

# Nutrients Supporting Mitochondrial Health

The mitochondria are cellular components tasked with generating energy, akin to miniature power stations within each cell of the body. They transform food and oxygen into cellular energy, known as adenosine triphosphate ("ATP").

During energy production, molecules known as "free radicals" are generated, similar to the exhaust emitted by an engine. If left unchecked, these free radicals can cause damage, commonly referred to as "oxidative stress," in the body. Excessive free radicals can initiate cell death and accelerate the aging process. Therefore, the objective is to enhance the efficiency of the mitochondrial "engine" to minimize free radical production.

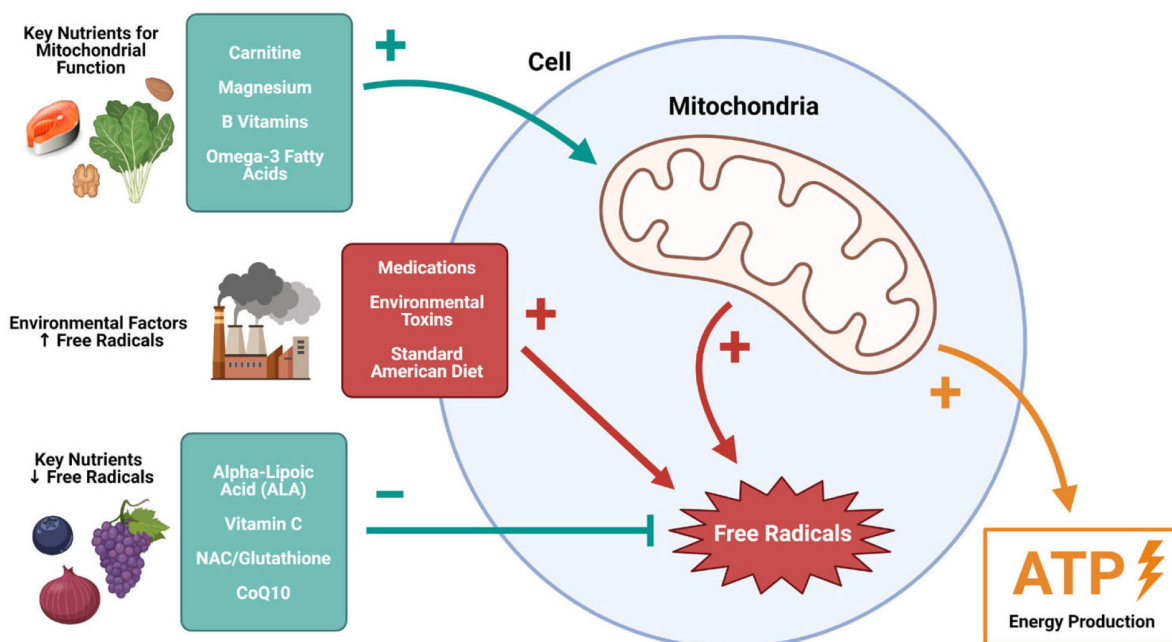
Diminished mitochondrial function has been linked to the onset of conditions like heart disease, diabetes, cognitive decline, and various neurological disorders. Certain nutrients, combined with dietary and lifestyle adjustments, can enhance mitochondrial health by providing essential components for optimal energy production. Additionally, some nutrients counteract the harmful effects of free radicals generated within the

mitochondria.

For tailored advice on foods and supplements to support mitochondrial health, consulting one of our functional medicine providers is encouraged.

**Carnitine** is a vital nutrient facilitating the transport of fats into mitochondria for energy generation. Inadequate carnitine levels may compromise energy production and lead to mitochondrial dysfunction. Research suggests that supplementing with carnitine could alleviate fatigue and enhance cognitive function.

**Magnesium** a crucial mineral, plays a pivotal role in maintaining optimal mitochondrial function. Replenishing magnesium levels in the body may confer protective benefits for heart health, blood pressure regulation, and may even alleviate depressive symptoms.



**B vitamins** play a direct role in energy production by boosting mitochondrial activity and counteracting the harmful effects of oxidative stress. Studies suggest that supplementing with B vitamins can enhance cognitive function in individuals with mild cognitive impairment. Additionally, vitamin B12 and folate (vitamin B9) are believed to safeguard mitochondrial function and may alleviate depressive symptoms, particularly in those with MTHFR genetic variations.

**Omega-3 fatty acids (EPA & DHA)** are utilized by mitochondria to generate energy and reduce inflammation, indirectly benefiting mitochondrial health. Research indicates that omega-3 supplementation can have a positive impact on muscle mass and mobility in older adults. Furthermore, it may enhance cognitive abilities.

**Alpha-lipoic acid (ALA)** is essential for mitochondrial energy production and acts as a potent antioxidant to mitigate oxidative stress during cellular energy generation. Studies suggest that ALA supplementation can improve diabetic neuropathy and insulin sensitivity.

**Vitamin C** serves as both a vitamin and antioxidant, shielding mitochondria from oxidative stress. Maintaining adequate vitamin C levels is associated with better cognitive performance, while deficiencies may exacerbate cognitive impairment. Restoring vitamin C levels could potentially alleviate symptoms of anxiety, fatigue, and enhance overall well-being.

**N-acetyl cysteine (NAC)** acts as an antioxidant that indirectly safeguards mitochondria from oxidative stress by replenishing glutathione levels. Glutathione, a potent endogenous antioxidant, can be depleted in various chronic diseases due to oxidative stress. Supplementing with NAC may help restore glutathione levels and mitigate oxidative damage.

**Coenzyme Q10 (CoQ10)** is pivotal for cellular energy production and possesses anti-inflammatory and antioxidant properties, promoting mitochondrial efficiency and health. Factors such as aging, genetics, and certain medications may lead to decreased CoQ10 levels. Supplementation with CoQ10 has shown promise in alleviating fatigue and depression in individuals with multiple sclerosis, as well as improving symptoms of diabetic neuropathy and Parkinson's disease.

Supplementation	Dosing	Notes
<input type="checkbox"/> Carnitine <input type="checkbox"/> Magnesium <input type="checkbox"/> B Vitamins <input type="checkbox"/> Omega-3 fatty acids <input type="checkbox"/> Alpha-lipoic acid <input type="checkbox"/> Vitamin C <input type="checkbox"/> NAC/Glutathione <input type="checkbox"/> Coenzyme Q10 <input type="checkbox"/> Other: _____		



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