Nutrient of the Month: Biotin

Biotin is one of those unassuming B-family vitamins: it is clearly essential, but we don’t yet know all of its necessary or merely highly desirable roles. It is a coenzyme for several human carboxylases (enzymes that catalyze the transfer of carbon dioxide) necessary for timely conversion of lipids, glucose, and branched-chain amino acids into energy substrates, and has in the past been called vitamin H or vitamin B7.

The amount of biotin humans need is not known, and many recently realized functions of this vitamin are not reflected in the current US Daily Value for adults, which at 30 micrograms daily is one-tenth of previous recommendations. Decent food sources of biotin include eggs, yeast, liver (beef/pork), soybeans, wheat/wheat germ, lentils, peas, garlic, mushrooms, American ginseng, and oats. It is important to note that overconsumption of raw egg white (the protein of which binds biotin and renders it unavailable) can cause biotin deficiency. Smoking, insufficient stomach acid production, and use of isotretinoin or antiepileptic medications may also interfere with biotin metabolism. The human microbiome may produce biotin, but particular bacteria (such as Bacteroidetes and Proteobacteria phyla members) appear to “barter” it with species (like Firmicutes and Actinobacteria phyla members) that are unable to produce it, rather than making it solely for the human host.

Biotin has long been appreciated for helping maintain skin, hair, and nails. Deficiency or insufficiency of this vitamin or genetic variations in biotin-related enzymes can alter the balance among circulating fatty acids as well as lipid mediators, which may be one mechanism behind hair loss or skin irritations like atopic dermatitis, skin infections, and possibly also cutaneous nickel allergy.
Several studies suggest that proliferating immune cells are sensitive to biotin nutritional status, and biotin supplementation alters genetic expression of immune cell cytokines, including those associated with T helper cell-1 (Th1) and Th2 populations and members of the pro-inflammatory tumor necrosis factor-α network. Additionally, many human heat shock proteins (involved in the response to physical and oxidative stress) function while bound to biotin; thus, biotin nutritional status may influence immune balance and the inflammatory response in several different ways. These and other emerging functions of biotin are not considered in nutrition guidelines:

Involvement in pancreatic synthesis of insulin and regulation of a normal glucose and insulin response

--A related study suggests that a ketogenic diet may increase biotin requirements because of its crucial services in aiding metabolic flexibility between carbohydrate and fat metabolism

--Preliminary research shows that biotin may influence hypothalamic regulation of appetite

Assisting normal prenatal cell division; deficiency might result in teratogenic effects

Safely improving function in responsive individuals with multiple sclerosis, possibly through modulating myelin synthesis and mitochondrial energy production in neurons

Potentially significant contributions to genomic stability through:

--Binding to and influencing the function of histones, proteins that guard chromosome integrity

--Modifying the function of carboxylases that control gene expression, minimizing certain transcription errors

--Influencing DNA methylation patterns

--Helping protect telomeres, the protective caps on chromosomes that can degrade with biological aging

Reducing the toxicity of benzo[a]pyrene, a carcinogen in tobacco smoke and grilled meat, through its epigenetic effects

Influencing levels of estradiol and estrogen-metabolizing enzymes in females, according to early animal research

2018 Thought Leaders Consortium: Watch a 7-Minute Preview Webinar

Do you have 7 minutes to learn more about a concept that could have a major impact on how health care is contextualized and delivered in the decades to come? A fascination with distinguishing biological age from chronological age has already taken hold in the consumer wellness marketplace and top researchers all around the world are exploring the mechanisms that power this emerging area of inquiry. Watch now and learn more!

Video Link: https://vimeo.com/283080559
Resource Spotlight: The Human Metabolome Database

This remarkable set of linked databases, associated with the Canadian Institutes of Health Research and Genome Canada, provides a wealth of detail related to metabolic pathways in humans. It is searchable for metabolites (e.g. creatinine), diseases (like mitochondrial enzyme deficiencies), pathways (as for nicotinamide/nicotinate), and proteins/enzymes (such as methyltetrahydrofolate reductase). Consider lactic acid: with these databases, you can view its molecular structure, read a synopsis of its normal metabolism, learn its chemical synonyms, relatives, precursors, and properties, discover its body locations and levels in health, in disease, and by age and gender, learn about disorders in which its metabolism is altered, view metabolically-related enzymes and their genetic variants, consult multiple charting styles (like KEGG, SMPDB, and PDB) for its metabolic pathways, and see cited literature references. While different people will find different data points useful, the scope and variety of information provided regarding the ins and outs of human metabolism make this a valuable learning tool.

Phytonutrients Aimed at Resolution of Inflammation

Investigation into how inflammation may be resolved has revealed that it is a carefully orchestrated, step-by-step process with many cell signaling gatekeepers. Key among these influences is how they impact the maturation of macrophages into the M1 type programmed for more offensive (but also pro-inflammatory) microbicidal tissue activity or the M2 type that is more antiinflammatory and concerned with cellular and tissue housekeeping. This detailed 2018 review examines the macrophage-programming effects of a wide variety of phytochemicals ranging from dietary polyphenolics like quercetin, procyanidins, resveratrol, and epigallocatechin gallate (EGCG) to berberine, curcumin, terpenes, aloe-emodin, and geraniin. With chronic illness, obesity, and inflammation spreading through populations across the globe, understanding how food molecules ‘speak to genes’ and turn intercellular conversations from inflammation to resolution is an increasingly important avenue of scientific study.

Read more: https://bit.ly/2MShgEv