Optimising mitochondrial function

fx Medicine™ BioCeuticals

FATIGUE is the most common **UNEXPLAINED COMPLAINT** presenting to Australian general practitioners[1]

MITOCHONDRIA are the **POWER HOUSES** of the cell

MITOCHONDRIA produce a person's **BODY WEIGHT IN ATP EVERY DAY**[2]

MITOCHONDRIA are **PRESENT IN EVERY CELL OF THE BODY** except red blood cells[3]

THE MITOCHONDRIA[2-4]

Mitochondria play host to one of the most important processes in your body: cellular respiration. In the citric acid cycle, mitochondria are the 'power houses' of the cell, producing energy from glucose and oxygen, which they package as energy-rich molecules of adenosine triphosphate (ATP).

In addition, mitochondria have been implicated in metabolic and cellular processes including:

- Cell repair
- Cell signalling
- Cell regrowth
- Cellular ageing
- Production of reactive oxygen species (ROS) and maintenance of ROS homeostasis.

MITOCHONDRIAL DYSFUNCTION[2,4-6]

When mitochondrial function is impeded, cellular energy production is reduced resulting in:

- Ageing
- Cell injury
- Cognitive decline
- Fatigue
- Necrosis/apoptosis
- Pain.

If this process is repeated, whole systems may begin to fail with progression leading to conditions such as cardiovascular disease, diabetes, and Alzheimer's.

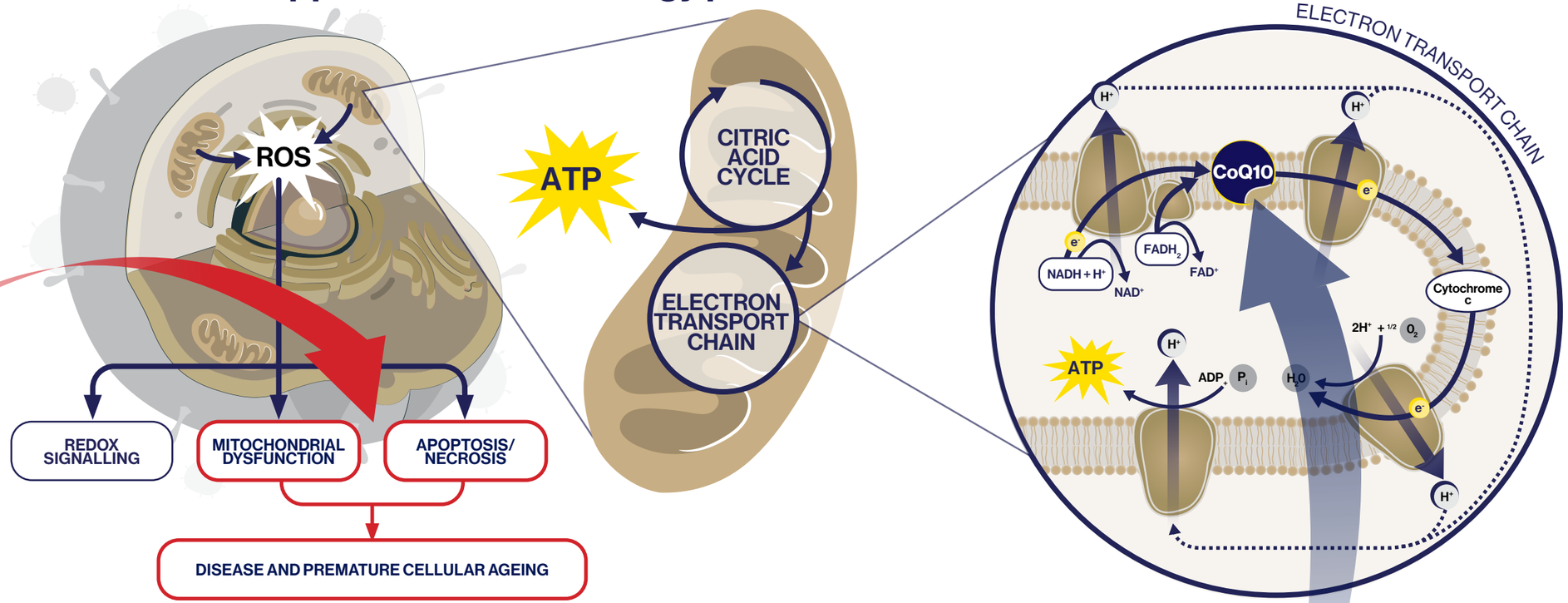
Mitochondrial dysfunction typically affects organs and tissues with high energy requirements including the heart, brain, muscles, kidneys and endocrine system.

MITOCHONDRIAL STRESSORS[2,4,5]

Causes of mitochondrial damage:

- Ageing
- Alcohol
- Excessive oxidative stress
- Genetics
- Illnesses and chronic disease states
- Medications
- Overeating
- Stress
- Toxins.

What happens in the cell: energy production and excessive oxidative stress[1-5]



ROS: Reactive oxygen species; ATP: adenosine triphosphate; ADP: adenosine diphosphate; NADH: nicotinamide adenine dinucleotide; FADH: flavin adenine dinucelotide; e^-: electron; H^+: hydrogen ion; P_i: inorganic phosphate

Nutritional support for mitochondrial energy production

ALA Alpha lipoic acid[6-8]

- Cofactor for several mitochondrial enzymes.
- Hydrophilic antioxidant with anti-inflammatory action.
- Has regenerative effect on mitochondria.
- Optimises mitochondrial function and reverses cell ageing.

B B vitamins[6,7,9,10]

- B1, B2, B3, and B5 are required in the citric acid cycle and electron transport chain for the production of energy.
- Biotin is essential for regulating mitochondrial fatty acid oxidation.

Mg Magnesium orotate[11,12]

- Critically involved in the synthesis of ATP.
- Magnesium activates ATP.
- Orotate stimulates ATP synthesis.
- Orotate facilitates the transport of magnesium into the cell and inner mitochondrial membrane.

CoQ10 Coenzyme Q10 (CoQ10)[6,7,13]

- 'Nature's sparkplug' and electron transporter with an essential role in the electron transport chain.
- Lipophillic antioxidant.
- Cell membrane stabiliser.
- Deficiency associated with mitochondrial dysfunction.

Ubiquinone or Ubiquinol?

- Ubiquinone requires conversion into uqibuinol following absorption.
- Ubiquinol is the active form of CoQ10 and is a critical component of cellular energy production in the body.

References available upon request. For further information contact BioCeuticals Naturopathic Advisory Team on 1300 650 455 or advisory@bioceuticals.com.au | For educational and informational purposes only. Please seek advice from a qualified health care professional about concerns regarding your health.

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