June 2019 - Mid-Month Bonus Newsletter

Thank you for subscribing to this newsletter from the Personalized Lifestyle Medicine Institute. Enjoy and share this information, which is for educational purposes only and is not intended to be a substitute for professional medical advice, diagnosis, or treatment. Always consult with a qualified healthcare professional when you are in need of advice regarding a medical condition.

In this issue: Nutrient of the Month: Dietary Nitrates; The Seventh Annual Thought Leaders Consortium: Early-Bird Registration Ends June 30th; Betaine: An Old Friend Has a New Trick

Nutrient of the Month: Dietary Nitrates

Nitrates sound a bit like fertilizer, but perhaps even dietary ones are so, in that they help cultivate nitric oxide within blood vessels. While fruits and vegetables provide a wide variety of nutrients and phytonutrients (like potassium and flavonoids) that aid long-term function of the heart and blood vessels, only recently has attention turned to their inorganic nitrates. Considering recent news that around 1 in 7 humans has high blood pressure, that the global average blood pressure for adults is high according to new standards, and that hypertension is expected to become the #1 risk for premature death in the next two decades, this modest nutrient takes on greater significance. Dietary nitrates contribute to, and may even be the primary origin of, precious nitric oxide generated within blood vessels, where it relaxes them and aids smoother blood flow. Insufficient vascular nitric oxide production is associated with strokes and atherosclerosis, and generous provision of food nitrates has been proposed as one way the Mediterranean Diet provides long-term cardiovascular benefit.

It was first demonstrated in 2008 that, in healthy individuals, drinking beetroot juice (which is rich in nitrates) could substantially lower blood pressure, and it even helped maintain proper blood vessel function during a challenge. Various studies have concluded that nitrate supplementation improves exercise tolerance, especially of high-intensity physical activity in non-athletes; it may do so by modulating mitochondrial function, oxygen consumption, and/or production of pro-oxidant metabolites. One well-designed study found that, in young African-American females, beetroot juice increased nitric oxide levels, decreased systolic blood pressure, and improved heart rate variability (a crucial functional stress measure) during rest as well as during aerobic activity; researchers cited a previous study finding that African-Americans may produce less vascular nitric oxide overall. Other research notes that nitrate’s blood pressure effects...
are more pronounced in men than in premenopausal women (who appear to more efficiently convert nitrates), emphasizing that dietary nitrate intake may be particularly applicable to men and postmenopausal women, especially African-Americans; all populations at elevated risk for cardiovascular disease.

That study also found, intriguingly, that the oral microbiome plays an important role in the conversion of dietary nitrates into biologically-active forms. Species of Veillonella (Firmicute phylum members) especially, but also of Actinomyces and Rothia (both Actinobacteria, as are bifidobacteria) seem to be the main oral microbes that chemically reduce dietary nitrates to their more vasoactive nitric oxide form. Nitrogen-containing compounds have been used for centuries for heart pain (though not all forms enjoy a good safety profile), and an ancient Buddhist text even specifies that a medicinal nitrogenous compound be held under the tongue—handy for that oral chemical conversion!

There are a few twists in the nitrate story that are worthy of note. Agricultural practices and the use of fossil fuels have significantly increased levels of nitrates in the soil and in drinking water in some parts of the world (including the US; private wells in agricultural areas may be especially susceptible), and excess ingestion of nitrates through water can be potentially life-threatening for infants, in whom it can negatively alter the structure and function of oxygen-delivering hemoglobin. In addition, the blood heme in meat products employing nitrites as preservatives may encourage oxidative formation of N-nitrosamines, one of two types of N-nitroso compounds that have been linked to higher risk for cancer, thyroid dysfunction, and birth defects. On the other hand, several studies suggest that phytomolecules like vitamins C and E and flavonoids may improve the body's utilization of nitrates and/or their reduction (the chemical opposite of oxidation) into nitric oxide, and thus actually limit their oxidation into hazardous N-nitroso chemicals.

Boiling (or otherwise cooking in water) and peeling can lower vegetables’ nitrate contents by up to half, so eating them unpeeled and either raw or lightly cooked will best preserve these nutrients. In addition to beets, other plants with notable nitrate contents include lettuce, spinach, string beans, broccoli, nettles, celery, arugula, parsley, cabbage, melon, potatoes, bananas, avocados, pickled vegetables, and pineapple; leafy greens are especially good, and lettuce is by far the chief dietary source. Processed meats such as ham, hot dogs, cold cuts, and sausages appear to have the highest nitrite contents, but bread and grains also contribute to daily intakes. This same study found that, at least among older persons, women tend to ingest more total nitrates and less total nitrites than do men. Mixed green salad, anyone?

---

**Early-Bird Registration Discount Ends June 30th!**

**THE SEVENTH ANNUAL THOUGHT LEADERS CONSORTIUM**

**Personalizing Nutrition Therapy in the Age of Lifestyle Medicine:**
Compelling Evidence, Breakthrough Science, and a New Era of Clinical Care

The registration rush has begun!

Reserve your seat before **June 30th** to access our early-bird discount. Regular pricing goes into effect the next day.

[Conference Overview >>](#)

[Conference Registration >>](#)
An Old Friend Has a New Trick

Betaine has long been a stand-by for supporting liver function and fat metabolism, and in recent years we also have come to appreciate its work with B vitamins in improving epigenetic methylation patterns to protect the genome. But research into how obesity can lead to a wide range of cardiometabolic issues has revealed that betaine may also modulate inflammation within adipose tissue.

In obese mice, betaine supplementation lowered high-fat diet-induced gene expression of the pro-inflammatory cytokine interleukin-6 (IL-6), which is strongly associated with cardiovascular disease and chronic inflammation in humans. It also increased carnitine levels in fat tissue, which could potentially improve transport and oxidation of stored fat; previous study in female athletes found that, coupled with exercise, supplemental betaine reduced body fat mass significantly better than did placebo, and it also tended to increase work capacity.

In obesity, fat cells suffer from reduced oxygenation as adipose mass overwhelms circulatory capacity to provide oxygen, and this is thought to be an early step in the development of low-grade inflammation in stored fat. A previous study found that betaine downregulated tumor necrosis factor-alpha as well as IL-6 in hypoxic fat cells, an effect that would tend to limit inflammatory changes.
This series of studies provides evidence that even though betaine is not considered an essential nutrient, it may benefit long-term metabolic flexibility by influencing how the body stores and brings out stored fat reserves—which should be of interest to many aging humans.