

I - GULF WAR ILLNESS - RESEARCH

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Health Consequences of
Service During the Persian Gulf
War; Initial Findings and
Recommendations for Immediate
Action, 1995 [Report]

[104 Pages]

INSTITUTE OF MEDICINE

Health Consequences of
Service During the
Persian Gulf War:

Initial Findings and
Recommendations for
Immediate Action

1995



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Study Points Away From Single Cause of Gulf War Illnesses

WASHINGTON (AP) A study of more than 1,000 ailing Persian Gulf War veterans points strongly away from the idea of a single cause of their illnesses, the Pentagon reported Tuesday.

Most of those examined have known ailments, leaving researchers to focus on a relatively small number still suffering from unknown causes.

"There is no magic bullet," said Dr. Stephen Joseph, the assistant defense secretary for health affairs.

"It's clear that we have not identified a single or unique cause or agent which would be responsible for a large number or significant proportion of the illnesses in our Persian Gulf veterans," Joseph said at a Pentagon news conference. In fact, Joseph said, "the broad spread of symptoms and diagnoses that we're finding points very strongly away from there being a single illness or disease."

Of the 697,000 veterans of the Persian Gulf War, 11,000 responded to a Pentagon offer to closely examine ailments that might be linked to service in the 1990-91 conflict. In addition, 34,000 have come forward to participate in a study being conducted by the Department of Veterans Affairs. Those totals indicate that about 6 percent of Gulf War veterans have come forward with an ailment they believe is linked to their service.

Of the 11,000 who came forward to participate in the Pentagon's Comprehensive Clinical Evaluation Program, 1,019 have been fully evaluated. In that group, the Pentagon found that 85 percent had ailments or diseases with known causes. These ran the gamut from circulatory and digestive problems to infections, specific injuries, psychological problems and blood disorders. About a quarter of those fully evaluated reported psychological conditions including depression, headaches, post-traumatic stress disorder and anxiety.

Further Defense Department research is focusing on the 15 percent whose ailments could not be diagnosed. These problems included headache and memory loss, fatigue, sleep disorders, and intestinal and respiratory ailments.

President Clinton plans to request \$15 million to \$20 million in his fiscal 1996 budget proposal, due to be presented to Congress next month, to investigate these undiagnosed illnesses further.

Meanwhile, the Pentagon is establishing two treatment centers, one at Walter Reed Army Medical Center in Washington, the other at the U.S. Air Force Medical Center and Brooke Army Medical Center in San Antonio, Texas, to concentrate on the undiagnosed problems.

Whether or not a single cause for Gulf War ailments is found, Joseph said, the Pentagon is committed to treating all veterans who report medical problems.

Both the Pentagon and the VA have been criticized by veterans groups for ignoring, or making light of, the health complaints of veterans.

A preliminary survey by the VA yielded similar results, with 80 percent of those examined diagnosed as either healthy or suffering from known ailments and 20 percent suffering ailments of unknown cause.

Because the veterans being examined came forward complaining of medical problems, the results of the survey can't be extended to the entire population of 697,000 Gulf War veterans, officials

cautioned.

Some of the known ailments may relate directly to service in the Persian Gulf, Joseph said. Skin disease and asthma, for example, could have been aggravated by time served in the harsh desert climate.

But the researchers, using what Joseph called a ``rather sophisticated range of investigation'' found no evidence of damage caused by any one of several causes that have been subject of speculation among veterans. These include nerve gas or some other chemical weapon, pesticide, or tainted inoculation.

In a sense, Joseph said, the 15 percent with a variety of undiagnosed problems do represent a syndrome.

``A syndrome is really a collection of symptoms. So what I've described to you in one sense is a syndrome,'' Joseph said. ``This is not the same thing as saying there is a single illness or single disease.''

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Panel Says Research Methods Unlikely to Solve Gulf Syndrome Puzzle

WASHINGTON (AP) The government must end wasteful studies in favor of more scientifically sound research if the nation is to solve the mystery of so-called Gulf War syndrome, a federal advisory group contends.

The Institute of Medicine urged the government Wednesday to abandon piecemeal research on select veterans or military units in favor of population-based studies that target specific questions.

"If this is going to refocus the scientific community, it's good news," responded Phil Budahn of the American Legion, a veterans group that has pushed for such changes.

The institute also disputed widespread allegations that soldiers were exposed to chemical warfare. The panel "could find absolutely no reliable intelligence and no medical or biological justification for any of these purported claims," its report said.

The Defense and Veterans Affairs departments said Wednesday they will follow some of the recommendations by the institute, an arm of the prestigious National Academy of Sciences that provides health policy advice.

Of the 697,000 troops who served in the 1990-91 war, about 6 percent 43,000 have reported ailments ranging from muscle pain, memory loss and birth defects to respiratory and heart problems and certain cancers.

All but about 15 percent have known illnesses that explain the symptoms. Although there is no concrete evidence of a single, disease-causing agent among the rest, the Clinton administration plans to devote up to \$20 million this year figuring out if there is one "syndrome."

Congress asked the Institute of Medicine to review the government's investigations. Only halfway through its three-year probe, the institute declared Wednesday that changes must be made now if veterans are ever to get answers.

"Based on what we now know from these efforts, all of us veterans, the public, Congress and the scientific community must adjust our expectations of what we will, and will not, find," said Dr. John Bailar III of McGill University, who led the institute's review.

Among the recommendations:

Start large-scale epidemiological studies, which use a representative population to find the causes and risk factors of disease. Include pregnancy outcomes.

End piecemeal studies that focus on certain military units or veterans in a certain state. Such studies were initially conducted in Indiana, Mississippi and North Carolina and yielded little information.

Stop ignoring two clues: lead poisoning and chemical interaction. Simulating camp conditions could answer suggestions that veterans breathed too much lead from diesel stoves that heated their tents and from burning oil wells. Also needed are carefully controlled animal studies to see if two pesticides and a pill troops took to protect against nerve gas, a medicine proven safe when taken alone, interacted dangerously.

The federal Persian Gulf Veterans Coordinating Board, made up of the departments of Defense, Veterans Affairs and Health and Human Services, must better ensure that studies are well-designed and don't duplicate each other.

Here are some articles
re "President Clinton's
Advisory Committee on
Human Radiation."

The clear impression
is that the Committee
is doing its good
work for the President.

— Dean

THE NEW YORK TIMES, Thursday, January 19, 1995, Page B10

Healthy People Secretly Poisoned in 40's Test

By PHILIP J. HILTS

Special to The New York Times

WASHINGTON, Jan. 18 — Some patients injected with small amounts of radioactive substances in experiments at the University of Rochester at the dawn of the atomic age were not terminally ill, according to documents unearthed by a Presidential panel.

The findings contradicted statements by the experimenters that the patients had not been expected to live very long, said the panel, the President's Advisory Committee on Human Radiation Experiments, which made the documents public today. The panel also said patients were not informed of the experiments.

In connection with the Manhattan Project to build the atomic bomb, at least 31 patients were injected with radioactive plutonium, uranium, polonium, americium or zirconium, the advisory committee determined.

Robert Loeb, public information director at Strong Memorial Hospital of the University of Rochester Medical Center, said that the experiments had indeed been conducted there but all patients and researchers involved were now dead.

The investigating committee, a panel of ethicists, historians and scientists, was appointed by President Clinton to search all Government agencies for information about experiments on humans using radiation. The action came after Congressional hearings and a disclosure in 1993 by The Albuquerque Tribune of experiments in which plutonium was injected into 18 people.

After months of searching, the committee has collected about 200 cubic feet of documents that have led to a revision of the medical and ethical history of the early atomic

era.

The latest batch of documents, obtained mostly from Yale University, the National Archives and the Department of Energy, were a surprise, said Stephen Klaidman, a committee spokesman, "because we had no idea that the subjects of these experiments were not terminally ill, not suffering from cancer, and may not even have been chronically ill." He added, "They were doing experiments of unknown risk on people who potentially had a full, long life ahead of them."

At the University of Rochester, 11 patients were injected with plutonium, 6 or more were injected with

New documents undercut doctors' statements.

uranium, and 5 were given polonium. At least nine other patients at other universities and hospitals around the country received similar single injections of radioactive substances.

Scientists did not choose terminally ill patients for the experiments at Rochester, as some of them said later, but selected relatively healthy hospital patients, including an 18-year-old boy, to be injected with plutonium, uranium and other radioactive substances, the documents show. The experiments were intended to show what type or amount of exposure would cause damage to normal people in a nuclear war.

"It is of primary importance that the subjects have relatively normal kidney and liver function, as it is

desirable to obtain a metabolic picture comparable to that of an active worker," according to the plan for plutonium injections at Rochester written in September 1945 by Dr. Wright Langham of the Los Alamos Scientific Laboratory.

"The individuals chosen as subjects were a miscellaneous group of male and female hospital patients for the most part with well-established diagnoses," said one document written in 1950 by Dr. Samuel Bassett, who carried out some injection experiments. "Patients with malignant disease were also omitted from the group on the grounds that their metabolism might be affected in an unknown manner."

At least 3 of the original 11 patients given plutonium at Rochester were still alive and 2 were being treated by doctors at Rochester in 1971, the documents showed.

But Dr. Langham, who helped write the experimental plans and oversaw them, suggested in public papers after the experiments that the patients had been terminally ill.

He wrote in a 1950 paper that most subjects were "suffering from chronic disorders such that survival for 10 years was highly improbable." In a public statement at a chemical conference in 1956, he said the patients were "hopelessly sick."

The patients in the experiments, carried out from 1945 to 1947, were never told they were being experimented on, according to reports Dr. Patricia Durbin wrote for the Atomic Energy Commission in 1971 after interviewing Dr. Langham and others who conducted the experiment.

Dr. Bassett put the radioactive materials in syringes without telling doctors making the injections that they were injecting radioactive materials.

EDITORIALS

Radiation Investigation Serves Past and Future

DOCUMENT BY DOCUMENT, individual story by individual story, the White House Advisory Committee on Radiation Experiments is bringing to light the extent of government-sanctioned radiation and nuclear tests between 1944 and 1974.

Just last week, the committee uncovered reports detailing a 1950s international cam-

"We want to be able to say, 'You don't have to worry about surreptitious experiments'."

paigned of deception aimed at hiding the fact that the U.S. government gathered human remains and other data to measure fallout from U.S. atomic weapons tests.

In its 10 months of existence, through hearings and reviews of hundreds of thou-

sands of documents — many of them previously classified — the presidential panel has compiled examples of questionable radiation experiments on humans, both with and without their consent.

A middle-aged woman testified about being pulled out of her second-grade class in Richland, Wash. — where her father worked at the country's main plutonium site — to be given unidentified liquids to drink. She was required to make follow-up doctor visits for the next six years. Service personnel told of seeing the shadow of their bones when they were exposed to Cold War atomic-bomb tests. Former inmates recounted 1960s experiments in which their testicles were deliberately exposed to strong doses of radiation.

The 13-member committee — made up of experts in bioethics, radiation oncology

and biology, history of science and medicine, epidemiology, nuclear medicine and law — is drafting a report, due in May, with an eye toward determining possible compensation, medical follow-up or remedies to people who were victims of past government radiation experiments.

But equally important, the scientists are focusing on the future. Included in the panel's report will be recommendations for an ethics policy for current and future government research experiments based on lessons learned from the Cold War tests as well as from studies of current radiation-related experiments.

"We want the area of radiation therapy to advance," said Dr. Ruth Faden, committee chairwoman and a bioethicist at Johns Hopkins University. "We want to be able to say to the American public, 'When you go into a hospital, you don't have to worry about surreptitious experiments being done.'"

The questions for which the panel sought answers on U.S. action in the three decades following the dawn of the Atomic Age — What ethics criteria were used to evaluate human radiation experiments? What codes of conduct, if any, existed to govern federally sponsored experiments? Who developed them? How were they put into effect? — still apply today, despite more rigorous standards.

Right now, experiments are being conducted that may one day spell the end of certain kinds of cancer or cure other diseases. Both science and humanity will be served if those who take part in such experiments enjoy the peace of mind that comes with the knowledge that they are part of a scientific test being performed in an atmosphere of the highest ethical standards. The committee could make a significant contribution toward that goal.

Inquiry Links Test Secrecy To a Cover-up

A Fear of Publicity Is Seen as a Motive

By PHILIP J. HILTS
Special to The New York Times

WASHINGTON, Dec. 14 — Military and nuclear energy officials were motivated by fear of lawsuits and unfavorable publicity in their decision to keep secret many experiments using radiation on humans, Federal investigators have found.

The President's Advisory Committee on Human Radiation Experiments, the panel charged with unearthing the history of all government-sponsored experiments in which radiation was used on humans, has found new documents showing that as early as 1947 public relations and legal considerations, not security concerns, were principal motives in the decision of Federal officials to cover up radiation experiments.

In the past six months, the panel has searched out and logged hundreds of thousands of papers on experiments with humans, beginning in 1945 at the dawn of the atomic age.

Until the panel began its work, the experiments were thought to have been scattered incidents, but the documents show that they were part of a plan that was debated and approved at high levels. It was also previously thought that there were only a handful of such experiments, but the panel has found hundreds, from the deliberate release of radiation into the air to the injection of people with radioactive plutonium.

The most recent documents unearthed at the Oak Ridge National Laboratory in Tennessee show that officials of the military and the Atomic Energy Commission at first sought to declassify reports of experiments on humans, in accordance with public statements that scientific reports should not be secret.

For example, Dr. Alan Gregg, the chairman of one of the committees that oversaw the human experiments, wrote in May 1947: "A policy of secrecy in science is neither personally courageous nor politically wise. As Lord Acton said, 'Power corrupts, and absolute power corrupts absolutely.'"

But at the same time, C. L. Marshall, a declassification officer with the Atomic Energy Commission, wrote in February 1947 that a scientific paper outlining experiments in which two people were injected with plutonium should not be declassified.

"This document appears to be most dangerous since it describes experiments performed on human subjects, including the actual injection of the metal, plutonium, into the body," he wrote.

He noted that there was no statement in the paper about whether the patients experimented on had given their consent, and concluded: "The experimenters and the employing agencies, including the U.S., have been laid open to a devastating lawsuit, which would, through its attendant publicity, have far-reaching results."

It has long been suspected that legal and public relations concerns helped drive the ethical debate over the experiments on humans, and the advisory committee in recent weeks has found many memorandums substantiating that.

On Oct. 8, 1947, J. C. Franklin, the manager of operations of Oak Ridge, wrote to Carroll L. Wilson, general manager of the atomic agency, "There are a large number of papers which do not violate security but do cause considerable concern to the Atomic Energy Commission insurance branch, and may well compromise the public prestige and best interests of the commission."

He added: "Papers referring to levels of soil and water contamination surrounding Atomic Energy Commission installations, idle speculation on the future genetic effects of radiation and papers dealing with potential process hazards to employees are definitely prejudicial to the best interests of the Government. Every such release is reflected in an increase in insurance claims, increased difficulty in labor relations and adverse public sentiment."

He ordered that any such documents be edited or kept secret.

The advisory committee investigators said that documents so far found that an official as highly placed as Dr. Shields Warren, head of the medical division in Washington, had classified human experiments because of public relations or legal implications.

The investigators said the classification on that basis may have been illegal, but have not yet determined which laws would have governed the classifications carried out in the 1940's.

The advisory committee staff also found documents in which military officials at the Oak Ridge laboratory discussed what to do about workers at the Tennessee-Eastman factory who were experiencing kidney disease and tuberculosis at a higher-than-usual rate.

A memorandum from an engineering officer on July 25, 1945, noted that a kidney disease victim "is unaware of her condition, which now shows up on routine physical check and urinalysis."

New York
Times

Thurs. Dec.
15, 1994
A26

Nightmares of the atomic age

Residents tell White House panel of experiments that they believe led to disease, death

By Karen Dorn Steele
Staff writer

They called themselves casualties of the Cold War.

They traveled miles of icy highways to tell their stories of pain and poor health to a White House panel investigating human radiation experiments in the dawn of the atomic age.

Dozens of angry people spoke to

four doctors and professors from the Advisory Committee on Human Radiation Experiments meeting in Spokane on Monday.

U.S. Department of Energy officials admitted in 1990 that Hanford's radiation releases during the Cold War were large enough to cause increased health risks. The link between Hanford and disease is still being studied.

Inside

Prisoners seek compensation.
/A6

Mesa farmer Tom Bailie spoke of the "death mile," a stretch of rural homesteads in the shadow of Hanford where every one of his neighbors has cancer or thyroid disease.

Brenda Weaver of Spokane, who lived in the "death mile" as a child, talked of deformed sheep at her family's farm and men from Hanford who combed the fields with Geiger counters. She spoke of her daughter, Jamie, who was born in 1965 with no eyes.

Gertie Hansen of Coeur d'Alene told of the thyroid illness that struck

Continued: Experiments/A10



Christopher Anderson/The Spokesman-Review

■ **Harold Bibeau describes radiation experiments performed on him.**

Experiments: Stories told about radiation effects

Continued from A1

half the girls in her high school class, and the death of her husband from cancer at age 36.

Trisha Pritikin of Berkeley, Calif., recalled her childhood in the Tri-Cities, and the thyroid disease and chronic fatigue she copes with as an adult.

"I'm the daughter of a Hanford worker. There was no way I could have given informed consent" to radiation emissions from Hanford, Pritikin said.

Kay Sutherland of Walla Walla mourned two infants who lived only hours. She spoke quietly of the four other miscarriages she suffered while Hanford's plutonium factories spewed radiation into the air and the Columbia River.

"We were used for experiments without our knowledge or consent," Sutherland said.

Harold Bibeau, a former prisoner in Oregon, recalled the pain and worry he felt after his testicles were bombarded with X-rays in a government-funded experiment when he was 23.

The Atomic Energy Commission had planned to track the prisoners to make sure they didn't develop health problems, but the plans were dropped.

"They cut us off with nothing to show for our efforts except \$100 and a lot of pain," Bibeau told the radiation panel.

Leonard Schroeter, a Seattle attorney who covered as a military reporter the Nuremberg war crimes trials in the '40s, said the U.S. government's human radiation experiments were as evil as Nazi atrocities.

"Criminal statutes were violated by researchers and physicians. Your job is not only to call attention to that, but to suggest appropriate responses," Schroeter told the panel.

It will be important for the White House to admit criminal acts were committed and to provide victims with compensation, Schroeter said.



Christopher Anderson/The Spokesman-Review

■ Gerlie Hansen of Coeur d'Alene testifies Monday on radiation exposure.

Schroeter said he isn't saying individuals should be prosecuted, but the government should acknowledge that the researchers conducting human experiments were acting as agents of official policy.

Committee members told their audience that they were there mostly to listen.

They probed gently for documentation that could back up the stories. They praised nervous people for coming forward.

"We are very sensitive to the hurt and pain of many people," said Dr. Reed Tuckson, president of Charles Drew University of Medicine in Los Angeles.

"What we hear the most in these hearings is a loss of trust" in the government, he said.

Panelists offered some comments on the direction of their work, which is about half finished.

The committee plans to push for complete declassifica-

tion of all documents related to the Green Run, the 1949 military experiment at Hanford that released a huge cloud of radiation over Eastern Washington with no public warning.

Allen Conklin, Washington state's top radiation protection official, said he has a security clearance and has read the classified versions of the Green Run report.

"Are there compelling national security reasons to keep this secret?" asked Duncan Thomas, a University of Southern California medical school professor.

"In my opinion, no," Conklin replied.

The 14-member advisory committee group was appointed by President Clinton this year to investigate radiation experiments and deliberate radiation releases during the Cold War.

The committee will write a final report next year on the ethical implications of the research.

Radiation: Thousands may be victims

CONTINUED FROM PAGE A1

die. And their family loses everything."

He was diagnosed in 1990 with multiple myeloma, a type of blood and bone cancer that can be caused by excessive exposure to X rays.

Richard Casey of Fort Thomas, who retired from the Air Force in 1978, said he suffers health problems because he took part in cleanup of the Marshall Islands in the South Pacific.

At Piketon, home of the Portsmouth Gaseous Diffusion Plant, former workers and neighbors of the facility about 80 miles east of Cincinnati talked of releases of radioactive gases, storage of highly radioactive mixed wastes on site and accidents involving workers.

"I got so contaminated that I spent four days in the showers ... scrubbing me down with borax and I turned lobster red," said Owen Thompson, who lives near Piketon.

For 14 years the Rarden resident worked in the special team that handled problems at the facility that now enriches uranium for nuclear-power plants. Since 1986, he has had two malignant brain tumors. He developed a tumor on each knee, he said, from crawling through radioactive spaces to check on malfunctioning valves.

"I'm just a dumb hillbilly, big and strong. That's what they were looking for," he said. "I would do anything they told me."

That's what the government was counting on, said Gene Hincham, vice president of the Fernald Atomic Trades and Labor Council Workers at Fernald, a former uranium-processing plant 18 miles northwest of Cincinnati, who died had their bodies taken to the U.S. Transuranium and Uranium Registries in Richland, Wash.

Tissue samples were examined, but results weren't released, he said. And families who had hoped to give their relatives a decent burial were left without a body or an explanation.

"The Department of Energy did all this without the informed consent of workers and any surviving spouses," he said. "And it's still going on today."

At Miamisburg, 45 miles north of Cincinnati, Branham told of thorium, plutonium, tritium and bromine contamination of at least one Mound worker who died in 1967. He and other union leaders kept the body of 45-year-old B.J. Carpenter of Carlisle away from the government. At Carpenter's request, they had his body autopsied, looking specifically for radiation problems. The autopsy was performed in Canada.

Fernald officials knew radiation contamination was in Lisa Crawford's drinking water for four years before they told her family, said Crawford of Crostin Township, president of Fernald Residents for Environmental Safety and Health. Her family's well is now shut down.

In Cincinnati, at what used to be General Hospital, indigent cancer patients were receiving high doses of radiation — all without informed consent — 11 relatives told the panel in emotional testimony.

"My mother had a very distinctive handwriting," said Herb Vario of Price Hill, whose mother, Kimo Cline, was patient No. 075 in tests from 1960 to 1971 at what is now University Hospital. "I could show you a consent form (that I've found in her medical records). I've looked at it, and she didn't sign it."

Faden said that despite progress in unearthing documentation on the clandestine tests, the committee faces "significant roadblocks" in gaining access to secret documents at the U.S. departments of Energy and Defense.

Gannett News Service contributed to this report.

Study of radiation experiments continues

Investigator hears area families' stories

By CORYDON IRELAND
STAFF WRITER

Stories the medical records can't tell — that's what federal radiation investigator Patricia J. Perentesis was after in Mendon yesterday.

She spent the day at a private house in this rural suburb interviewing members of six Rochester-area families whose mothers, fathers and uncles — now all dead — were injected with plutonium during a federal Cold War radiation experiment 50 years ago.

Three months ago, the families formed the Rochester Radiation Victims Survivors Group, now part of the Task Force on Radiation and Human Rights, a national association of 24 groups representing radiation experiment victims and their surviving families.

"The biggest thing is to give the most open, complete story all the way around," said Perentesis, a consultant with President Clinton's Advisory Committee on Human Radiation Experiments.



DAN LOH staff photographer

Radiation reports Patricia Perentesis, a government investigator, speaks to Rochester Radiation Victims Survivors Group yesterday.

The committee, after a year of meetings and research, will unveil a "thick," multivolume report on April 23, she said.

"The main object is to clear out all the secrecy."

The committee's mission: to investigate Cold War radiation experiments on humans, suggest remedies for victims and recommend

ethics guidelines for future research.

Eleven patients at a Strong Memorial Hospital metabolism unit during 1945 and 1946 were unwittingly injected with plutonium, a radioactive substance used to make atomic bombs.

The experiment also involved seven other patients in three other U.S. hospitals. It was intended to

establish radiation exposure standards workers.

Yesterday's face-to-face interviews may answer questions that decades-old medical charts and laboratory results cannot, said Perentesis, a registered nurse and nuclear medicine technician. Included: what chronic physical complaints the patients may have suffered after the injections.

"The families here have been cheated, one way or another," said Milton Stadt, a retired Kodak machinist from Victor, whose mother, Janet, was injected in 1946. "Everyone here is a victim."

Children whose parents may have been sickened by the injections, he said, were deprived of economic opportunity because their parents' incomes were limited by sickness. Children were also deprived of their parents' time, energy and attention.

Perentesis said her own feelings about the experiments are "mixed."

"There was definitely information retrieved. It was beneficial to everyone," she said.

"I'm not saying it was right or wrong, but (researchers) definitely garnered information that was not wasted." □

Unexplained Illnesses Among Desert Storm Veterans

A Search for Causes, Treatment, and Cooperation

Persian Gulf Veterans Coordinating Board

Between August 1990 and March 1991, the United States deployed 697 000 troops to the Persian Gulf to liberate Kuwait from Iraqi occupation. Since the Gulf War, most veterans seeking medical care at Departments of Veterans Affairs and Defense medical facilities have had diagnosable conditions, but the symptoms of several thousand veterans have not been readily explained. The most commonly reported, unexplained complaints have been chronic fatigue, rash, headache, arthralgias/myalgias, difficulty concentrating, forgetfulness, and irritability. These symptoms have not been localized to any one organ system, and there has been no consistent physical sign or laboratory abnormality that indicates a single specific disease. Because of the unexplained illnesses being experienced by some Gulf War troops, a comprehensive clinical and research effort has been organized by the Departments of Veterans Affairs, Defense, and Health and Human Services to provide care for veterans and to evaluate their medical problems. To determine the causes and most effective treatments of illnesses among Gulf War veterans, a thorough understanding of all potential health risks associated with service in the Persian Gulf is necessary. These risks are reviewed in this article and include possible reactions to prophylactic drugs and vaccines, infectious diseases, and exposures to chemicals, radiation, and smoke from oil fires.

(*Arch Intern Med.* 1995;155:262-268)

Iraq invaded Kuwait on August 2, 1990. In support of United Nations Resolution 660, the United States immediately responded by sending troops to the Persian Gulf in Operation Desert Shield. More than 5 months later, on January 16, 1991, Operation Desert Storm began with an air war against Iraq that was followed by a 4-day ground war 39 days later. By the time hostilities ended, the United States had 697 000 troops in the Persian Gulf. In contrast to previous US conflicts, a larger proportion of participants were women (7% of the force) and Reserve/National Guard personnel (17% of the force).

Medical preparations during Opera-

tion Desert Shield were extensive,¹ but fortunately combat casualties were far fewer than anticipated. Furthermore, the incidence of nonbattle injuries and diseases was very low in comparison with other military campaigns because of preventive medicine efforts, minimal contact with local populations, and almost no access to alcohol.²

Since the war, most Gulf War veterans seeking medical care from the Departments of Veterans Affairs (VA) and Defense (DOD) medical facilities have had diagnosable illnesses expected in such a large cohort of adults. Also, as of September 1993, there has been no evident increase in the number of reported deaths among Gulf War veterans: approximately 2000 veterans have died since the war, whereas more than 3000 deaths would be expected in an age- and gender-matched US civilian population not medically screened for military service (Envi-

From the Walter Reed Army Medical Center, Washington, DC (Dr Blanch); US Army Research Institute of Environmental Medicine, Natick, Mass (Dr Hiatt); US Naval Medical Research Institute (Dr Hyams); and Department of Veterans Affairs (Drs Kang, Mather, and Murphy), Washington, DC; Veterans Affairs Medical Center, Birmingham, Ala (Dr Roswell); and Centers for Disease Control and Prevention, Atlanta, Ga (Dr Thacker).

Table 1. The 10 Most Frequent Complaints Among 17 248 Ill or Concerned Veterans in the Veterans Affairs Persian Gulf Health Registry, June 1994

Complaint	Percent With Complaint*
Fatigue	17.4
Rash	16.8
Headache	14.1
Muscle and/or joint pain	13.9
Neuropsychologic complaints†	10.5
Shortness of breath	7.5
Sleep disturbances	4.9
Diarrhea and other gastrointestinal complaints	4.1
Cough	3.8
Choking sensation, sneezing, mouth breathing	3.3

*Because the current Veterans Affairs registry database records and analyzes the three most debilitating complaints of each veteran, a veteran with two or three of the 10 most common complaints was counted in more than one complaint category in this table. For veterans with more than three complaints, additional complaints are not analyzed at present. Also, 16% of registry veterans have no current medical complaints.

†Difficulty concentrating, forgetfulness, irritability, and depression.

ronmental Epidemiology Service, Department of Veterans Affairs, Washington, DC).

UNEXPLAINED ILLNESSES

Despite the apparent overall good health of Desert Storm troops, the symptoms of some veterans from diverse military units have not been readily explained. Of 17 248 ill or concerned veterans who have enrolled and been evaluated in the VA Persian Gulf Health Registry, approximately 3000 patients have had unexplained illnesses as of June 1994. In addition, several hundred Gulf War veterans still on active duty currently have been found to have unexplained illnesses in the DOD Persian Gulf Health Surveillance System.

Predominantly, these veterans have complained of the new onset of persistent fatigue and a wide variety of generalized physical and neuropsychologic complaints. Among 17 248 evaluated veterans in the VA registry, the most common complaints have been fatigue, rash, headache, and arthralgias/myalgias

Table 2. Components of the Uniform Case-Assessment Protocol Developed by the Departments of Veterans Affairs and Defense for the Clinical Evaluation of Veterans With Illnesses Possibly Related to Persian Gulf Service

Initial screening registry examination
Medical history, including completion of Gulf War risk factor questionnaire
Physical examination
Laboratory tests, including: complete blood cell count with differential cell count; serum glucose, electrolytes, and creatinine; serum urea nitrogen; liver enzymes; urinalysis; and chest roentgenogram
Referral center evaluation of patients with unexplained illnesses after initial screening examination
Laboratory tests, including: sedimentation rate; C-reactive protein; rheumatoid factor; antinuclear antibody; serum protein electrophoresis; creatine kinase; thyroid function tests; vitamin B ₁₂ and folate level; serologic testing for hepatitis B, brucellosis, Q fever, Lyme disease, syphilis, and human immunodeficiency virus infection (with patient's consent); stool examination for ova and parasites; and tuberculosis skin test
Specialty consultations from a neurologist, infectious diseases subspecialist, dentist, and psychiatrist and/or psychologist
Additional consultations, tests, and procedures as clinically indicated

(Table 1). Among 79 Indiana reservists evaluated by the US Army in April 1992, the most common complaints were fatigue, sleep disturbance, and forgetfulness³; and, in another group of 166 veterans, the most common complaints were joint pain, rash, and shortness of breath or chest pain.⁴ These symptoms, which result in varying degrees of incapacitation, have not been localized to any one organ system, and there has been no consistent physical sign or laboratory abnormality that would indicate a single specific disease. Although complaints of rash and feverishness are common, a characteristic rash or unexplained fever has not been documented among VA registry patients or other populations of veterans.³

Among veterans with unexplained illnesses seeking care in the VA and DOD medical facilities, no distinctive demographic, exposure, or geographic risk factor currently has been identified, except that nearly half of these veterans have been reservists/National Guard personnel, a population that represented 17% of troops deployed to the Persian Gulf.

Similar unexplained medical problems have not been reported to date among local inhabitants of Saudi Arabia and Kuwait or among more than 100 000 non-US coalition forces (Saudi, French, Egyptian, Syrian, and Moroccan troops).⁵ The British Ministry of Defense is evaluating 33 veterans predominantly complaining of fatigue, weakness, muscle and/or joint pain, head-

ache, and other nonspecific complaints but have found no increase in the incidence of these diverse symptoms among British Gulf War veterans.⁶

Only preliminary investigations of veterans with unexplained illnesses have been conducted. Clinical evaluation at three VA referral centers of 100 veterans with symptoms not readily explained after initial screening and registry examination has resulted in a diagnosis in a majority of patients (Table 2). The diagnoses were diverse and included asthma, inflammatory bowel diseases, and various rheumatologic, neurologic, and psychiatric conditions, including posttraumatic stress disorder. In another evaluation of 42 symptomatic veterans, impairments in memory and fine motor skills were found in 24% and 48% of patients, respectively.⁴

Recently, there have been reports of similar unexplained symptoms among some spouses of veterans and isolated reports of increased health problems among infants born to Gulf War veterans. In response to reports of excessive rates of birth defects among children of veterans belonging to two units of the Mississippi National Guard, the VA medical center in Jackson, Miss, conducted a collaborative investigation with the Mississippi State Department of Health and the Centers for Disease Control and Prevention, Atlanta, Ga. Contact was made with 90% of service personnel from the two units, and medical records

from 54 of 55 children conceived and born after the war to 52 predominantly male Persian Gulf veterans were evaluated. Three cases of major birth defects and two cases of minor birth defects were identified. The total number of birth defects in this group was not greater than expected based on general population estimates⁷; however, too few subjects were involved to evaluate individual types of birth defects (Alan D. Penman, MD, Mississippi State Department of Health, personal communication, 1994).

UNIQUE HEALTH RISKS

There are numerous possible explanations that could account for the unexplained illnesses that US Desert Storm veterans are experiencing. A thorough understanding of the living and working environment of the US troops and the unique health threats they faced is necessary to determine the causes of these illnesses. The following factors need to be considered when evaluating the health problems of Gulf War veterans.

Living Conditions

The US troops entered an extremely hot and bleak desert environment where they initially were not superior to those of the Iraqi army. No one knew at the beginning of Operation Desert Shield that coalition forces eventually would win a quick and decisive war. Consequently, a large proportion of our troops did not fight a "4-day war" but spent months isolated in the desert, under constant stress and uncertain when they would return home.

Because of the massive logistic problems involved in deploying and supporting troops more than 7000 miles from the United States, our troops had few amenities and lived under arduous and austere conditions. The weather, which initially was extremely hot and humid, changed to cold and damp conditions by the time the war began. Troops were crowded into warehouses, makeshift buildings, and tents where they had little personal privacy. The diet most often con-

sisted of prepackaged meals. Sanitary needs were provided by wooden latrines and communal washing facilities. Desert filth flies were a constant annoyance.

Despite these hardships, when hostilities finally began, US troops were fully prepared and anxious to win the war and return home. Levels of apprehension and stress, which were high during Operation Desert Shield, actually decreased after the war started.⁸

Chemical and Biological Warfare Threat

The possibility that Iraq would use chemical warfare (CW) and biological warfare (BW) was a major concern for all coalition forces. Although extensive preparations were made for this threat, including thorough training of medical personnel, both the DOD and a Defense Science Board Task Force on Gulf War Health Effects have concluded that the Iraqis did not use chemical or biological weapons against coalition forces and that there was no exposure of US troops to CW/BW agents in Kuwait and Saudi Arabia.⁹ This conclusion is based on several factors: an extensive US CW detection capability failed to verify the presence of chemical warfare agents during Operation Desert Storm; no casualties characteristic of chemical or biological exposure were reported by military medical facilities during the war; no chemical or biological weapons were found on the battlefield; and, no intention to use CW/BW agents was uncovered from interrogation of Iraqi prisoners of war.

There were, though, several credible CW agent detections by Czechoslovakian chemical defense teams attached to the Saudi Arabian military that could not be verified by US forces during the war.⁹ Czech detections reportedly were of extremely low, nonincapacitating levels of CW agents that did not persist for more than a few hours. These detections occurred in areas where there was no known military action or incoming Scud missiles and where few US troops were located.

The possibility has been raised that Czech detections resulted from

CW agents released from Iraqi production and storage facilities bombed by coalition forces.¹⁰ The DOD has discounted this possibility because if CW or BW agents, which are highly lethal in low concentrations, had been dispersed from hundreds of miles inside Iraq where storage facilities were located, massive fatalities would have resulted among the Iraqis residing near these facilities where levels of CW/BW agents would have been extremely high. However, there is no indication such an event occurred from aerial photographs and intelligence reports.⁹

No study directly evaluating possible exposure of the Iraqi population and troops to CW/BW agents during the Gulf War has been reported, although health surveys of Iraqi children since the war found increased mortality from diarrhea and injuries, particularly in Northern Iraq.¹¹ A pilot clinical program to evaluate the US Gulf War veterans for possible chronic neurocognitive toxicity secondary to nerve agent exposure has been initiated by the Birmingham VA Medical Center; however, definitive scientific investigation of possible CW exposure will be difficult because there is no specific marker of remote contact with CW agents.

Some of the confusion over the possibility that Iraq used CW agents arises from the nature of the detection equipment. Tens of thousands of automatic chemical agent sensors were arrayed across the battlefield and in operation during the Gulf War. These sensors are designed to be extremely sensitive to provide early warning; as a result, specificity suffers and a high rate of false-positive alarms occurs. Numerous substances, other than CW agents, can activate automatic detectors, including some organic solvents, vehicle exhaust fumes, and insecticides. Consequently, CW alarms frequently sounded during the air and ground war, which necessitated the precautionary donning of masks and other protective equipment.

Standard operating procedure calls for each sensor alarm event to be evaluated using more specific test equipment to verify the presence or

absence of harmful levels of chemical agents. Follow-up analysis by the DOD of thousands of alarm events failed to confirm that CW agents were used against coalition troops.⁹ Nevertheless, because of the frequent alarms, use of confining protective gear, and rumors of other units being hit by CW agents, troops were understandably concerned that they had been exposed to CW agents.

Adding to the impression of a CW/BW attack was the presence of dead sheep, goats, and camels on the battlefield. The US troops are taught that unexplained events, like dead animals, may be an indication of chemical or biological attack. Dead animals, which were in various stages of decay and desiccation, were found throughout the desert from the beginning of Operation Desert Shield, more than 5 months before the war began.¹² According to Saudi Arabian officials, leaving dead animals in piles is a common practice by nomadic herders, and investigations by the US Veterinarian Corps Officers failed to detect unusual diseases (R.R.B.).

Nerve Agent Prophylaxis and Immunizations

At the beginning of the war, all US and British troops were provided with an individual package containing 21 30-mg tablets of pyridostigmine bromide, a cholinesterase inhibitor, to help prevent the lethal effects of CW nerve agents.¹³ On direction by commanders when the risk of chemical attack was judged to be significant, troops were instructed to self-administer one pyridostigmine tablet every 8 hours.

Pyridostigmine is a drug approved by the Food and Drug Administration (Washington, DC), which has been used since the 1950s in anesthesia and for the treatment of myasthenia gravis without any known long-term effects. Because much higher doses are employed to treat patients with myasthenia than are used for CW prophylaxis, no chronic sequelae were anticipated among Gulf War troops. In addition, numerous studies of this drug in low doses have not revealed any serious side effects.^{14,15} Despite these

indications of safety, pyridostigmine has been considered a potential cause of unexplained illnesses because it often produced mild acute gastrointestinal and urinary disturbances among Desert Storm troops¹⁶ and because the effects of pyridostigmine, which is classified by the Food and Drug Administration as investigational for CW prophylaxis,¹⁷ have not been evaluated previously in such large numbers of deployed military troops.¹⁰

Two nonlive vaccines, botulinum toxoid and anthrax, also have been postulated to be causes of unexplained illnesses. The botulinum vaccine is an unlikely factor because it was given to only 8000 troops, and these troops, which are being closely followed up, have not reported problems with unexplained illnesses. The Food and Drug Administration-approved anthrax vaccine was given to a much larger number of troops, approximately 150 000, but to date no association has been found between this vaccine and unexplained illnesses. Anthrax vaccines have been used for several decades in high-risk populations without any major adverse effects.^{18,19}

The possibility that chronic fatigue and debility could result from the combination of vaccinations that Gulf troops were given over a short period of time, rather than any single vaccine, has been suggested. However, long-term effects have not been observed among multiply immunized foreign travelers, US military recruits who routinely receive eight or more vaccinations during induction, and laboratory workers who have received multiple vaccinations, including botulinum toxoid and anthrax vaccines.¹⁹

Infectious Diseases

The US troops were exposed to a number of infectious diseases, including respiratory and diarrheal infections commonly found among deployed troops and some tropical diseases rarely seen in the United States.^{20,21} The most notable of these infectious diseases is leishmaniasis because it is a cause of chronic disease and because leishmania parasites potentially can be transmitted

by blood transfusion. A total of 12 cases of viscerotropic and 19 cases of cutaneous leishmaniasis have been diagnosed among US troops. When leishmania infection was first detected among Gulf War troops, a temporary ban on donating blood by these veterans was instituted. Because of the small number of diagnosed leishmaniasis cases and the low parasite burden of viscerotropic disease, this ban was lifted on January 1, 1993, and there have been no reports of leishmania transmission from blood subsequently donated by Desert Storm veterans.

Unlike Gulf War veterans with unexplained illnesses, most troops with documented leishmaniasis have had characteristic, objective signs of disease, including elevated temperature, lymphadenopathy, and hepatosplenomegaly.²² Because leishmania infection has been found in only one veteran without these readily apparent signs of infection, leishmaniasis is not believed to be a major cause of unexplained illnesses. Nevertheless, it has not been possible to determine the exact risk of infection because a sensitive and specific serologic or skin test has not been developed that can screen exposed populations. Each individual case currently has to be diagnosed by identifying the leishmania parasite in a bone marrow or lymph node biopsy specimen, and drug therapy is reserved for seriously ill patients due to the high toxicity of treatment.

Q fever and brucellosis are two other infectious diseases found in the Middle East that can cause chronic disease. *Coxiella burnetii* was diagnosed as the cause of meningoencephalitis in one Gulf War veteran,²³ but brucella infection has not been found by clinical and serologic evaluation of veterans with chronic illnesses.³ Although these two infectious agents can cause chronic disease, Gulf War veterans with unexplained illnesses have not had recurrent fever or the serious complications associated with these infections, including pneumonia, hepatitis, osteomyelitis, and meningitis.

Arthropod-borne viral diseases found in the Persian Gulf—sandfly fever, West Nile fever,

Table 3. Major Pesticides Used by US Forces During Operations Desert Shield and Storm*

Allethrin/resmethrin
Amidinohydrazone
Azamethiphos
Bendiocarb
Brodifacoum
Bromadiolone
Chlorphacinone
Chlorpyrifos
Cypermethrin
<i>N, N</i> -diethyl- <i>m</i> -toluamide (DEET)
Diazinon
Dichlorvos
Malathion
Methomyl
Permethrin
<i>o</i> -Phenothrin
Prothoxur
Pyrethrin

*Information obtained from the Armed Forces Pest Management Board, Walter Reed Army Medical Center, Washington, DC.

Crimean-Congo hemorrhagic fever, and dengue—are not known to cause chronic infection and disease. There has been one report of increased antibody titers to Epstein-Barr virus among Gulf troops,⁴ but titers to cytomegalovirus and other viral infections also were elevated, similar to the polyclonal increase in antibody titers found in patients with chronic fatigue syndrome.²⁴ The possibility that a previously unrecognized, emerging infectious disease could be responsible for illness among some Gulf War veterans is a consideration, but Gulf War veterans evaluated to date have had no consistent physical or laboratory abnormality that would indicate a unique infectious process.

Because of reports that family members have contracted unexplained illnesses from Gulf War veterans, it is important to note that potential infectious disease threats and likely infectious BW agents (*Bacillus anthracis*, *Yersinia pestis*) are rarely, if ever, transmitted by casual personal contact or sexual contact.^{25,26}

Environmental Hazards

Desert Storm troops were exposed to several potentially harmful environmental hazards in the Persian Gulf, the most spectacular of which

was smoke from 605 oil well fires started by the retreating Iraqi army. A concerted effort was made by the DOD, US Environmental Protection Agency, the Department of Health and Human Services, and the National Oceanic and Atmospheric Administration to evaluate the health effects from these fires. Based on data collected from May through December 1991, the carcinogenic and non-carcinogenic health risks from exposure to oil fire smoke were determined to be minimal due to lofting of the smoke above ground level and nearly complete combustion of most chemical substances.^{27,28} In addition, assays of metals and volatile organic compounds (including benzene) among troops indicated extremely low-level exposure to harmful substances.²⁷ It also is notable that there has been no indication of unexplained illnesses among the US civilian firefighters who were highly exposed to combusted and noncombusted products of damaged oil wells.²⁹

In addition to smoke, US troops were exposed to low levels of several pesticides, and possible health effects from such exposure are being investigated. The vast majority of pesticides employed in the Gulf were products that have been registered by the Environmental Protection Agency and have been used without ill effects on numerous prior exercises of US troops in areas like Egypt and Southeast Asia (Table 3). Also, these pesticides are routinely used in the commercial market and by the DOD in the United States. Pet flea collars, which contain organophosphates and carbamates, were used inappropriately by a small number of troops before being prohibited but have not been associated with unexplained illnesses. Herbicides were not used by US forces in this desert environment.

No cases of acute pesticide poisoning are known to have occurred during Operations Desert Shield/Storm. The possibility that pesticides could have increased the acute toxic effects of pyridostigmine is being investigated, but chronic effects are considered unlikely.³⁰ To further assess the possibility of synergistic effects among various substances that the Gulf War troops may

have been exposed to, the VA and US Army are conducting studies of potential interactions between pyridostigmine, *N,N*-diethyl-*m*-toluamide, and permethrin.

Numerous petrochemical plants are located on the northeastern coast of Saudi Arabia where many of our troops entered the theater of operations. Most combat troops passed through these port areas rapidly, but large numbers of support personnel were permanently stationed on the coast, a large percentage of whom were reservists. It is possible that exposure to various chemicals in these areas could explain a higher risk of reported illnesses among reservists compared with active duty personnel. However, there have been no accounts of increased health problems among local workers or inhabitants of the cities around these petrochemical plants.^{3,31}

Several other factors could explain why, at least initially, reservists frequently have been identified with unexplained illnesses: reporting bias is possible because of career concerns among active duty personnel during a period of downsizing; reservists tended to be older and possibly less physically resilient compared with active duty troops; and, reserve personnel may have suffered increased stress because they had to leave civilian jobs and experienced greater disruption of their personal lives.^{9,32}

Another unique environmental hazard of this war was exposure to depleted uranium (DU) munitions that are used for their enhanced armor penetrating ability. Depleted uranium is a heavy metal that is less radioactive than natural uranium and poses a minimal health hazard when external to the body, although the impact of DU on armored targets or the involvement of DU munitions in fires can result in localized aerosolization and increased exposure. There were 35 soldiers in vehicles struck by DU during friendly fire incidents (22 who may retain DU fragments). Approximately 32 other soldiers potentially were exposed to DU while fighting a fire in a munitions storage area and from servicing vehicles hit by DU munitions; but

these troops when tested have not had elevated urine uranium levels.⁹ Troops directly exposed to DU munitions are being closely followed up by the VA and DOD and have not had problems with unexplained illnesses. Other ground-based troops are not considered by the DOD to have been exposed to excess risk because of the low levels of radiation involved with DU munitions.

Some troops may have been exposed to a number of other potential environmental hazards, including microwaves; chemical agent-resistant coating paint fumes containing isocyanate; various petroleum products like JP4 fuel used in tent heaters and on the ground to keep the sand from blowing; decontamination solution 2 that contains

numerous research studies have been initiated to evaluate physiologic and psychologic risk factors among Gulf War veterans

propylene glycol, monomethyl ether, and ethylene glycol; and, airborne allergens and irritants.³³ None of these exposures has been identified as a primary cause of unexplained illnesses, either because they involved small numbers of infrequently affected troops or because they are not known to cause the constellation of chronic multisystem complaints reported by Gulf War veterans.^{9,27,30} Nevertheless, all potential environmental exposures are being evaluated extensively to determine their effects on the health of Persian Gulf troops.

GOVERNMENTAL RESPONSE, RESEARCH, AND COOPERATION

Gulf War veterans are being afforded medical care, either at VA hospitals, where priority care is provided for health problems possibly related to exposures during Gulf War service (Public Law 103-210), or at the DOD medical care facilities. Therefore, all veterans with

health concerns or illnesses possibly related to service in the Persian Gulf should make an appointment for a medical evaluation at their nearest VA medical facility or at any DOD medical care center for Desert Storm veterans still on active duty.

In addition to medical care, VA, DOD, and the Department of Health and Human Services have mobilized a comprehensive clinical and research effort to determine the causes and most effective treatments of illnesses among US troops. In 1992, the VA established a health registry, modeled after the Agent Orange registry, of ill and concerned Gulf War veterans. This registry, which currently includes more than 34 000 veterans (17 248 available for computer analysis), has been used

extensively to assess patterns of illness and to generate hypotheses of disease causation that are being tested in directed research studies. The DOD has implemented a comparable clinical registry and is developing a complete database

of troops and their movements during Operations Desert Shield and Storm to determine any patterns of adverse environmental exposure.

The VA has established three regional referral centers at its medical centers in Houston, Tex, Los Angeles, Calif, and Washington, DC, to evaluate Persian Gulf veterans who are found to have undiagnosed or complex medical problems after initial screening registry evaluation. The DOD also has established a Comprehensive Clinical Evaluation Program, which is comparable with the VA referral center evaluation, to provide uniform and comprehensive clinical evaluation of all veterans with illnesses that may be related to Persian Gulf service (Table 2).

In conjunction with these clinical efforts, numerous research studies have been initiated to evaluate physiologic and psychologic risk factors among Gulf War veterans, and the VA has established three environmental hazard research centers. Planned studies

include the following: a random survey by the VA of 15 000 Gulf War veterans and 15 000 era veterans who did not deploy to the Persian Gulf, a cohort study by the DOD and VA of active duty military personnel, and a random survey of veterans from Iowa by the Centers for Disease Control and Prevention. Research efforts are focused on three goals: a determination of patterns of illness among Gulf troops to better define their complex of symptoms; a determination of risk factors and likely causes of disease; and, a comparison of the incidence of all diseases, including birth outcomes, between Gulf War veterans and military personnel who did not deploy to the Middle East.

Besides clinical and research efforts, Congress has held numerous hearings on this matter, and several boards and committees have been formed to evaluate this problem and to coordinate governmental response. The VA created a Persian Gulf Expert Scientific Panel to advise on clinical and research strategies; the DOD established a Defense Science Board Task Force on Gulf War Health Effects, headed by Dr Joshua Lederberg; the National Academy of Sciences' Medical Follow-up Agency is responsible for evaluating government efforts to collect and assess information related to the health of Persian Gulf War veterans; and, in January 1994, the Persian Gulf Veterans Coordinating Board, headed by the secretaries of the VA, DOD, and Department of Health and Human Services, was established to coordinate clinical care, research, and compensation issues.

More recently, from April 27 through 29, 1994, a "National Institutes of Health Technology Assessment Workshop on the Persian Gulf Experience and Health" was held at the National Institutes of Health, Bethesda, Md. The workshop panel concluded that "no single or multiple etiology or biological explanation for the reported symptoms [of Gulf War veterans] was identified from the data available to the panel," and that "no single disease or syndrome is apparent, but

rather multiple illnesses with overlapping symptoms and causes."³⁰ The Defense Science Board Task Force also concluded in June 1994 that "there is insufficient epidemiologic evidence at this time to support the concept of any coherent syndrome."⁹

Because no single cause has been found to explain the health problems of Persian Gulf veterans, all potential causes that have been identified are being investigated. Progress has been made in our understanding of the health consequences of military service in the Persian Gulf, but quick answers should not be expected because public health issues of this complexity often require prolonged investigation. Ultimately, answers for our veterans' medical problems can be provided only by cooperation between all branches of the government, veterans' organizations, and clinicians and medical researchers.

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Committee members of the Persian Gulf Veterans Coordinating Board are as follows: MG Ronald R. Blanch, MC, USA; COL Joel Hiatt, MSC, USA; CAPT Kenneth C. Hyams, MC, USN; Han Kang, DrPH; Susan Mather, MD, MPH; Frances Murphy, MD, MPH; Robert Roswell, MD; and Stephen B. Thacker, MD, MSc.

This article reviews the clinical presentation and potential causes of unexplained illnesses among Persian Gulf War veterans and should serve as a basis for formulating further lines of investigation. No potential causes of illness are being excluded in this review. The Coordinating Board would very much appreciate any new information concerning the health of Persian Gulf War veterans.

Reprint requests to the Persian Gulf Veterans Coordinating Board, Technology World, South Bldg, Suite 450, 800 K St NW, Washington, DC 20575.

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THE WHITE HOUSE
WASHINGTON

March 1, 1995

MEMORANDUM FOR THE FIRST LADY

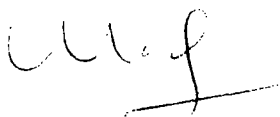
FROM: MACK McLARTY
SUBJECT: GULF WAR SYNDROME OUTREACH

From time to time, Ross Perot calls me about various matters. Surprisingly, more often than not, he is low key and constructive with his information or request.

During a recent call, Ross was interested in and complimented you on your outreach to Gulf War Syndrome victims. Apparently, he has done a lot of work on this issue, which is not surprising given his interest in the military. He would be glad to share information with your office if you would find that helpful. Additionally, he mentioned a gentleman named Jim Tuite, who was on Senator Riegle's staff and whom Ross described as the most knowledgeable person on the Hill regarding Gulf War Syndrome. Tuite can be reached at 342-5452.

I pass this information along for what it is worth. Again, on these types of matters, I have found Ross quite constructive and reasonable. He can be reached at 214-788-3003.

cc: Maggie Williams
Melanne Verveer



MEMORANDUM

To: Mrs. Clinton
From: Diana Zuckerman
Re: Announcement of Advisory Committee
Date: March 2, 1995

We just got a copy of the first draft of the speech: it is 10 pgs long, and the Gulf War is first mentioned on pg. 8. The speech writer has asked for comments by 10 a.m. Friday. The draft is attached.

There is general agreement that staff of interested Senators and Members will be notified of the announcement on Monday morning, to avoid them talking about the issue before the speech. However, in order to have some favorable response from key players, we all agree that it would be helpful if you would call Senators Rockefeller and Daschle (a key player on Agent Orange and very interested in this issue) and Rep. Sonny Montgomery over the weekend, preferably Sunday. The purpose of the call would be for you to tell them of your commitment on the issue, to praise them for all their hard work, to tell them about the announcement, and to ask for their suggestions in the weeks to come. We believe that if you call, they will honor your request not to discuss the issue until after the President's speech, and they will be more likely to praise the idea in response to press inquiries. We'll prepare talking points for the phone calls, if you are willing to do them. The good news is that I know Daschle's person on this issue, and she is very positive about your involvement of the last few weeks, so I think that will be fine.

I expect that Jay Rockefeller will also be fine but there are problems. One of his key aides believes that the White House has intentionally avoided including Rockefeller or other Congressional friends, and wants to use this as a campaign issue. Melanne is trying to reach that aide, but they have been playing telephone tag so far. I told another key staffer that this was not at all the case, but your call to Jay will obviously be crucial in getting him on board and feeling a part of the action.

THE WHITE HOUSE
WASHINGTON

March 1, 1995

MEMORANDUM FOR THE FIRST LADY

FROM: MACK McLARTY

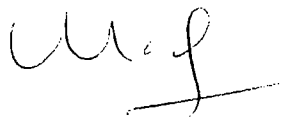
SUBJECT: GULF WAR SYNDROME OUTREACH

From time to time, Ross Perot calls me about various matters. Surprisingly, more often than not, he is low key and constructive with his information or request.

During a recent call, Ross was interested in and complimented you on your outreach to Gulf War Syndrome victims. Apparently, he has done a lot of work on this issue, which is not surprising given his interest in the military. He would be glad to share information with your office if you would find that helpful. Additionally, he mentioned a gentleman named Jim Tuite, who was on Senator Riegle's staff and whom Ross described as the most knowledgeable person on the Hill regarding Gulf War Syndrome. Tuite can be reached at 342-5452.

I pass this information along for what it is worth. Again, on these types of matters, I have found Ross quite constructive and reasonable. He can be reached at 214-788-3003.

cc: Maggie Williams
Melanne Verveer



bc-gulf sperm

ANOTHER GULF SYNDROME

COMPLAINT: BURNING SPERM

Eds: Good thru weekend

By JOHN HANCHETTE=

and NORM BREWER=

Gannett News Service=

WASHINGTON Some doctors were incredulous over the bizarre sexual complaint they began hearing shortly after the 1991 war with Iraq.

But now, reproductive scientists and federal health administrators are looking closely at a growing grievance from the wives and girlfriends of Persian Gulf War veterans: that after sex, their partners' sperm burns painfully for several hours.

Military families think something in the war they're not sure what is to blame. So far, doctors, medical researchers and Pentagon officials are stumped.

This week, several members of the Persian Gulf Expert Scientific Committee met here to trade ideas and map a course of study.

"There's very little known about this phenomenon," said Dr. Maureen Hatch, study group leader and an epidemics expert from Mount Sinai Medical School in New York. "It's a very private issue, and it may be very poorly reported."

The obscure review group is an important indicator of federal efforts to finally take seriously the sexual reactions that scores of Desert Storm veterans say have wrecked their marriages and scrapped their desires to have children.

"When these women first stepped forward, people said they're crazy," said Dr. Eula Bingham, chairman of the overall scientific panel and environmental health professor at the University of Cincinnati College of Medicine. "Whoever heard of that? They were just pushed aside."

Even Hillary Clinton who has taken an interest in the mysterious gulf war illness symptoms afflicting 55,000 returnees from that conflict ran into the burning sperm story on a recent visit to Walter Reed Army Medical Center. Her gentle and artful questioning of an Army couple from the 101st Airborne drew out the complaint. Sgt. Bryan Hall of Baltimore said the pain of ejaculation was so intense "it just stays there, non-stop" that he got a vasectomy.

The burning sperm issue is fraught with medical mystery. Many men don't seem to experience penis pain, even as their mates describe the intensity as "shooting fire." That would seem to rule out caustic chemical content. Sometimes the semen causes blisters, rashes and itching on exterior skin. Sometimes it causes vaginal swelling. Sometimes condoms help, sometimes not.

The numbers are amorphous because the Pentagon and Department of Veterans Affairs still are gearing up their reporting systems, and most couples won't volunteer details unless vigorously questioned. When Dr. Arnold Gorin, director of the Veterans Affairs referral center in Houston, studied 24 returning soldiers with other symptoms, he found 19 who said their sex lives had diminished, and eight whose partners complained of pain during ejaculation.

Gorin has dubbed the effect "pyrospermia," a designation colleagues picked up and repeated. He explained the lack of medical literature: "When a doctor hears something he doesn't understand, he tends to ignore the symptom because it doesn't fit his conceptual framework."

Two doctors, however, presented differing evidence. "There's an adequate number of plausible explanations for the symptoms to not have to resort to 'this mystery disease,'" said Col. Lynn Farnsworth, gynecology chief at Walter Reed.

He offered several alternatives that may be to blame: chemical irritations from lubricants; recurrent vaginitis from candidiasis or other biological infections; lichen sclerosis; or hypersensitivity to seminal plasma the much-reported "allergic to sex" syndrome.

Dr. David Bernstein, allergy expert from the University of Cincinnati College of Medicine, said he has collected 40 similar cases although without the ``burning'' complaint dating back to 1981 in which hypersensitivity to semen has caused all sorts of symptoms from hives to cramps to shortness of breath to bleeding.

``We have really no idea what the general prevalence is we have no idea how common these occurrences are,'' he said, but added he suspects a genetic vulnerability to allergies may have something to do with it.

The committee of scientists will assist the VA in preparing 30,000 questionnaires for gulf war veterans that include many specific questions about sexual relations. The panel will report to the VA in two weeks on suggested protocol for researching the subject.

``When we studied Agent Orange, we found veterans still had a lowered sperm count 25 years after Vietnam,'' said Dr. Steven Schrader, toxicology chief of the National Institute of Occupational Safety and Health. ``Let's not wait 25 years to study this.''

Some scientists thought it premature to start studying an illness whose existence has not been proved.

Replied Bingham: ``This is an attempt to get this to the attention of someone who will begin to look into it. It may not be connected to the spouses' experiences in the gulf war. And we may have the cart before the horse, true. But we have to have someone willing to say there's a horse around here somewhere. If we don't investigate this, we'll never know if it's true.''

**** filed by:GN-F(--) on 03/01/95 at 17:41EST ****
**** printed by:WHPR(JEL) on 03/02/95 at 09:19EST ****

I - Gulf War

From Melissa / F41

W

A10 THE HARTFORD COURANT: Sunday, October 22, 1995

Older patients used in government study of gulf war veterans

By THOMAS D. WILLIAMS
Courant Staff Writer

You wouldn't expect people aged 55 to 68 to be as healthy as soldiers in their mid-30s, especially if the older people are patients in medical clinics.

So why did the U.S. Department of Defense select older patients to compare with 10,000 Persian Gulf War veterans who were complaining about combat-related illnesses?

Thousands of soldiers seeking government health benefits have complained that military and veterans' doctors have not treated persistent ailments that they blame on oil-well fires, dirty water, chemical and

biological warfare agents and other factors during the 1991 gulf war.

A Pentagon study issued in August found that the soldiers' complaints of fatigue, headaches, sleeplessness and joint pain are common, particularly among medical clinic patients nationwide. The military used the comparison to bolster its contention that soldiers are not as sick from the war as they assert and that many are suffering from mental disorders, not real physical ailments.

The report, however, did not detail the differences in ages and genders between the sick soldiers and the civilians. It did warn, 30 pages into the report, that its comparison

should be looked at cautiously. The genders in the populations differ and the soldiers have more persistent illnesses than the civilians, it said.

In a critique several days after the report was issued, The National Institute of Medicine said, "If there were better descriptions of the comparison of populations and more consistent referencing, the DOD report would be more persuasive."

The Defense Department recently responded to The Courant's request for more information, two months after the request was made.

The department said the average age of gulf war veterans the Defense Department examined was

34, but the average age for civilians in three national health studies used for comparison were between 55 and 65, and some were older than 65. Eighty-eight percent of the soldiers examined by the Defense Department were male, while 52 percent to 68 percent of the civilians in the other studies were female.

"It would have been preferable to compare the illnesses and symptoms experienced by gulf war veterans to the illnesses and symptoms experienced by [soldiers who didn't go to the war], but such information is not yet available," said Marianne Coates, a Defense Department spokeswoman.

Dr. Nancy Dreyer, president of

Epidemiology Resources Inc. in Newton, Mass., said the ideal study is a comparison of groups of soldiers of the same ages and genders. Dreyer has not seen the study, but her company does research into occupational and environmental safety.

In fact, the Pentagon did have in hand another study, which it commissioned, comparing soldiers who went to the gulf war with those who did not. It is a study of U.S. Air Force National Guard troops that compared units of soldiers who went to war with units of soldiers of similar ages and gender who did not go to war. That research, by the Centers for Disease Control and Prevention

in Atlanta, was done in two stages, and the second part is due to be completed soon.

The disease control center report found gulf war veterans from unit to unit were 2.6 to 12.5 times more likely to suffer diarrhea than those staying at home; 1.6 to 2.8 times more likely to be depressed; and 3.4 to 5.2 times more likely to have memory loss.

More than 70,000 of the 697,000 soldiers who served in the 1991 gulf war have reported being ill since the war. Many have complained that their spouses and children are sick and that their babies born after the war have deformities caused by their wartime exposures.

Gulf Syndrome Theory Points to Chemical Mix

Animals in Test Suffer Nervous System Damage

Associated Press

DURHAM, N.C., April 9—Anti-nerve gas pills combined with anti-insect compounds may be the cause of a mysterious cluster of ailments known as Gulf War syndrome, researchers said.

Duke University researchers tested nerve gas pills, insect repellents and insecticides given to U.S. troops during the Gulf War and discovered nervous system damage in laboratory animals, the Herald-Sun of Durham reported today.

The team's lead scientist said that no undisputed link has been established between the chemicals and insecticides and the ailments reported by about 37,000 veterans of the war. But that's where the preliminary findings point, said Mohamed Abou-Donia, deputy director of Duke's toxicology program.

"I'm confident we have more than a hypothesis," he said. "We have very solid data to demonstrate we have a plausible scenario of what could have happened in the Gulf War."

In every case, the lab animals—chickens—exposed to the combination of chemicals suffered nervous system damage like that suffered by veterans.

Last month, the Pentagon's top doctor said no single cause of Gulf War syndrome had been found. Stephen Joseph released updated figures of a Pentagon medical evaluation program of Gulf War veterans showing that in 84 percent of cases a clear diagnosis of health problems could be found.

Of the 2,074 cases analyzed, Pentagon doctors were unable to diagnose about 16 percent in the study complaining of fatigue, headaches and sleep disturbances.

"We're not saying this is what happened in the Gulf War," Abou-Donia said. "What we have done so far is a simulation, to some extent, of what might have happened."

The next step, he said: understanding how it happens.

One possible reason some veterans got sick and others didn't is that each person's ability to deal with toxic chemicals varies. Also, some veterans may have been exposed to higher doses of chemicals, Abou-Donia said.

Another toxicologist said the Duke team's research will be hard to prove.

"It's a kind of scenario that is fairly easy to construct but difficult to prove," said Ernest Hodgson, head of the toxicology department at North Carolina State University in Raleigh, who is not involved in the study.

"Chemicals do interact, and there are cases where the toxicity of two chemicals is far greater than when given separately. . . . So it's credible, but that's a long way from proof," Hodgson said.

The Duke researchers have compared the animals' blood samples with blood samples from about a dozen Persian Gulf War veterans.

If the researchers can uncover a "biological fingerprint" in the blood samples, that could be used to diagnose veterans with Gulf War illness, Abou-Donia said.

THE NATION

INE Study bolsters gulf war veterans' claims



By Charles Tasnadi, AP

DEUTCH: Pentagon is 'not letting up in our search.'

By John Ritter
USA TODAY

A new study about the origin of illnesses among Persian Gulf war veterans casts fresh doubt on the military's assertion that troops were not exposed to chemical or biological warfare agents.

A Berkeley, Calif., microbiologist says preliminary findings of a test of 40 veterans suggest such agents are among substances that can trigger chronic fatigue, joint pain and central nervous system disorders — symptoms reported by many gulf veterans.

Howard Urnovitz of Calypso Biomedical Inc. will present his findings at a conference on gulf war veterans' illnesses this weekend in Irving, Texas. He will call for a larger study including a comparison with a group that didn't go to the gulf.

The conference comes amid calls for a fuller accounting of whether Iraq used chemical and biological agents in the war. The Pentagon has maintained that Iraq did not.

Deputy Defense Secretary John Deutch said Thursday "there is no compelling evidence" these agents were used. "But I want to stress we're con-

tinuing to look. We're not letting up in our search."

Ailing veterans believe they were sickened by chemicals from Iraqi Scud missile attacks or fallout from coalition bombing of Iraqi chemical and biological facilities.

Of the nearly 700,000 U.S. personnel sent to the region, more than 50,000 have registered their complaints of various chronic symptoms like fatigue, muscle and joint pain, memory loss, headaches, heart, intestinal problems and reproductive disorders.

Urnovitz says 85% of vets in his sample tested positive for

antibodies that appear when toxins activate a substance in body cells called HERVs — human endogenous retroviruses.

HERVs are getting closer scientific study for their role in disease and immune function.

Normally latent in the body, HERVs are activated by toxins such as sexually transmitted diseases, radioactivity and chemical and biological agents. "We know that certain exposure triggers them; the evidence is there," Urnovitz says.

"I don't know what happened in the gulf," he says. "I do know we need to recruit people for clinical trials."

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By Chris O'Meara, AP
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No drug link, detective says; Fuhrman up

By Gale Holland
USA TODAY

LOS ANGELES — The lead detective in the O.J. Simpson murder case ended eight days on the witness stand Thursday morning by denying that Nicole Brown Simpson and Ronald Goldman were victims of a drug "hit."

Detective 7

that Faye Resnick owed money to drug dealers?" Clark said.

"No," Lange said.

"Do you have any information that the murders had anything to do with drug dealing?" Clark asked.

"None," Lange said.

He was followed on the stand by Goldman's stepmother, Paula Goldman, who testified that she had no information about the murders.



Date: 11/01/95 Time: 15:37

New Studies Find Gulf Vets With Symptoms, Not More Deaths & Birth

SAN DIEGO (AP) New federal studies have yet to find higher rates of death, hospitalizations or birth defects among Persian Gulf War veterans, many of whom complain of fatigue, memory loss, joint and muscle pain and other symptoms dubbed ``Gulf War syndrome.''

Summaries of these latest, unpublished findings from the Department of Defense, Department of Veterans Affairs and Centers for Disease Control and Prevention were presented Tuesday at the American Public Health Association annual meeting.

Although still preliminary, the studies are being released now because the Pentagon is feeling pressure to show what it is doing to address the veterans' health concerns.

``What we need to do is be scientifically persuasive that we are doing and have done everything we can,' ' said Dr. Stephen C. Joseph, assistant secretary of defense for health affairs. ``It's important to report where we are.''

A Presidential Advisory Committee on Gulf War Veterans' Illnesses also is looking at the problems of veterans who say they've gotten sick from wartime exposure to chemicals from burning oil wells, insecticides, and inoculations against germ warfare.

The Pentagon has maintained there is no mystery illness. Congress has put its support behind the veterans, with the House voting last month to extend priority health care to Gulf vets.

A Washington-based Gulf veterans group expressed skepticism that the latest studies' findings would be free of government spin control.

``In the past, the Department of Defense and the Department of Veterans Affairs have enjoyed widespread media coverage of those reports that have tended to minimize the seriousness of Gulf War illnesses,' ' The National Gulf War Resource Center Inc. said in a statement.

Joseph said the Pentagon is having its latest studies peer-reviewed for publication in major journals.

In most of the studies, many still in their earliest phases, researchers compared rates of illness, death and hospitalization of some of the 700,000 veterans who served in the Gulf with veterans who were not deployed.

The CDC study also compared the Gulf vets with civilians. It found that civilians and veterans who didn't go to the Persian Gulf had nearly comparable rates of depression, anxiety, musculoskeletal disorders and fatigue, while those symptoms were much more common among the Gulf War veterans.

``The real key is to figure out why are these symptoms being reported more often,' ' said Keiji Fukada, a medical epidemiologist with the CDC in Atlanta. ``There's some kind of pre-existing condition or symptom that got worse when people went to the Gulf. Going to war increases the prevalence.''

There are several studies still ahead.

Rebecca Calderon, an Environmental Protection Agency scientist working with the Naval Health Research Center in San Diego, said she will study sterility, delayed conception and spontaneous abortion among 16,000 couples, half of whom had Gulf War experience.

Joseph said an Army environmental group is wrapping up the first big study looking at smoke plumes from Kuwaiti oil wells set afire

by Iraqi forces. It basically has found no relationships with toxic materials.

In addition, he said, an Army locator study due out in 1996 will let officials pinpoint the field position of each military unit at a particular date and correlate that with smoke and other environmental conditions.

APNP-11-01-95 1530EST

Gulf War illness linked to Iraqi germ weapons

Pam Busick
69391

12/11/96

Gene-altered bacterium found in vets' blood

© 1996 Seattle Post-Intelligencer

By ED OFFLEY
A MILITARY REPORTER

Evidence exists that could link the ailments of sick Persian Gulf War veterans to Iraqi biological weapons, independent medical researchers warn.

Such weapons pose a more serious health threat than chemical agents because they are designed to spread germs throughout a wide population, including soldiers, their spouses, children and even family pets, experts say. And, they say, symptoms can appear years after exposure.

While the Pentagon has acknowledged that U.S. troops in the Gulf War were exposed to chemical agents, officials said they still are checking data on biological weapons.

Garth Nicolson, a research biochemist who has tested the blood of hundreds of sick Gulf War veterans and members of their families, said he has discovered a mycoplasma — a primitive bacterium — that had been genetically altered in many of the samples. The only logical conclusion to draw, he said, was that the germ had been deliberately manipulated for use as a weapon.

"We found very unusual infections that have genetic structures not found in the wild," said Nicolson, scientific director of the non-profit Institute for Molecular Medicine in Irvine, Calif.

Given the artificial structure of the bacterium, its widespread detection among hundreds of Gulf War veterans and their families, and Iraq's confirmed work on such weap-

ons, Nicolson said, he concluded that people are sick as a result of "invasive . . . biological weapons."

In separate interviews, two experts in related medical fields confirmed the validity of Nicolson's research. They also shared most of Nicolson's premise that many Gulf War veterans show signs of bacterio-

logical infection and not chemical poisoning.

Whether Gulf War troops were exposed deliberately or accidentally is not clear. It is possible, for instance, that exposure occurred when biological agents were dispersed into the air as a result of allied bombing of Iraqi storage bunkers.

Nicolson and other experts said.

Nicolson and his wife, Nancy, both of whom are biomedical researchers, became interested in the issue when their daughter, an Army soldier, returned from the war with multiple ailments.

See ILLNESS, Page A10

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Illness: Pentagon had no way to

from Page 1

Defense Secretary William Perry said last week there is no evidence U.S. Gulf War troops were exposed to Iraqi biological weapons. But, Perry said, "since we know that the Iraqis had the weapons, we have to continue to examine data and we cannot categorically rule it out." Earlier, the Pentagon ended more than five years of denial and admitted that thousands of soldiers in the war were exposed to chemical agents.

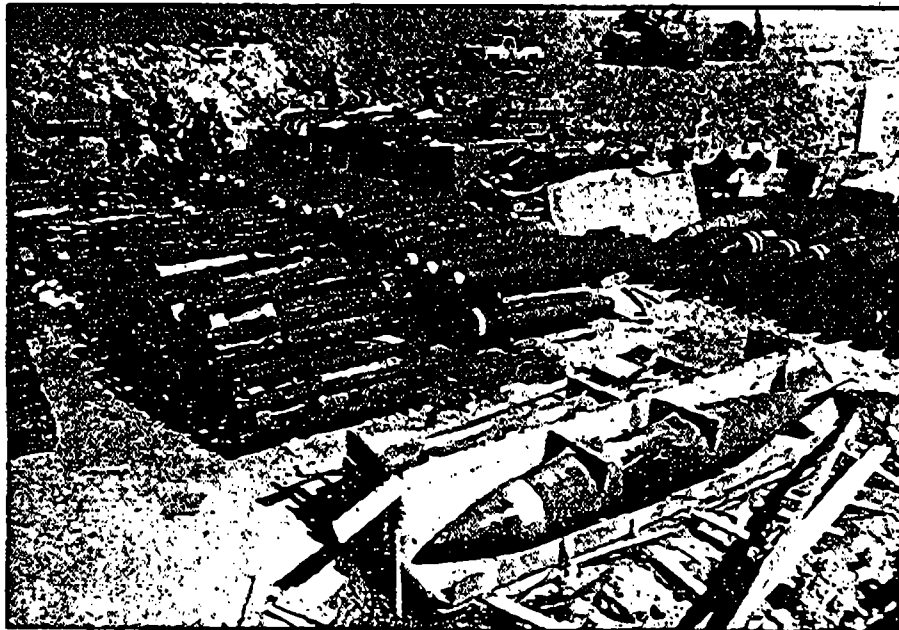
Biological warfare uses bacteriological agents that are infectious and can cause illness and death not just after initial contact but even years later, Nicolson said. Chemical warfare agents, in contrast, are chemical compounds that attack the skin and nervous system but can be washed off. They leave victims sick but not infectious.

Since the seven-week Gulf War, which began Jan. 17, 1991, tens of thousands of veterans and their family members have complained of a wide array of ailments, including memory lapses, chronic fatigue, itching joints, dizziness and benign tumors. Some veterans have reported children born with severe birth defects. The ailments are loosely classified as Gulf War syndrome. But the cause remains under debate.

Complicating the issue is the fact, discovered in 1994 during a Senate Banking Committee investigation, that even three years after the war the Pentagon had no means to detect biological warfare agents on the battlefield.

John Deutch, then-deputy secretary of defense and now head of the CIA, told a government conference in New Mexico in 1994 that the United States has "no biological-detection capability deployed with any forces, anywhere," the Banking Committee noted in a report after its investigation.

The year before, according to the Banking Committee report, Deutch said that the De-



MIKE WEBER / SPECIAL TO THE P.

American troops examine stockpiles of captured Iraqi bombs at a storage complex near Nasiriyah. The munitions were then blown up, releasing a plume of chemical agents.

partment of Defense was "withholding classified information on the exposure of U.S. forces (in the Gulf War) to biological materials."

The report contained the results of a survey of 4,000 veterans reporting medical symptoms after serving in the Gulf War. It noted that 77 percent of their spouses and 65 percent of their children showed similar symptoms.

Since 1991, the Pentagon, Veterans Administration and a number of federal scientific organizations have studied the widespread rash of illnesses afflicting between

35,000 Gulf War veterans (the VA's estimate), and as many as 100,000 veterans and family members (the estimate by outside researchers such as Nicolson).

The Pentagon initially said veterans reporting ailments were suffering from psychological stress. Before the Pentagon admitted last week that nerve agents may have been dispersed over the battlefield, theories about the cause of the ailments included exposure to pollution from oil-field fires, reaction to experimental vaccines or parasitic infections, such as leishmaniasis found in the desert environment.

PI

12/11/96

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detect biological war agents

Garth and Nancy Nicolson, who hold doctorates in biochemistry and biophysics, respectively, say a growing number of veterans and their families still are becoming sick in the years since the Gulf War ended.

Their research is supported by other experts.

Charles Hinshaw of Wichita, Kan., former president of the American Academy of Environmental Medicine, reviewed the scientific procedure Nicolson used to detect the genetically manipulated bacterium. Hinshaw said of Nicolson's work, "The scientific techniques used to identify the (bacterium) in these Gulf War veterans is valid."

Ed Hyman, a New Orleans-based specialist in kidney and urinary tract medicine who was cited by the Senate Banking Committee in 1994 for his work with sick Gulf War veterans, said that he, too, has found a bacterial link to Gulf War syndrome.

Hyman said he concluded that the ailments stem from a source that is either a bacterium that exists in the desert environment or a biological warfare agent.

"I think the best bet is (a bacterium) endemic to that region. The second-best bet is germ warfare," he said.

Hyman supported Nicolson's assertion that chemical agents such as sarin could not cause symptoms among family members of veterans.

"Once a person is damaged by sarin there's no way they can pass it on to their wife and children," he said of the veterans. "The Nicolsens are dead right about it."

The Nicolsens and Hinshaw also said they have received information from colleagues in the Persian Gulf region that the type of illness afflicting U.S. veterans is rampant among the civilian populations there, particularly in Iraq, Kuwait, northern Saudi Arabia and Jordan.

A survey of Iraqi health conditions published in March by the United Nations World Health Organization disclosed "an explosive

Common symptoms

■ These are the most common symptoms that occurred in a sample of 625 veterans from Operation Desert Storm diagnosed with Gulf War syndrome.

Aching joints	90 percent
Chronic fatigue	75 percent
Memory loss	73 percent
Sleep difficulties	72 percent
Headaches	70 percent
Skin rashes	60 percent
Concentration loss	59 percent
Depression	53 percent
Muscle spasms	52 percent
Nervousness	51 percent
Diarrhea	51 percent
Blurred vision	49 percent
Anxiety	49 percent
Breathing problems	49 percent
Chest pain	47 percent
Dizziness	46 percent
Nausea	42 percent

Source: "Chronic Fatigue Illness and Desert Storm," by Garth Nicolson, Ph.D., and Nancy L. Nicolson, Ph.D., 1995

rise" in the incidence of diseases in Iraq since the war, including cholera, typhoid, malaria and meningitis." The U.N. agency report attributes the health crisis to the deterioration of the medical system, breakdown in water and sewage treatment, and hardships caused

See GULF WAR Page A 1

ILLNESS

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DESERT STORM DIAGNOSIS

Gulf War: Illness reported in Kuwait

From Page A10

by economic sanctions.

The U.N. agency also documented a fivefold increase in reported cases of leishmaniasis between 1989 and 1992, from 2,159 cases to 12,645 per 100,000 population.

There also is evidence Iraq's infant mortality rate increased after the war. No studies have suggested a connection between the deaths and possible exposure to chemical or biological agents.

A study of Iraqi civilians comparing records before the war and in late 1991, conducted by the International Team on the Gulf Crisis, found a 380 percent increase in the mortality rate of children under 5. The survey attributed this to "a complex interaction of factors," including shortages of food and medicine, lack of clean water and poor sanitation.

The survey, funded by UNICEF, the MacArthur Foundation and other organizations, also noted epidemic outbreaks of typhoid, cholera, hepatitis, measles and tetanus throughout Iraq.

Hinshaw said a Kuwaiti physician told him an ailment mirroring Gulf War syndrome is widespread among the Kuwaiti population.

"The word is the Kuwaitis have this (illness) and the Kuwaiti government is suppressing this whole issue," Hinshaw said.

Neither the Pentagon nor Veterans Affairs Department have compared health data on Gulf War veterans and Iraqi civilians with the government of Iraq, officials said.

"There is currently no cooperation in health programs between the United States and Iraq in looking at Gulf War illness," Pentagon spokesman Bryan Whitman said yesterday.

He said the Pentagon task force on Gulf War health issues had received Nicolson's research findings and was reviewing them, along with other independent medical studies.

"We are interested in looking at all research that may help us better understand the causes of Gulf War illness," Whitman said.

Iraq's biological and chemical warfare capability never has been questioned.

U.S. military commanders during and after the Gulf War freely admitted their greatest fear was that advancing allied units might get pinned down in the Iraqi minefields and obstacle belts in Kuwait and Iraq, then slaughtered by massive attacks with chemical and biological weapons.

As for Iraqi biological warfare capability, the Pentagon and the United Nations reported after the war that Iraq possessed a sophisticated biological warfare industry by the late 1980s.

The Banking Committee probe found evidence Iraq was working on the following biological warfare agents at the time of the Gulf War:

- Anthrax - An often fatal infectious disease caused by the ingestion of anthrax spores that blocks breathing and leads to fatal blood poisoning.

- Botulinum toxin - Symptoms of exposure, which is often fatal, are vomiting, thirst, weakness, fever, dizziness and muscle paralysis.

- Other biological agents identified include histoplasma (similar to tuberculosis), brucella melitensis (which causes damage to major internal organs), and clostridium perfringens, toxic bacteria that cause gangrene.

Iraq started in 1986 to initiate an offensive biological warfare capability, according to the U.N. special commission that investigated alleged manufacturing and storage sites beginning in 1991. U.N. inspectors said that while no explicit evidence of Iraqi biological weaponry was found, they noted that the main site was razed by the Iraqi government a week before inspectors were allowed in.

The Senate Banking Committee also discovered that from 1986 to 1989 a non-profit medical institute called the American Type Culture Collection exported to Iraq, with approval of the U.S. Commerce Department, 70 shipments of bacterial cultures that could have been used for producing biological weapons.

The newspaper Newsday on Nov. 27 reported that Joshua Lederberg, head of a U.S. scientific panel that earlier had denied any links between biological weapons and Gulf War syndrome, was a director of the American Type Culture Collection.

However, Lederberg, a Nobel

Prize-winning geneticist and former president of Rockefeller University, told The New York Times on Monday that the Pentagon had withheld key evidence from his panel, including the presence of chemical agents at the Iraqi bunker complex blown up by U.S. troops.

Lederberg said the disclosures mandate an intensified effort to determine whether low doses of nerve gas can cause long-term illnesses.

While the Nicolsons have specialized in microbiology and infectious illnesses for decades, it was their role as parents that first thrust them into the hunt for the source of Gulf War syndrome.

Their daughter, Sharron, served in Operation Desert Storm with the 101st Air Assault Division, which made the deepest penetration into Iraqi territory and from whose ranks many of the sick veterans have come, Nicolson said. She returned from the war with symptoms of Gulf War syndrome and has many friends who also became sick, Garth Nicolson said.

After compiling a database of common symptoms among ailing veterans, Nicolson said, he and his wife began to suspect the immediate cause was an unknown "mycoplasma infection." Mycoplasmas, he explained, are small micro-organisms related to bacteria, some of which can aggressively invade blood cells.

Using a technique he calls "gene tracking," Nicolson in one study made a detailed analysis of the DNA structure of blood samples of several dozen sick Gulf War veterans. He found that 55 percent of the sample group were victims of an "invasive" mycoplasma that had "penetrated deeply into the patients' blood cells."

In analyzing the samples, Nicolson said, he discovered evidence of "genetic manipulation" of the mycoplasma that converted it from a relatively benign bacterium to "a much more invasive and pathogenic mechanism." Preliminary surveys of veterans are turning up a possible pattern of infection linked to specific areas of the battlefield.

"The soldiers that were involved in the deep (attacks) in Iraq and those that were near Saudi and Kuwaiti Scud-B (missile) impact sites... may be at highest risk," Nicolson wrote in an article last May in The Townsend Letter for Doctors and Patients.

Antibiotics tailored to the mycoplasma have helped alleviate symptoms for many veterans, Nicolson said, but he noted that it is too early to know if the drugs will provide a permanent cure.

Joyce Riley, a civilian intensive care nurse in Houston and co-founder of the American Gulf War Veterans

PI

ILLNESS

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ing extensive reports from sick veterans who say their family members and even pets and domestic livestock also have become ill.

Riley, an Air Force Reserve captain, said she developed symptoms while on active duty in an Air Force C-130 unit during the war. But, Riley added, she did not even travel to the Persian Gulf; her air crew ferried sick and injured troops within the continental United States.

She said a former Special Forces soldier with 22 years on active duty told her last month that he called her group after military doctors could not explain why his wife and two children also were plagued with symptoms of Gulf War syndrome.

"I asked him, 'Did your pets die?'" Riley said.

"Yes," the soldier said. "How did you know?"

Riley said dead pets are common in reports the veterans association receives from the 20 to 30 sick veterans who contact it each day.

For the Nicolsons, perhaps the most startling information they have collected on Iraqi biological warfare turned up two years ago with a knock on their front door in Houston.

Nicolson said he and his wife were stunned to find an Iraqi army general standing on the doorstep. The middle-aged man in civilian clothes was sweating profusely as he handed Nicolson a letter in Arabic and introduced himself in fluent English.

"He said he was sick with the Gulf War illness," recalled Nicolson, who at the time was chairman of the Tumor Biology Department at the University of Texas M.D. Anderson Medical Center. "He wanted to talk about it to see what we knew about it." The Iraqi said he had learned of Nicolson through several of his articles in medical journals.

"He tested positive for this mycoplasmic infection," Nicolson said.

The Iraqi, who used an Iraqi diplomatic passport to travel quietly to Texas, told the Nicolsons that Iraqi President Saddam Hussein had deliberately released biological agents in southern Iraq.

"He told us there were at least 300,000 (Iraqis) dead and 1 million sick because of the release of chemical and biological weapons in southern Iraq," Nicolson said. Unofficial reports from medical colleagues at Mideast health research facilities indicate up to 25 percent of the populations of Kuwait, Jordan, southern Iraq and northern Saudi Arabia are experiencing Gulf War syndrome ailments.

"He (the Iraqi general) told us there were both chronic and acute biological agents used in the Gulf War," Nicolson said.

Mike Weber, a Fort Lewis-based soldier treated for tumors after serving with an Army unit that blew up the Iraqi weapons bunker complex now confirmed to have contained chemical agents, said recently that he recalled a radio news item picked up shortly before the ground war began. "The BBC reported Saddam Hussein threatened not only the soldiers in the Gulf but (also) their wives and babies as well," he said. "Maybe this is what he meant."

Help for Gulf War veterans



VA Puget Sound Health Care System, Persian Gulf health clinics:

VA Medical Center, Seattle

Dr. Stephen Hunt

(206) 762-1010, Ext. 1139

(206) 764-2140

American Lake Medical Center, Lakewood

Dr. Testal Gabre-Kidan

(800) 581-8308

(206) 589-4058

Other sources

For civilian veterans: Information on medical exams, marital/family counseling, disability compensation, VA benefits programs — VA Persian Gulf Information Helpline, (800) 749-8387

For active-duty personnel: Defense Department Persian Gulf Hotline, (800) 796-9699

Reporting Gulf War Incidents: For firsthand incidents affecting health, such as chemical agent attacks — Defense Department Incidents Hotline, (800) 472-6719

Washington Department of Veterans Affairs: General information on Gulf War health issues — (800) 562-2308, Rick Price

Internet sites and other organizations

GulfLink, official Defense Department information site for Persian Gulf War illness issues:
<http://www.dtic.dia.mil/gulfink>

Gulf War Veteran Resource Pages, volunteer, non-official home page clearinghouse for Gulf War health issues:
<http://www.gulfwar.org/index.html>

American Gulf War Veterans Association, new veterans activist organization:

3506 Highway 6 S., No. 117
Sugar Land, TX 77478-4401
Contact Dave Riddell or Joyce Riley
(281) 438-1699, office
(281) 587-5437, voice mail
(713) 438-4581, fax

Sources: Veterans Administration, Department of Defense and the American Gulf War Veterans Association

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The Eight Myths of Operation Desert Storm and Gulf War Syndrome

by

Garth L. Nicolson, Ph.D. and Nancy L. Nicolson, Ph.D.

*From the Institute for Molecular Medicine, P.O. Box 52470,
Irvine, California 92619-2470 USA*

Corresponding Author:

Prof. Garth L. Nicolson
Office of the Scientific Director
The Institute for Molecular Medicine
P.O. Box 52470
Irvine, California 92619-2470 U.S.A.
Tel (714) 476-7933 Fax (714) 757-0419
and
Professor of Internal Medicine
Professor of Pathology and Laboratory Medicine
The University of Texas Medical School at Houston

Operation Desert Storm has been hailed as one of the most successful conflicts in the histories of the U.S. and U.K. Armed Forces in terms of achieving military objectives as well as minimizing our casualties. There is a dark side, however, to this brief war that involves our civilian and military leadership and their continuing denial that anything unusual happened during the Persian Gulf War. What happened was within one year after returning to the U.S. and U.K. from service in the Gulf War between 50,000-100,000 soldiers presented with a variety of unusual chronic signs and symptoms that have been difficult to diagnose but have been collectively called Gulf War Syndrome (GWS) or Gulf War Illness. Although most military, veterans' and civilian physicians agree that some of these Gulf War veterans have medical problems, the U.S. Department of Defense (DoD) and British Ministry of Defence (MoD) have been unable to diagnose the exact syndrome and for some time denied that it even existed. Indeed, the DoD and MoD have propagated a number of myths concerning GWS and the Gulf War.

Myth No. 1 is that these soldiers are not sick or are not any sicker than the civilian populations as a whole. This myth was widely disseminated by the DoD for several years after Operation Desert Storm. In particular, the Assistant Secretary of Defense for Health Affairs, Dr. Steven Joseph, claimed that veterans who served in the Gulf War did not have unusual medical problems and were no more sick than American civilians. Each soldier had to pass a physical examination to be deployed to the Persian Gulf. That a large number of these soldiers and in many cases their immediate family members now have unusual medical conditions was carefully shown in a case control study performed by the Center for Disease Control (CDC) in Atlanta, Georgia.¹ Hundreds of soldiers that were deployed to the Persian Gulf region were compared to similar numbers of soldiers from the same units that were not deployed. In the four Reserve and National Guard units from Pennsylvania and Florida that they studied where large numbers of members were deployed to the Persian Gulf, the CDC found that Gulf-deployed soldiers had significantly higher prevalences of variety of chronic illness signs and symptoms that were not present in the same frequencies in the undeployed soldiers. In fact, some of these signs and symptoms were over 13-times more prevalent in the deployed soldiers.¹ This indicates that the DoD has been unintentionally or intentionally misleading the American public about the nature and extent of the illnesses in Gulf War veterans. The situation has not been much better in the U.K.

Myth No. 2 is that there is no such thing as Gulf War Syndrome (GWS); it is a myth invented by the press to sell copy. There are now in excess of 100,000 U.S. and approximately 3,000 British Operation Desert Shield/Storm veterans and their family members ill with GWS, and these patients share similar but individually unique sets of chronic signs and symptoms.² Since collectively the signs and symptoms of GWS are not well established as criteria for particular diseases and they do not readily fit into common diagnostic categories used by military and veterans' hospitals, many military physicians have listed the diagnoses as unknown, or they conclude that soldiers with GWS have psychological problems, such as Post Traumatic Stress Disorder [PTSD]. Most veteran combat soldiers that we interviewed did not believe that the Gulf War was a particularly stressful war, and they resent that the military has attempted to use psychiatric diagnoses for what they consider are clearly medical problems. Some psychological problems did exist among some of the soldiers deployed to Desert Storm, but assessment of the overwhelming majority of Gulf War veterans indicated that GWS signs and symptoms did not fit with a psychological origin of the disorder.² Moreover, the involvement of multiple organ systems and disparate signs and symptoms of GWS has not allowed these soldiers to be placed into a single DoD case definition that would enable them to get appropriate treatment for their illnesses. We feel that the problem here, in part, is in the military-based diagnostic categories which are primarily designed for battlefield diagnoses not for chronic illnesses. Since it is difficult for military and Veterans' Administration (VA) physicians to find appropriate diagnostic categories for GWS that would allow Desert Storm

veterans and their family members to receive appropriate treatment, they are listed as psychiatric or somatization disorders. These patients are not just psychiatric cases, they have real medical problems based on organic disorders obtained from the Gulf War.

Myth No. 3 is that GWS doesn't exist, because it cannot be defined as a legitimate medical syndrome. We have published in the *Journal of Occupational and Environmental Medicine* that the signs and symptoms of GWS almost exactly fit the profile for myalgic encephalomyelitis (ME) or Chronic Fatigue Syndrome or Chronic Fatigue-Immune Dysfunction Syndrome (CFIDS).² This syndrome overlaps with Fibromyalgia, and many of the signs and symptoms are similar. Thus the statements from the DoD and MoD that GWS is not a new syndrome are essentially correct; and from the most common signs and symptoms we can document that GWS is a ME/CFIDS-like disorder.² What the DoD and MoD have avoided disclosing, however, is the finding that this is a real disorder that is affecting hundreds of thousands of American and British subjects. That GWS fits with a ME/CFIDS-like condition was also concluded by the Commanding Officer of Walter Reed Army Medical Center in Washington D.C.³ Thus even military physicians have taken a stand against this myth. The classical working case definition of ME/CFIDS was proposed by the CDC, and it is characterized by persistent or relapsing, debilitating fatigue, that does not resolve with rest. In addition to the absence of clinical conditions that could easily explain the symptoms, such as cancers or autoimmune diseases, patients present with mild fever, sore throat, muscle pain, generalized muscle weakness, headaches, painful lymph nodes, sleep difficulties, and neuropsychologic complaints, such as memory loss, light sensitivity, confusion, irritability and depression. These are exactly the signs and symptoms found in GWS.²

Myth No. 4 is that since the cause of GWS cannot be determined, it is not a problem that is associated with Operation Desert Storm deployment. The possible causes of GWS appear to be multiple and are certainly complex. In this respect, we agree with the DoD and MoD that there are several possible causes for GWS-ME/CFIDS, and each patient has to be carefully examined to rule out certain conditions and illnesses. Some of the Desert Storm veterans that have multiple chronic symptoms may eventually have their diagnoses linked to chemical exposures in the Persian Gulf, such as oil spills and fires, smoke from military operations, chemicals on clothing, pesticides, chemoprophylactic agents, chemical weapons and others.⁴ In some cases, this exposure may have resulted in multiple chemical sensitivity (MCS). MCS shares some but not all of the symptoms listed above, including--in some cases--immune system dysfunction, but in many of the soldiers the infectious nature of the illnesses and its spread to immediate family members precluded simple explanations, such as exposure to toxic chemicals or to chemical weapons. In these patients, the chronic symptoms and moderately contagious nature of the illness are consistent with chronic infections that can cause ME/CFIDS-like symptoms.⁴

We have been studying families where the first member sick with GWS-ME/CFIDS was a Gulf War veteran. This was followed one by one by every other member of the family until the entire family presented with GWS-ME/CFIDS. That entire families are now sick with GWS-ME/CFIDS indicates that in some cases of GWS a contagious disease is present, and we find it particularly alarming that the U.S. and U.K. Governments are doing little to stop the apparent spread of this illness among the civilian populations.

Myth No. 5 is that the U. S. and British Governments are doing everything possible to identify and treat illnesses in Desert Storm veterans. What the U.S. and U.K. Governments have done is establish panels of experts to study the situation. For example, a Government panel was convened in the U.S. in 1993 to discuss the medical problems of Gulf War veterans. Unfortunately, the report issued by the panel did little to address the Gulf War veterans' problems, and the Gulf War veterans themselves have organized conferences to consider the causes and treatment of GWS-CFIDS. The DoD did, however, establish a Comprehensive Clinical Evaluation Program for tens of thousands of Gulf War veterans, but it been argued

that the study design of this program has been slanted to support the DoD's original conclusions on GWS-ME/CFIDS. Next, a President's Advisory Committee on Persian Gulf War Illnesses was established to study the problem and report back to the President. This panel has been convening since 1995 and has issued an interim report. Unfortunately, the interim report does not adequately address the problem, nor has it suggested successful treatments of GWS-ME/CFIDS. It does suggest that further study and research are necessary. Similar conclusions were forthcoming from a 1995 Defence Committee Report on GWS from the House of Commons. Since 1993, a Medical Assessment Programme was established to examine health concerns of Gulf War veterans in the U.K.

Myth No. 6 is that GWS-ME/CFIDS will eventually go away without any treatment. Although some patients with GWS-ME/CFIDS have slowly recovered without any special treatment, the usual case is quite the opposite. We proposed that many of the symptoms of GWS-ME/CFIDS are due to chronic infections.⁵ In support of this explanation, some soldiers with GWS-ME/CFIDS have been examined for the presence of bacteria in their urine,⁶ and the soldiers with positive urine have been successfully treated with broad spectrum antibiotics.⁴ In addition, we suggested that most of the GWS-ME/CFIDS symptoms can be explained by aggressive pathogenic infections that can be successfully treated with commonly used antibiotics, such as doxycycline.⁵ Of the 73 Desert Storm veterans that we followed who had most of the signs and symptoms of GWS-ME/CFIDS and were able to find treatment, 55 indicated that they had good responses with doxycycline, and they eventually returned to normal duty.⁵

The variable incubation time of GWS-ME/CFIDS, ranging from months to years after presumed exposure, the cyclic nature of the relapsing fevers and the other signs and symptoms seen in many patients are consistent with a disease caused by biological agent(s).⁵ We strongly suspected that mycoplasmas, a group of small microorganisms related to bacteria but without cell walls, some species of which can invade cells, might be involved in GWS-ME/CFIDS, because this type of microorganism can cause chronic infections that yield unusual signs and symptoms similar to GWS-ME/CFIDS.^{5,7} Usually mycoplasma infections produce diseases limited to particular tissue sites or organs, such as urinary tract or respiratory infections. However, the types of mycoplasmas that we have detected in Desert Storm veterans and that may be causing the chronic fatigue and other symptoms of GWS-ME/CFIDS are very dangerous, can colonize and destroy a variety of organs and tissues, and are difficult to treat.⁷ We have been able to develop sensitive tests for the presence of mycoplasmal infections in GWS-ME/CFIDS patients, and our published results indicate that these infections can be successfully treated.⁷ In a group of GWS-ME/CFIDS patients and their family members with GWS-ME/CFIDS signs and symptoms we found that about one-half of these cases showed evidence of mycoplasmal infections in their blood leukocytes. The mycoplasma-positive patients were placed on several six-week antibiotic cycles, and almost everyone has recovered. When the recovered patients were retested for the presence of mycoplasmal infections in their blood leukocytes, they were now negative, indicating that the antibiotic treatments suppressed the infection and allowed these patients to recover from their GWS.⁷

Myth No. 7 is that the U.S. and U.K. governments would never deny that over one hundred thousand veterans and their family members are sick with GWS-ME/CFIDS. Why would the U.S. and U.K. Governments deny our veterans adequate treatment, especially when a rather simple antibiotic appears to be allowing many of them to recover from GWS-ME/CFIDS? We believe that the reason that some diagnoses and treatments for GWS-ME/CFIDS have been ignored by the DoD and MoD has more to do with politics than medicine. During the initial stages of the Gulf War there were reasonable fears that Saddam Hussein would use his extensive stores of Chemical and Biological Weapons (CBW). Indeed, the U.N. Disarmament Commission documented that offensive CBW agents were sent to forward positions in Southern Iraq, and Iraqi field commanders were given orders to use them

against Coalition Forces. The DoD and MoD have denied that CBW agents were used in the Gulf War, but there is extensive evidence to the contrary. Testimony of U.S. Army CBW experts before the U.S. Congress indicated that over 14,000 chemical alarms sounded during, but not before or after, the Desert Storm air/ground offensive. To counter this testimony, the DoD indicated that every one of these was a false alarm. There were also indications that battlefield records were altered to support the DoD's statements that there was no CBW use during Desert Storm. In spite of this, one of the military's top physicians indicated recently to the President's Advisory Committee on Persian Gulf War Illnesses that it was now likely that Coalition Forces were exposed to "low level" CBW agents during the Gulf War. This is in contrast to statements issued just weeks earlier from the Assistant Secretary of Defense that there was no credible evidence of CBW use during the Gulf War. Thus DoD physicians have completely reversed their position on CBW release during the Gulf War. The official denials concerning Biological Weapons release during Desert Storm are particularly interesting, since there was absolutely no capability to detect Biological Weapons release in the Gulf. If we had zero capability to detect Biological Weapons, how could we conclude that Biological Weapons were not used? We have found highly unusual microorganisms in veterans' blood leukocytes that could be Biological Weapons. Thus it should be considered that CBW was used by Iraq during the Gulf War, and its use could have resulted in casualties, including eventually chronic illnesses such as GWS-ME/CFIDS.

Myth No. 8 is that our Armed Forces were well prepared to fight a Soviet-style integrated conflict (involving CBW) in the Middle East. The Iraqi military was prepared since the Iraq-Iran War to fight a Soviet-style integrated war (with conventional weapons and unconventional weapons such as CBW). We consider it quite possible that a threat was issued to Iraq that if CBW was used on Coalition Forces in the Gulf that we would respond in kind, or retaliate with our own unconventional weapons. Once there were reports of Chemical Weapons release during Desert Storm, a decision had to be made to retaliate or ignore the threat. A decision may have been made that there was no CBW release to fit with the decision that there would be no response to the reports of CBW use in the Persian Gulf. Once we officially decided that CBW agents were not used, even in the face of contrary evidence, policy may have been implemented to fit with this decision. This decision would also be consistent with the notion that we were prepared to fight a Soviet-style integrated war, and the publicity that would undoubtedly occur concerning lack of military readiness and questions about whether Coalition Forces had appropriate equipment to counter CBW attacks. Unfortunately, the response of the DoD and MoD to the GWS-ME/CFIDS crisis makes it almost appear that they are trying to cover this up and not respond to this crisis. The response fits with the notion that the cause of GWS-ME/CFIDS and possibly other illness among Gulf War veterans may be related to the possible release of CBW during Desert Storm and the denial by the U.S. and U.K. of CBW use during the Gulf War.

The response to possible CBW use during the Persian Gulf War has actually increased our risk and future vulnerability to CBW attack. Aggressor countries and terrorists groups may have concluded that the U.S. and U.K. are vulnerable to CBW, because they may assume from the Gulf War that we will not acknowledge CBW use and we will not treat our casualties. Thus a very bad precedent has been set by our policies during the Gulf War. Unfortunately, the steps that we take to health crises such as GWS-ME/CFIDS may dictate how our weaknesses are assessed and exploited in the future.

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About the Authors This information is being provided to the Editor

Professor Garth Nicolson is the Scientific Director of the Institute for Molecular Medicine in Irvine, California. He was formally the David Bruton Jr. Chair in Cancer Research and Professor at the University of Texas M. D. Anderson Cancer Center in Houston and he remains Professor of Internal Medicine and Professor of Pathology and Laboratory Medicine at the University of Texas Medical School at Houston. Among the most cited scientists in the world, having published over 400 medical and scientific papers, edited 13 books, served on the Editorial Boards of 12 medical and scientific journals and currently serving as Editor of two (*Clinical & Experimental Metastasis* and the *Journal of Cellular Biochemistry*), Professor Nicolson has active peer-reviewed research grants from the U.S. Army, National Cancer Institute, American Cancer Society and National Foundation for Cancer Research. Dr. Nancy Nicolson is trained in molecular biophysics and is the President of the Rhodon Foundation for Biomedical Research and Chief Executive Officer of the Institute for Molecular Medicine in Irvine, California. She has published over 25 medical and scientific papers, has delivered over 60 international and national scientific presentations and was the Who's Who in the World 1996 Woman of the Year.

The Gulf Between Syndrome and Poison Gas

A1

By David Brown
Washington Post Staff Writer

The theory that many veterans of the Persian Gulf War are ill because they were unwittingly exposed to nerve gas more than five years ago contradicts most of what's known about the health effects of chemical weapons.

Such a scenario is unlikely because nerve gases almost always cause immediate symptoms in people who encounter them, and almost never cause permanent damage to those who survive. There is even less evidence they can cause illnesses that first appear months after contact.

Those are the conclusions suggested by three decades of research on nerve gases, and affirmed by many scientists familiar with the chemical compounds and their effects.

"Based on what we know about low-level exposure to this type of chemical, one would be very hard pressed to make that connection [between veterans' illnesses and gas exposure]," said John A. Thomas, president of the American College of Toxicology and a professor at the Health Science Center of the University of Texas in San Antonio.

The current knowledge about chemical weapons does not jibe with widespread assertions by some veterans groups, politicians and commentators that thousands of veterans are chronically ill from exposure to poison gases during the Persian Gulf War.

Those assertions in recent months have led the Defense Department to create a 110-person "task force" to investigate possible poison gas releases in the gulf. Two congressional committees plan to hold hearings on the issue this year. Some veterans organizations say they will push for further research on the effects of low-dose exposure to chemical weapons, which they believe may be causing the physical complaints known popularly as "Gulf War Syndrome."

Almost since the war ended in 1991, reports of a mysterious illness—characterized by mood changes, concentration problems, muscle pains, skin rashes, diarrhea and other complaints—circulated among veterans. Some former soldiers, dissatisfied with their diagnoses and medical care, looked for a cause of the symptoms in the environmental hazards encountered in the war against Iraq.

On that long list of hazards were smoke from oil fires, exotic infections, drugs and vaccines, depleted uranium used in projectiles—and chemical weapons. Although the Pentagon studied each, for years military officials said chemical weapons could not directly explain

See SYNDROME, A10, Col. 1

SYNDROME, From A1

any illness a veteran might be suffering. That's because Iraq had not used chemical weapons. Except for one soldier who was accidentally exposed, no American troops were exposed to the toxic compounds, military officials said.

Last June, however, the Defense Department amended its story.

Investigators announced that thousands of soldiers may have been exposed to small amounts of poison gas when they blew up a munitions dump in Khamsiyah, Iraq, soon after the fighting stopped. It wasn't until months later that United Nations inspectors visiting the site learned that some of the missiles had contained chemical warfare agents. That information, passed on by the U.N. team, lay unnoticed in Pentagon files for years.

The Khamsiyah revelation fueled many veterans' suspicions that the military was hiding information crucial to their health. This suspicion was bolstered by the Defense Department's acknowledgment, in various forums recently, that it had never thoroughly interviewed soldiers who had reported other possible exposures to poison gas.

Furthermore, some veterans asserted that there were countless other "exposure events" besides the one Pentagon officials said might have occurred. According to one theory, the intense bombing of Iraqi military targets repeatedly sent poison gas into the atmosphere, creating a toxic fall-out on the soldiers below.

The idea that chemical weapons exposure caused Gulf War Syndrome rests on a number of assumptions. One is that there is, in fact, an unexpected amount of illness among veterans of the Gulf War. Another is that U.S. soldiers were actually—*as opposed to theoretically*—exposed to chemical weapons. Perhaps most important is the idea that nonfatal poisoning can cause the kind of health problems some veterans report.

At the moment, however, none of those assumptions is proved. (None is disproved, either. But for reasons of logic, the second two assumptions can never be disproved: Research can never prove that something didn't or can't happen; only that it did, or that it can.)

There are 104 government-funded studies, planned or underway, that seek to answer questions about the health of Gulf War veterans. A major part of that research is dedicated to investigating the long-term effects of "chemical hazards" soldiers may have faced in the gulf, including the hazards of poison gas.

Nerve gases can cause symptoms that resemble some of the initial, relatively minor complaints some veterans have described. A small amount of research hints that the compounds could cause longer-lasting physiological changes. It is possible unexpected effects may be uncovered with further research.

Current knowledge of these toxic chemicals, however, suggests it's highly unlikely they can cause health problems similar to those seen in Gulf War Syndrome.

"There doesn't seem to be any plausible reason, nor does there seem to be good evidence, that at very low concentrations [of nerve agent] one would expect to see adverse health effects of the kind that are reported," said Lewis Smith, director of toxicology in Britain's Medical Research Council, and a longtime researcher in the field.

Research on chemical weapons began immediately after the German army gassed the British on Dec. 19, 1915, at the Battle of Ypres, opening the era of chemical warfare. Scientists today have detailed knowledge about the chemistry and health effects of the five major types of chemical weapons: phosgene, arsenic, cyanide, mustard gas, and nerve agent.

Iraq possessed the last two types. (Although soldiers report detecting both in the Persian Gulf, most theories attribute chronic illness to nerve agent. This is, in part, because mustard gas is hard to miss. It kills cells and causes painful blisters on the skin, mouth and throat minutes after contact. No widespread symptoms consistent with mustard gas were reported in the Gulf War.)

In contrast, nerve agent in low doses causes symptoms—runny nose, diarrhea, nausea—that some soldiers said they experienced on the battlefield. Trace concentrations could theoretically have caused even more subtle (or overlooked) effects at the moment of exposure.

Furthermore, because nerve agent (as its name suggests) alters nerve function, it's the poison more likely to alter mood and behavior over the long term, the kind of problems some veterans report.

The nerve agents used as chemical weapons—sarin, soman, tabun and VX—are members of a large family of chemicals called "organophosphate cholinesterase inhibitors." Scientists understand their biological effects in great detail. They all drastically increase the "activity" of acetylcholine, an essential neurotransmitter in everything from insects to human beings.

When a person is poisoned with organophosphates, the pupils constrict, muscles twitch, the person salivates, sweats and sometimes wheezes. Often there's nausea, vomiting and involuntary defecation. At higher doses, or with longer exposure, people have convulsions, lapse into unconsciousness, develop profoundly low blood urea and stop breathing.

Organophosphates are the most commonly used pesticides in the world, with hundreds of tons used every year by everyone from household exterminators to crop dusters. Unlike pesticides, however, the compounds designed as chemical weapons kill people and animals at extremely low doses. They're so potent that in practice there's little difference between the amount that causes sickness and the amount that causes death.

This property has an important implication: It is difficult to get a response to nerve agents in a group of animals without making at least a few of them critically ill. This is true even under the most controlled laboratory conditions.

If soldiers encountered nerve agents during the Persian Gulf War, the conditions would have been a far cry from those of a laboratory. The compounds would have been "delivered" imprecisely by the wind, contacting thousands of soldiers arrayed unequal distances from the exploded source of the poison. Under such circumstances, it's probable a few people would have received doses high enough to kill, or at least make them seriously ill. However, that does not seem to have happened.

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None of the 148 combat deaths of U.S. military personnel came from nerve gas poisoning, nor did any of the 145 off-battlefield deaths. Furthermore, there were no nonfatal injuries attributed to nerve agents, according to military medical records.

Assuming however that gas released into the atmosphere actually came into contact with soldiers, the effects appear to have been unprecedented in their mildness and uniformity. There was no death, no serious illness, no moderate illness, perhaps some mild illness, and in most cases no illness at all.

A more likely result would have been that seen in the best-studied, outdoor, mass-exposure to nerve gas on record: a terrorist attack using sarin gas in Matsumoto, Japan.

On the night of June 27, 1984, wind blew nerve agent from the attack into a residential area of that city of 200,000 people. About 600 people were poisoned over several hours, with the physiological responses ranging across the entire spectrum of severity. Two hundred fifty-three people consulted physicians, 56 were admitted to the hospital, four people died on the way to the hospital, and three were found dead.

But did some American troops in the Persian Gulf exhibit the signs and symptoms of mild nerve-gas poisoning? "His seemingly straightforward question is a matter of great dispute.

The Pentagon says no. Until recently (when intense criticism forced them to abandon the argument), military officials pointed to the total lack of definite cases of nerve gas poisoning as the best evidence against reports there had been mild cases. The latter, military authorities said, had to be something other than reaction to gas.

The first rigorous compilation of possible "exposure events" was made by the staff of the Senate banking committee in 1994. That committee became involved, in part, because its chairman, then-Sen. Donald W. Riegle Jr. (D-Mich.), had received complaints of chronic illnesses from constituents who were veterans.

James J. Tufts III and other banking committee staff members collected 16 accounts of times when missiles exploded, sirens sounded, strange smells were noticed, and symptoms such as itchy eyes and skin, runny noses and breathing problems were experienced by one or more soldiers.

In a representative account, John Jacob, a mechanic with the 1st Infantry Division, told the committee staff that on Feb. 25, 1991, while riding in a vehicle in southern Iraq, he smelled something strange. "He recalled . . . a sudden burning in his throat and lungs, watery eyes, blurry vision and photosensitivity, nausea, dizziness and diarrhea," the staff wrote in its report. "He donned his mask and gloves, and sounded an alarm."

The Defense Department is investigating more than a dozen "credible" exposure events. However, it's diffi-

cult to sort out the cause of the symptoms Jacob and others describe. Traces of nerve gas could cause them, but so could the body's "fight-or-flight" response to battle, unknown environmental pollutants, and the drug pyridostigmine bromide.

Pyridostigmine was given to soldiers sent to the Persian Gulf to protect them against the nerve agent soman. The drug binds to the acetylcholinesterase enzyme and temporarily "shields" it from irreversible damage by that nerve agent. Because of its chemical behavior, pyridostigmine's occasional side effects are similar to those of extremely low-dose nerve agent poisoning: diarrhea, nausea, breathing problems, salivation. These problems disappear in a few hours, as the body burns off the drug.

The pills were distributed to the soldiers in blister packs. No records were kept of their use, which appears to have been highly variable. Some soldiers took them when they suspected a gas attack; others waited for instructions. Some took many doses; others only a few. Military authorities now estimate that about 250,000 service personnel took pyridostigmine at least once.

It's unlikely that six years after the fact medical investigators will ever figure out what caused the runny noses, headaches and bouts of nausea some soldiers reported. But even if some are ultimately attributed to low-dose nerve agent exposure, there's little reason to believe they would be followed, months later, by a chronic disease.

Research does show that long-lasting—and possibly permanent—changes sometimes occur in animals repeatedly exposed to nonfatal doses of nerve gas. These effects, however, do not always occur. And when they do, they are subtle and require sophisticated equipment to be found. More important, they're not illnesses in the common meaning of the term; the animals showing the changes are not sick in any obvious way.

For example, rats given soman at doses that cause prostration or sel-

lures sometimes subtle microscopic changes in their brains. Rhesus monkeys given the nerve agent at "symptomless" doses do worse than unpoisoned monkeys in a test of balance and dexterity. That problem, however, goes away within two days of stopping the poison. Even at doses that cause temporary physical collapse of the animal, the brain function returns to normal in three weeks.

Acute poisoning by nerve gas causes characteristic changes in the brain wave, or electroencephalogram (EEG), tracings of human beings and other primates. In the 1970s, scientists at Harvard Medical School and Edgewood Arsenal, the Army's chemical weapons center, looked to see if these changes persisted over time.

The researchers gave monkeys low doses of sarin once a week for 10 weeks, or a single dose that was large enough to cause seizures lasting more than an hour. Some of the animals had slightly abnormal EEG tracings for up to a year. Although the changes were of the sort sometimes associated with anxiety and memory problems, the animals did not behave abnormally. The same researchers found similar EEG changes in 77 men who had been exposed to sarin, in some cases multiple times, through industrial accidents.

Although these findings are provocative, the conditions under which they occurred did not exist during the Persian Gulf War. The experiments either involved repeated exposures (often five to 10 times), or single exposures sufficient to cause immediate illness. Furthermore, despite the laboratory abnormalities, none of the animals was clearly ill. (The health of the sarin-exposed people was not addressed by the researchers.)

In one of the few human experiments with nerve gas in recent decades, eight British soldiers volunteered to undergo low-dose sarin poisoning at a laboratory in Porton Down, England, in 1983 and 1984. The researchers found small changes in the electrical activity of muscle fibers. This lasted for up to 15 months in some cases. However, there was no muscle weakness or any other illness, and the changes eventually were reversed.

There is, however, one report of a group of people exposed to nerve gas who developed symptoms quite similar to those of "Gulf War Syndrome." These were 129 Germans who worked in munitions factories in Berlin and Muenster between 1936 and 1945. They made many kinds of chemical weapons, including sarin and tabun after the start of World War II. In 1963, a scientist named U. Spiegelberg reported on his examination of them.

"The great majority of the examined persons showed persistently lowered vitality . . . headache, gastrointestinal and cardiovascular symptoms, premature decline in libido and potency, intolerance of alcohol, nicotine and medicines . . . [and] impression of premature aging," Spiegelberg wrote. Some also showed memory problems and mild dementia.

This report contains no details about who was exposed to what, does it mention how often workers suffered sublethal exposures to the compounds. It also does not describe the underlying health and nutrition of the workers, which may not have been good during the war years. Because all had held their jobs at least two years (and some for as long as eight), the men's poison exposure almost certainly was far greater than any that might have occurred in the Persian Gulf. Despite those differences, this is the best evidence that the constellation of symptoms some veterans report could conceivably arise from nerve gas.

During the 1950s and 1960s, 1,116 American soldiers were exposed to low doses of nerve agent in Army experiments at Edgewood Arsenal. Frederick R. Sidell, a physician who worked at Edgewood for 31 years, said in a recent interview that he knows of no chronic, Gulf War Syndrome-like illness among those subjects. "I've not heard of any complaints about their health, and I worked at the institute where the complaints would have come," said Sidell, who retired last year.

Even in recent decades, there were "dozens and dozens" of civilian workers at the arsenal who were accidentally exposed to sarin, some several times, he said. "I never heard one say a word that they had any effects of the agent," he said. "It was pretty much an in-grown community, and you'd think workers would have talked among themselves and complained if there had been problems. But there didn't seem to be any."

Of course, it is possible sarin can cause long-term illness, and this fact simply has not been noticed yet.

However, if that's the case, the long-term effect is one "that has not been seen in animal populations, and has not been seen in human populations, from this class of chemicals," said Palmer Taylor, chairman of the department of pharmacology at the University of California at San Diego, and an expert in this field.

"It would have to be an action of sarin that is unique to sarin," he said, adding "it would be unlikely for such a unique property to exist."

Pesticides, which touch far more people than nerve agents ever have, offer an indirect look at the question. Many scientists suspect those compounds, which are similar in some ways to nerve gas, can have subtle, long-term effects on human health. However, different studies have shown different effects, and the idea itself is far from proved.

Among the abnormalities noted in some research are changes in mood, ability to concentrate, as well as minor sensation problems (such as decreased ability to sense vibration with the toes). In virtually all cases, however, the subjects had suffered poisonings severe enough to cause immediate illness. Many required overnight stays in the hospital.

The issue of what may happen after truly "symptomless" exposure to organophosphates is even murkier. There are only a few studies of people whose jobs put them in frequent proximity to pesticides, but who had no history of being poisoned by them.

on h id bug exterminators and sheep farmers who odically dip their animals in pesticide have found subtle abnormalities, or none. Importantly, these studies noted no constellation of brain, muscle, skin and intestinal problems that some veterans say they have gotten from far less frequent symptomless exposures.

Are there long-term health effects from one or two exposures to doses of nerve gas too small to be noticed?

A huge research program is gearing up to answer this question. Few biologists are willing to write off as impossible something that is merely unlikely. Nevertheless, many scientists would be surprised if it turns out that "Gulf War Syndrome" is the product of nerve gas poisoning that almost nobody suspected and, six years after the fact, nobody has proved actually happened.

FOR MORE INFORMATION

To access an online archive of declassified documents detailing troop exposure to chemical agents during the Persian Gulf War, click on the above symbol on the front page of The Post's site on the World Wide Web at <http://www.washingtonpost.com>

The Washington Post

THURSDAY, JANUARY 2, 1997

COMPARING SYMPTOMS



U.S. Marine reconnaissance team in April 1991.

Nerve gas poisoning affects the body in ways that are understood and predictable. Symptoms begin within minutes of exposure and last hours, or in some cases days, in victims who do not die immediately. There is no firm evidence that nerve gas can cause long-lasting illness, like the symptoms of "Gulf War Syndrome." Some studies have demonstrated mild laboratory changes in some people exposed to the toxic compounds.

Immediate effects of nerve gas exposure:

Pinpoint pupils
Headaches
Impaired judgment
Salivation
Nausea and diarrhea
Chest tightness and wheezing
Muscle twitches
Convulsions
Death

Long-term effects of nerve gas exposure:

No symptoms or illnesses known for certain.
Mild changes in the electrical activity of brain and muscle cells seen in some experiments.

Symptoms of "Gulf War Syndrome":

Mood changes
Poor concentration
Joint and muscle pain
Skin rashes
Diarrhea
Complaints involving other organ systems

3/3

A Theory of Chemical Interactions

Study Shows Additive Effects, but Relevance Appears Limited

Some people seeking a cause for "Gulf War Syndrome" believe it wasn't poison gas that caused chronic illness, but the interaction of more benign chemicals.

As evidence that unhealthy interactions could have occurred during the Persian Gulf War, they point to an experiment published earlier this year by Mohamed B. Abou-Donia, of Duke University Medical Center, and colleagues at three other institutions.

The scientists used chickens, a species commonly employed in toxicology experiments. They gave the birds various combinations of pyridostigmine, the drug given soldiers as partial protection against nerve gas; permethrin, an insecticide used on uniforms and tents; and DEET, the active ingredient in the bug repellent used by the troops.

Birds exposed to two of the compounds usually became ill, with muscular weakness, diarrhea and breathing problems the most common symptoms. Of the five birds given all three compounds, three died.

While the study clearly demonstrated the "additive" effects of the chemicals, its relevance to Gulf War exposures is likely to be small. This is because the doses Abou-Donia and his colleagues gave the birds were far bigger than soldiers would have encountered.

The animals every day took four times the amount of pyridostigmine a soldier would have taken in a day, and the birds took it every day for two months. The DEET dosage was 10 times that used by the best-studied population of heavy bug repellent users, employees of Everglades National Park. The daily permethrin dose was 7 million times what a soldier would have absorbed from a uniform each day.

An alternative theory is that Gulf War Syndrome was caused only by pyridostigmine, which had unexpectedly bad effects on some soldiers who took it.

For 50 years, physicians have used that drug to treat a muscle disease called myasthenia gravis. The doses prescribed are three to 50 times what soldiers took, and myasthenia patients take the drug every day.

People with myasthenia gravis are not comparable to healthy soldiers. Nevertheless, there's no evidence the drug causes a chronic illness in them. Furthermore, the drug washes out of the body in less than a day, making persistent effects unlikely. It also rarely alters thinking or mood because very little gets into the brain.

However, this is a drug that may have behaved differently on the battlefield.

During the Gulf War, a team of Israeli scientists interviewed 213 soldiers who had recently taken pyridostigmine. One-quarter of them reported a brain-related symptom, such as headache, insomnia, nervousness, difficulty focusing attention or impaired ability to calculate. The complaints were four times more common in the soldiers than in a group of volunteers who had taken pyridostigmine in peacetime.

Why might this have been true? A recent study suggests battlefield stress might have allowed the drug to get into the brain, where it could conceivably affect thinking and mood.

Several scientists, led by Alon Friedman of Hebrew University in Jerusalem, produced stress in a group of laboratory mice by forcing them to swim. They then injected the animals with pyridostigmine, killed them and measured (indirectly) the amount of drug that had gotten into the animals' brains.

The stressed mice needed only one-hundredth of the dose given unstressed mice to show a similar amount of pyridostigmine "activity" in brain tissue. This suggests that wartime stress could have made soldiers far more sensitive than usual to the drug's nervous system effects.

However, it is not known if the veterans complaining of poor concentration and bad moods took an unusual amount of pyridostigmine—or any at all—during the war. Even if they did, there's no reason to believe the drug would still be showing its effects months or years later.

— David Brown

The Washington Post

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TO: Pam
FR: Brenda
4 pgs.

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HEADLINE: Gulf War illness genuine, Dallas researchers say Neurological damage suspected

BYLINE: Laura Beil, George Rodrigue, Staff Writer of The Dallas Morning News

DATELINE: WASHINGTON

BODY:

WASHINGTON - The elusive "Gulf War syndrome" is genuine and appears to be caused by neurological damage from chemical exposures

during the conflict, a team of Dallas researchers announced Wednesday.

In arguably the most sophisticated investigation of the issue so far, three reports from scientists at the University of Texas Southwestern Medical Center at Dallas conclude that the veterans studied have symptoms that may reflect injury to the brain and nervous system.

"Illness from the Persian Gulf War is real," said Dr. Robert Haley, chief of epidemiology at UT Southwestern.

The veterans' symptoms, including concentration problems, muscle weakness and chronic diarrhea, suggest that they are suffering from a rare condition caused by chemicals that inhibit a certain enzyme in nerve cells. The condition, which is called organophosphate-induced delayed polyneuropathy, or OPIDP, is known by toxicologists but not most general physicians, Dr. Haley said.

"This probably explains why no one explored this diagnosis earlier," he said.

The Dallas researchers' three studies of Gulf War syndrome will appear in the Jan. 15 Journal of the American Medical Association.

A fourth study of Desert Storm veterans, from scientists at the University of Iowa and the U.S. Centers for Disease Control and Prevention, will appear in the same issue.

All four reports "shed important new light in helping to better characterize the perplexing symptoms of illnesses experienced by Gulf War veterans," Dr. Phil Fontanarosa, a senior editor of the journal, said Wednesday during a news conference releasing the research.

Veterans' groups said they hoped the study would spur further research and eventually lead to treatment.

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"What Dr. Haley did today was a major gift to Gulf War vets," said American Legion spokesman Phil Budhan. "There's been a lot of anxiety and confusion about what happened in the gulf. We've always thought the answers were going to come from hard science . . . and what Dr. Haley's done is some of the best science we've seen to date."

Whether the studies will fundamentally alter the government's treatment of veterans remains a question.

Senate investigators, preparing for hearings on Thursday, said they consider Dr. Haley's findings significant.

A presidential advisory committee issued its findings Tuesday, heavily emphasizing the role of stress in Gulf War ailments. While not discounting stress as a factor, Dr. Haley said Wednesday that the ill veterans studied did not show signs of stress.

White House spokesman Mike McCurry said the researchers who presented their new findings Wednesday did not contradict the presidential panel's report.

"They were the first to say they had not found the causal link to those health effects, but that work needed to continue. And we'd welcome any of those who can come forward with research and continue the work," Mr. McCurry said at a news conference.

Aides to the presidential committee noted that their report had called for further research along the lines of Dr. Haley's work.

Committee Chairwoman Joyce C. Lashof agreed that veterans may suffer from the interaction of numerous chemicals to which they were exposed.

"We would not have changed anything in our final report based on what these JAMA reports contain," said commission spokesman Gary Caruso.

Other scientists, while hailing the new findings as an important clue, cautioned that it is too early to declare the mystery solved.

"I think Dr. Haley deserves a tremendous amount of credit," said Dr. Robert Roswell, director of the Florida and Puerto Rico VA medical centers and executive director of the Persian Gulf veterans coordinating board. "But this shouldn't be viewed as the final answer."

For instance, he said, symptoms of OPIDP usually surface within weeks or months - not years - after exposure to chemicals.

The Dallas scientists focused on 249 members of 24th Reserve Naval Mobile Construction Battalion, all of whom completed extensive survey booklets.

The unit drew reservists from North and South Carolina, Tennessee, Georgia and Alabama into active duty during the Gulf War.

The scientists say they tried to make up for the weakness of other studies. For example, the survey avoided using ambiguous terms such as "fatigue" when

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asking about possible symptoms.

Also, 43 of the survey volunteers underwent objective neurological tests that could not be influenced by perceptions of their own illnesses.

The UT Southwestern research team identified not one, but three possible Gulf War syndromes, each of which may represent different degrees of severity of the same malady.

Syndrome 1, called impaired cognition, appeared to be associated with younger veterans and those who wore pet flea collars around their boots to discourage insects.

Syndrome 2, called confusion-ataxia, was more common in older veterans and those who reported being in a likely chemical weapons attack. Syndrome 2 had the most severe symptoms.

Syndrome 3, called arthro-myo-neuropathy, appeared to be more common in veterans who used government-issued insect repellent and in older veterans.

Up to one out of four veterans in the unit studied were suffering from at least one of the syndromes.

In a supporting study, Iowa researchers also found that Gulf War veterans reported more symptoms of illness than members of the military who served at the same time outside the gulf region.

Service members could have been exposed to a variety of chemicals, including pesticides, insect repellents and anti-nerve gas pills. Dr. Haley said Wednesday that previously published data from studies in animals indicate that although none of the agents individually would be responsible for the syndrome, the cocktail of chemicals could have these effects.

The bottom line is that the implication of a chemical combination "is probable but needs further testing," said Dr. Tom Kurt, a UT Southwestern toxicologist who worked with Dr. Haley. Jim Hom from the medical school also was an author on the papers. The research was funded by the Perot Foundation.

In an editorial published with the four studies, Dr. Philip Landrigan of the Mount Sinai School of Medicine in New York writes that the new studies "confirm what many physicians caring for Gulf War veterans already know, namely, that the illnesses in these men and women are quite real."

He praised the painstaking measures that the researchers took in trying to avoid skewing their results.

However, Dr. Landrigan pointed out on Wednesday that all researchers are investigating exposures that occurred six years ago and can't be measured now.

"In this particular instance, the trail is a bit cold," said Dr. Landrigan, who is also a member of the Presidential Advisory Committee on Gulf War Veterans' Illnesses.

Also, he said, less than half the members of the battalion participated in Dr. Haley's studies, and those who chose to volunteer may be different in some

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way from those who didn't.

In the end, Dr. Landrigan said, he hopes these studies will prompt more research that looks deeper at the question.

"We certainly have a responsibility to keep looking," he said.

Pentagon spokesman Jim Turner said the military had not yet drafted its response to the reports. Several Defense Department experts endorsed Dr. Landrigan's critique of the JAMA articles, Mr. Turner added.

Veterans who were studied said the report vindicated their long-standing belief that they suffered from more than psychological stress.

"We kind of suspected these things all along, but nobody believed us," said Jerry Jones, a dis-abled Navy Seabee who participated in the research. "We still have people thinking that we're malingerers, and it's all in our heads."

Staff writer Susan Feeney in Washington contributed to this report.

GRAPHIC: CHART(S): (DMN) Possible Gulf War Syndromes. PHOTO(S): Robert Haley.

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Chemical linked to gulf syndrome ^{the}

BY LAURIE GARRETT
NEWSDAY, LONG ISLAND, N.Y.

NEW YORK — Israeli scientists have discovered that a chemical used by allied troops during the Persian Gulf War may under conditions of human stress get into the brain and produce symptoms like some of those described as gulf war syndrome.

The chemical — pyridostigmine — was issued to all allied troops in the Persian Gulf beginning in January 1991. Pentagon spokesman Lt. Donna Boltz confirmed Monday that pyridostigmine was used at the discretion of commanding officers to protect soldiers from the life-threatening impact of organophosphate chemical weapons, widely believed to be used by Iraq. Some troops may have been ordered to take several doses, some none.

Pyridostigmine has been used as a prophylactic treatment to protect people from the organophosphate class of chemicals, such as the deadly gas sarin.

Though the Pentagon hasn't released hard numbers on how many troops received the drug during the war, its use in that arena appears to have been the most widespread in combat history.

In today's issue of *Nature Medicine*, a team of Israeli psychiatrists and pharmacologists report that some of their country's gulf war veterans have suffered central nervous system symptoms indicative of pyridostigmine chemical toxicity in their brains, including dizziness, nausea, disorientation, depression, irritability, insomnia, headaches and impaired calculation capabilities.

Pyridostigmine, like most drugs, was not thought to be able to cross the so-called blood-brain barrier, an elaborate membrane system that prevents unwanted chemicals from leaving the bloodstream and entering the brain.

But Dr. Alon Friedman of Hebrew University in Jerusalem and his colleagues from the Is-

raeli Defense Forces and Tel Aviv University found that when people are under severe stress, the blood-brain barrier becomes permeable, and pyridostigmine readily crosses into the brain.

They based their findings first on experiments in mice. Rodents given pyridostigmine under normal circumstances suffer only peripheral nervous system side effects, such as diarrhea and excess sweating. That means that the drug is circulating through the bloodstream, but not into the brain. But mice who were put under stress and then injected with the drug suffered central nervous system side effects.

Similarly, studies of 35 healthy Israeli soldiers given the drug during peacetime showed that most suffered only mild peripheral nervous system effects. But 24 percent of the 213 wartime soldiers in the Israeli army who were given the drug suffered central nervous system effects, many long-lasting.

PHOTOCOPY
PRESERVATION

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GCertain Gulf vets found to have higher rate of muscle, bone

WASHINGTON (AP) Gulf War veterans who were near an accidental release of nerve gas in Iraq show a higher rate of muscle and bone ailments than those farther away, a top veterans official said Tuesday.

The Veterans Affairs Department identified 81 Gulf veterans who were part of a weapons demolition team that blew up shells later found to contain deadly sarin nerve gas. Of that group, 31 percent "have been diagnosed with musculoskeletal conditions at a higher rate than veterans who were farther away," Dr. Kenneth Kizer, the VA's top health official told a House panel.

The results are preliminary, Kizer cautioned. They concern soldiers involved in the demolition of Iraqi weapons at a site called Kamisiyah in March 1991, just after the war. Test results on these 81 soldiers "cannot be generalized to the entire Kamisiyah group or considered definitive," he said.

Nevertheless, they bolster the arguments of veterans and lawmakers who argue that exposure to chemical weapons during the Gulf War may explain various ailments suffered by thousands of veterans. The ailments, known collectively as Gulf War syndrome, include headache, insomnia, muscle ache, joint pain, stomach disorder and chronic fatigue.

The VA has conducted diagnostic examinations of more than 52,000 Gulf veterans. Of those, 1,978 were within 31 miles of Kamisiyah and 81 were at the scene of the demolition operations. The soldiers thought they were blowing up conventional munitions. Only last year did the Pentagon confirm reports that some of the warheads contained sarin.

The medical exams of Gulf veterans generally and those within 31 miles of the site returned similar results: 25.3 percent and 25.9 percent respectively reporting ailments of "musculoskeletal and connective tissue." For the 81 veterans at the site, however, 30.9 percent reported musculoskeletal and connective tissue ailments.

Exam results indicating "injury and poisoning" of various kinds also were higher for the Kamisiyah group: 8.6 percent, compared with 4.8 percent for all those examined and 5.9 percent for those within 31 miles of Kamisiyah.

In several other categories, the reported problems among the 81 at Kamisiyah were not appreciably higher. Indeed, in such categories as mental disorders, nervous and circulatory system ailments and respiratory and digestive troubles, the results for the 81 at Kamisiyah were slightly lower.

Because the veterans who came in for VA exams were "self-selected" in that they came in because they believed they were ill, comparisons of various subcategories of Gulf veterans may be of limited value to the nearly 700,000 American troops who served in the conflict.

"This information gives one perspective, or a partial snapshot," Kizer said.

Rep. Christopher Shays, R-Conn., chairman of the House Governmental Reform and Oversight human resources subcommittee, pressed Kizer on the VA's failure until 1995 to ask ailing veterans about possible chemical exposures.

When Kizer refused to concede that the VA had made mistakes, Shays retorted, "You are being evasive."

In a sign of the Pentagon's increasing sensitivity to veterans' complaints, Bernard Rostker, the Pentagon official in charge of

Gulf War issues, said he ordered a staff paper removed from the department's Gulf War information computer home page because it discounts low-level exposure as the cause for Gulf War illnesses.

Rostker also responded to testimony in December by two Marines and an Army major that higher-ups had ignored their alerts about chemical weapons detections. In one case, Rostker said, troops were ordered to don their protective gear in response to a preliminary warning that was later found to be a false alarm.

But Rostker said there are cases, including chemical detections by Czech units fighting in the Gulf War coalition, that the Pentagon ``cannot explain.'' One problem may be that the U.S. chemical weapons detection equipment used to follow up on Czech reports was less sensitive than the gear used by the Czechs.

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