

# Turbo-charge your metabolism with **B-COMPLEX**

*In a day and age where breakfast, lunch, and dinner consists of coffee, fast food and a power bar, it's no wonder most of us can't cope with a fast-paced, zip from one task to the next lifestyle. We've all heard the complaints about how there's never enough energy, mental or physical, to meet the high demands of a typical day. There has to be a way to get our bodies to do what they're supposed to do to make it through the day. Well, there is. Viva Vitamins brings you a new formulation to an age-old supplement that many of us have taken for granted.*

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## **“Where Does Energy Come From?”**

Isn't energy supposed to come from food? And isn't our bodies supposed to turn food into energy somehow? The answer is yes. Our bodies have the amazing ability to convert macronutrients from food into usable potential and kinetic energy through myriads of biochemical pathways. We know that these reactions are catalyzed by enzymes (globular proteins that speed up reaction rates), but do enzymes have on/off switches? As much as enzymes have the ability to speed up reactions, most enzymes require coenzymes and cofactors (small organic and inorganic molecules that are required by enzymes to carry out their catalytic activity). So what does this have to do with energy? The majority of our energy comes from ATP, creatine and other phosphagens. These end products, in a nutshell, give us energy. But, how do these energy molecules come about? This is where the b vitamins come into the scene. Imagine if high energy-yielding phosphagens were the end product on an assembly line in a factory. The assembly line would be the reaction pathway, the workers on the assembly line would be enzymes, and the b vitamins (cofactors) would be the tools the workers use to form the product intermediates. Now you can see how detrimental it would be if one worker did not have a tool to put together their piece of the puzzle. It would halt the entire assembly line. The big picture: No tool, no product. No b vitamin, no macronutrient conversion into a phosphagen (energy). In fact, studies suggest that increasing the amount of b vitamins through supplementation may not only increase energy, but help prevent certain neurocognitive disorders (Balk E et al., 2006). A sort of a one-two punch for enhancing physical and mental health.

## **“Which B Vitamins Do What?”**

Knowing what the b vitamins do as a whole to yield energy, what do they do in particular when acting independently from the rest of the group?

Vitamin B1 (Thiamin or aneurine HCl) is responsible for proper neural function and is directly involved in carbohydrate metabolism. There is even evidence that suggests that high doses of Vitamin B1 could decrease the risk of early diabetic nephropathies (N. Rabhani et al., 2008). Vitamin B2 (Riboflavin) like many of the other b vitamins, plays a vital role in the metabolism of fats,

ketones, carbohydrates, and protein. One interesting use of riboflavin in alternative medicine is its use as an additive along with beta-blockers in the prevention of migraine headaches (Sándor PS et al., 2000). Niacin, often referred to as vitamin B3 is often used interchangeably with the term nicotinamide, because of their similarities in structure, function and biosynthetic pathway. Niacin is converted to nicotinamide and then to NAD (Nicotinamide Adenine Dinucleotide) and then to NADH-phosphate in our bodies. Although the two are the same in their nutrient activity, nicotinamide does not have the same pharmacological effects of niacin due to its amide functional group. So, nicotinamide does not lower cholesterol or cause flushing (Jaconello P et al., 1992). Vitamin B9 (Folic acid, Folate, Vitamin M, or Folacin) is absolutely required to synthesize DNA bases (mostly thymine, but purine nucleotides as well) needed for DNA replication (Kamen B et al., 1997). It is a key player in the methyl group transferring network needed for various methylation reactions. Pantothenic acid (vitamin B5) is needed to form coenzyme-A (CoA), which is critical in the metabolism and synthesis of carbohydrates, proteins, and fats. Symptoms of deficiencies include disorders of the nervous system, gastrointestinal tract, and immune systems, reduced rate of growth, decreased caloric intake, and alterations in lipid and carbohydrate metabolism (Smith, C et al., 1996). Vitamin B6 (Pyridoxine, Pyridoxal, Pyridoxamine) aids in the osmotic regulation of sodium and potassium as well as promoting red blood cell production. It also reduces the risk of cardiovascular disease by decreasing the formation of homocysteine. Vitamin B12 (Cobalamin) comes in a variety of different forms which determines its specific function. Primarily, Cobalamin's function in our bodies is involving itself in the metabolism of literally every cell in our body, especially affecting the synthesizing of DNA, but also fatty acid synthesis and energy yielding reactions. Choline is classified as a water-soluble nutrient usually grouped within the Vitamin B complex. This natural amine is found within the lipids that make up cell membranes and in the neurotransmitter acetylcholine. Choline and its metabolites are needed for three main physiological purposes: structural integrity and signaling roles for cell membranes, cholinergic neurotransmission (acetylcholine synthesis), and as a major source for methyl groups via its metabolite, trimethylglycine (betaine) that participates in the S-adenosylmethionine synthesis pathways.<sup>1,2,3</sup> Of the seven isoforms of Inositol,

myo-Inositol is the most prominent of the naturally occurring inositols. Interestingly, it used to be considered a b vitamin, but due to the fact that it can be synthesized *in vivo*, it was declassified. Inositol is involved directly in a number of signaling and secondary messenger cascades and plays a part in a number of physiological processes, including: insulin signal transduction (Larner J, 2002), gene expression (Shen, X, 2003), comprising of major components of cerebral spinal fluid (Nick, Gina L., 2004), just to name a few. Vitamin B7 (Biotin, or Vitamin H) is necessary for cell growth, the metabolism of amino acids and fats, and the actual synthesis of fatty acids. It also plays a role in the Citric acid cycle (aka., Krebs Cycle). Supplementation with biotin has demonstrated beneficial results in treating hair loss in adults and children as well as type II diabetics.<sup>4</sup> PABA (*p*-amino benzoic acid) is sometimes called vitamin Bx and is an intermediate in the bacterial synthesis of folic acid. PABA can be thought of as a natural UV blocker and is used as a drug against fibrotic skin disorders.<sup>5</sup>

### Controlling Release:

Now let's consider the fact about intestinal absorption. Like other nutrients, the b vitamins have certain target sites of absorption along the gastrointestinal tract that contain intricately-engineered transport channels that are specific for that b vitamin (Rosenberg, J et al., 2006). This must be the case due to their solubility in water. What happens if a b vitamin passes up its site of absorption? Unfortunately, it can't be recovered by the body. It doesn't get a second chance to get absorbed and become bioavailable. This becomes an underlying issue with many tablet manufacturers. There is such an emphasis on cutting costs that the quality of the product is compromised. The tablets are pounded together so tightly with bees wax or some other strong organic adhesive that there is very little control over the release of the vitamins they contain. Once again, Viva Vitamins has solved that problem. Within each tablet, microclusters of a b-vitamin subtype are enrobed in a particular coating that is designed to disintegrate upon a given pH. Researchers at Viva Vitamins have identified the pH of the environment at the target absorptive sites of each b vitamin and have engineered these coatings accordingly. At the site of absorption, the b vitamins are then released from the tablet and are exposed in close proximity to their transport channels. Talk about curbside service!

### Purpose:

Viva Vitamins' B-Complex has taken an age-old idea and supercharged it using the latest scientific research and technology to create a powerhouse b vitamin formulation where a difference from other vitamin blends is evident. The B-Complex is designed to increase physical and mental energy when diet alone cannot. This is critical for the avid exerciser, fast-paced worker, full-time student, or anyone else needing a pick-me-up throughout the day. Viva Vitamins' B-Complex yields real results using real science... not marketing science.

## References:

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