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Nutraceuticals for
SI, NI, OS, MD.

Accurate Education

Complementary and Alternative Medicine (CAM)

Why Nutraceutical Supplements?

Nutraceuticals are pharmaceutical grade compounds generally derived from foods that provide nutritional and therapeutic benefits directed at specific medical conditions.To gain a full understanding of the place that nutraceutical supplements have in managing chronic pain and supporting health in general, one should be familiar with 4 conditions: Systemic Inflammation **(SI)**, Neuroinflammation **(NI)**, Oxidative Stress (**OS)** and Mitochondrial Dysfunction **(MD)**.

These conditions are responsible for the breakdown of tissues and cellular processes that promote the diseases of aging, including diabetes, heart disease, stroke, chronic kidney and liver disease, rheumatoid arthritis, cancer and Alzheimer's. They also contribute to chronic pain by creating a cycle of tissue damage and immune cell activation that sustains pain. This leads to **pain sensitization**, a condition in which the sensation of pain is abnormally magnified which is commonly associated with many chronic pain conditions, including chronic neck pain and back pain, migraines and fibromyalgia.

The comprehensive management of chronic pain must include not just those treatments directed at the tissue damage and dysfunction associated with a chronic pain condition, but must also include treatments directed at the conditions that drive and magnify chronic pain: **SI, NI**, **OS** and **MD - referred to here as the 4 Demons.**

1. **Systemic inflammation (SI)** is a widespread inflammatory response throughout the body, triggered by infection, injury, stress and other conditions. It involves activation of the immune system with the release of pro-inflammatory compounds that contribute to chronic pain and lead to other health issues. Symptoms of SI include increased pain, fatigue, cognitive impairment, depression, decreased motivation for physical activity and, in severe cases, organ dysfunction. While inflammation is a natural part of the healing process, chronic or excessive SI contributes to the development of heart disease, diabetes, and autoimmune disorders like rheumatoid arthritis.

2. **Neuroinflammation (NI)** is inflammation within the nervous system, often triggered by SI which releases inflammatory compounds that cross into the brain and spinal cord. These compounds activate immune cells in the nervous system causing NI that contributes to the progression of acute to chronic pain and magnifies chronic pain.

3. **Oxidative stress (OS)** is an imbalance of excessive "oxidants" ("oxidizing," chemically active agents including free radicals) obtained from the diet or produced by the body, coupled with insufficient "antioxidants," the compounds that neutralize oxidants. Excessive oxidants damage nerve cells and other tissues causing and maintaining pain. Antioxidants are manufactured by the body, but sufficient dietary intake of antioxidants is critical for good health. OS and chronic SI co-exist and feed each other, damaging tissues in a vicious cycle that further worsens pain.

4. **Mitochondrial Dysfunction (MD).** Mitochondria are organelles found in cells that function as the "power stations" of cells in that they process food into energy. In addition to providing energy, they play a major role in maintaining antioxidants to combat OS and SI. Because mitochondria impact the metabolism of all cells, they play a major role in general health. Impairment of mitochondrial function contributes to many conditions including obesity, chronic pain,, migraines, fibromyalgia, depression, diabetes, heart disease and premature aging. In MD, impaired energy production leads to fatigue and lack of energy, even if more food (calories) is ingested.

Supplements and the Anti-Inflammatory Diet (AID)

Our diet is the source of anti-inflammatory and antioxidant compounds that combat the 4 Demons. In theory, a healthy diet will provide enough of these healthful compounds to keep the demons under control. Unfortunately, the Standard American Diet (the SAD diet) not only lacks adequate amounts of these nutrients, it also includes many compounds that promote inflammation and oxidative stress.

The Anti-Inflammatory Diet (AID) focuses on foods that contain greater amounts of anti-inflammatory and antioxidant compounds to reduce inflammation and oxidative stress. It emphasizes whole, unprocessed foods like fruits, vegetables, and healthy fats, while limiting or avoiding processed foods, red meat, and sugary drinks that contribute to systemic inflammation and oxidative stress.

However, even the AID does not provide enough of the anti-inflammatory and antioxidant nutrients needed to fully address the 4 Demons that plague patients with chronic pain. For example, blueberries known to be rich in the antioxidant Resveratrol, only contain 1 mg in a full serving while research has determined that 250-500 mg/day of Resveratrol, are needed to gain its full benefits for arthritis. For this reason, pain patients are encouraged to take nutraceutical supplements.

In many cases, the gastrointestinal absorption of these compounds may be severely limited when ingested, so simply eating foods or taking nutraceuticals containing a particular compound may not be adequate to obtain it's full benefits. Therefore, it may be necessary to take nutraceutical supplements that provide enhanced absorption formulations (i.e. curcumin).

In summary, for certain nutrients it may not be enough to obtain them directly from the diet due to poor absorption or relatively small amounts found in foods. To gain their full benefits, it is necessary to take higher doses as nutraceutical supplements, some of which may require enhanced formulations.

The following is a (partial) list of some nutraceuticals that target SI, NI, OS & MD:

Acetyl L-Carnitine (ALC)	Curcumin	Omega-3 (EPA and DHA)
Alpha-Lipoic Acid (ALA)	Magnesium	Palmitoylethanolamide (PEA)
Boswellia	Melatonin	Resveratrol
CoQ10	N-Acetyl Cysteine (NAC)	Sulforaphane
Curcumin	Nicotinamide Riboside (NR)	Vitamin D3

Systemic Inflammation

Neuroinflammation

Oxidative Stress

Mitochondrial Dysfunction