

# FIBROMYALGIA

**Carnitine** Deficiency causes muscle pain due to inefficient cellular energy metabolism (mitochondrial myopathy) which presents as fibromyalgia.<sup>4,5</sup>

**Choline & Inositol** Altered levels of both nutrients seen in fibromyalgia; Choline & inositol are involved in pain perception.<sup>6,7,8,9</sup>

**Serine** Blood levels of this amino acid are much lower in fibromyalgia patients.<sup>10,11</sup>

**Vitamin D** Low levels impair neuromuscular function and cause muscle pain. Deficiency is common in fibromyalgia patients.<sup>12,13,14,15,16</sup>

**Vitamin B1** Thiamin (B1) deficiency mimics fibromyalgia symptoms including serotonin depletion (decreased pain threshold), a decrease in repair enzymes (muscle soreness) and poor energy production (muscle fatigue.)<sup>17,18</sup>

**Antioxidants** Low antioxidant status increases pain in fibromyalgia, which is often considered an oxidative stress disorder.<sup>19,20,21</sup>

**Zinc** Blood levels of zinc are associated with number of tender points in fibromyalgic patients.<sup>22</sup>

**Magnesium** Involved in pain perception pathways and muscle contraction; treatment with magnesium can improve tenderness and pain.<sup>23,24,25</sup>

**Selenium** Deficiency is linked to fibromyalgia; In one trial, symptoms improved in 95% of patients supplemented with selenium for at least 4 weeks.<sup>25,26,27</sup>

**Coenzyme Q10** Clinical trials consistently show that coQ10 reduces fibromyalgia symptoms such as pain and fatigue.<sup>1,2,3,4</sup>

Spectracell MicroNutrient Testing is Available From:



## REFERENCES

- <sup>1</sup>Cordero M, Alcocer-Gomez E, de Miguel M et al. Coenzyme Q(10): A novel therapeutic approach for Fibromyalgia? Case series with 5 patients. *Mitochondrion* 2011;11:623-625.
- <sup>2</sup>Lister R. An open, pilot study to evaluate the potential benefits of coenzyme Q10 combined with Ginkgo biloba extract in fibromyalgia syndrome. *J Int Med Res* 2002;30:195-199.
- <sup>3</sup>Cordero M, Moreno-Fernandez A, Demiguel M et al. Coenzyme Q10 distribution in blood is altered in patients with Fibromyalgia. *Clin Biochem* 2009;42:732-735.
- <sup>4</sup>Abdullah M, Vishwanath S, Elbalkhi A et al. Mitochondrial myopathy presenting as fibromyalgia: a case report. *J Med Case Rep* 2012;6:55.
- <sup>5</sup>Rossini M, di Munno O, Valentini G et al. Double-blind, multicenter trial comparing acetyl L-carnitine with placebo in the treatment of fibromyalgia patients. *Clin Exp Rheumatol* 2007;25:182-188.
- <sup>6</sup>Fayed N, Garcia-Campayo J, Magallón R et al. Localized 1H-NMR spectroscopy in patients with fibromyalgia: a controlled study of changes in cerebral glutamate/glutamine, inositol, choline, and N-acetylaspartate. *Arthritis Res Ther* 2010;12:R134.
- <sup>7</sup>Wang S, Su D, Wang R et al. Antinociceptive effects of choline against acute and inflammatory pain. *Neuroscience* 2005;132:49-56.
- <sup>8</sup>Petrou M, Harris R, Foerster B et al. Proton MR Spectroscopy in the Evaluation of Cerebral Metabolism in Patients With Fibromyalgia: Comparison With Healthy Controls and Correlation With Symptom Severity. *Am J Neuroradiol* 2008;29:913-918.
- <sup>9</sup>Galeotti N, Bartolini A, Gherlardine C. Role of intracellular calcium in acute thermal pain perception. *Neuropharmacology* 2004;47:935-944.
- <sup>10</sup>Yunus M, Dailey J, Aldag J et al. Plasma tryptophan and other amino acids in primary fibromyalgia: a controlled study. *J Rheumatol* 1992;19:90-94.
- <sup>11</sup>Koning T, Klomp L. Serine-deficiency syndromes. *Curr Opin Neurol* 2004;17:197-204.
- <sup>12</sup>Turner M, Hooten W, Schmidt J et al. Prevalence and Clinical Correlates of Vitamin D Inadequacy among Patients with Chronic Pain. *Pain Med* 2008;9:979-984.
- <sup>13</sup>Shinchuk L, Holick M. Vitamin D and rehabilitation: improving functional outcomes. *Nutr Clin Pract* 2007;22:297-304.
- <sup>14</sup>Al-Allaf A, Mole P, Paterson C et al. Bone health in patients with fibromyalgia. *Rheumatology* 2003;42:1202-1206.
- <sup>15</sup>Plotnikoff F, Quigley J. Prevalence of severe hypovitaminosis D in patients with persistent, nonspecific musculoskeletal pain. *Mayo Clin Proc* 2003;78:1463-1470.
- <sup>16</sup>Mascarenthas R, Mobarhan S. Hypovitaminosis D-induced pain. *Nutr Rev* 2004;62:354-9.
- <sup>17</sup>Eisinger J. Alcohol, thiamin and fibromyalgia. *J Am Coll Nutr* 1998;17:300-302.
- <sup>18</sup>Koike H, Watanabe H, Inukai A et al. Myopathy in thiamine deficiency: analysis of a case. *J Neurol Sci* 2006;249:175-179.
- <sup>19</sup>Altindag O, Celik H. Total antioxidant capacity and the severity of the pain in patients with fibromyalgia. *Redox Rep* 2006;11:131-135.
- <sup>20</sup>Ozgcimen S, Ozyurt H, et al. Antioxidant status, lipid peroxidation and nitric oxide in fibromyalgia: etiologic and therapeutic concerns. *Rheumatol Int* 2006;26:598-603.
- <sup>21</sup>Bagis S, Tamer L, Sahin G et al. Free radicals and antioxidants in primary fibromyalgia: an oxidative stress disorder? *Rheumatol Int* 2005;25:188-190.
- <sup>22</sup>Sendur OF, Tastaban E, Turan Y et al. The relationship between serum trace element levels and clinical parameters in patients with fibromyalgia. *Rheumatol Int* 2008;28:1117-1121.
- <sup>23</sup>Magaldi M, Moltoni L et al. Changes in intracellular calcium and magnesium ions in the physiopathology of the fibromyalgia syndrome. *Minerva Med* 2000;91:137-140.
- <sup>24</sup>Abraham G, Flechas J. Management of fibromyalgia: rationale for the use of magnesium and malic acid. *J Nutr Med* 1991;3:49-59.
- <sup>25</sup>Eisinger J, Plantamura A, Marie P et al. Selenium and magnesium status in fibromyalgia. *Magnes Res* 1994;7:285-288.
- <sup>26</sup>Chariot P, Bignani O. Skeletal muscle disorders associated with selenium deficiency in humans. *Muscle Nerve* 2003;27:662-668.
- <sup>27</sup>Reinhard P, Schweinsberg F, Wernet D et al. Selenium status in fibromyalgia. *Toxicol Lett* 1998;96-97:177-180.
- Additional references at <http://www.spectracell.com/online-library-mnt-fibromyalgia-abstract/>

