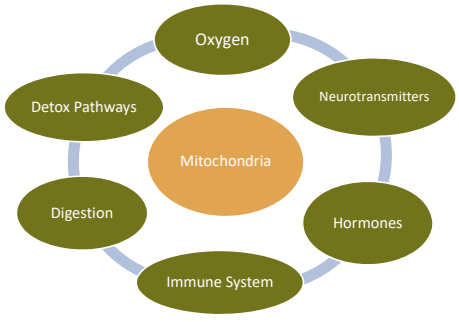
INE INSTITUTE OF NUTRITIONAL ENDOCRINOLOGY

Cellular Metabolism and Nutrition: A Powerful Model for Self-Healing

Dr. Ritamarie Loscalzo

Medical Disclaimer: The information in this presentation is not intended to replace a one-on-one relationship with a qualified health care professional and is not intended as medical advice. It is intended as a sharing of knowledge and information from the research and experience of Dr. Ritamarie Loscalzo, drritamarie.com, and the experts who have contributed. We encourage you to make your own health care decisions based upon your research and in partnership with a qualified health care professional.

What Affects Energy?

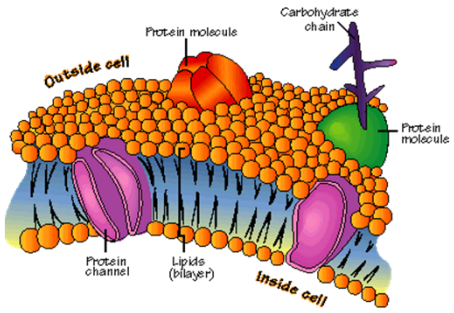


What Causes Fatigue?

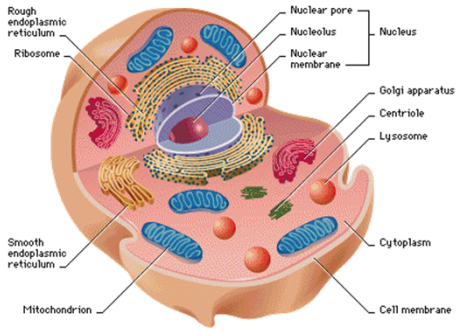
Imbalances in:

- ✓Oxygen
- ✓Neurotransmitters
- ✓Hormones
- ✓Mitochondria
- ✓Immune System
- ✓Digestion
- ✓Detox Pathways

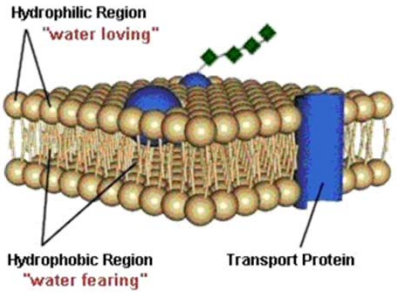
Cell Wall



Inside Cells



Cell Membrane



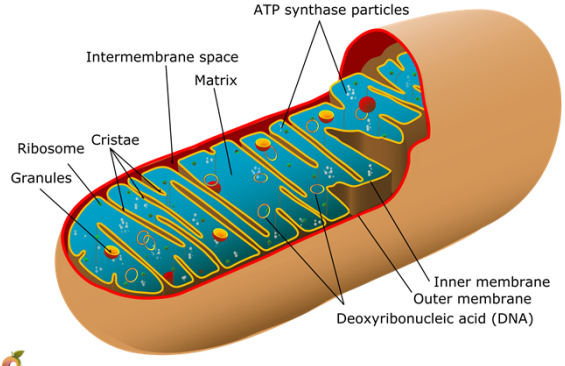
Mitochondria:
The Power House of The Cells

Sugar and Oxygen

Free Radicals

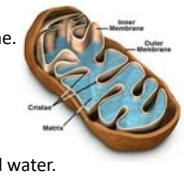
ATP (energy)

A Peek Inside Mitochondria



Mitochondrial Parts

- ✓ **Outer membrane:** Semi-permeable phospholipid bilayer, allows passage of ions, ATP (adenosine triphosphate), ADP (adenosine diphosphate), and nutrients.
- ✓ **Inner membrane:** Permeable: allows oxygen, water, and carbon dioxide to pass through.
- ✓ **Cristae:** Shelf-like folds in inner membrane that help in expansion of the inner cell membrane.
- ✓ **Intermembrane space:** This is the space between outer membrane and inner membrane.
- ✓ **Intermembrane space:** Primarily responsible for oxidative phosphorylation.
- ✓ **Cytoplasmic matrix:** Contains the DNA molecules, enzymes, oxygen, carbon dioxide, recyclable intermediates (energy shuttles), and water.



Mitochondria Functions

- ✓ **Cellular respiration:** The release of energy from glucose
  - ➢ **Stage 1:** Glycolysis
  - ➢ **Stage 2:** Citric Acid Cycle
  - ➢ **Stage 3:** Electron Transport
- ✓ Cell signaling for neurons
- ✓ Managing apoptosis
- ✓ Controlling cell cycle
- ✓ Monitoring cell differentiation, growth, and development

Stage 1: Glycolysis

- ✓ Glucose is a **six-carbon sugar**.
- ✓ The enzymes in the cytoplasmic matrix initiate **glycolysis.**
- ✓ **Glucose**, a 6-carbon sugar, is oxidized to 2 molecules of a 3-carbon sugar, yielding two molecules of ATP, two molecules of pyruvic acid and two electron-carrying molecules of NADH (nicotinamide adenine dinucleotide).

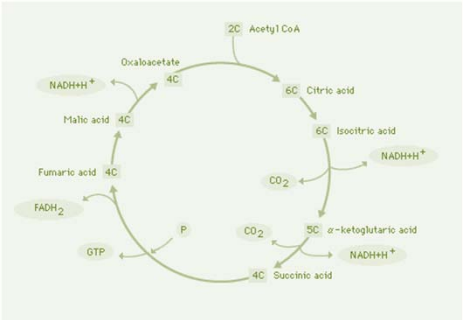
Stage 2: Citric Acid Cycle aka Krebs Cycle

- ✓ The three-carbon molecules which have been produced as a result of glycolysis are converted into acetyl compounds.
- ✓ The intermediary reactions of this process yields **ATP** molecules of energy and **NAD and FAD** (flavin adenine dinucleotide) molecules, too.
- ✓ **NAD and FAD** molecules are further reduced in the Kreb cycle to carry high energy electrons.

Stage 3: Electron Transport

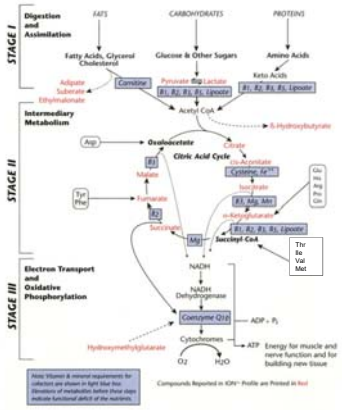
- ✓ A series of electron carriers generated in the membrane of the mitochondria from the Krebs cycle
- ✓ The ATP molecules are further produced by the chemical reactions of these electron carrier molecules
- ✓ **36 ATP molecules after cellular respiration**

Creating Energy: The Krebs Cycle



Nutrients Needed for ATP Production

- ✓**Vitamin B3:** Niacin NADH (Nicotinamide adenine dinucleotide hydride)
- ✓**Vitamin B2:** *Flavin Adenine Dinucleotide* (*FAD*)
- ✓**Amino Acids:** Kreb cycle intermediates
- ✓**CoQ10:** Oxidative phosphorylation process
- ✓**Magnesium:** Activates alpha-ketoglutarate
- ✓**Carnitine:** Shuttles fat
- ✓**Ribose:** Fuels Kreb cycle



Nutrients to Protect From Free Radicals

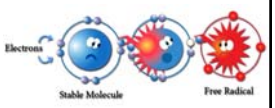
- ✓Zinc
- ✓Selenium
- ✓Vitamin C
- ✓Vitamin A
- ✓Manganese
- ✓Copper
- ✓Sulfur containing amino acids

Protecting Mitochondria

- ✓Sugar balance
- ✓Co-enzymes
- ✓Antioxidants
- ✓Fat balance
- ✓Whole foods diet
- ✓Avoidance of environmental toxins
- ✓Be wary of medications
- ✓Manage stress

Free Radical Damage

Oxidize aka "rust" cells
↓
More free radicals
↓
More "rusted" cells
↓
Damaged DNA
↓
Damaged cell membranes
↓
Oxidized cholesterol
↓
Stiff arteries
↓
Wrinkles
↓
Brain damage
↓
Dementia, depression, brain fog, etc.



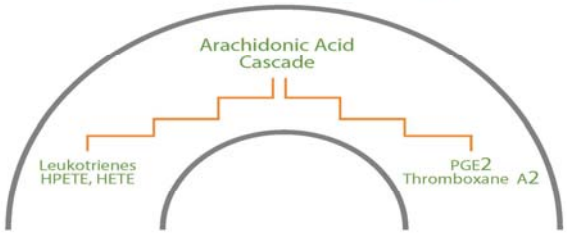
Substances That Damage Mitochondria

- ✓ Sugar
- ✓ Trans and heated fats
- ✓ MSG
- ✓ Pesticides
- ✓ Preservatives
- ✓ Artificial flavorings
- ✓ Processed grains
- ✓ Acid forming foods
- ✓ Inflammatory foods
- ✓ Cortisol

Restoring Your Client's Energy

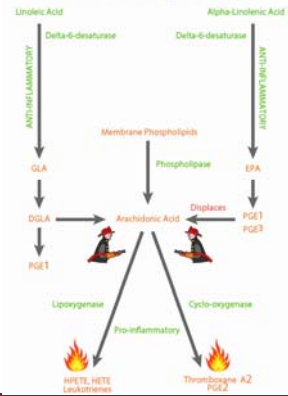
Food Choices	• Fresh, whole, organic
Environment	• Air quality and quantity • Sunshine
Toxins	• Food, water, air • Internally produced
Movement and Rest	• Exercise • Sleep
Thoughts and Attitudes	• Positive, appreciative, caring
Structural Alignment	• Posture, mobility
Energetic Balance	• EMFs • Meridians, chakras

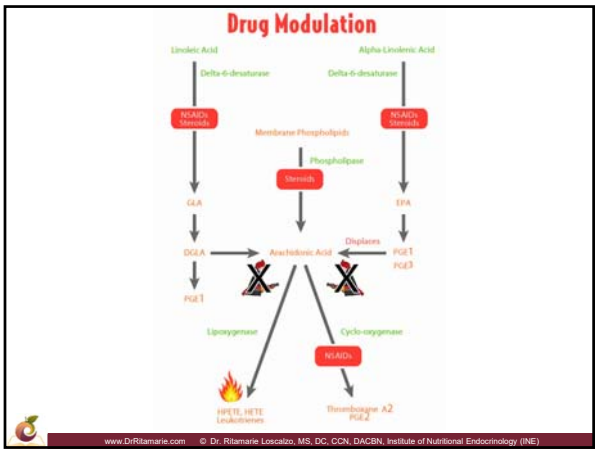
Mast Cell Membrane



Producing Pro-inflammatory Agents

Inflammatory Cascade




Drug Modulation
Linoleic Acid
Alpha-Linolenic Acid
Delta-6-desaturase
Delta-6-desaturase
NSAIDs
Steroids
NSAIDs
Steroids
Membrane Phosphoplipids
Phospholipase
Steroids
GLA
EPA
DGLA
Arachidonic Acid
Displaces
PGE1
PGE3
PGE1
Lipoxygenase
Cyclo-oxygenase
NSAIDs
HPETE, HETE
Leukotrienes
Thromboxane A2
PGE2
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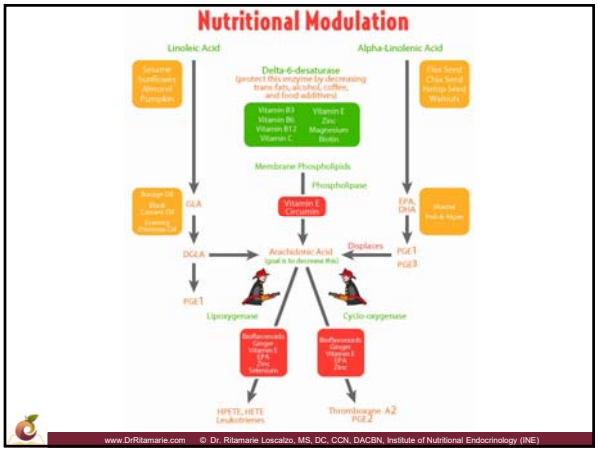
Nutritional Modulation
Linoleic Acid
Alpha-Linolenic Acid
Delta-6-desaturase
Vitamin B3
Vitamin B6
Vitamin B12
Vitamin C
Vitamin E
Zinc
Magnesium
Biotin
Membrane Phosphoplipids
Phospholipase
Vitamin E
Curcumin
GLA
EPA
DHA
DGLA
Arachidonic Acid
Displaces
PGE1
PGE3
PGE1
Lipoxygenase
Cyclo-oxygenase
Bioflavonoids
Ginger
Vitamin E
EPA
Zinc
Selenium
Bioflavonoids
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PGE2
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