SIEVEKING PLASTIC SURGERY

AGELESS SOLUTIONS

PROTECT YOUR POWER: THE ROLE OF MITOCHONDRIA IN HEALTH AND LOGEVITY

Your Weekly Newsletter

by Dr. Nick Sieveking

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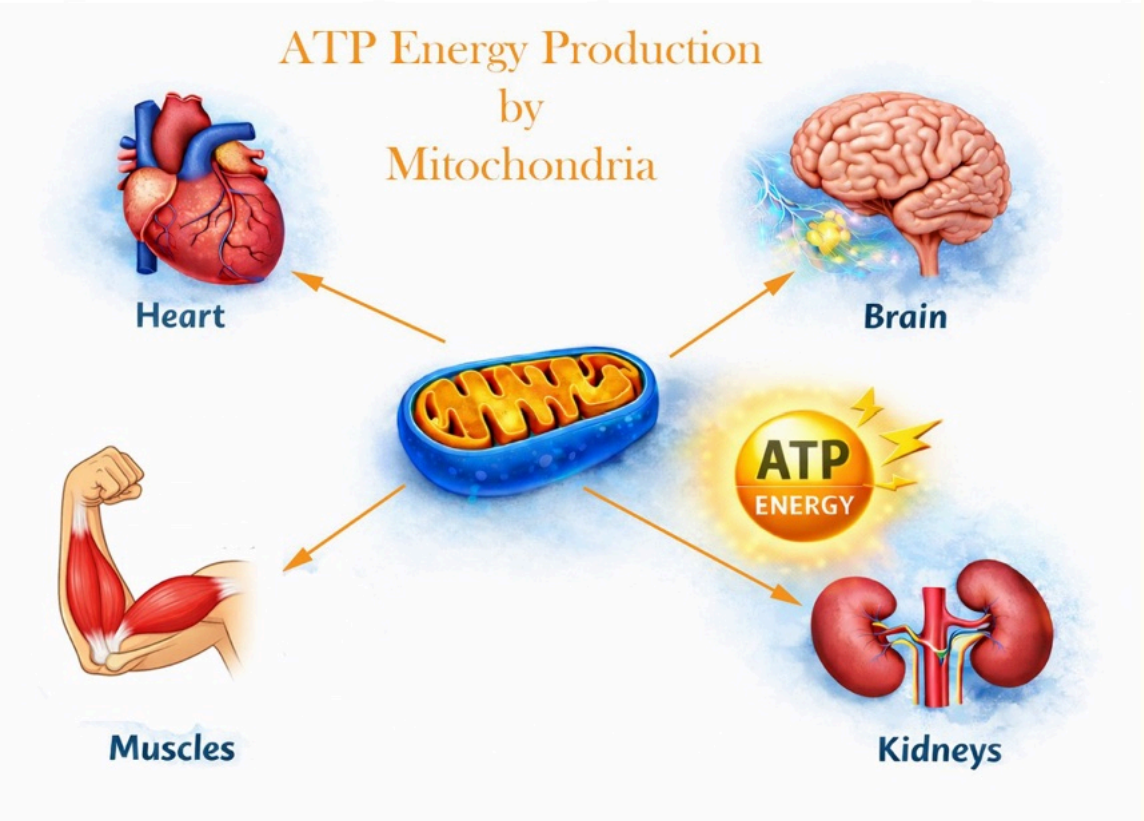
What Are Mitochondria?

Mitochondria are small structures inside nearly every cell in your body that act as your internal energy generators. Their job is simple but critical—they take the food you eat and the oxygen you breathe and convert it into usable energy, called ATP. This energy powers everything your body does, from thinking clearly and maintaining a healthy metabolism to moving your muscles and producing hormones. Organs that require the most energy—like the **brain, kidney, heart, & muscles**—contain the highest number of mitochondria. When they are functioning well, you feel energized and resilient. When they are not, fatigue, brain fog, and metabolic issues begin to appear.



Key Functions of Mitochondria

- **Produce ATP (Energy)**
  - Convert nutrients and oxygen into usable cellular energy that powers every function in the body
- **Regulate Metabolism**
  - Determine whether your body burns fat or glucose for fuel
- **Control Apoptosis (Cell Turnover)**
  - Help decide when damaged cells are repaired or eliminated
- **Manage Oxidative Stress**
  - Balance the production and neutralization of free radicals to limit tissue damage
- **Influence Inflammation**
  - Play a central role in triggering (when needed) or calming (when detrimental) inflammatory pathways
- **Support Hormone Function**
  - Involved in the production and signaling of key hormones (thyroid, sex hormones, cortisol)
- **Maintain Cellular Health & Longevity**
  - Directly impact aging, tissue repair, and resilience
- **Regulate Calcium Balance**
  - Help control intracellular calcium, critical for muscle contraction and nerve signaling, bone health, heart health, brain function, etc.
- **Drive Exercise Performance & Recovery**
  - Determine endurance, strength output, and recovery capacity
- **Support Brain Function**
  - Provide the energy required for focus, memory, and cognitive clarity

When Mitochondria Aren't Functioning Properly, What Happens?

When your mitochondria begin to underperform, your body doesn't have the energy it needs to function efficiently. This shows up in ways most patients don't immediately connect to cellular health:

You may experience:

- Persistent fatigue—even after a full night of sleep
- Brain fog, poor focus, or memory issues
- Insulin resistance and weight gain (especially around the abdomen)
- Poor exercise tolerance and slow recovery
- Chronic, low-grade inflammation ===> all system degradation and failure
- Accelerated aging (skin, energy, and overall resilience)

But it goes deeper than that:

- Hormonal imbalances (thyroid, testosterone, estrogen dysregulation)
- Increased oxidative stress (damage at the cellular level)
- Higher risk of metabolic disease (Type 2 diabetes, cardiovascular disease)
- Weakened immune function
- Increased susceptibility to chronic illness and degenerative conditions

In short: When mitochondria fail, energy production drops—and when energy drops, every system in the body begins to suffer

Cardiac Issues Linked to Poor Mitochondrial Function

The heart is one of the most mitochondria-dense organs in the body. When mitochondrial function declines, the heart cannot produce the energy it needs to pump efficiently.

This can lead to:

- **Heart Failure (Reduced Pump Function)**
  - The heart muscle weakens due to insufficient ATP production
- **Cardiomyopathy**
  - Structural and functional abnormalities of the heart muscle, often tied to impaired energy metabolism
- **Arrhythmias (Irregular Heart Rhythms)**
  - Disrupted electrical signaling due to poor energy availability and calcium imbalance (Atrial Fibrillation, heart block, Premature ventricular contractions,..)
- **Ischemia & Poor Recovery After Injury**
  - Reduced ability to tolerate or recover from decreased blood flow (e.g., after a heart attack)
- **Endothelial Dysfunction**
  - Impaired function of blood vessels, contributing to poor circulation & vascular disease
- **Hypertension (High Blood Pressure)**
  - Linked to vascular stiffness and impaired energy handling in smooth muscle cells
- **Increased Oxidative Stress in Cardiac Tissue**

    - Leads to cellular damage, fibrosis, and progressive decline in cardiac function
- **Accelerated Cardiovascular Aging**
    - Reduced resilience of the heart over time

Neurodegenerative Disorders & Mitochondrial Dysfunction

Poor mitochondrial function is strongly linked to the development and progression of several neurodegenerative conditions:

- Alzheimer’s disease
    - Reduced energy production and increased oxidative stress contribute to plaque formation and neuronal loss

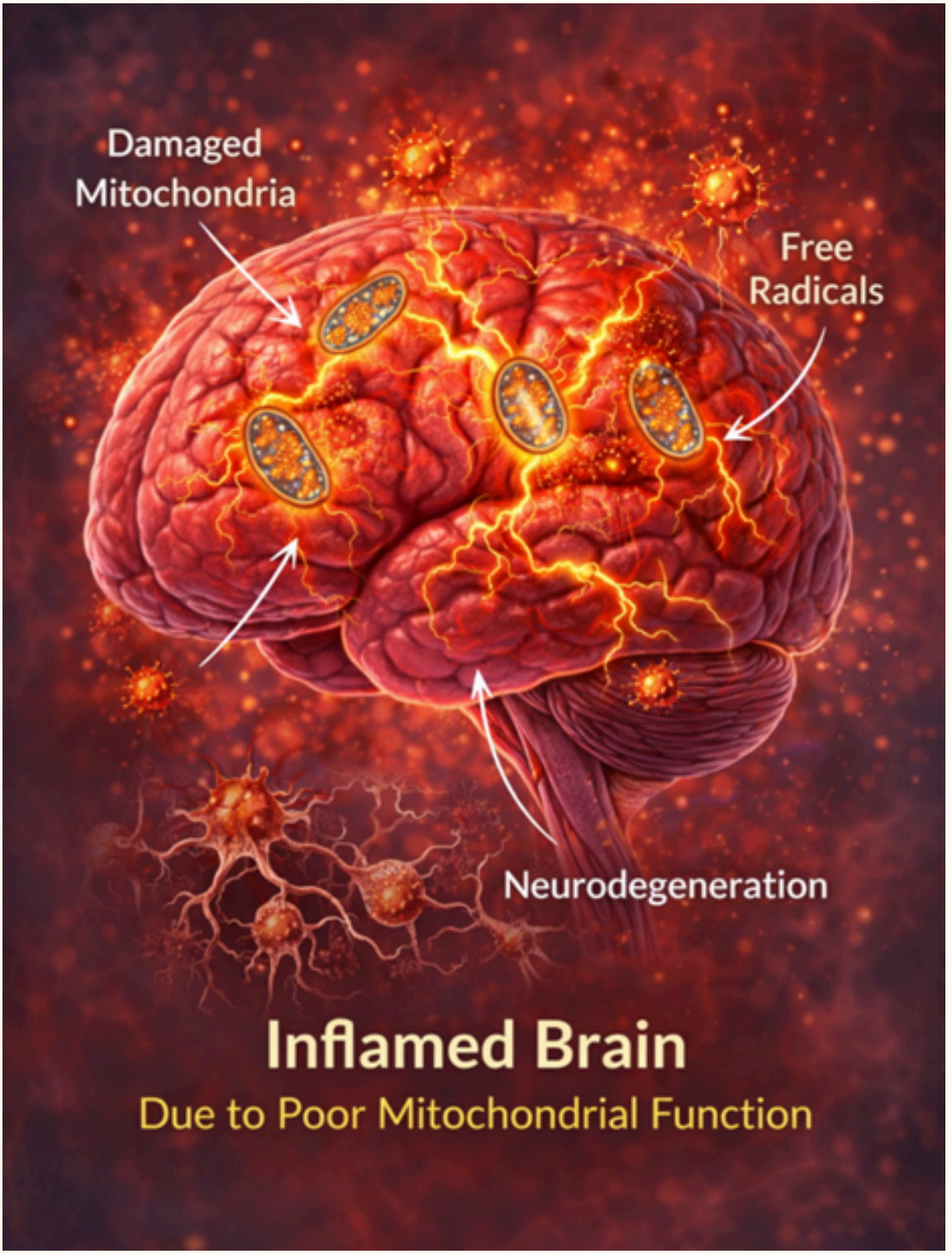
- Parkinson’s disease
    - Mitochondrial defects impair dopamine-producing neurons, accelerating degeneration
- Amyotrophic lateral sclerosis (ALS)
    - Energy failure in motor neurons contributes to progressive muscle weakness
- Huntington’s disease
    - Impaired mitochondrial metabolism plays a role in neuronal dysfunction and death

Across brain diseases, the most robust, mechanistically grounded association is between poor mitochondrial function and age-related neurodegenerative disorders—especially **Parkinson’s and Alzheimer’s**—where mitochondrial dysfunction is increasingly framed as a primary etiologic driver rather than just a downstream consequence.

Why This Happens (Patient-Level Explanation)

- The brain consumes a massive amount of energy
- Neurons rely almost entirely on mitochondria to function
- When mitochondria fail:
    - Energy production drops
    - Oxidative stress rises
    - Inflammation increases
    - Damaged neurons cannot repair themselves

Over time, this creates a cascade that leads to cognitive decline and neurodegeneration.



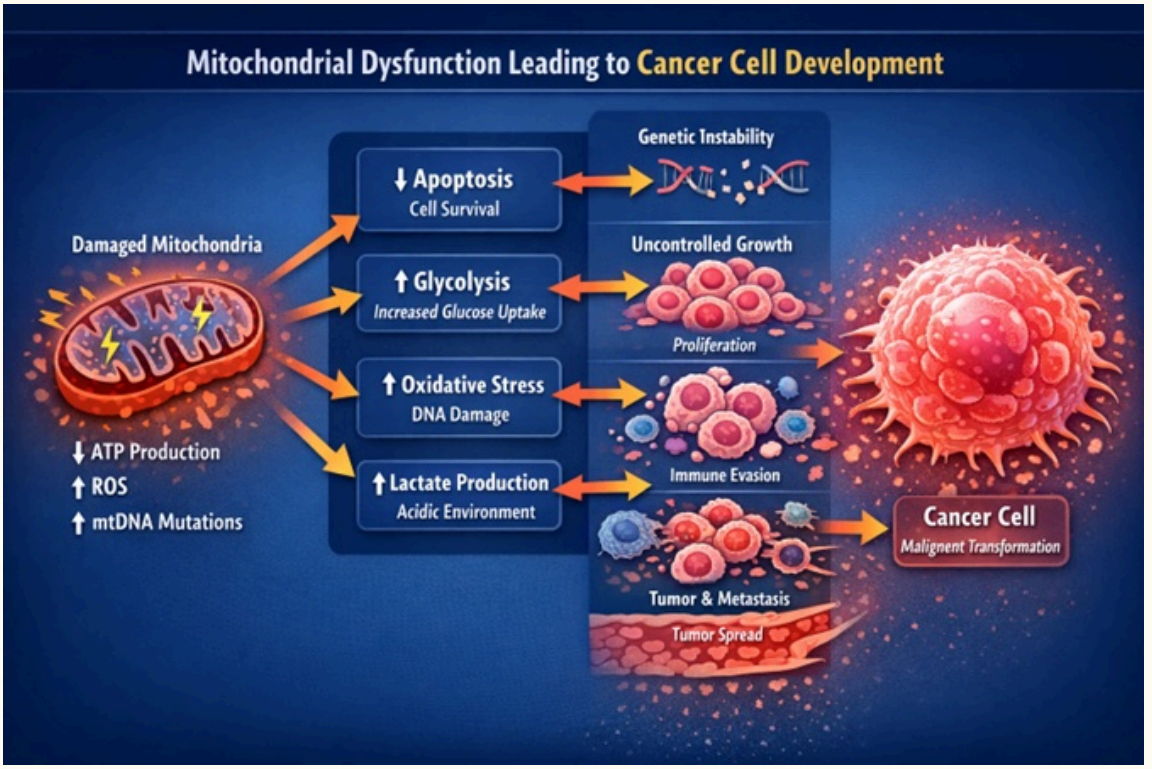
Cancer & Mitochondrial Dysfunction

Mitochondria play a central role in regulating cell growth, energy production, and cell death. When they are not functioning properly, several processes can shift in a way that favors cancer development.

How Mitochondrial Dysfunction Contributes to Cancer

- **Altered Energy Metabolism (Warburg Effect)**
  - Cancer cells shift away from normal mitochondrial energy production and rely more on glucose (glycolysis), even when oxygen is present. Cancer cells don't "lose" mitochondria—they reprogram metabolism which gives tumors a strategic advantage.
- **Failure of Apoptosis (Cell Death)**

    - Damaged or abnormal cells, that should be eliminated, are allowed to survive and replicate
- **Increased Oxidative Stress**
    - Excess free radicals damage DNA, increasing mutation risk Cancer Cells
- **Chronic Inflammation**
    - Mitochrial dysfunction promotes a pro-inflammatory environment that supports tumor growth
- **Loss of Cellular Control Mechanisms**
    - Mitochondria help regulate normal cell signaling—when disrupted, uncontrolled growth can occur => The Hallmark of Cancer Cells
- **Genetic Instability**
    - Damage to mitochondrial DNA and increased mutation rates can contribute to cancer progression



Important Clinical Perspective

- Mitochondrial dysfunction is not the sole cause of cancer
- But it is a major contributing factor in the cellular environment that allows cancer to develop
- It often works in combination with:
    - Environmental toxins- plastics, pesticides, lead, arsenic, mold
    - Drugs- (e.g. Statins) up to 30% of drugs are toxic to mitochondria
    - Smoking
    - Alcohol intake
    - Poor metabolic health => Metabolic Syndrome
    - Chronic inflammation
    - Infections – Epstein-Barr, CMV, Lyme's Disease
    - Gut disorders and disruptions of micro biome (LPS endotoxin)
    - Lifestyle factors: stress, lack of exercise, poor sleep

    - Genetic susceptibility
    - Nutrient deficiencies- magnesium, B vitamins, CoQ10, NAD, Carnitine, omega-3 fatty acids

Testing

Mitochondrial health is influenced by many interconnected factors, and no single test can give a complete picture on its own. When the global symptoms of mitochondrial dysfunction appear—alongside certain test abnormalities—it's essential to explore and address potential mitochondrial disease.

Symptom Review

- Persistent fatigue—even after a full night of sleep
- Brain fog, poor focus, or memory issues
- Insulin resistance and weight gain (especially around the abdomen)
- Poor exercise tolerance and slow recovery
- Chronic, low-grade inflammation ===> all system degradation and failure
- Accelerated aging (skin, energy, and overall resilience)

First-line Panel (Screening)

Order these baseline labs for any patient in whom mitochondrial disease is part of the differential diagnosis:

1. CBC— hemoglobin, platelet, white blood cell abnormalities. Anemia in 10%
2. CMP (AST/ALT)—Liver injury, coagulopathy, hypoglycemia, and low albumin are common
3. Creatinine Kinase (CK)—elevations point to muscle damage
4. Low Albumin—a marker for liver disease
5. Glucose-- Mitochondrial disease is associated with both hypoglycemia and hyperglycemia/diabetes
6. Uric Acid-- uric acid abnormalities more often reflect mitochondrial dysfunction in vascular, renal, and hepatic tissues
7. Serum Lactate — serum/plasma lactate is often elevated at rest or with minimal exertion
8. Plasma Amino Acids — Alanine: Consistently elevated in definite mitochondrial disease
9. Plasma Acylcarnitine profile—suggests mitochondrial myopathy (muscle disease)
10. Quantitative urine organic acids-- In mitochondrial disease, urine organic acids can show lactic aciduria, excess ketones, and specific dicarboxylic/3 methylglutaconic type acids

Purpose of this Tier

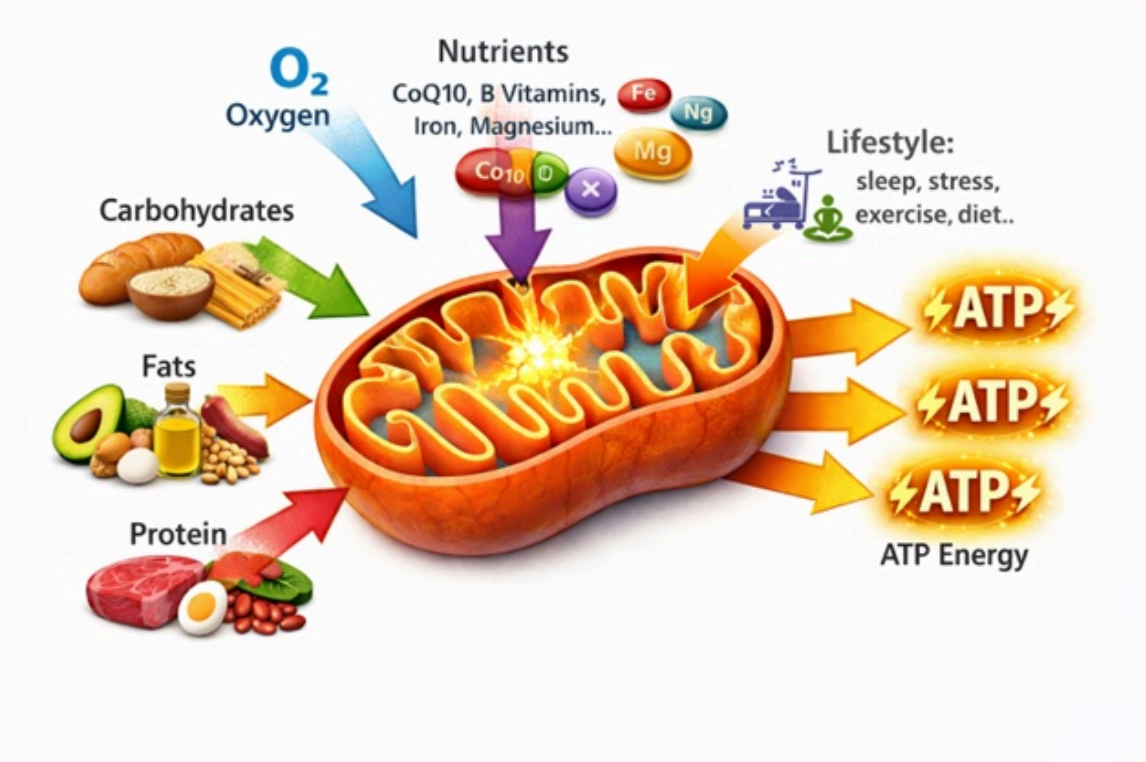
- Help raise or lower suspicion for primary mitochondrial disease compared with other metabolic disorders.
- Determine whether early genetic testing or referral to a mitochondrial specialty center is appropriate.

Treatment and Lifestyle Support

There isn't a single definitive test or treatment for mitochondrial disease. Unlike conditions such as hypothyroidism or high cholesterol, which have clear diagnostic criteria and straightforward therapies, mitochondrial disorders often involve a degree of clinical presumption and trial and error in management. When mitochondrial dysfunction is suspected based on symptoms and initial laboratory abnormalities, a combination of lifestyle measures and targeted nutraceutical support is recommended.

Lifestyle Measures:

- Prioritize consistent, high quality sleep
- Implement effective stress reduction strategies
- Engage in regular aerobic exercise and resistance training
- Follow an anti-inflammatory eating pattern and avoid highly inflammatory foods
- Do not smoke
- Limit alcohol intake
- Avoid medications that disrupt the gut microbiome or interfere with hormone balance
    1. Antibiotics
    2. Acid suppressors (PPIs / H2 blockers)
    3. NSAIDs
    4. Corticosteroids
    5. Hormonal medications (birth control, HRT, androgens)
    6. Antidepressants / psychiatric medications
    7. Diabetes medications
    8. Statins
    9. Laxatives
    10. Artificial sweeteners



a. **Mitochondrial Support Protocol**

Core "Mitochondrial Cocktail" (Foundation)

1. CoQ10 (Ubiquinol preferred)
    a. Supports electron transport and ATP production
    b. Typical: 100–300 mg daily
2. L-Carnitine / Acetyl-L-Carnitine
    a. Moves fats into mitochondria for energy
    b. Typical: 1–3 g daily
3. B-Complex (especially B1, B2, B3, B6, B12, Folate)
    a. Required cofactors for energy production
    b. Typical: High-quality daily B-complex
4. Magnesium (glycinate, malate, or citrate)
    a. Stabilizes ATP and supports enzyme function
    b. Typical: 300–400 mg daily
5. Alpha Lipoic Acid (ALA)
    a. Antioxidant + mitochondrial enzyme support
    b. Typical: 300–600 mg daily
6. Vitamins C & E
    a. Protect mitochondria from oxidative damage
    b. Typical: Standard daily dosing

Targeted Add-Ons (Based on Patient Needs)

7. NAD^+ Support (NR, NMN, or NADH)
    a. For fatigue, aging, cognitive decline
8. Omega-3s (EPA/DHA)
    a. Membrane health + inflammation control
9. Urolithin A

    a. Promotes mitophagy (clearing damaged mitochondria)
    b. Useful for muscle weakness, aging
10. Phospholipids (e.g., Phosphatidylcholine)
    a. Rebuild mitochondrial membranes
    b. Helpful in chronic fatigue, neuro symptoms
11. Creatine Monohydrate
    a. Rapid ATP buffering (muscle + brain)
    b. Useful for exercise intolerance, myopathy
12. NAC / Glutathione Support
    a. Reduces oxidative stress burden
13. PQQ (Pyrroloquinoline Quinone)
    a. May stimulate new mitochondria (biogenesis)
14. Vitamin D3 (+ K2)
    a. Supports mitochondrial signaling and overall health
    b. Supports mitochondrial signaling and overall health

Spotlight on Red Light Therapy

<u>Benefits of Red Light Therapy for Mitochondrial Dysfunction:</u>

- Increases ATP energy production by 50–150% within 30–90 minutes (Mito Red Light)
- Restores stalled electron transport by displacing inhibitory nitric oxide from cytochrome c oxidase (Dr Kumar review)
- Drives mitochondrial biogenesis via PGC-1α (up to 2.8-fold in muscle studies)
- Activates Nrf2 → upregulates glutathione, SOD, and catalase
- Dampens NF-κB-driven chronic inflammation
- Reduces net oxidative stress and lipid peroxidation over repeated sessions
- Improves mitochondrial membrane potential and oxygen consumption

- Preferentially rescues stressed tissue (hypoxic, aged, inflamed) over healthy cells
- Enhances cerebral metabolism and cognition via transcranial delivery (Frontiers Neuroscience)
- Accelerates muscle recovery and reduces exercise-induced lactate
- Improves glucose handling and insulin sensitivity in small trials
- Effects persist up to 5 days per session — supports 3–5×/week dosing

SONGWRITERS FOR STREAMS 2026

You are invited to join the 4th Annual Songwriters for Streams this Sunday, April 26 from 4:00-6:30pm at the beautiful riverside home of Libby and Dr. Nick Sieveking. This fundraiser is Harpeth Conservancy's yearly celebration of music, community and conservation supporting their mission to protect clean water and healthy rivers in Tennessee.

Click below to view more details and purchase your tickets!

SONGWRITER FOR STREAMS TICKETS

We are celebrating this Mother's Day season with **25% OFF Hydrafacials**, **Diamond Glow** facials, and **Pure Brilliance** treatments from **May 1-15, 2026**. Call today to book an appointment for yourself or the special mother in your life.

Schedule Now!

STAY TUNED!

Be on the lookout for next week's newsletter, *"The Facelift Journey: A Patient's Perspective."*

Newsletter Archives

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