may be highly beneficial to the quadriplegic person if the reclining mechanism of wheelchairs were redesigned so that the axes of rotation of the chair coincide more clearly with the axes of rotation of the body.

C. GERALD WARREN, M.P.A., Department of Rehabilitation Medicine, University of Washington, School of Medicine, Seattle, WA

MIKE KO, Research Engineer, Department of Rehabilitation Medicine, University of Washington, School of Medicine, Seattle, WA

STEVEN FREEMAN, Research Technician, Department of Rehabilitation Medicine, University of Washington School of Medicine, Seattle, WA

4:10 **Radio Communication Systems for the Disabled**

The increased usage of vehicles by the disabled has led to the need for radio communications in calling for emergency assistance. Recently, the Federal Communications Commission, through the liberalization of the regulations, has provided for more individuals to become eligible for licensure. Through the Citizen and Amateur Radio Service, the handicapped have the opportunity to become further independent when emergencies arise under mobile conditions. In addition, there are other benefits which relate to human relationships and recreational pursuits. The paper also describes technical details of equipment, station operation, eligibility requirements, where and how to apply for a license, as well as other aspects of civilian band communication.

HERBERT KENT, M.D., Associate Professor, University of California at Irvine; Chief, Rehabilitation Medicine Service, VA Hospital, Long Beach, CA

SESSION 73—Forum Room
Chairman—

GARY T. ATHELSTAN, PH.D., Minneapolis, MN
Co-Chairman—

MARGARETE DI BENEDETTO, M.D., Sherborn, MA

2:30 **A Descriptive Study of Personality Factors in Patients With Psychogenic and Somatic Low Back Pain**

The purpose of this study was to investigate personality factors in two groups of patients: those with psychogenic low back pain and those with somatic low back pain. The population consisted of 35 patients in each group, ranging in age from 25 to 60 years and comparable with respect to age, sex and length of disability. Subjects were drawn from the Institute of Rehabilitation Medicine and Faculty Practice of the New York University Medical Center. Assignment to either the psychogenic or somatic category was based on validated medical criteria. All subjects were administered three tests: the WRAT to screen for reading level, the Cornell Medical Index (CMI), and the Sixteen Personality Factors Questionnaire (16PF). No statistically significant differences were found between the groups with regard to degree of emotional disturbances—although the psychogenic group was higher on each index. The second order factors

Thursday P.M.

and the individual factors of the 16PF failed to distinguish the groups. The profiles of the psychogenic and somatic groups closely resembled each other and were also similar to the normal population. The findings did not lend support to the concept of a low back pain personality stereotype. Several conclusions and recommendations are made. The value of the results of the CMI and the 16 PF when used individually to determine other disabling conditions and to plan effective physical and psychological therapy programs is underscored.

NANCY L. ESIBILL, PH.D., Rehabilitation Counseling Department,
New York University, New York City

2:50

The Relationships of Depressions, Anxiety and Disease Processes in the Course of Rheumatoid Arthritis

Depression and anxiety are repeatedly implicated as part of the response pattern in rheumatoid arthritis. Generally, they have been assessed at only one point in time or over a period of improvement. There are suggestions that the mood changes may precede disease activity increase. Correlation studies of the mood states with the disease state have been limited to one parameter of rheumatoid arthritis activity, usually pain. A study prospectively looking at the interaction of depression and anxiety with several standardized criteria dimensions of rheumatoid arthritis activity over periods of improvement, exacerbation and absence of disease activity will be reported. The sample of 100 patients used in the study were also assessed for other factors influencing the mood and disease activity. The results help detail aspects of the natural history of depression and anxiety in rheumatoid arthritis over an extended period of time. This, plus the findings that depression influences medication use and rehabilitation outcome in rheumatoid arthritis, increases the study's relevance for those in rehabilitation.

DUANE S. BISHOP, M.D., Psychosocial Co-Ordinator, Chedoke-McMaster Regional Rehabilitation Unit, Hamilton, Ontario, Canada

3:10

The Rheumatoid Personality—A Psychodiagnostic Myth

It has often been suggested that there is a specific "rheumatoid personality". To test this hypothesis, the MMPI and TSCS were administered to 46 patients (22 males and 24 females), ranging in age from 19 to 71, admitted to the Arthritis Center at Moss Rehabilitation Hospital, Philadelphia. The results for this population were compared with the following diagnostic groups: gastric ulcer, low back pain, emphysema, and multiple sclerosis. An examination of the kurtosis (slopes of the curves) did not reveal significant differences among the various disabilities. Rather what seemed to have emerged was a "chronic disease personality," not a "rheumatoid arthritic personality." Results from both the MMPI and the TSCS were subjected to a hierarchical cluster analysis (a statistical procedure that ranks in size from highest to lowest those subgroup variables which are positively correlated with each other). Fifteen relatively discrete groupings of personality entities were identified suggesting individual differences within the arthritic group and refuting the rheumatoid arthritic personality concept.

PHILIP SPERGEL, ED.D., Director of Psychological Services,
Moss Rehabilitation Hospital, Philadelphia, PA

GEORGE E. EHRLICH, M.D., Head, Rheumatology Section,
AEMC, Moss Rehabilitation Hospital, Philadelphia, PA

DOROTHEA D. GLASS, M.D., Medical Director, Moss Rehabilitation Hospital, Philadelphia, PA

3:30

Cardiac Rehabilitation Patient Teaching Program

The purpose of the study was to develop a formal teaching program for cardiac patients and to measure increases in their knowledge of their cardiac condition. Initially an interview form was developed and tested on 78 cardiac patients and families.

Thursday P.M.

This tool measures increases in the patient's knowledge of diet, activity, medications, risk factors, signs and symptoms of cardiac distress. Thirty patients were tested prior to the educational program, immediately following the program and six weeks post discharge. Chi-square and the Guttman scale were used in the analysis. The results of the analysis show statistically significant increases in patient knowledge in almost all areas. The Guttman scale also has shown a change in knowledge in each area. The results show that certain modifications in dietary instruction need to be made. In the area of medications, there is a significant improvement in knowledge from the time of the past test to the follow-up six weeks later. The patients will continue to be interviewed in the same manner to increase the size of the study group. Patients are interviewed in three months and six months after discharge. The purpose of the long-term interviews is to test for retention of knowledge and/or compliance with health program. Any patients readmitted to the hospital will also be interviewed at that time.

CAROL M. HUTELMYER, M.S.N., R.N., Rehabilitation Nursing,
Thomas Jefferson University Hospital, Philadelphia, PA

CHRIS MC CANN, B.S.N., Thomas Jefferson University Hos-
pital, Philadelphia, PA

3:50

Early Evaluation and Rehabilitation of the Patient Less Than Six Weeks Post-Myocardial Infarction

This report summarizes our experience with a multi-disciplined team approach, utilizing monitoring and close observation, to design an individualized rehabilitation program for both the complicated and uncomplicated post myocardial infarction patient. Complicated patients were considered to be those exhibiting left ventricular impairment, continuing ischemia, or rhythm disturbances. Twenty-nine patients were evaluated and treated using the subacute protocol of the Rancho Los Amigos Cardiology Service. Mean time to program initiation was 15 days post myocardial infarction. The physician, occupational therapist and physical therapist were responsible for evaluating patient responses to mild exertion, utilizing a 12-lead electrocardiogram, physical examination, 24-hour Holter monitor, self-care evaluation and treadmill screening test. Patient performance was assessed at each stage of testing and individualized activity levels were determined in accordance with cardiac responses. Twenty-seven of the 29 were able to eventually complete the protocol. Monitoring and close observation were utilized to evaluate the efficacy of medications and progression of program. Fifteen had appropriate responses to activity and proceeded to a mild exercise program with minimal observation. Fourteen were considered to be complicated, requiring close observation, and of these five experienced a temporary program interruption. Two were dropped from program secondary to severity of complications. Under this protocol, the following can be accomplished: (1) evaluation of early candidacy for a rehabilitation program; (2) prescription of individualized activity levels; and (3) identification of potential problems which warrant intervention and/or continued evaluation.

KATHY HARRINGTON, B.S., R.P.T., Rancho Los Amigos Hos-
pital, Downey, CA

MARY SCHUMACHER, B.S., O.T.R., Rancho Los Amigos Hos-
pital, Downey, CA

RONALD SELVESTER, M.D., Rancho Los Amigos Hospital,
Downey, CA

4:10

Motivational Factors in Cardiac Rehabilitation

The intent of this research was to study the motivational factors (manifest needs) related to work return after a heart attack. Specifically, the need for achievement was assessed as the major discriminant in the eventual success or failure in assuming a work role subsequent to a myocardial infarction. The research subjects included 158 men with a myocardial infarction with a final group of 70 men being interviewed. Data

collection was done by an interview schedule coupled with the administration of the *Edwards Personal Preference Schedule* for the measurement of manifest needs. Forty-eight (68%) of the men returned to work after the heart attack. The subjects had an average age of 48.9 years with an average education of 11.9 years. The data analysis showed demographic variables not to be independent of work return. The time to resumption of hobbies and sexual activities along with marital status, income at heart attack and work load at myocardial infarction, were statistically significant ($P .05$) in relation to work return. The need for autonomy was the major psychological variable discriminating between work status after a myocardial infarction. The need for interception and change were also shown to be important discriminating factors. The need for achievement was not related to work return. Recommendations suggested the need for early assessment and counseling intervention programs to aid in cardiac rehabilitation.

KENNETH MITCHELL, PH.D., Rehabilitation Counseling, University of North Carolina, Chapel Hill, NC

SESSION 74—Senate Room

Chairman—

THOMAS P. ANDERSON, M.D., Minneapolis, MN

Co-Chairman—

RONALD B. HARTLEY, PH.D., Santa Barbara, CA

2:30

The Applicability of the Problem Oriented Medical Record to a Communicative Disorders Section

The purpose of this study was to explore the applicability of the Problem Oriented Medical Record to the needs of a Communicative Disorders Section. Our methodology was the establishment and ordering of criteria for clinical reporting of speech pathology and/or audiological impairments. These criteria included: (a) maximum possible message with minimum possible length; (b) an integrated speech pathology and audiology description of the patient's normal and pathological communication; (c) an integrated speech pathology and audiology plan and progress description. Fifteen successive patients referred for evaluation were described via the Problem Oriented format. The records were reviewed by staff and critically appraised. We found the new format advantageous in several areas. The primary benefit was a forced reappraisal by the clinician of the traditional written communication system. The reappraisal was shaped by the need to specify subjective, objective, assessment and plan notes for each problem. The criteria of maximum message and maximum intelligibility appeared to be reached. Length of report however was increased. Use of the Problem Oriented approach avoided idiosyncratic clinician style and stressed program philosophy. Audiology was integrated into the report. A discussion will involve comments from physicians. A standard case evaluation and progress record and a Problem Oriented record will be demonstrated.

SYLVIA BALICK, M.A., Beth Israel Medical Center, New York City

GAIL GREENE, M.S., Beth Israel Medical Center, New York City

JEROME KAPLAN, M.A., Beth Israel Medical Center, New York City

DAVID PRESS, M.S., Beth Israel Medical Center, New York City

JAMES T. DEMOPOULOS, M.D., Beth Israel Medical Center, New York City

2:50

Spastic Dysphonia: A Review of Sixty Cases

Thursday P.M.

Detailed, systematic studies of spastic dysphonia have been reported in the literature, but they are few in number and may be considered only a beginning in helping us to understand this serious vocal handicap. Examination by indirect laryngoscopy usually reveals normal structure and function. The audible characteristics of this problem thus become indispensable to diagnosis. One of the dual purposes of this proposal is to demonstrate the "sound of spastic dysphonia" by means of tape-recorded speech samples of several patients with this severely disabling vocal disorder. The paper discusses 60 patients with spastic dysphonia who were seen during an eight-year period (1968-1975) in the Department of Otolaryngology of the Cleveland Clinic Foundation. Documented observations are summarized according to the following categories: age, sex, and occupational history; onset and duration of vocal symptoms; subjective complaints about the vocal abnormality; defective vocal characteristics and their relative incidence; conditions of decreased vocal abnormality; pertinent medical data; and the efficacy of selected technics in management through voice therapy.

EUGENE M. BATZA, PH.D., The Cleveland Clinic Foundation,
Cleveland, OH

3:10 **Successful Feeding of the Cleft Lip and Palate Infant**

To the mother, a baby born with cleft lip and palate represents failure to produce a normal, beautiful child. Many times this failure is continued when she has difficulty feeding the baby. This feeding program is based on knowledge that a positive maternal-infant attachment requires success responses from both mother and baby and that success is often indicated by weight gain and a content baby. Not only do these babies require equipment which will facilitate a near-normal feeding process with little regurgitation of formula, but also their mothers require continued verbal reinforcement which indicates they are not failures in the mothering process. The presentation will be based on five years experience as the Pediatric Rehabilitation Nursing Specialist and member of the Cleft Lip and Palate Team at Rancho Los Amigos Hospital. It has given the author an opportunity to develop, implement and evaluate a positive feeding program for these infants.

SUZANNE HOUGHTON, M.S., R.N., Rancho Los Amigos Hos-
pital, Downey, CA

3:30 **Muscle Strength in Mentally Retarded Children**

The purpose of this investigation was to determine if mentally retarded educable children would demonstrate quantitative objective muscle strength scores that are at variance with those produced by "normal children". In addition, it was hoped that if significant weaknesses could be demonstrated, that such variations from the norms might occur in specific recognizable patterns. Seventeen hundred thirty normal boys and girls age 7 to 15 and 220 mentally retarded children age 8 to 15 were tested by means of a Cybex II exerciser-dynamometer, according to a method described previously, in order to determine muscle strength scores of ten selected muscle groups. Anthropometric measurements—such as height, weight, age, sex and dominance were correlated with muscle strength scores. Normative data of retarded and non retarded children were compared by statistical methods. Results indicate that mentally retarded boys tended to be weaker in all muscles examined when compared to non retarded boys of same age and body configuration. The difference in strength scores appeared to be significant at the 0.005 level of confidence. Mentally retarded girls demonstrated weaknesses in the lower extremities only. In the upper extremities deviations from the norm were too small to be significant. Generally, deviations from the predicated scores were greater on the dominant side as compared to the nondominant side. It is anticipated that further analysis will confirm our findings and permit the development of a therapeutic program designed to ameliorate these defects by activities suitable for inclusion in a general physical education program.

Thursday P.M.

JUSTIN ALEXANDER, PH.D., R.P.T., Director of Physical Therapy, Bronx Municipal Hospital Center, Bronx, NY

GABRIELLA E. MOLNAR, M.D., Associate Professor, Director of Pediatric Rehabilitation Service, Departments of Rehabilitation Medicine and Pediatrics, Albert Einstein College of Medicine, Bronx, NY

NICHOLAS GUTFELD, Director, Scientific Computing Center, Albert Einstein College of Medicine, Bronx, NY

ILANA GILAD, R.P.T., Research Assistant, Department of Rehabilitation Medicine, Albert Einstein College of Medicine, Bronx, NY

3:50

Gait Patterns of Children With Hemiplegic Cerebral Palsy

Asymmetry of walking is one of the most evident clinical signs of hemiplegic cerebral palsy. Different gait characteristics lend themselves to objective and relatively simple measurements and could be used to follow spontaneous age related progression or improvement as a result of various therapeutic measures. It was with these considerations in mind that a study of gait in 15 hemiplegic children was undertaken. Age of the subjects ranged from 6 to 14 years. Right and left hemiplegics, girls and boys were nearly equally represented in the study group. Majority of the children had congenital cerebral palsy. Polygraph recordings of gait were taken by Limb Load Monitor at different velocities of walking. Stride length, duration of stance and swing phase, period of double support and amount of weight bearing were measured. These data were analyzed and compared for the affected and unaffected legs. Results were correlated with age, severity of neuromuscular deficit, leg length discrepancy, presence or absence of parietal lobe syndrome and with previous treatment.

GABRIELLA E. MOLNAR, M.D., Associate Professor, Director of Pediatric Rehabilitation Service, Departments of Rehabilitation and Pediatrics, Albert Einstein College of Medicine, Bronx, NY

SESSION 75—Committee Room

Chairman—

MARCUS J. FUHRER, PH.D., Houston

Co-Chairman—

GARY L. ALBRECHT, PH.D., Chicago

2:30

Application of Unobtrusive Longitudinal Monitoring Techniques to Assess Gross Behavioral Activity in a Non-Institutional Setting

During 1976, the Texas Institute for Rehabilitation and Research initiated a transitional living program for severely physically disabled individuals. This program, New Options, is designed to present certain information, skill training, and experiences which will facilitate the behavioral adaptation and personal adjustment of individuals to severe physical disabilities. In order to measure the effects of the program on individual participants; extensive research and program evaluation is being done. Various elements of this research relate to three basic areas: (1) attitudes toward the program; (2) acquisition of significant information relevant to individual rehabilitation oriented goals; and (3) behavioral changes associated with the program. Since previous research suggests that gross behavioral activity levels in naturalistic settings may be better indicators of personal independence than standardized muscle and function tests, several unobtrusive monitoring techniques including the Rest Time Monitor and Wheelchair Odometer are being used to continuously measure gross activity levels of New

Thursday P.M.

Options participants. Previous use of these techniques has been limited to evaluation of hospitalized patients undergoing comprehensive rehabilitation. The application at New Options is unique in view of the fact that program participants have the freedom to plan and structure their own behavior in a comparatively non-institutionalized setting. This paper describes one phase of the evaluation program at New Options and presents a preliminary analysis of longitudinal data including comparisons with data obtained using other techniques and from other sources.

LEX FRIEDEN, B.S., Texas Institute for Rehabilitation and Research, Houston, TX

LAURO S. HALSTEAD, M.D., Texas Institute for Rehabilitation and Research, Houston, TX

2:50

An Interdisciplinary Group Approach for the Education and Adjustment of Spinal Cord Injured Individuals and Their Families: A Pilot Study

Two years ago an interdisciplinary group of rehabilitation professionals consisting of an occupational therapist, a nurse, and two social workers instituted a group for spinal cord injured individuals and their families at Dodd Hall, Ohio State University Hospitals. Utilizing the group process, we hoped to facilitate the patient's and family's psycho-social adjustment to a permanent physical disability. One-day workshops were held at 6-week intervals. To date approximately 140 patients and their families have voluntarily participated with a wide variety of age, ethnic, economic, educational, and social classes represented. Didactic presentations by physicians and other health professionals, audio-visual aids, a panel of former patients, and open group discussion are primary methods utilized by the group leaders. Objective and subjective data (i.e. multiple choice tests and written/verbal evaluations from the participants) are used to evaluate the workshop's effectiveness and to form a basis for our exploratory study. We have found the Family Group Workshop to be useful in accomplishing the following rehabilitation objectives: (1) increasing the patient's and family's knowledge and understanding of the effects of spinal cord injury upon physical, social, vocational, and psycho-emotional functioning; (2) increasing the participation of family members in the patient's rehabilitation program and decreasing their feelings of isolation, hopelessness, and anxiety; (3) reestablishing communication channels among family members to allow increased mutual support in emotionally dealing with a disability; (4) directing patient and family toward discharge and realistic planning for the future. We believe the Family Group Workshop is a valuable addition to the rehabilitation program at Dodd Hall and recommend that other rehabilitation centers incorporate a similar group concept into their rehabilitation programs.

KATHERINE ROHRER, M.S.W., The Ohio State University, Columbus, OH

BETH ADELMAN, O.T.R., The Ohio State University, Columbus, OH

DEBORAH TALBERT, R.N., The Ohio State University, Columbus, OH

JANET GAMBLE, M.S.W., A.C.S.W., The Ohio State University, Columbus, OH

ERNEST W. JOHNSON, M.D., Professor and Chairman, Department of Physical Medicine, The Ohio State University College of Medicine, Columbus, OH

3:10

Study of a Socio-Cultural Approach to the Problems of Pediatric Patients and Families Experiencing Multiple Hospitalizations in a Rehabilitation Program

Since health is intimately connected with the way in which people construct reality, the aim of this study was twofold: to identify and reduce fears and anxieties in the pediatric patient and his family prior to admission in order to "detoxify" them, if necessary for re-entering the hospital, and secondly, to document areas where hospital routines, rituals, and customs could be adapted to individual needs instead of the more traditional expectation that patients do all the adapting. A Family Preparation Program Clinic was designed as a means of carrying out the study. Data was obtained from observation-participation and follow-up interviews using a questionnaire. The results validate prior studies demonstrating that the number of times a child has been hospitalized is a critical variable in the development of hospitalization stresses. This study demonstrates a wide range of anxieties, fears and gaps in information on the part of both parents and children with prior hospital experiences, and indications from parents and staff that the program has reduced fears with carryover to the ward situation. Therefore, a socio-cultural approach, successfully integrated into the usual medical format prior to admission, does promote a plan of care for the child and family which reduce those fears and anxieties accrued during prior hospital experiences.

MAXENE JOHNSON, R.N., Pediatric Nursing Specialist, Rancho
Los Amigos Hospital, Downey, CA

MARY SALAZAR, M.S.W., Supervising Medical Social Worker,
Rancho Los Amigos Hospital, Downey, CA

3:30

The Use of Psychological Role Models in Rehabilitation: Our Educative Function

Psychological intervention in physical rehabilitation programs has traditionally aimed at aiding the person to mourn his loss, to accept his disability, and to prepare him for his return to the community. Emphasis on this curative function of rehabilitation neglects our equally important educative function. We must provide our patients with normal handicapped models. A psychological program to do this using audio-visual materials is briefly described here. Each type of chronic disability progresses through various identifiable stages. In coming to terms with their disability, patients are ready in each of these stages to deal with certain information on the problems that they are then confronted with. By presenting an appropriate model, i.e. a person like himself who can talk about or illustrate how he has felt in, or dealt with, this kind of situation, we provide normative information to the disabled individual in adjusting to his new social status. He can then realistically compare his feelings and performance to a peer group of other disabled individuals. He is not forced to continually compare himself with normals and with his own body past thereby seeing himself in terms of inadequacy and loss. This program fosters choice and opportunities for future planning. These models can be presented to patients as part of their rehabilitation program using inexpensive audio-visual techniques.

RONALD GOODRICH, M.A., Psychologist, Bronx Municipal Hos-
pital Center, Bronx, NY

3:50

Dance for the Disabled

Dance shows promise as an effective, ongoing, pleasurable modality in physical rehabilitation for long term neurological and orthopedic patients in a hospital or community setting. An artistic counterpart to sports for the disabled, it simultaneously fills physical, creative, psychological and social needs. Techniques used in training dancers are a beneficial adjunct to present physical therapy procedures. This paper describes five years experience in adapting dance for physical rehabilitation. Through the collaboration of a physiatrist, physical therapist and dancers, an experimental group was organized in the physical medicine department of St. Luke's Hospital in order to devise a therapeutic movement program combining the insights of medicine, therapy and dance. Participants included adults with mild to moderately severe orthopedic and neurological problems whose mobility ranged from independent ambulation to wheel-

Thursday P.M.

chair bound. Later, classes were organized grouping patients with similar ambulation abilities and with similar diagnosis, i.e. arthritis and multiple sclerosis. Therapists' observations and reports from patients in all groups indicate that physical exhilaration, gains in psych-social areas, and an increase in physical function can be derived from this modality. Case studies and a film are used in explaining goals, procedures and findings. Future directions planned for the program are also discussed.

BERNADETTE HECOX, M.A., R.P.T., Assistant Professor, Program in Physical Therapy, College of Physicians and Surgeons, Columbia University; Chief Investigator for Dance Therapy Project, St. Luke's Hospital, New York City
SHYH-JONG YUE, M.D., Project Director, Dance Therapy Project, St. Luke's Hospital, New York City

4:10 **Consumer Services for the Physically Handicapped in Ann Arbor, Michigan**

In recent years a number of successful programs have been developed across the country to deal with the problems that physically handicapped individuals have in living independently in the community. A program started recently in Ann Arbor, Michigan—the Ann Arbor Center for Independent Living—is expected to be a model for a number of similar projects state-wide. This prototype service center, run by the physically handicapped for the physically handicapped, includes services in the areas of housing, attendant care, and advocacy as well as a separate residential facility for those with the most severe handicaps. Of interest is the fact that it took less than one year to launch the project from the time of the first serious discussions. The program design and the steps taken to achieve it will be discussed, as well as practical recommendations to others wishing to establish similar centers.

LAWRENCE HANDELSMAN, M.D., Department of PM&R,, University of Michigan Medical Center, Ann Arbor, MI

RICHARD WEIR, Ann Arbor Center for Independent Living, Ann Arbor, MI

JOHN WEIR, Ann Arbor Center for Independent Living, Ann Arbor, MI

EULENE MC CORKIE, Ann Arbor Center for Independent Living, Ann Arbor, MI

4:30- 6:00 **CONGRESS ANNUAL BUSINESS MEETING—**
California Room
(Admission by Membership Card only)

6:30- 8:00 **CONGRESS PRESIDENTIAL RECEPTION—**
Convention Center Foyer

Friday A.M.

Friday, November 12

7:00- 8:00 **BREAKFAST SESSIONS: MEET-THE-EXPERT**

SESSION 76—Senate Room

Sports for the Disabled

CAIRBRE B. MC CANN, M.D., Director of Medical Rehabilitation, Maine Medical Center, Portland, ME

SESSION 77—Committee Room

Management in the Prevention of Tissue Trauma

JOHN E. ROGERS, JR., M.S., Consulting, Medical Engineering, LaHabra, CA

Use of special measurements to determine trauma along with materials designed to decrease trauma to body tissue indicate in clinical studies a dramatic decrease in the incidence of pressure sores, ischemic and decubitus ulcers or, more accurately, tissue trauma sores. Management of tissue problems common in persons with diabetes, amputations, and spinal cord injury will be discussed.

SESSION 78—Sunset Room

Sensory Disabilities: The Hard of Hearing and Deaf

GERALD HUCKLEBERRY, Speech Pathologist, San Diego School District, San Diego, CA

Current status of management of the deaf and hard of hearing will be explored. Current techniques, research and management of the deaf patient will be presented.

SESSION 79—Sunrise Room

Biomedical Engineering: Delivering Equipment the Patient Really Needs

DONALD R. MC NEAL, PH.D., Director, Neuromuscular Engineering, Rehabilitation Engineering Center, Rancho Los Amigos Hospital, Downey, CA

SESSION 80—Esquire Room

Affirmative Action Programing for Handicapped Citizens

JAMES W. KNIGHT, Handicapped Employment Officer, Region VI, US Department of Labor, Employment Standards Administration, Dallas, TX

SESSION 81—Towne Room

Spinal Cord Injury

PROFESSOR SIR LUDWIG GUTTMAN, C.B.F., M.D., Director, Stoke Mandeville Sports Stadium for Paralyzed and Other Disabled, Aylesbury, Bucks, England

8:30-12:00 ☆ **SESSION 82**—California Room

Forum on *Basic and Clinical Research and What's New in Spinal Cord Injury*

The increased interest in total spinal cord injury management opens up the interest of physicians and allied health professionals in a wider understanding of the diagnosis and treatment of spinal injuries in many areas. This forum will focus on the National Spinal Cord Injury Care System projects sponsored by the Rehabilitation Services Administration of the Department of Health, Education and Welfare. A description of

Friday A.M.

this program will be given. This will be followed by an extended insight into the pathological mechanism of spinal cord injury by a system review that has explored all spinal pathology of all patients, who have died from said injuries, either acutely or subsequently. A complete review of the history and development of spinal cord injury will be provided by the physician who has done more to correlate the development and management of spinal cord injuries. Further insight into special problems of stabilization of the spinal cord, as well as a review of neuroradiologic diagnostic procedures and their interpretation, will also be provided.

Moderators—

GLENN G. REYNOLDS, M.D., Clinical Assistant and Head, Section of PM&R, Stanford University School of Medicine; Chief, Department of PM&R, Santa Clara Valley Medical Center; Director of California Model Regional Spinal Cord Injury Care System, San Jose, CA

VINOD SAHGAL, M.D., Assistant Professor, Department of Neurology and Rehabilitation Medicine, Northwestern University Medical School, Chicago, IL

8:30 **The National Model Regional Spinal Cord Injury Care System**

J. PAUL THOMAS, M.A., Project Director, Spinal Cord Injury Project, Rehabilitation Services Administration, Office of Human Development, Department of HEW, Washington, DC

9:00 **The Historical Development of Spinal Cord Injury Management**

PROFESSOR SIR LUDWIG GUTTMANN, C.B.F., L.L.D., D.SC., M.D., Director, Stoke Mandeville Sports Stadium for the Paralyzed and other Disabled, British Paraplegic Sports Society LTD, Aylesbury, Bucks, England

10:00-10:30 Coffee Break

10:30 **Present Status of Surgical Stabilization Procedures in Spinal Cord Trauma**

PAUL R. MEYER, M.D., Co-Director, Midwest Regional Spinal Cord Injury Care System, Northwestern University, Chicago

11:15 **Status of Regeneration of the Spinal Cord Following Injury**

BYRON A. KAKULAS, M.D., Professor of Neuropathology, Dept. of Neuropathology, Royal Perth Hospital, Perth, W. Australia

8:30-11:55 SCIENTIFIC PAPER SESSIONS

SESSION 83—Council Room

Chairman—

JUNE S. ROTHBERG, PH.D., R.N., Garden City, NY

Co-Chairman—

PHILIP E. GORDON III, M.D., San Diego, CA

**8:30 Impact of a State Level Program for Vocational Evaluation
 of the Industrial Injured**

The purpose of this presentation is to describe the process of developing a vocational plan of action for returning the industrial injured to appropriate gainful employment. In addition to reviewing California's Division of Industrial Accident's objectives and philosophies, the presentation will place emphasis on the process of obtaining pertinent information necessary for implementing a successful vocational rehabilitation plan. Included in the presentation will be the particular information gathering process in the areas of general aptitude, achievement, vocational interests, personality assessments and work samples. The plans prepared through these techniques are designed to meet new worker compensation requirements.

JAMES STEINBARTH, M.S., Coordinator, Vocational Services,
Donald N. Sharp Rehabilitation Center, San Diego, CA

HERBERT HOLDEN, M.S., Vocational Specialist, Donald N.
Sharp Rehabilitation Center, San Diego, CA

J. E. EISELE, M.D., Director, Donald N. Sharp Rehabilitation
Center, San Diego, CA

DALE E. WILLIAMS, M.S., Administrator, Donald N. Sharp
Rehabilitation Center, San Diego, CA

**8:50 Applications of Pre-determined Time Standards in Workshop
 Settings**

There is a definite need for a simple, quickly applied tool which can correlate performance of the handicapped individual with that expected of the normal worker and still be easily introduced to lay personnel. Our efforts at both the Cerebral Palsy and Rehabilitation Centers in Atlanta demonstrated that MTM-3 (Third Generation of Methods—Time—Measurement) satisfies these criteria. As every motion involved in an operation is detailed and a corresponding time value applied, the overall result reflects a normal rate of accomplishment more accurately than the usual methods and is especially useful in bidding jobs for the workshop. MTM-3 also has a place in the evaluation section to verify or correct existing standards on bench type work samples to develop more meaningful time distribution charts relating to the specific population at a center. In extreme cases, MTM-3 yields a more accurate determination of the actual degree of disability than the existing AMA estimated percentages as regards the motor skills.

HAL C. TODD, P.E., Department of Rehabilitation Medicine,
Emory University, Atlanta, GA

SAMUEL B. CHYATTE, M.D., Department of Rehabilitation
Medicine, Emory University, Atlanta, GA

CHERILLE M. CLAXTON, M.ED., Department of Rehabilitation
Medicine, Emory University, Atlanta, GA

**9:10 The Physician's Ethical and Legal Responsibility to the
 Newly Handicapped Driver**

There is little in the literature to guide the physician who advises newly handicapped patients about the safety of driving again. There is even less information on preventing an uncooperative, unsafe, handicapped patient from driving and not risk the backlash of a suit for breach of patient-doctor confidentiality. There is no information in the medical literature on whether the newly handicapped driver's insurance and license is valid. Solutions to these problems will be offered by exploring relevant legal decisions, state licensing and reporting laws, and insurance company contracts. This review

Friday A.M.

suggests that medical ethics demands the physician report the unsafe handicapped driver who refuses to relinquish his license and stop driving. Legally, this action seems safe because no cases of suit have been found.

STANLEY R. JACOBS, M.D., Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia, PA

9:30 The Handicapped Driver—An Insurer's Point of View

The purpose of this paper is to review the approach used by one automobile insurer to underwrite and medically evaluate a handicapped driver. The significant factors which must be carefully developed for each individual application for automobile insurance are discussed. In the final analysis, for example, the extent of any physical or mental impairment must be considered along with information verifying the capability of the handicapped person to operate an automobile safely. Cooperation in research programs among many disciplines, namely state motor vehicle bureaus, insurers, product manufacturers, health professionals, and driver educators as well as handicapped drivers, is clearly indicated.

MICHAEL MITTELMANN, M.D., Associate Medical Director, Aetna Life & Casualty, Hartford, CT

WALTER H. GREENFIELD, JR., B.S., C.P.C.U., Aetna Life & Casualty, Hartford, CT

9:50-10:15 Coffee Break

10:15 A Home Planning Program as an Integral Part of the Team Approach in Rehabilitation of the Severely Disabled Quadriplegic Patient

As a result of an earlier research project, the Home Planning Service at the Institute of Rehabilitation Medicine evolved when the need arose to deal with the environmental problems of severely disabled individuals which prevented them from living as normal a life as possible following discharge from the center. We will describe, with a slide presentation, home planning procedures which begin early in the rehabilitation process, emphasize interaction of the home planning specialist with other members of the rehabilitation team, and present a tool developed for the purpose of evaluating the inefficiencies that exist in the home environment which prevent the return to a safe and independent life. We will discuss methods of disseminating information to families, rehabilitation professionals, architects, builders and contractors with emphasis on a Home Planning Guide, and present significant findings from a recent follow-up study of 75 patients.

SHARON J. WRIGHT, B.S., Institute of Rehabilitation Medicine, New York University Medical Center, New York City

10:35 The New Options Project: A Live-In Program to Foster Social Adaptive Skills

Today there is an increasing range of living alternatives and vocational possibilities for severely physically disabled individuals. Many persons are unable to take advantage of these opportunities, however, because they lack the basic skills and psychological resources necessary to be active in the community and to lead more independent lifestyles. As an outgrowth of a pilot residential program instituted in January 1972, the Texac Institute for Rehabilitation and Research in Houston has begun an educational and therapeutic program to help persons acquire the skills necessary for living in diversified settings and for negotiating a variety of life situations. The six-week, live-in

Friday A.M.

transitional program, called New Options, is conducted in a dormitory-style setting. Teaching modules concentrate on areas such as attendant and financial management, social skills, sexuality, housing alternatives, vocational and educational opportunities, and problem-solving. A family seminar is offered to parents, spouses, children, and significant friends. Disabled persons living in the community work as staff associates, co-facilitating teaching modules and serving as models for participants. Individuals participating in the program co-counsel one another through a buddy system. Group field trips are made to university campuses, employment sites, living arrangements, and government agencies. Participants also have individual practice assignments in the community. Research on the project is intended to assess the effects of the program on participants and to evaluate the usefulness of various methods for helping persons acquire social adaptive skills. The project is also being studied as a social system to monitor the development of relationships between professional staff members, disabled staff associates, and program participants.

JEAN A. COLE, PH.D., Texas Institute for Rehabilitation and Research, Houston, TX

BARBARA L. HOLDEN, A.C.S.W., Texas Institute for Rehabilitation and Research, Houston, TX

LEX M. FRIEDEN, PH.D., Candidate, Texas Institute for Rehabilitation and Research, Houston, TX

10:55

Home Care—A Vital Link to Health Service Delivery

A description of the Philadelphia VA Hospital-Based Home Care program is reflected through services to four patients with quadriplegic, multiple sclerosis, bilateral amputations and spondylosis. An emphasis is placed on the mobilization of family and other support and the utilization of community agencies as ancillaries to the hospital's "core" team of a rehabilitation physician, a nurse and social worker. The paper stresses team work with a multidisciplinary and holistic approach to home care and underscores the rehabilitative, emotional, social and psychological advantages and problems for and of the patient and family in establishing a home care service. The paper also reflects our support of alternative health delivery services as viable extensions to the hospital and espouses a "science and human values marriage" as a countermeasure to the various inequities and problems in health service delivery to the frequently underserved and "medically and socially disenfranchised" chronically ill.

MYRA HASKIN, M.D., VA Hospital, Philadelphia, PA

LYDIA SHIPLEY, M.S. R.N., VA Hospital, Philadelphia, PA

PHILIP HAME, M.S.W., VA Hospital, Philadelphia, PA

MAURICE CARTER, Social Work Student, University of Pennsylvania, School of Social Work, Philadelphia, PA

11:15

New Approach Applied in Physical Rehabilitation of Multiply Handicapped

Community based comprehensive rehabilitation services for multiple handicapped children and adults were rendered in the past three years in a congested urban area. Multimodality approach combining conservative treatment, surgery, bracing and specialized therapeutic intervention was used. In addition to individual treatments, group therapy was offered to children and parents in the community service offices on a weekly basis for those patients for whom no school or program placement was available. Continuous communication between the rehabilitation staff and primary workers in this therapy room located in the community, eliminates need for frequent conferences, which were held only 2 to 3 times yearly. It was found that this previously unserved multiply handicapped population suffers greatly from understimulation from early childhood on. This is due to the fear of parents and their lack of training in handling the children. Group treatment is helpful especially in training parents and

Friday A.M.

staff to incorporate basic techniques of postural adjustment and handling of the handicapped into daily routine and results in better understanding of problems associated with the physical handicap. Adaptive equipment is essential for maintenance of alignment and prevention of deformities.

SUSAN GORDON, M.D., Assistant Professor, Department of Rehabilitation Medicine, Albert Einstein College of Medicine; Director, Rehabilitation Service, Bronx Developmental Services, Bronx, NY

11:35 **Activity Planning for the Short Term Rehabilitation Patient**

This paper calls attention to the therapeutic values and rehabilitative possibilities of a purposely planned and professionally implemented activity program in light of the trend toward shortening hospital stays. Because of time pressure, previous program planning methods must be re-examined. Activities should be chosen by the criteria of suitability as an integral part of the over-all rehabilitation plan. Emphasis should be placed on the variety of exposures and the reinforcement of experiences by all the other team members, as an important part in achieving satisfactory carry-over. A shift of objectives is urged from task oriented and diversional to personal-satisfaction giving, human relationships promoting and life quality level improving goals. Based on personal experiences in a rehabilitation hospital, specific activities will be described, along with their purpose, skill and physical facility requirements and their rehabilitative potentials. Results of the knowledgeable utilization of such therapeutic activities will be shown by the widened range of attainable gains, improved morale, better adjustment and a more complete realization of the individual's rehabilitation goals.

SUSANNE L. HARSNAANYI, M.S.T.R., Chief, Activity and Resocialization Therapy, Gaylord Rehabilitation Hospital, Wallingford, CT

SESSION 84—Chamber Room

Chairman—

MARTIN GRABOIS, M.D., Houston, TX

Co-Chairman—

KAREN R. BRECKENRIDGE, M.P.H., R.P.T., Pomona, CA

8:30 **Amputations Resulting from Electrical Injury: A Review of Twenty-Two Cases**

Twenty-two cases of amputation resulting from electrical injury are reviewed. These patients had a combined total of 43 major amputations. Electrical injury resulting from contact with high tension current (greater than 1000v.) commonly results in significant systemic damage. This study was conducted with the purpose of developing statistical data on the rehabilitation and eventual outcome of these patients. Our findings revealed that most of the injuries were job-related and most often involved young male adults. Upper extremity amputations were more predominant, and more than 50% of the patients had two or more limbs amputated. In addition to the major amputations, other obstacles of rehabilitation are discussed including skin burns and limitation of joint motion. The length of hospitalization in a rehabilitation facility for these amputees was greater than for patients with amputations not resulting from electrical burns. Prostheses were fitted in 93% of the amputated limbs. At the follow-up stage of rehabilitation, 50% of the patients in this series were either employed or pursuing career training or educational goals.

THOMAS C. LABORDE, M.D., Chief Resident, Department of Physical Medicine, Baylor College of Medicine, Houston, TX

Friday A.M.

ROBERT H. MEIER, III, M.D., Director, Houston Center for Amputee Services, Texas Institute for Rehabilitation and Research, Houston, TX

8:50

Physical Medicine and Rehabilitation Treatment of Out Patient Burns

Our institution has developed a comprehensive physical medicine and rehabilitation program for the minor acute burn which provides the treatment and follow-up necessary for these patients to avoid hospitalization and potential problems inherent in even minor burns, such as infection, loss of function and poor cosmetic results. A protocol, and treatment techniques, have been established to cover all aspects of the patient's care, including infection control, wound care and debridement, pig skinning, edema control, splinting and exercise, and control of hypertrophic scarring post healing. A review of 50 patients will be presented including extent and depth of burn, average healing time, complications and final functional and cosmetic results.

PHALA A. HELM, M.D., Southwestern Medical School, Dallas, TX

MARJORIE D. HEAD, L.P.T., Parkland Memorial Hospital, Dallas, TX

9:10

Utilization of Physical Therapy for Management of Minor Burns

Wound management is the major consideration in the treatment of minor burns. A protocol for care of minor burns that can be managed on an out patient basis has been established at the U.S. Public Health Service Hospital in New Orleans. Burn patients are evaluated by the emergency room physician and referred to physical therapy for initial wound care, i.e. cleansing, debridement and dressings. The physician selects the appropriate topical antibiotic agent to be applied by the therapist. Physical therapy is also responsible for instructing the patient in range of motion and strengthening exercises and the application of elastic bandages on the extremities to support devitalized tissues and assist in control of edema. Dressing changes and debridement are performed daily in physical therapy and the patient is re-evaluated in the outpatient clinic on a periodic basis. The outpatient burn care protocol provided improved patient care, and the details of the program are discussed.

MARK D. STOFF, B.S., R.P.T., US Public Health Service Hospital, New Orleans, LA

9:30

The Use of Chloramine-T Hydrotherapy Treatment Against Resistant Micro-Organisms

The purpose of this project was to evaluate the effectiveness of Chloramine-T in the treatment of burn patients with highly resistant micro-organisms. The presence of pseudomonas constitutes a danger not only to the individual patient but may produce cross contamination. Previous techniques had proven to be unreliable, time consuming and harmful to staff. A study, involving carefully calculated, premeasured dosage with scheduled microbial samplings from patients, equipment and the environment demonstrated elimination of pseudomonas in a highly significant sampling.

LAURENCE STEVE, M.A., R.P.T., Assistant Director of Physical Therapy, Bronx Municipal Hospital Center, Bronx, NY
PAUL GOODHART, M.S., M.P.H., Epidemiologist, Bronx Municipal Hospital Center, Bronx, NY

JUSTIN ALEXANDER, PH.D., R.P.T., Director of Physical Therapy, Bronx Municipal Hospital Center, Bronx, NY

Friday A.M.

9:50-10:15 Coffee Break

10:15 **Muscle Fiber Number in Immobilization Atrophy**

Muscle fiber loss of 24% has recently been reported in disuse atrophy secondary to immobilization in rat soleus. Review of techniques used in the determination of fiber loss suggested that a true loss may have not occurred but, rather, that an experimental error failed to recognize the parallelogram nature of the architecture of the muscle and was responsible for the finding. To test the question, eight Sprague-Dawley rats of 10 to 12 weeks of age had one limb immobilized by plaster in knee flexion and ankle plantar flexion for four weeks. The soleus muscle from the control and immobilized limbs were excised and frozen. The technique used insured that cross sections subsequently cut and stained would contain all the fibers extending from the origin to the insertion aponeuroses. The total number of muscle fibers per muscle was counted from 25 to 50 photomicrographs made for each muscle cross section. Paired comparisons of total muscle fibers in control and immobilized muscles revealed no significant differences. The total number of fibers in control and immobilized soleus muscles was 2812 ± 521 and 2930 ± 403 , respectively. Therefore, muscle fiber loss does not occur in disuse atrophy produced by external immobilization as has been reported.

DIANA D. CARDENAS, M.D., Department of Rehabilitation Medicine, University of Washington School of Medicine, Seattle, WA

RONALD W. HARDY, M.S., Department of Rehabilitation Medicine, University of Washington School of Medicine, Seattle, WA

WALTER C. STOLOV, M.D., Department of Rehabilitation Medicine, University of Washington School of Medicine, Seattle, WA

10:35 **Muscle Contracture: Growth and Immobilization**

A previous investigation demonstrated that soleus muscle contractures was produced in 52-day-old rats immobilized for 5 weeks in knee flexion and ankle plantar flexion. Compared to contralateral controls, the amount of shortening was 10.6% of the muscle belly length. Eighty-seven percent to 90% of this contracture was due to shortening of the tendon aponeuroses of origin and insertion, and 10% to 13% to a shortening of muscle fiber. Associated was a 9% to 12% decrease in the number of sarcomeres arrayed between muscle fiber ends. This study investigates the possibility that the immobilized muscles may have had a retardation of growth and, hence, some of the shortening might only have been relative. Three groups of 5 animals each were studied: Group 1 was sacrificed at 52 days of age, to represent the initial condition; Group 2 had one leg immobilized at 52 days and were sacrificed at 87 days, to represent the immobilization effect plus growth; Group 3 was sacrificed at 87 days, to represent pure growth effects. The results indicate that the differences between an immobilized soleus and a contralateral control is indeed exaggerated by normal growth of the control muscle. The latter holds more for sarcomere number and muscle fiber length. Shortening of tendon aponeuroses is more attributable to an immobilization effect, rather than to growth.

WALTER C. STOLOV, M.D., Department of Rehabilitation Medicine, University of Washington School of Medicine, Seattle, WA

RONALD W. HARDY, M.S., Department of Rehabilitation Medicine, Seattle, WA

10:55

Development of the Muscle Strength Laboratory at the US Army Research Institute of Environmental Medicine

The need for muscle strength training for the soldier has long been recognized. Nevertheless, quantitative assessment of this parameter has lagged behind. Two years ago, this Institute established a Muscle Strength Laboratory to develop and evaluate strength training programs for the Army. The difficulties and problems observed in similar laboratories were proper stabilization and immobilization of proximal joints, standardization of the testing protocols, testing positions and inadequate coupling between the limb and the lever bar. Careful attention was given to the normal neuromuscular spread of excitation to synergistic muscle groups causing associated synkinetic movements, a major source of variability in gathering of muscle strength data. Once recognized, mechanical devices were built, tested and modified in an attempt to minimize these sources of data contamination. The testing positions, physical restraints, machine-subject coupling, instructions, coaching, warm-ups and contraction vs rest times, were standardized in order to minimize variability. The development of data analysis and storage into a centralized physical fitness data bank allows not only the manipulation of the muscle strength data, but also its correlation with other fitness, anthropometric, psychological and clinical data. So far, 584 subjects have been tested under these conditions. Part of these data is presented in this program.

MARCOS U. RAMOS, M.D., Major, MC, Exercise Pathology Division, US Army Research Institute of Environmental Medicine, Natick, MA

11:15

Rate of Isometric Peak Torque Development in the Intact Human: Preliminary Report

The maximal isometric strength of elbow flexors (EF), extensors (EE), knee flexors (KF) and extensors (KE) was measured in 184 subjects (age 17 to 24). Three maximal contractions were performed in a randomized order. The torque recorded was simultaneously fed into a derivative computer which analyzed the maximal slope of the curve displaying its output as dT/dt (ft lb/sec). Analysis included: (a) 1st, 2d and 3d trial differences and their relationship with corresponding dT/dt ; (b) difference between males (84 Ss) and females (100 Ss). Mean torque $\pm$ SD of entire sample: EF = 42.7 ± 16.2 ; EE = 40.7 ± 14.8 ; KF = 73.0 ± 23.7 and KE = 146.6 ± 40.7 . The highest torque was recorded in the third trial. Mean dT/dt : ER = 2,294; EE = 843.0; KF = 1,102 and KE = 3,538 ft lb/sec. Highest dT/dt in KE and EF was obtained in the second trial. Torque values in males were higher than females, the difference being smaller than previously reported. dT/dt showed a similar tendency. Recording of the peak rate of torque development during training, fatigue, and some clinical states may prove to be of value in the future.

MARCOS U. RAMOS, M.D., Major, MC, Exercise Pathology Division, US Army Research Institute of Environmental Medicine, Natick, MA

JOSEPH J. KNAPIK, M.S: SP5, Exercise Physiology Division, US Army Research Institute of Environmental Medicine, Natick, MA

11:35

Comparison of Isotonic, Isometric and Isokinetic Strength Training Programs under Standardized, Controlled Experimental Conditions

Interpretation of comparative studies in this area is hampered by lack of standardization of experimental procedures, testing positions, training intensities and duration of the contraction-rest periods. This study compared these programs under strict control

Friday A.M.

of these sources of variability. The Maximal Voluntary Contraction (MVC) of the elbow and knee flexors and extensors was measured in 32 subjects and then subsequently assigned into Controls, Isometric (M), Isotonic (I) and Isokinetic (K) Groups. These last three groups trained three times/week for 10 weeks. Fifty contractions at 80% MVC, each lasting 3 sec were alternated by 3 sec rest for 5 minutes for each muscle group. They trained in groups of 4 with a centralized signal generator giving the cadence. Percent MVC was given by a meter relay. Preliminary results after 8 weeks (T_8) of training as compared with the initial values (T_0) along with % increase are discussed.

MARCOS U. RAMOS, M.D., Major, MC, Exercise Pathology Division, US Army Research Institute of Environmental Medicine, Natick, MA

SESSION 85—Cabinet Room

Chairman—

THOMAS P. ANDERSON, M.D., Minneapolis, MN

Co-Chairman—

CHARLES R. POOR, M.S., Houston, TX

8:30

Developing Federal and State Laws Which Will Shape and Limit Present and Future Rehabilitation Programs

New federal and state cost regulation laws are especially important to rehabilitation because of traditional controversy concerning its cost benefit ratios. Medicare hopes to link cost (and charge) increases to the cost of living index. If this occurs, no new hospital rehabilitation programs could be introduced at the expense of existing programs. The 1975 Medicare regulations (PL 92-603) have defined routine hospital costs above the 80th percentile as being inefficient and excessive, and have successfully withheld payment. Most states have decreased the number of eligible patients and medical payment amounts in Medicaid. Also, states are passing laws so that losses of one "cost" payer will not be able to be recovered from commercial ("charge") carriers. As a result, the total income and quality of rehabilitation programs will be reduced. The costs of PSRO quality in a "cost limited" reimbursement program could paradoxically pre-empt new quality developments for rehabilitation programs. Strong new federal-state agencies (PL 93-641) are replacing Comprehensive Health Planning Agencies. These agencies will be able to use statistical criteria (via Determination of Need procedures) to deny the construction of new specialty beds, prevent the reconstruction of old beds, prevent the creation of new programs, and eliminate "unnecessary" established programs. Stronger Utilization Review mechanisms by third parties are being developed on the assumption that true cost reduction can only occur if inpatient beds are destroyed. Rationing of rehabilitation care is inevitable. Surprisingly, proposed national health insurance and "catastrophic" programs will not significantly alter the frequent impoverishment of patients by rehabilitation programs. Rehabilitation via home care is being impeded because its costs are "open ended" and it is not amenable to Utilization Review. These new federal and state systems will alter present rehabilitation programs and dictate the nature of future programs.

MANUEL J. LIPSON, M.D., Executive Director, Massachusetts Rehabilitation Hospital; Harvard Medical School, Boston, MA

8:50

Rehabilitation Outcome and Self-Assessment of the Disabled: Analysis of 500 Cases

During the first part of an ongoing study on evaluation of rehabilitation needs for selected functional impairments, outcomes were measured by two composed indices and by the patient's self-assessment. Five hundred cases, comprising a variety of

diagnoses, were studied, all having a permanent neuro-locomotor disability. A structured and pre-coded questionnaire was used to collect data at home, in nursing homes and in chronic hospitals. The index of physical ability developed for this study was constructed from a set of variables describing the level of dependency for mobility and self-care. The psycho-social index was composed of variables indicating the degree of integration in social life, including return to work. Each variable used for the composed indices was rated on a particular scale. The self-assessment part of the questionnaire allowed the patient to express his perception of, and his attitude towards his present situation and how he felt about his rehabilitation. The results indicated that the psycho-social index correlated with the physical one ($r = 0.49$; d.f. 426). According to several multi-variate analyses, the most important factor determining success was patient's motivation followed by age, duration of initial hospitalization and the physical index. When comparing the objective indices with the self-assessment, it was found that the disabled person viewed his condition rather realistically.

VERONIQUE SUSSET, M.D., Associate Professor, Department of PM&R, and Epidemiology, Faculty of Medicine, University of Sherbrooke, Sherbrooke, Quebec, Canada

JOSEF VOBECKY, M.D., Associate Professor, Department of PM&R, and Epidemiology, Faculty of Medicine, University of Sherbrooke, Sherbrooke, Quebec, Canada

9:10

Characteristics of Patients from the HUP Data System for Rehabilitation Hospitals

The Hospital Utilization Project (HUP), in collaboration with rehabilitation associations in California and Pennsylvania, instituted on July 1, 1974, a patient data system for rehabilitation hospitals. This is a report of the first year's aggregate of 5,427 patients from 20 hospitals in six states. Of this total, 4,662 were admitted for a full rehabilitation program, while 765 were short-term. Nearly half of the patients admitted for a full program were 65 years or older; 31% were stroke victims, by far the largest single diagnosis. Strokes, other brain injuries and disease, amputations, fractures, arthritis and spinal cord injuries accounted for 80% of full program admissions. Average lengths of stay are reported for each of these categories. Seventy-four per cent of the total sample was discharged to a private residential setting. The accumulation of patient data from a number of hospitals will give medical rehabilitation important information regarding its contribution to health care delivery as well as providing data which can be used form PSRO guidelines and for third-party payers. The HUP system is currently receiving discharge abstracts from 42 hospitals in 14 states.

ROBERT ALLEN KEITH, PH.D., Casa Colina Hospital for Rehabilitation Medicine, Pomona, CA

KAREN BRECKENRIDGE, M.P.H., Casa Colina Hospital for Rehabilitation Medicine, Pomona, CA

WILLIAM A. O'NEIL, Hospital Utilization Project, Pomona, CA

9:30

Evaluation of Comprehensive Medical Rehabilitation Centers by Use of Cost/Function Indicators

This paper describes the development and use of cost/function indicators to measure rehabilitation outcome. A sample of 97 spinal cord injured and 132 focal cerebral patients drawn from ten leading comprehensive medical rehabilitation centers (CMRC) located across the United States was used to develop cost/function indicators as aids in evaluating comprehensive medical rehabilitation processes and outcomes. Statistical analysis of the sampled data indicated that: treatment, not demographic, variables influence rehabilitation success; cost/effectiveness differed by the diagnostic category

Friday A.M.

treated; CMRCs have very different levels of cost/effectiveness; the indicators developed had wider applicability and utility than other traditional measures of rehabilitation outcome. Admission Barthel Score, Barthel Unit Cost and percent of improvement in function from admission to discharge, were used as indicator units to develop a theoretical cost/function model focusing specifically on admission-discharge indicator interrelationships in CMRCs. The model was then tested empirically and the basic structure tended to be supported by spinal cord as well as the stroke sample data. Discussion is offered in the use of such models as aids in planning, evaluation and development of computer simulation models of rehabilitation service effectiveness.

STEFAN J. HARASYMIW, PH.D., Rehabilitation Research, Department of Rehabilitation Medicine, Rehabilitation Institute of Chicago, Northwestern University Medical School, Chicago

GARY L. ALBRECHT, PH.D., Sociology, Department of Rehabilitation Medicine, Rehabilitation Institute of Chicago, Northwestern University Medical School, Chicago

MARCIA D. HORNE, ED.D., Rhode Island College, Providence, RI

9:50-10:15 Coffee Break

10:15 Outcome Criteria Used in Retrospective Nursing Audit of Spinal Cord Patients

Health professionals are being held more accountable for the services provided to clients/patients. This has necessitated the development of definitions of services offered and criteria used to measure the degree to which patients received the quality of services desired. A retrospective audit is one way to measure whether established criteria have been met. The results of the audit are presented to appropriate administrative personnel and ultimately to the Board of Directors of the agency. This proposal is designed to share the criteria developed for nursing care of the spinal cord injured patient as well as the preliminary results of a retrospective audit at the Rehabilitation Institute of Chicago. The purpose of the outcome criteria development is to measure whether or not the nursing department met established criteria for the spinal cord injured patient. The criteria were developed by a team of nurses within the department of nursing and reflect the area in which nursing assumes prime responsibility for the care of a spinal cord injured patient. The criteria are inclusive of all spinal cord injured patients regardless of age and sex. Approximately 50 charts have been audited to date and as a consequence of this audit further tools are in process to facilitate better data collection. Further, the audit allows for the identification of criteria which have not been achieved. This provides a data base for the investigation of the problems related to the nursing process that may have inhibited the achievement of the stated criteria. The results of the audit are available on the first 50 patients and by the time of presentation we will have data from approximately 75 former spinal cord injured patients. The audit not only includes the criteria to be achieved at discharge, but further identifies the complications that might occur during the process as well as the essential management by nursing of those complications. The presentation of the criteria will be inclusive of the other tools that have been developed to facilitate the audit such as flow sheets and teaching check lists. This audit is viewed as one dimension of a quality assurance program within a rehabilitation center and is pertinent information to be shared with our colleagues at a time when we are being called upon to document and to assure the client of the quality of our services.

NANCY B. HOLT, M.S., R.N., Director of Nursing, Rehabilitation Institute of Chicago, Chicago

10:35-

Four-Year Outcome: Midwest Regional Spinal Cord Injury Care System (MRSCICS)

The Midwest Regional Spinal Cord Injury Care System (MRSCICS) centered at Northwestern Memorial Hospital and Rehabilitation Institute of Chicago, has been operational since 1972. System outcome and input characteristics of 465 acute spinal cord injured patients have been monitored to determine system effectiveness. Of 480 expected annual new spinal cord injuries in the 20 million population "Midwest" catchment area, 127 (26%) are now admitted to MRSCICS; 71 (56%) are admitted within 72 hours of injury (early entry or "EE" patients). Major characteristics of the four-year input population are: age, 29; 82% male; 65% caucasian, 29% black; 49% quadriplegics; 57% complete lesions; cause of injury: 28% automobile; 23% gunshot; 21% fall. The mortality rate of EE patients is 7% in first calendar year, 3% year two and 2% year three after injury. The morbidity rate (skin pressure ulcer) is 50% less in EE patients compared to delayed entry (DE, greater than 72 hours post-injury) patients in the first year. Functional level of mobility and self-care (modified Barthel Index) is 26 at admission, 60 at discharge to community, 72 at one year and 70 at two year follow-up. By the second year 49% of patients are gainfully active. Duration of first-hospitalization (acute care and rehabilitation) for EE patients is 34 days (18%) less and about \$5,500 less than DE patients.

BYRON B. HAMILTON, M.D., PH.D., Northwestern University
Medical School, Rehabilitation Institute of Chicago, Chicago
PAUL R. MEYER, JR., M.D., Northwestern University Medical
School, Chicago

JOEL S. ROSEN, M.D., Northwestern University Medical
School, Rehabilitation Institute of Chicago, Chicago

DRAKE M. HAUGH, B.A., Rehabilitation Institute of Chicago,
Chicago

10:55

Unobtrusive Monitoring of Activity Patterns of Spinal Cord Injured Patients

Unobtrusive longitudinal monitoring of what patients actually do during comprehensive rehabilitation represents a relatively unexplored but potentially useful approach to functional evaluation. Recent advances in biomedical technology have created the possibility of supplementing and/or substituting a number of human observations with instrument-based measurements. This paper presents the first data obtained as part of a systematic research effort to explore the feasibility and utility of applying unobtrusive instrumentation to monitor selected patient activities over extended periods of time. The target activity studied was time out of bed for 25 spinal cord injury patients undergoing comprehensive rehabilitation. Measurements were made with a Rest Time Monitor (RTM) which provides a continuous, objective record of when a patient is out of bed, how often and for how long. Data are presented which describe activity patterns by level of injury and compare actual time out of bed with (1) scheduled time out of bed, (2) scores obtained from a standardized ADL rating scale, and (3) general clinical course. Distinctive types of activity patterns are described and related to post-discharge clinical and functional outcomes. Implications of using unobtrusive monitoring are discussed with reference to individual patient evaluation and management, prediction of outcomes, programmatic assessment and ethical concerns.

LAURO S. HALSTEAD, M.D., Assistant Professor, Departments
of Rehabilitation, Community Medicine and Physical Medi-
cine, Baylor College of Medicine; Texas Institute for Reha-
bilitation and Research, Houston, TX

Friday A.M.

11:15

The Relationship between Primitive Reflexes in Stroke Patients and Rehabilitation Outcome

Although it has been noted clinically that the presence of primitive reflexes in the stroke patient may be an unfavorable prognostic sign for rehabilitation, there has been little quantitative research on the point. The purpose of this investigation was to examine the relationship between the presence of such reflexes upon admission and outcome criteria for rehabilitation. Tests for snout, suck, jaw jerk, palmar-mental and left or right extensor-plantar reflexes as well as for mental status were included in the usual medical admission examination for 106 consecutive stroke patients. At least one reflex was minimally elicited in 90 patients. Each reflex occurred in about one-third of the population. The relationships among variables was tested by means of Kendall's rank correlation coefficient. An index comprising the total number of reflex signs was significantly related to poor ratings upon discharge for 8 out of 11 self care and mobility measures. The same index was also related to discharge to an institutional setting. While there was some relationship of reflex signs to mental status, it was inconsistent. Mental status measures had a stronger relationship to outcome criteria than did reflexes. While these reflexes were found to be significantly related to measures of rehabilitation outcome, additional study is required to isolate specific patterns of covariation that might increase predictive power.

JULIE G. BOTVIN, M.D., Casa Colina Hospital for Rehabilitation Medicine, Pomona, CA

ROBERT ALLEN KEITH, PH.D., Casa Colina Hospital for Rehabilitation Medicine, Pomona, CA

MARK V. JOHNSTON, M.A., Casa Colina Hospital for Rehabilitation Medicine, Pomona, CA

SCIENTIFIC FILM THEATER

Committee Room (Convention Center)

Continuous Showing:

Tuesday, November 9—9:00 to 1:00 p.m.

Thursday, November 11—9:00 to 1:00 p.m.

The Behavioral Control of Dysfluency

Color, sound, 28 minutes

Presented by LEE MEYERSON, PH.D., Arizona State University, Tempe, AZ

Therapy sessions "on camera" show the treatment procedure, outcome and rationale of a "learning approach" to speech dysfluency. Detailed treatment is shown for "Bill"—a professional entertainer who is fluent while performing but stutters severely when offstage. Three other cases are presented by representative speech samples prior to and subsequent to therapy. One additional case shows the maintenance of fluency in a client treated three years earlier. All subjects are male adults. Voice-overs and visual overlays carry the technical information of interest to the rehabilitation therapist.

To Catch A Killer: High Blood Pressure

Color, sound 27 minutes

Presented by MALCOLM M. SNYDER, Atena Life & Casualty, Hartford, CT

Stresses the necessity of having a simple blood pressure test regularly and explains that high blood pressure can be controlled easily and painlessly if it is detected and treated immediately.

Early Management of Infant Amputee

Color, sound, 20 minutes

Presented by E. W. JOHNSON, M.D.; MICHAEL ALEXANDER, M.D., NANCY SNYDER, O.T.R., Ohio State University, Columbus, OH

First Things First—Occupational Therapy and the Developing Child

Color, sound 27 minutes

Presented by BETTY COX; JANET B. SHERIDAN, American Occupational Therapy Association, Rockville, MD

Helping the child who is developmentally disabled gain the multitude of sensory, motor, perceptual, social, and psychological skills necessary for further learning is part of the occupational therapist's job. Helping impaired children cope with their feelings, needs, successes, and failures in a world that can sometimes be very hard for handicapped children to understand is the job of the occupational therapist. "First Things First" shows occupational therapists at work in the home, in the school, and in the day-care center, applying the skills and techniques they have been trained to use to facilitate the development of the infant and young child.

Give It A Try

Color, sound, 28 minutes

Presented by THEODORE M. COLE, M.D.; SANDRA S. COLE, Dept. of Physical Medicine and Rehabilitation and Program in Human Sexuality, Minneapolis, MN

A film on sexual counseling of a recently injured quadriplegic male and his able-bodied wife who are experiencing a sexually dysfunctional and frustrating relationship. A couple counseling program is established and an advocate counseling couple is integrated into the counseling format. The film ends with the couple beginning to apply some of their newly acquired communication techniques to their relationship to begin to "give it a try." It is a very informative, supportive, non-explicit but personal film.

Paralympics—1972—Heidelberg

Color, sound, 28 minutes

Presented by B. CAIBRE MCCANN, M.D., National Wheelchair Athletic Association, Woodside, NY

Presenting the climax of the wheelchair athletic competition of the International Wheelchair Games which were held in Heidelberg, Germany in 1972. The full range of competitive events in track, field, swimming and basketball is captured in this documentary, which demonstrates effectively what wheelchair athletics is all about.

Iliotibial Band—Anatomic and Clinical Aspects

Color, sound, 15 minutes

Presented by HAROLD WEINGARDEN, M.D.; ERNEST W. JOHNSON, M.D.; SHARON KAWAL, M.D., Dept. of Physical Medicine, Ohio State University, Columbus, OH

The dissection of the trusor fascia lata is shown on a cadaver; the clinical aspects of tightness of this muscle-fascia complex are shown on a patient. Techniques for testing for tightness are demonstrated.

Miss Wheelchair America Pageant

Color, sound, 30 minutes

Presented by ERNEST W. JOHNSON, M.D.; ROBERT POTTS, PH.D., Ohio State University, Columbus, OH

A description of the history of the Miss Wheelchair America Pageant, the objectives of the Pageant, several examples of state pageants, and the unfolding of the National Pageant, MWA 1976. Miss Dixie Lee Etheridge, the MWA 1976 winner, is presented with her achievements.

Rewards and Reinforcements in Learning

Black and white, sound, 27 minutes

Presented by LEE MEYERSON, PH.D., Arizona State University, Tempe, AZ

Elementary behavior modification procedures and results with disadvantaged and handicapped children are shown as they occurred in five different episodes. Narration provides information for contingency management. The following episodes of procedures for improving motor behaviors are of particular interest to rehabilitation personnel: programming shoe-tying for a three year old child; teaching an eight year old, profoundly retarded, cerebral palsied child to walk; correcting a speech impairment, a frontal lisp, in a seven year old child.

Whoever Thinks of Venus de Milo as a Double Amputee

Color, sound, 24 minutes

Presented by B. CAIRBRE MCCANN, M.D., National Wheelchair Athletic Association, Woodside, NY

Emphasizes the remarkable competitive performances of wheelchair, blind and amputee athletics. Filmed in Stoke Mandeville in 1974.

SCIENTIFIC EXHIBITS

Scientific Exhibits will be on display during the week of the 53rd Annual Session of the American Congress of Rehabilitation Medicine and the 38th Annual Assembly of the American Academy of Physical Medicine & Rehabilitation in the Town & Country/ San Diego Hall of the Convention Center. Awards may be given for those exhibits which are judged outstanding by the Committee on Awards and Prizes, and will be announced and presented at the Congress Luncheon on Thursday, November 11, 1976.

Exhibit Hours: Tuesday, November 9—9:00 to 4:30
Wednesday, November 10—9:00 to 4:30
Thursday, November 11—8:30 to 2:00

Developments for the Severely Disabled Person—Booths 36/37

C. GERALD WARREN, MPA, Assistant Professor and Coordinator of Research; MIKE KO, Research Engineer; JUSTUS F. LEHMANN, M.D., Professor and Chairman, Department of Rehabilitation Medicine, University of Washington School of Medicine, Seattle, WA

This exhibit demonstrates and discusses recent technological development for the severely disabled individual. Included are (1) a redesign of the reclining wheelchair used by quadriplegic persons, (2) optimal design criteria for knee-ankle orthoses based on measurement of forces between limb and orthosis, (3) a unique book reader for the severely disabled, mounted on a hospital bed for demonstration and use, (4) adaptive aid devices such as a mechanical amplifier for bed control, a urinary collection connector and leg bag valves, presented in a "do it yourself" format specifically for occupational therapists, (5) a unique method for allowing a single person to transfer a severely disabled patient, using specially designed sliding boards. This method is presented on film with a tape narrative, and the boards will be on hand for demonstration purposes.

EMG Biofeedback: A New Tool for Occupational and Physical Therapists—Booths 15/16

KAREN CULLEN, RPT, Instructor, Boston University; JAMES FEE, B.S.E.E., Applications Engineer, Cyborg Corporation; ABBY HUFFMAN, OTR, M.S. degree candidate, Boston University; SUSAN O'SULLIVAN, M.S., R.P.T., Assistant Professor, Boston University, Boston, MA

The exhibit is a slide tape show designed to demonstrate the purpose of EMG biofeedback; its basis in learning and reinforcement theory and the clinical application of EMG biofeedback to selected rehabilitation problems. The slide tape show is divided into sections providing background on the concept of biofeedback; set up and use of biofeedback equipment; clinical application and guidelines for setting up a training sequence as part of a therapeutic program. The slide tape show is intended to acquaint Physical Medicine professionals with the use of EMG biofeedback as an adjunct to therapy. The program will demonstrate approaches to varied disabilities such as spinal cord injuries, phantom pain, cerebral palsy, post surgical muscle transplants, hemiplegia and in cardiac rehabilitation.

New Approach to Myelodysplasia—Booth 84

ANANIAS C. DIOKNO, M.D.; JACK LAPIDES, M.D.; EVAN KASS, M.D.; BETTE LOWE, R.N., E.T.; GARY WEDEMEYER, P.A., University of Michigan Medical Center, Ann Arbor, MI

Our experience in the urologic evaluation and management of myelodysplasia will be presented. The exhibit will show the normal neuroanatomy of the urinary bladder and the mechanism of voiding. The urologic problems, methods of evaluation and the types of bladder and sphincter dysfunction observed in myelodysplastic children will be shown. It will also demonstrate our experience using drug therapy (anticholinergic and adrenergic) and intermittent self-catheterization in the treatment of neurogenic bladder dysfunction.

Miss Wheelchair America—Booth 79

ERNEST W. JOHNSON, M.D., Professor and Chairman, Department of Physical Medicine, The Ohio State University College of Medicine, Columbus, OH

Miss Wheelchair America stimulates public interest and action to eliminate architectural barriers and attitudinal discrimination against the disabled. It urges disabled people to take leadership roles in the search for independence. Miss Wheelchair America 1977 and staff members will be in the booth to discuss and/or explain in further detail the activities and goals of the organization on both a state and national level. Photographs of the national pageant and a press release scrapbook will be displayed. Brochures and information packets will be available and there will also be a short slide presentation available for viewing.

Physiological Surgery for Dyskinesia—Booths 51/52

I. S. COOPER, M.D.; KAMRAN TABADDOR, M.D.; M. RIKLAN, M.D.; et al, St. Barnabas Hospital, Bronx, NY

Exhibit consists of three panels. One is devoted to techniques and the results of stereotactic surgery for dyskinesias. Second panel demonstrates the techniques and the results of chronic cerebellar stimulation for spasticity and dyskinesias of cerebral palsy. The third panel illustrates the physiological basis of these procedures.

Povidone-Iodine in the Treatment of Burn Wounds—Booths 64/65

SYED S. AKHTAR, M.D., Director, Burn Unit, St. Mary's Hospital; Assistant Professor of Surgery, Michigan State University, Saginaw, MI

Over 100 patients hospitalized for severe burns were treated topically with povidone-iodine ointment as part of their therapy regimen. Burn wounds were buttered with the povidone-iodine ointment and either dressed or left open. Daily debridement and/or cleansing including hydrotherapy tank treatment with high dilution povidone-iodine employed. Sixty-six per cent received concurrent systemic antibiotics. Data is presented on the rate of infection in relation to grafting time, burn wound depth, sepsis, and mortality. Data is also presented on microbiology, complications, and adverse effects. This presentation is made on six free-standing attached panels using text, tables, photos and graphs. Eleven linear feet are required. The exhibit is self-illuminated and requires one 500 watt 110V A.C. outlet.

Quad-Rama Rehabilitation—Booths 17/18

HERBERT KENT, M.D., Chief, Rehabilitation Medicine Service; RONALD ROTHMAN, M.D., Staff Physiatrist; BEATRICE WAGENBRENNER, OTR, Chief, Occupational Therapy, VA Hospital, Long Beach, CA

This is a pictorial essay of the rehabilitation of five individuals who suffered severe physical disabilities. These patients were markedly discouraged and depressed. Their rehabilitation process was initially halted with the patients in a totally dependent state. Through quad-rama rehabilitation portrayal, the viewer can readily visualize how these patients were helped to cope with their problems and attain true independence. The story of these patients is augmented by a series of slides depicting all aspects of their rehabilitation. These are projected four at a time; thereupon, the audience becomes acutely aware of the comprehensiveness of this program. The display includes motivational avenues for similar patients: videotapes on wheelchair karate, scuba diving for the spinal cord injured, and equipment enabling C-2,3 quadriplegics to feed themselves.

Sexuality and Physical Disability: Training Resources and Courses—Booth 25

THEODORE M. COLE, M.D.; SANDRA S. COLE, B.A., Department of PM&R, Program in Human Sexuality, University of Minnesota Medical School, Minneapolis, MN
Demonstration and explanation of Trainer Seminars, Audio Visual Training Kit, Instructor Manual, and Resource Materials in Physical Disability and Sexuality. Includes books, articles, slides, movies and video tapes and evaluation tools. Kit is flexible and can be used in marathon or modular training formats. When used as complete training kit, best suited for rehabilitation professionals. When used in parts, may be suitable for patient and family education.

SFTR Recording of Joint Motion and Position in Neutral Zero Method—Booth 49

JOHN J. GERHARDT, M.D., Kaiser-Permanente Medical Care Program, Portland, OR
The Exhibit shows basic principles of the S F T R (Sagittal, Frontal, Transverse, Rotation) Method of recording joint motion and position in the Neutral Zero Method. It was developed to standardize joint measurements internationally. It reduces all motions to motions in three basic planes thus eliminating confusion of terminology, discipline and language. One letter and three numbers record motion; one letter and two numbers record a position of a joint in a given plane. The Neutral Zero starting positions and sequence of values are explained. Examples of recordings and advantages of the Method, which are easily understandable, precise, concise, short and ideal for computer use, are clearly shown.

Voice Control Systems—Booths 82/83

ROBERT B. ROEMER, Department of Mechanical and Environmental Engineering, University of California, Santa Barbara, CA

The exhibit will be a demonstration of voice controlled devices for the severely physically disabled. Demonstrated will be voice controlled wheelchair, remote manipulator, and environmental devices (television, etc.) .Posters will be used to explain the operating principles and the applications of voice control systems.

The Swollen Limb: Differential Diagnosis and Treatment—Booth 81

JAMES S. TAYLOR, M.D., Department of Dermatology; JESS R. YOUNG, M.D., Peripheral Vascular Disease, Cleveland Clinic Foundation, Cleveland, OH

This exhibit will display approximately 30-40 photographs on the differential diagnosis of the swollen limb listing lymphatic, venous, arterial, and other miscellaneous causes for a large extremity. Dermatologic clues to diagnosis will be emphasized. Details of treatment will be discussed in a pamphlet to accompany the exhibit. These photographs will be displayed on four panels of the exhibit. In a central panel there will be a carousel slide projector with its own small screen. Each of the exhibit photographs will be displayed on the screen in a rotating fashion for approximately 30 seconds to allow the tending physicians to quiz themselves.

TECHNICAL EXHIBITS

Exhibit Hours: Tuesday, November 9—9:00 to 4:30
Wednesday, November 10—9:00 to 4:30
Thursday, November 11—8:30 to 2:00

Abbey Rents & Sells—Booth 44

"When it comes to medical equipment, we wrote the book."

AGA Corporation—Booth 61

AGA Corporation presents its 680M Medical Thermography Equipment for Rehabilitation Clinic use in foot screening, in fitting prosthetic devices and shoes, in tendon transfers, with arthritic patients, in evaluating post op progress, and for the early detection of peripheral neuropathy among insensitives to help increase successful non-surgical treatment.

Ali Med, Inc.—Booth 70

Wherever and whenever pressure is a problem. A complete line of wheelchair cushions, splinting and padding material, prefabricated drop foot braces, and self molding arthritic and diabetic sandals will be exhibited.

Americana (Grolier Interstate, Inc.)—Booth 33

American Medical Systems, Inc.—Booth 26

American Medical Systems is involved in the design, manufacturing, and marketing of (1) the Nocturnal Penile Tumescence Monitor, a diagnostic aid in differentiating psychogenic from organic cases of erectile impotence, (2) the Inflatable Penile Prosthesis for treatment of erectile impotence, and (3) the Artificial Sphincter for control of urinary incontinence.

Autogenic Systems, Inc.—Booths 54/55

Autogenic Systems, Inc., the nation's largest biofeedback instrumentation manufacturer, will have its full line of the most sophisticated instrumentation available for demonstration.

Avery Laboratories, Inc.—Booth 72

Electronic devices for biomedical application. Transcutaneous, percutaneous, and totally implantable systems for stimulation of dorsal column, peripheral nerves, cerebellar and phrenic nerves.

The Burdick Corporation—Booths 86/87

The Burdick Corporation will exhibit a selection of its equipment for the professional physical therapist, featuring the D-900 Short Wave Diathermy console with 10-level self-tuning. Stop by the Burdick booth; we'd like to meet you.

Camp International, Inc.—Booth 10

Orthotic supports, braces and patient aids.

Chattanooga Pharmacal Co.—Booth 67

Featured will be HYDROCOLLATOR STEAM PACKS—a standard treatment modality in physical therapy programs around the world. ColPaC's—the reusable COLD APPLICATION will be demonstrated. NEW PRODUCTS—NYLATEX WRAP—a new material of rubber and nylon; PRON PILLO—designed to provide comfort to patient lying in prone position; and VINYL-TERRI-COVER—new type towel wrap for application of HYDROCOLLATOR Steam Pack will be exhibited.

Cyborg Corp.—Booths 38/39

Cyborg Corporation manufactures a complete line of EMG biofeedback instruments, including units for take-home training, clinical use and research. Local representatives in most areas of the country are available to give demonstrations and provide applications help.

F. A. Davis Company—Booth 14

F. A. DAVIS COMPANY invites you to see our publications on Physical Medicine and Rehabilitation. Included are Brunnstrom's CLINICAL KINESIOLOGY and PHYSICAL MANAGEMENT FOR THE QUADRIPLÉGIC PATIENT by Ford and Duckworth. Of special interest to you will be our PAIN SERIES and SCOLIOSIS by Rene Cailliet.

DISA ELECTRONICS—Booth 23

DISA will show its new digital EMG system with storage, recording, averaging and automatic EMG analysis capability. Also included are portable EMGs, delay lines, sensory equipment and special electrodes for recording jitter, fiber density and neurogenic blocking.

Eaton Laboratories—Booth 60

Your EATON representatives wish you a successful 1976 meeting. Complete information on EATON products and professional service is available at the EATON exhibit.

EDX Corporation—Booths 76/77

EDX will be exhibiting our portable EMG with split screen storage and program control, our new digital EMG with dynamic storage and paper recording, and an EMG with an internal user programmable computer for sophisticated signal processing.

Electro-Med Health Industries, Inc.—Booth 24

The EGS Stimulator provides high voltage galvanic current delivering increasingly rapid pulses achieving extended excitability and conductivity without the usual painful heating or unpleasant side reactions.

Electro Sciences for Medicine, Inc.—Booth 22

ESM MYOTRAINER—A portable, lightweight, battery powered instrument for muscle re-education using myofeedback. It provides both patient and therapist with audio and visual feedback of muscle activity.

ESM GAIT TRAINER—A miniaturized, battery powered, adjustable stimulator which produces and facilitates the swing phase of the gait cycle in patients where this function is absent.

EMG Associates—Booth 80

See the MEDI-STORE™, an important innovation in EMG. Our EMG/NCV systems are complete, simple-to-operate, portable, accurate, modular, expandable and offer optional STORAGE with unique automatic control features. Also offered are our quality electrodes and accessories.

Encyclopaedia Britannica, Inc.—Booth 48

Encyclopaedia Britannica welcomes delegates to the American Congress of Rehabilitation Medicine and American Academy of Physical Medicine & Rehabilitation meeting. As part of our exhibit we will have on display the new 1976 edition of the Encyclopaedia Britannica 3, The Britannica Junior and other related products. Stop and inspect these products in booth 48. They are available to the delegates at our convention offer.

Everest & Jennings, Inc.—Booths 86/87

EVEREST & JENNINGS products on display include Premier Wheelchairs (detachable and wrap-around arm models and the "Sportsman" active-duty lightweight), new Wheelchair Accessories, Walking Aids, Hoyer Patient Lifter, Aqua-Thera Controlled Heat Therapy Unit and Retec NC-30/IPPB System for breathing assistance and therapy. Stop by for demonstrations!

Fluidotherapy Company—Booth 19

Fluidized air-solid systems for heat therapy.

General Theraphysical Inc.—Booth 11

General Theraphysical, Inc. is your single source for all physical therapy equipment—Siemens of West Germany, Birtcher Corporation, Cuinier of France (manufacturer of the G5 massage apparatus for postural drainage and P. T.), Hanau I. R. and U. V. lamps, and GTI electroanalgesia equipment.

Guardian Chemical Corporation—Booth 34

Dow B. Hickam, Inc.—Booth 62

Dow B. Hickam, Inc. presents Granulex, the treatment of choice in decubitus and varicose ulcer therapy. Granulex provides a complete treatment in a single spray-on application. The formula contains Trypsin, a debriding agent; Balsam Peru, to stimulate circulation; and Castor Oil, which coats the wound keeping it soft and supple.

Ille Division of Market Forge—Booth 32

Ille extends a most cordial invitation to visit Booth No. 32 where they will display Whirlpool and Paraffin Bath Units and welcome discussions on equipment requirements.

International Medical Electronics, Ltd.—Booth 57

INTERNATIONAL MEDICAL ELECTRONICS, LTD., manufacturers of sophisticated medical equipment, featuring Magnatherm short-wave diathermy with two detachable heads. Offering the ability to treat two separate areas, or one from two directions at the same time. Please stop by Booth #57 for a demonstration.

Intertronic Systems Ltd.—Booth 63

Intertronic Systems Limited manufactures a complete line of products used for various electrotherapy applications. Some of the equipment is especially adapted for neuro-point location and auriculotherapy applications. The other equipment includes a complete line of electronic stimulators specifically designed for transcutaneous neurological stimulation for the control of chronic pain.

Instrumentation & Control Systems, Inc.—Booth 66

The Liberson Brief Pulse Portable Stimulator (used since 1959) generates biphasic pulses of 50 microsec—1 msec, 40 Hz, 150 V; stimulation may alternate with pauses (2½ sec each). It is used transcutaneously for inhibition of pain, stiffening, spasticity; functional stimulation, reflex walking, biofeedback, increase of muscle strength and range of motion.

Invacare Corporation—Booth 56

The Invacare Corporation will display their patient aid equipment and the Rolls line of wheelchairs.

The Jobst Institute, Inc.—Booths 74/75

We will be pleased to discuss the use of the JOBST Post-Op AIR-BOOT as an immediate Post-Op prosthesis following below-knee amputation to provide psychological advantages of a continuing kinesthetic sense of gait and balance. We'll also discuss JOBST ANTI/BURNSCAR Supports; JOBST HYDRO-FLOAT products for management of decubiti; JOBST VENOUS PRESSURE GRADIENT Supports and JOBST EXTREMITY PUMP for management and treatment of edema of the extremities.

Kincoa Ltd.—Booth 68/69

Roto Rest Mark I and II Beds provide a new treatment modality for immobilized patients. The beds oscillate from side to side keeping the patient in constant movement helping to eliminate the hazards of immobility, i.e. pressure sores, decreased pulmonary function, vascular stasis, renal problems. It allows quality nursing care while maintaining the dignity of the patient.

Life-Tech Instruments, Inc.—Booth 9

Life-Tech Instruments is proud to exhibit a portable solid-state, modular EMG instrument having the capability of being expanded, via plug-in circuit modules, into a complete laboratory system. Some of the modules on exhibit are: digital averager, sweep store, transient capture, strip chart recorder, pre-Analysis delay.

Lumex, Inc.—Booth 30/31

Lumex cordially invites you to visit our exhibit booth and participate in a demonstration of our exclusive Isokinetic Equipment: CYBEX II Instrumentation System; FITRON Cycle-Ergometer; KINETRON lower limb bilateral reciprocal training device; ORTHOTRON knee/ankle/shoulder exercise modality; CYBEX Pulse Meter.

Marion Laboratories, Inc.—Booth 78

Join us at our booth to find out about our recent addition to therapeutic resources for urological problems: DITROPAN® (oxybutynin chloride), a dual-acting antispasmodic/anticholinergic

- effectively diminishes frequency of bladder contractions
- delays initial desire to void
- increases bladder capacity

DITROPAN tablets are indicated for the relief of symptoms associated with voiding in patients with uninhibited neurogenic and reflex neurogenic bladder.

W. H. McMills, Inc.—Booth 29

This new and unique Patient Handling Device, Model NB-1A, provides for the growing need for special care equipment for cardiovascular, neurological and orthopedic patients. Quadraplegic, Paraplegic and similar types of patients can receive the tilting treatment in this bed without being taken to other facilities.

Medco Products Company, Inc.—Booth 50

For Best Results and Service—See MEDCO'S "Family of Unequaled Products." Medconlator Twin- Dublett- Mark VC- Medcotherm Medcolator- Medco Lotion-. Serving the Medical Profession since 1932.

Medical Devices, Inc.—Booth 42/43

MEDICAL DEVICES, INC.—Manufacturers of the Neuropac™, a Transcutaneous Electrical Nerve Stimulator for non-invasive, non-destructive control of pain. A complete family of external Neuropac™ systems, including the only true dual channel system. Neuropac™ systems are available in single or dual channel versions, with or without adjustable pulse width.

Medical Equipment Distributors, Inc.—Booths 3/4/5

Medical Equipment Distributors, Inc. specializes in equipment for rehabilitation and physical medicine. Included in the equipment featured at this conference is the breath-controlled quadriplegic wheelchair system.

Medical Instrument Company—Booths 20/21

See live demonstrations of MEDIC's STORAGELINE 2000 EMG. While you are at our booth, we would like to show you all the new "PORTALINE 500" EMG. This instrument incorporates the latest integrated circuitry which allows it to be the smallest, lightest, least expensive quality EMG on or in the market.

Mentor Corporation—Booth 12

The world's distinguished rehabilitation centers look to Mentor Corporation as the only producer of an effective implantable Bladder Pacemaker. Company representatives will also demonstrate the Mentor CONTINAID Incontinence Controller. Featured new products are the Mentor URO-SAN Disposable Male External Catheter and the Mentor "SELF-CATH" Remale Catheter for intermittent catheterization.

The Pal Relax Bar Co., Inc.—Booth 85

An exercise and therapy apparatus of sturdy steel tubing construction with horizontal padded bars. A great variety of suspended inversion, upright and horizontal positions are possible with ease and comfort. Gravity forces have multiple application to every part of the body. A challenge for every user.

J. T. Posey Company—Booth 13

J. A. Preston Corporation—Booth 59

You are invited to examine Preston's new Direct Gear Drive Motorized Wheelchair, designed by Sony. The chair can negotiate curves up to 4" and climb 30% inclines. You will also see representative Diagnostic instruments from Preston's complete line for Physical Medicine including a Recording Chronaxie Meter.

The Purdue Frederick Company—Booth 73

BETADINE WHIRLPOOL CONCENTRATE is a microbicidal solution of providone-iodine for effective decontamination of water in whirlpool baths and tanks. It promptly reduces bacterial contamination of water before and during physical therapy procedures . . . *kills* microorganisms in the bath, including *Pseudomonas*, *E. coli*, and staphylococci. Substantially provides microbicidal efficacy of iodine virtually without its drawbacks. Economical.

Roho Research and Development Inc.—Booth 53

Presenting new suspension concepts for effective healing and prevention of decubitus ulcers while sitting, plus extending patients sitting times. The lightweight one, THE BALLOON CUSHION.

Social Security Administration, Bureau of Disability Insurance—Booth 58

Staadynamics, Inc.—Booths 27/28

Introducing a new personal Biofeedback unit. Staodyn TNS controls acute and chronic pain. Combined with our complete physical medicine program, it becomes unusually effective, comfortable, and safe. Clinical data and demonstration.

Stimulation Technology, Inc.—Booths 46/47

EPC electronic stimulators, a noninvasive therapy in the management of intractable, acute and chronic pain. The EPC products include the MINI, the PERSONAL, and CLINICAL models for clinical, hospital and laboratory application. All models incorporate adjustment controls for output, pulse duration, and pulse frequency.

Teca Corporation—Booths 1/2

Visit us to see the latest in EMG—the unique TE4 direct writing electromyograph with newest signal processing modules. Demonstration will be going on for various techniques in EMG. Our PG6 Polgon systems joint angle indicator for human gait analysis will be shown—see and operate the new integrated stop action storage EMG with automatic features which save you time and simplify testing.

Thermo-Mold Medical Products, Inc.—Booths 40/41

Pre-cut, pre-sized Warn 'N Form® Orthopedic devices are heated and molded to the patient with ease and comfort in just minutes. The splints, braces and supports, once formed, are strong, lightweight, moisture absorbent, non-toxic, non-irritating, X-ray penetrable, washable, hold shape in any climate; may be reformed again and again. Orthopedic sheets can be cut to desired configurations.

Vari-Temp Mfg. Co.—Booth 71

Bio-Feedback Technology, Inc.—Booth 35

Bio-Feedback Technology, Inc., manufacturers of research biofeedback instrumentation, Feedback Encephalograph, Feedback Myographs, Differential Thermometers, GSRs, and the Electroenterographs. The EMGs being used for muscle relaxation and rehabilitation.

TECHNICAL EXHIBITORS

ABBEY RENTS & SELLS

600 South Normandie
Los Angeles, CA 90005
Attn: Gerald Benjamin, Dir. of Mktg.
Phone: (213) 384-5292

AGA CORPORATION

550 County Avenue
Secaucus, NJ 07094
Attn: A. G. Couch, Med. Mktg. Mgr.
Phone: (201) 866-3344

ALI MED, INC.

172 W. Newton Street
Boston, MA 02118
Attn: J. A. Chemlinir, Pres.
Phone: (617) 267-3163

AMERICAN MEDICAL SYSTEMS, INC.

3312 Gorham Avenue
Minneapolis, MN 55426
Attn: James J. Benda
Phone: (612) 927-4211

AMERICANA (GROLIER INTERSTATE, INC.)

1409 Winding Brook Circle
Dallas, TX 75208
Attn: Joe Irwin, Mgr.
Phone: (214) 942-2322

AUTOGENIC SYSTEMS, INC.

809 Allston Way
Berkeley, CA 94710
Attn: Stephen K. Foster, Sales Mgr.
Phone: (415) 548-6056

AVERY LABORATORIES, INC.

145 Rome Street
Farmingdale, NY 11735
Attn: Abe Chizik, Sales Mgr.
Phone: (516) 293-3630

THE BURDICK CORPORATION

15 Plumb Street
Milton, WI 53563
Attn: Ralph Asplund, Dir. Mktg.
Phone: (608) 868-7631

CAMP INTERNATIONAL, INC.

Box 89
Jackson, MI 49204
Attn: Frederick H. Parker
Phone: (517) 787-1600

CHATTANOOGA PHARMACAL CO.

P.O. Box 4287
Chattanooga, TN 37405
Attn: Henry Kanies, V.P. Marketing
Phone: (615) 877-3551

CYBORG CORP.

342 Western Avenue
Boston, MA 02035
Attn: James F. Fin
Phone: (617) 782-9820

F. A. DAVIS COMPANY

1915 Arch Street
Philadelphia, PA 19103
Attn: Judith Polizzi
Phone: (215) 568-2270

DISA ELECTRONICS

779 Susquehanna Avenue
Franklin Lakes, NJ 07417
Attn: William G. Zimmerman, Sales Mgr.
Phone: (201) 891-9460

EATON LABORATORIES

17 Eaton Ave.
Norwich, New York 13915
Attn: Lee Decker
Phone: (607) 335-2273

EDX CORPORATION

2121 S. Susan
Santa Ana, CA 92704
Attn: Stephen W. Baker, Pres.
Phone: (714) 549-8900

ELECTRO-MED HEALTH INDUSTRIES, INC.

6240 N.E. 4th Court
Miami, FL 33138
Attn: Jack Flax, Gen. Mgr.
Phone: (305) 756-6013

ELECTRO SCIENCES FOR MEDICINE, INC.

4100 Barton Road
Clarence, NY 14031
Attn: John H. Doolittle, V.P.
Phone: (716) 634-2814

EMG ASSOCIATES

P.O. Box 862
Stamford, CT 06904
Attn: Bernard Cohen, Gen. Mgr.
Phone: (203) 327-1720

ENCYCLOPAEDIA BRITANNICA, INC.

425 N. Michigan Avenue
Chicago, IL 60680
Attn: Sidney Feldman
Phone: (312) 321-6886

EVEREST & JENNINGS, INC.

1803 Pontius Avenue
Los Angeles, CA 90025
Attn: Jim Fitzpatrick
Phone: (213) 478-1057

FLUIDOTHERAPY COMPANY

359 Westminster
Houston, TX 77024
Attn: Ernest J. Henley, V.P.
Phone: (713) 464-4035

GENERAL THERAPHYSICAL INC.

2018 Washington Avenue
St. Louis, MO 63103
Attn: Thomas P. Muchisky, Pres.
Phone: (314) 231-9643

GUARDIAN CHEMICAL CORPORATION

230 Marcus Boulevard
Hauppauge, New York 11787
Attn: Robert S. Rubinger
Phone: (516) 273-0900

DOW B. HICKAM, INC.

P.O. Box 35413
Houston, TX 77035
Attn: Randall H. Maple, V.P.
Phone: (713) 723-0690

ILLE DIVISION OF MARKET FORGE

2245 Reach Road
Williamsport, PA 17701
Attn: R. B. Eddy, Sales Mgr.
Phone: (717) 323-9491

INSTRUMENTATION & CONTROL SYSTEMS, INC.

129 Laura Drive
Addison, IL 60101
Attn: Marion L. Servos, Adv. Mgr.
Phone: (312) 543-6200

INTERNATIONAL MEDICAL ELECTRONICS, LTD.

2805 Main
Kansas City, MO 64108
Attn: Billie Peck
Phone: (816) 221-0115

INTERTRONIC SYSTEMS, LTD.

980 Alness Street, #15
Downsview, Ontario
Attn: Karl Hakars
Phone: (416) 661-3902

INVACARE CORPORATION

1200 Taylor Street
Elyria, OH 44035
Attn: Rick Rolph, Nat'l Sales Mgr.
Phone: (216) 365-9321

THE JOBST INSTITUTE, INC.

653 Miami Street
Toledo, OH 43694
Attn: Harry E. Fehl
Phone: (419) 698-1611

KINCOA, LTD.

3145 West 47th Street
Chicago, IL 60632
Attn: Marilyn Seamon, Dir. Med. Mktg.
Phone: (312) 376-8084

LIFE-TECH INSTRUMENTS, INC.

8000 Harwin Dr., Suite 450
Houston, TX 77036
Attn: Elio Ronchini
Phone: (713) 783-6490

LUMEX, INC.—CYBEX DIVISION

100 Spence Street
Bay Shore, NY 11706
Attn: David Hillery, Div. Mgr.
Phone: (516) 273-2200

MARION LABORATORIES, INC.

10236 Bunker Ridge Rd.
Kansas City, MO 64137
Attn: Mrs. Jan Phillips
Phone: (816) 761-2500

W. H. McMILLS, INC.

431 Waverley Street
Palo Alto, CA 94301
Attn: B. McMills, V.P.
Phone: (415) 325-6962

MEDCO PRODUCTS COMPANY, INC.

P.O. Box 50070
Tulsa, OK 74150
Attn: L. S. DeGroff, Pres.
Phone: (918) 939-3347

MEDICAL DEVICES, INC.

833 Third Street, South West
St. Paul, MN 55112
Attn: Robert H. Berg, Pres.
Phone: (612) 631-0590

MEDICAL EQUIPMENT DISTRIBUTORS, INC.

1215 S. Harlem Avenue
Forest Park, IL 60130
Attn: Jan Little, Gen. Mgr.
Phone: (312) 771-4555

MEDICAL INSTRUMENT COMPANY

9200 Glenoaks Blvd.
Sun Valley, CA 91352
Attn: C. E. Dilley, Pres.
Phone: (213) 768-4880

MENTOR CORPORATION

3104 West Lake Street
Minneapolis, MN 55416
Attn: Thomas M. Haurer, Exec. V.P.
Phone: (612) 925-3830

THE PAL RELAX BAR CO., INC.

233 Oak Knoll Rd., P.O. Box 511

Ukiah, CA 95482

Attn: J. H. Penner, Pres.

Phone: (707) 462-1444

J. T. POSEY COMPANY

39 S. Altadena Drive

Pasadena, CA 91107

Attn: Jan Young

Phone: (213) 795-7767

J. A. PRESTON CORPORATION

71 Fifth Avenue

New York, NY 10003

Attn: Gary Thal, Mgr. Mktg. Serv.

Phone: (212) 255-8484

**THE PURDUE FREDERICK
COMPANY**

50 Washington Street

Norwalk, CT 06856

Attn: Don Koppel

Phone: (203) 853-0123

**ROHO RESEARCH AND
DEVELOPMENT INC.**

P.O. Box 658

Belleville, IL 62222

Attn: William F. Graebe, Jr., V.P.

Phone: (618) 397-1881

**SOCIAL SECURITY
ADMINISTRATION, BUREAU OF
DISABILITY INSURANCE**

Room 7407 Dickinson Tower

Baltimore, MD 21241

Attn: Fred Dechowitz

Phone: (301) 594-0606

STAODYNAMICS, INC.

601 S. Bowen Street

Longmont, CO 80501

Attn: Marilyn Sage

Phone: (303) 772-3631

STIMULATION TECHNOLOGY, INC.

9440 Science Center Drive

Minneapolis, MN 55428

Attn: Gary Bolego, Sales Admin. Mgr.

Phone: (612) 535-0255

TECA CORPORATION

220 Ferris Avenue

White Plains, NY 10603

Attn: Jack Lenchner, Sales Mgr.

Phone: (914) 946-4593

**THERMO-MOLD MEDICAL
PRODUCTS, INC.**

370 Lexington Avenue

New York, NY 10017

Attn: Elmer M. Arluck, Pres.

Phone: (212) 725-8644

VARI-TEMP MFG. CO.

1104 N. Marshall Avenue

El Cajon, CA 92020

Attn: Terry S. Altomari, Sales Mgr.

Phone: (714) 449-7020

**BIO-FEEDBACK
TECHNOLOGY, INC.**

10612 A Trask Avenue

Garden Grove, CA 92640

Attn: Alan U. Robertson, Sales Mgr.

Phone: (714) 537-3800

BOOK FAIR

Exhibit Hall

An exciting feature of the annual session of the American Academy of Physical Medicine and Rehabilitation and the American Congress of Rehabilitation Medicine is the 1976 BOOK FAIR. On display, as a convenience to members, will be an interesting array of literature devoted to every aspect of rehabilitation. You are invited to browse through the many publications on display. Should you wish to purchase copies of any of the publications, order forms will be available and Congress/Academy staff personnel will be on duty to assist you. (A portion of the price of each publication sold will be retained by the Congress/Academy to help defray the costs of the annual meetings.) The following publishing companies have contributed to the BOOK FAIR:

THE ALMQUIST & WIKSELL PERIODICAL CO.

Stockholm, Sweden

ARLINGTON HOUSE PUBLISHERS

New Rochelle, NY

CHURCHILL LIVINGSTONE (Medical Division of Longman, Inc.)

New York, NY

WARREN H. GREEN, INC.

St. Louis, MO

S. KARGER AG/Medical and Scientific Publishers

Basel, Switzerland

J. B. LIPPINCOTT COMPANY

Philadelphia

WILLIAM J. LUEDKE

Philadelphia, PA

MEDIC PUBLISHING CO.

Bellevue, WA

MEDICAL EXAMINATION PUBLISHING COMPANY, INC.

Flushing, NY

NEW YORK UNIVERSITY PRESS

New York, NY

PLENUM PUBLISHING CORPORATION

New York, NY

SISTER KENNY INSTITUTE

Minneapolis, MN

CHARLES C. THOMAS

Springfield, IL

UNIVERSITY OF MINNESOTA PRESS

Minneapolis, MN

AMERICAN CONGRESS OF REHABILITATION MEDICINE

Program Index

AGARWALA, B., Chicago, IL	24, 34
ADELMAN, B., Columbus, OH	68
ALBERT, B. W., Philadelphia, PA	18
ALBRECHT, G. L., Chicago, IL	52, 67, 82
ALEXANDER, J., Bronx, NY	37, 67, 77
ANDERSON, T. P., Minneapolis, MN	49, 50, 51, 65
ANDERSON, W. H., Lansing, MI	40
APTE, S. Y., Minneapolis, MN	25
ARMITSTEAD, A. I., Englewood, CO	42
ARNOLD, T., Chicago, IL	24
ATHELSTAN, G. T., Minneapolis, MN	35, 62
BAKER, C. T., San Diego, CA	23
BALICK, S., New York, NY	65
BARAM, E. M., Philadelphia, PA	48, 49
BATEMAN, R., Minneapolis, MN	19
BATZA, E. M., Cleveland, OH	66
BEDOTTO, R. A., West Orange, NJ	57
BELLESA, T., San Jose, CA	43
BENDER, F. P., Philadelphia, PA	39
BENJAMIN, M. V., New York, NY	26
BERKMAN, A. H., Bronx, NY	19
BERROL, S., San Jose, CA	43
BETTS, H. B., Chicago, IL	28, 34, 47
BISHOP, D. S., Hamilton, Ontario, Canada	51, 63
BLACKMER, B., Boston, MA	54
BOEHME, A. R., Boston, MA	22
BOTVIN, J. G., Pomona, CA	84
BRADY, G. C., Irvine, CA	33
BRECKENRIDGE, K., Pomona, CA	81
BRYANT, P., Alberta, Canada	39
BUERGER, A. A., Irvine, CA	32
CAPELL, B., Minneapolis, MN	19
CAPELL, J. T., Minneapolis, MN	19
CARDENAS, D. D., Seattle, WA	78
CARTER, M., Philadelphia, PA	75
CASE, J. B., New York, NY	56
CASSVAN, A., East Meadow, NY	45
CHYATTE, S. B., Atlanta, GA	73
CLARK, J. A., Santa Barbara, CA	60
CLAXTON, C. M., Atlanta, GA	73
CLOWERS, D. E., Seattle, WA	15, 17
CLOWERS, M. R., Seattle, WA	15
COCKRELL, J. L., Ann Arbor, MI	56
COHEN, B. A., Atlanta, GA	47, 59, 61
COLACHIS, S. C., Jr., Phoenix, AZ	14
COLE, J. A., Houston, TX	75
COLE, S. S., Minneapolis, MN	17
COLE, T. M., Minneapolis, MN	17
CONNETT, K. L., San Diego, CA	14
CONVERY, F. R., San Diego, CA	14, 31
CRESS, R. H., Albany, NY	16
CREWE, N. M., Minneapolis, MN	15, 34, 35
CROMES, G. F., Dallas, TX	40
CROUCH, R. H., Decatur, GA	47
CUMMINGS, V., Bronx, NY	49

DAGOSTINO, J., San Diego, CA	22
DELAETUR, B. J., Seattle, WA	39, 58
DELISA, J., Seattle, WA	39
DEMOPOULOS, J. T., New York, NY	57, 65
DENHART, C. F., Columbus, OH	59
DEWIS, L., Woburn, MA	54
DI BENEDETTO, M., Shaerborn, MA	51, 62
DIMITRIJEVIC, M. R., Ljubljana, Yugoslavia	55, 56
DINSDALE, S., Hamilton, Ontario, Canada	26
DITUNNO, J. F., Jr., Philadelphia, PA	48
DONAHUE, P., Albany, NY	16
DONOVAN, W. H., Seattle, WA	15, 16
DUTTARER, J. K., Downey, CA	19
DZAU, R. E., Boston, MA	22
EHRlich, G. E., Philadelphia, PA	63
EISELE, J. E., San Diego, CA	21, 22, 73
EMDHOFF, M., Philadelphia, PA	48
EMERSON, S., San Diego, CA	14
ESCHEN, J., Jr., New York, NY	46
ESIBILL, N. L., New York, NY	63
FAULKNER, J. A., Ann Arbor, MI	24
FINE, H. L., Philadelphia, PA	39
FISHER, S. V., Minneapolis, MN	25
FORDYCE, W. E., Seattle, WA	53
FOWLER, E., San Diego, CA	21
FREED, M. M., Boston, MA	35
FREEDMAN, W., Philadelphia, PA	49
FREEMAN, S., Seattle, WA	62
FRIEDEN, L. M., Houston, TX	68, 75
FRIEDMANN, L. W., Woodside, NY	56
FRIELICH, M., Fairleigh, NJ	19
FUHRER, M. J., Houston, TX	27, 55, 67
FULTONBERG, D. M., East Meadow, NY	45
GAMBLE, J., Columbus, OH	68
GARRETT, A. L., West Haverstraw, NY	23
GIBSON, C. J., Rochester, NY	20
GILAD, I., Bronx, NY	67
GLASS, D. D., Philadelphia, PA	63
GOLDBERG, R. T., Boston, MA	35, 54
GOLDSCHMIDT, J. W., Chicago, IL	28
GOMEZ, A., San Diego, CA	21
GOODHART, P., Bronx, NY	77
GOODRICH, R., Bronx, NY	37, 69
GORDON, D. L., Columbia, MD	53
GORDON, P. E., III, San Diego, CA	72
GORDON, S., Bronx, NY	76
GRABOIS, M., Houston, TX	56
GRACOIS, M., Houston, TX	55
GREEN, G., New York, NY	65
GREEN, R. F., New York, NY	43
GREENFIELD, W. H., Hartford, CT	74
GUTTMANN, L., Aylesbury, Buckshire, England	31, 71, 72
HALL, K., San Jose, CA	43
HALLAUER, D. S., Rochester, NY	21
HALPERN, D., Minneapolis, MN	46
HALSTEAD, L. S., Houston, TX	18, 68, 83

HALSTEAD, M. G., Houston, TX	18
HAME, P., Philadelphia, PA	75
HAMILL, C. M., White Plains, NY	20
HAMILTON, B. B., Chicago, IL	16, 30, 32, 83
HAMILTON, R., San Jose, CA	43
HANDELSMAN, L., Ann Arbor, MI	70
HARASYMIW, S. J., Chicago, IL	33, 52, 82
HARDY, R. W., Seattle, WA	72
HARRINGTON, K., Downey, CA	64
HARSNAANYI, S. L., Wallingford, CT	76
HART, D. L., West Haven, CT	58
HARTLEY, R. B., Santa Barbara, CA	65
HASKIN, M., Philadelphia, PA	75
HAUGH, D. M., Chicago, IL	83
HEAD, M. D., Dallas, TX	77
HECOX, B., New York, NY	70
HEIGENHAUSER, G. F., Ann Arbor, MI	24
HELM, P. A., Dallas, TX	77
HENNIG, L. M., Jackson, MS	30
HERBISON, G. J., Philadelphia, PA	48
HINKLE, E., San Diego, CA	22, 37
HINTERBUCHNER, C., New York, NY	44, 46
HOLDEN, B. L., Houston, TX	75
HOLDEN, H., San Diego, CA	73
HOLT, N. B., Chicago, IL	19, 82
HOPKINS, K., San Jose, CA	43
HORNE, M. D., Providence, RI	33, 52, 82
HOUGHTON, S., Downey, CA	66
HUCKLEBERRY, G., San Diego, CA	71
HUTELMYER, C. M., Philadelphia, PA	64
JACOBS, S. R., Philadelphia, PA	74
JAWEED, M. M., Philadelphia, PA	48
JOHNSON, E. W., Columbus, OH	68
JOHNSON, M., Downey, CA	69
JOHNSON, R. M., New Haven, CT	58
JOHNSTON, M. V., Pomona, CA	84
JONES, N. L., Hamilton, Ontario, Canada	26
KAKULAS, B. A., Perth, W. Australia	72
KAPLAN, J., New York, NY	65
KAPLAN, P. E., Chicago, IL	47
KEITH, R. A., Pomona, CA	81, 84
KENNEDY, N. B., Downey, CA	28
KENT, H., Long Beach, CA	49, 62
KERSTEIN, M. D., New Haven, CT	36
KEWALRAMANI, L. S., Davis, CA	27
KING, R. B., Chicago, IL	16
KIVIAT, M. D., Seattle, WA	16
KLUGE, C. A., Dallas, TX	40
KANPIK, J. J., Natick, MA	79
KNIGHT, J. W., Dallas, TX	71
KO, M., Seattle, WA	62
KOSIAK, M., St. Paul, MN	25
KRAUS, J. F., Davis, CA	27
KRESCH, E., Philadelphia, PA	49
LABORDE, T. C., Houston, TX	76
LANGTON, D. P., San Diego, CA	22, 45
LEDERER, E., Chicago, IL	28

LEHMANN, J. F., Seattle, WA	15, 17, 39, 58
LERNER, E., Haven, CT	36
LEWIN, H., New York, NY	56
LINCOLN, H. P., Long Beach, CA	50
LIPIN, C. L., Jackson, MS	42
LIPSON, M. J., Boston, MA	80
LIPTON, L. S., Chicago, IL	21
LUNSFORD, B. R., Downey, CA	30
LYMBURNER, K., Hamilton, Ontario, Canada	26
MAKI, R. J., San Diego, CA	37
MAPLE, R. R., New York, NY	55
MAYER, N. H., Philadelphia, PA	39
MC ALEER, C. A., Dallas, TX	40
MC CANN, C., Philadelphia, PA	64
MC CANN, C. B., Portland, ME	31, 71
MC CLUER, S., Columbia, MO	38
MC CORKIE, E., Ann Arbor, MI	70
MC ELWAIN, R. A., San Jose, CA	43
MC GRAW, M. J., San Diego CA	14
MC HUGH, R., Minneapolis, MN	46
MC KENZIE, M. W., Jackson, MS	36
MC PHEE, M. C., Rochester, MN	54
MCNEAL, D. R., Downey, CA	71
MEERSCHAERT, J. R., Royal Oak, MI	31
MEIER, R. H., III, Houston, TX	77
MELVIN, J. L., Milwaukee, WI	30
MEREDITH, J., Chicago, IL	47
MERRILL, M., San Diego, CA	21, 22
MEYER, P. R., Chicago, IL	72, 83
MIKULIC, M. A., Seattle, WA	20
MILLER, B., Ann Arbor, MI	24
MINTEER, M. A., San Diego, CA	14, 44
MIROTZNIK, J., New Brunswick, NJ	52
MISSEL, J., Boston, MA	53
MITCHELL, K., Chapel Hill, NC	65
MITTELMANN, M., Hartford, CT	74
MOLNAR, G. E., Bronx, NY	67
MORRIS, A. F., Atlanta, GA	61
MROCZEK, N., Minneapolis, MN	46
MYERS, S. J., New York, NY	31
NAND, S., Chicago, IL	28
NEWMAN, E., Minneapolis, MN	50, 51
NEWMANN, J., New York, NY	26
NICHOLAS, J. J., Pittsburgh, PA	44
NICHOLS, A., Baldwin Park, CA	29
NICHOLSON, C. G., Alberta, Canada	39
NUGENT, T., Champaign, IL	31
OLIVER, R. C., White Plains, NY	20
OLSON, D. A., Chicago, IL	36, 60
O'NEIL, W. A., Pomona, CA	81
OWENS, O., West Haven, CT	36
PETERS, N., Woburn, MA	54
PETERSON, B., Norwalk, CA	29
PHIPPS, M., Woburn, MA	44
PIERCY, K., Glendora, CA	29

PINKERTON, S., Dallas, TX	40
POLLOCK, D., New York, NY	61
POMFRET, A., Woburn, MA	44
PRESS, D., New York, NY	65
PRICE, M., Minneapolis, MN	50, 51
PUGH, J., New York, NY	57
PURI, K. B., Irvine, CA	41
RAINES, J. R., Decatur, GA	60
RAMOS, M. U., Natick, MA	79, 80
RAMSBY, G. R., West Haven, CT	58
RANSOHOFF, J., New York, NY	26
RAO, P. R., Fort Howard, MD	23
RAPPAPORT, M., San Jose, CA	43
REINSTEIN, L., Baltimore, MD	32
REYNOLDS, G. G., San Jose, CA	43, 72
ROBERTS, R. V., Sacramento, CA	29
ROEMER, R. B., Santa Barbara, CA	60
ROGERS, J. E., Jr., LaHabra, CA	71
ROHRER, K., Columbia, OH	68
ROSEN, J. S., Chicago, IL	24, 83
ROSENTHAL, D., Philadelphia, PA	17
ROTHBERG, J. S., Garden City, NY	72
RUFF, G. L., Ann Arbor, MI	24
RUSKIN, A. P., Brooklyn, NY	52
SAHGAL, V., Chicago, IL	21, 72
SAKALAS, R., Chicago, IL	34
SALAZAR, M., Downey, CA	69
SALHOOT, J. T., Houston, TX	18, 30
SATUREN, P., New York, NY	46
SAWTELL, R. R., Rochester, MN	54
SCHUMACHER, M., Downey, CA	64
SELL, H., New York, NY	61
SELVESTER, R., Downey, CA	64
SHAPIRO, B. A., Chicago, IL	38
SHARKEY, P. C., Houston, TX	56
SHERIDAN, J., Irvine, CA	41
SHIPLEY, L., Philadelphia, PA	75
SIMMONS, E. F., West Haven, CT	59
SMITH, J. F., Washington, D. C.	28
SOKOLOW, J., New York, NY	26
SORRELL, D., New York, NY	43
SOUTHWICK, W. O., West Haven, CT	58
SPARKS, R. W., Houston, TX	18
SPERGEL, P., Philadelphia, PA	17, 63
STAAS, W. A., Philadelphia, PA	44
STANTON, J. H., Downey, CA	40
STEINBARTH, J., San Diego, CA	73
STERLING, H. M., Davis, CA	27
STEVE, L., Bronx, NY	77
STOCK, D. D., Houston, TX	18, 32
STOFF, M. D., New Orleans, LA	77
STOLOV, W. C., Seattle, WA	78
STONEBRIDGE, J. B., Seattle, WA	58
STRAX, T. E., Philadelphia, PA	33
SULLIVAN, R. A., West Orange, NJ	57
SUSSET, V., Sherbrooke, Quebec, Canada	81
SZYMKE, T. E., Minneapolis, MN	25

TAFT, G., Chicago, IL	47
TALBERT, D., Columbus, OH	68
TAYLOR, R. G., Davis, CA	27
THOMAS, J. P., Washington, D. C.	72
THOMPSON, S. N., Decatur, GA	47, 59
TOBIS, J. S., Irvine, CA	41, 42
TODD, H. C., Atlanta, GA	73
TOERGE, J., Chicago, IL	23
TONKOVICH, J. D., Knoxville, TN	23
TORTOSA, F., New York, NY	43
TRIESCHMANN, R. B., Marina del Rey, CA	36
TRONTELJ, J. V., Ljubljana, Yugoslavia	56
VICICH, J., Chicago, IL	25
VOBECKY, J., Sherbrooke, Quebec, Canada	81
VOSTINAK, E. J., Chicago, IL	38
WAPENSKI, J., Columbus, OH	59
WARREN, C. G., Seattle, WA	39, 62
WAYLONIS, G. W., Columbus, OH	59
WEIR, J., Ann Arbor, MI	70
WEIR, R., Ann Arbor, MI	70
WEISS, R. E., Rochester, NY	20
WEISSMAN, F., Bronx, NY	19
WENDLAND, C. J., Los Angeles, CA	15
WENDLAND, L. V., Downey, CA	30
WICKS, J. R., Hamilton, Ontario, Canada	26
WILKE, H. H., White Plains, NY	53
WILLIAMS, D. E., San Diego, CA	73
WILLIAMS, J., Chicago, IL	34
WINOGRAD, M., San Diego, CA	22, 37
WRIGHT, S. J., New York, NY	74
WU, Y. C., Chicago, IL	16
WUNDER, K. E., East Meadow, NY	45
YUE, S. J., New York, NY	55, 56, 70
YUDOWITZ, B., Woburn, MA	54
ZAHN, M., San Jose, CA	43, 60
ZIEGLER, G., Pittsburgh, PA	45
ZIMMERMAN, M. E., New York, NY	60