Carnitine Transports fatty acids into mitochondria; Decreases both mental and physical fatigue in clinical trials.\textsuperscript{15,31,32}

B Vitamins Necessary for converting food into energy; Cofactors in the mitochondrial respiratory chain include B1, B2, B3, B5, B6, B12 and Folate.\textsuperscript{8,15,16,26-30}

Vitamin D Low levels are seen in patients with chronic fatigue syndrome; Deficiency causes reduced muscle strength.\textsuperscript{24,25}

Vitamin E Inverse correlation exists between fatigue and vitamin E levels.\textsuperscript{23}

Vitamin A When cellular levels of vitamin A are low, mitochondrial respiration and ATP production decreases.\textsuperscript{22}

Vitamin C Assists iron uptake and transport; Precursor to carnitine and several hormones that affect energy levels. Supplementation reduced fatigue in various trials.\textsuperscript{15,16,21}

Antioxidants Several studies confirm that oxidative stress exacerbates clinical symptoms of fatigue. Mitochondrial dysfunction (inefficient energy metabolism) can be treated therapeutically with antioxidants such as Selenium, Cysteine, α-Lipoic acid and Glutathione, of which unusually low levels are seen in chronic fatigue patients.\textsuperscript{12,16,18,19,20}

Chromium Promotes glucose uptake into cells, helping stabilize blood sugar.\textsuperscript{16,33}

Zinc Deficiency lowers immunity and may cause muscle fatigue; Involved in several reactions for energy metabolism.\textsuperscript{15,34,35}

Asparagine Supplementation of this amino acid delayed fatigue during exercise by decreasing the rate at which glycogen was used up; needed for gluconeogenesis, a process that allows glucose to be made from protein to prevent blood sugar from getting too low.\textsuperscript{12,3}

Biotin Helps liver utilize glycogen for energy. Animal studies confirm that biotin deficiency causes clinical fatigue.\textsuperscript{9}

Glutamine Mental and physical fatigue coincides with reduced levels of this amino acid in various tissues. Supplementation makes muscle more sensitive to insulin, increasing energy levels.\textsuperscript{5,6,7}

Serine Counteracts the overproduction of fatigue-causing stress hormones.\textsuperscript{8,9}

CoQ10 Deficiency causes fatigue due to its role in mitochondrial energy metabolism; therapeutic benefits particularly noticeable in chronic fatigue syndrome.\textsuperscript{10,11,12,15}

Fructose Intolerance Fatigue (and hypoglycemia) are classic symptoms of this condition, since it depletes the main form of cellular energy, ATP.\textsuperscript{13,14}

Magnesium Required to store energy molecule ATP; Repletion of magnesium in chronic fatigue patients shows clinical improvement in energy levels.\textsuperscript{15,16,17}

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