VITAMIN B1 | THIAMIN | THIAMINE

Summary of benefits:

Promotes nerve regeneration and functions as an antioxidant, protecting nerves from oxidative damage (68).
Helps rid the body of toxins (69).
Plays a vital role in cardiac function (69.
Helps reduce blood pressure and potential heart complications in diabetics (68,69).
Supports the immune system (11,68,69).
Plays an integral role in glucose metabolism (69).
May reduce neuropathic pain in diabetics (71).
Plays an essential role in cell growth and function (70).

INTRODUCTION

Thiamine, also referred to as thiamine or vitamin B1, can be found in many foods, namely meat, fish, seeds, beans, peas, tofu, brown rice, squash, asparagus, and mussels (128). This particular vitamin assumes a pivotal role in the realm of energy metabolism, thus exerting profound influence over cellular growth, development, and function [11].

ABSORPTION, ACTIVATION, & STORAGE

The assimilation of ingested thiamine, whether derived from food or dietary supplements, unfolds through distinct mechanisms depending on the administered dosage. At nutritional doses, active transport within the small intestine facilitates thiamine absorption, while at pharmacologic doses, passive diffusion occurs [11]. A significant portion of dietary thiamine exists in the phosphorylated form, necessitating enzymatic hydrolysis by intestinal phosphatases to liberate free thiamine prior to absorption [11]. Albeit, the remaining fraction of dietary thiamine is present in a readily-absorbable, unbound state [11,12].

Although thiamine can be stored in the human body, primarily in the liver, reserves are limited [13]. The short half-life of thiamine necessitates relatively consistent intake to sustain adequate blood levels.

Approximately 80% of the total thiamine content, which amounts to roughly 25-30 mg in the average adult human body, assumes the form of thiamine diphosphate (TDP), also known as thiamine pyrophosphate. TDP represents the principal metabolically active form of thiamine. Intriguingly, certain bacteria inhabiting the large intestine possess the ability to synthesize free thiamine and TDP. However, the precise contribution of these bacterial synthesizers to thiamine nutrition remains an enigma [14]. Functioning as an indispensable cofactor, TDP partakes in the catalytic activities of five key enzymes involved in glucose, amino acid, and lipid metabolism [11,13].

MEASUREMENT & DEFICIENCY

Measuring blood thiamine levels isn't a reliable method for assessing thiamine status. Instead, thiamine status is often evaluated indirectly by gauging the activity of the transketolase enzyme, which relies on TDP, in erythrocyte hemolysates under varying conditions of added TDP. This measurement, known as the "TDP effect," provides insight to the degree of transketolase saturation with TDP. Typically, healthy individuals exhibit a TDP effect ranging from 0% to 15%, while those with marginal deficiency demonstrate values between 15% and 25%. Individuals with outright deficiency exhibit a TDP effect surpassing 25%.

Another commonly employed parameter to assess thiamine status is urinary thiamine excretion, which offers information about dietary intake but not tissue reserves [15]. In adults, a urinary thiamine excretion of less than 100 micrograms per day (mcg/day) signifies inadequate thiamine intake, while values lower than 40 mcg/day indicate severely deficient intake [16].

Dosage Rationale

The RDA for vitamin B1 is 1.2 mg and 1.1 mg for men and women 19 years and older, respectively. Several studies by Thompson have demonstrated that a maximum of anywhere from 4.8 to 8.3 mg of thiamine can be absorbed in a single oral dose. Hence, we opted for 10 mg of thiamin in our Super U formula to reduce the likelihood of deficiency while insuring the provision of the aforementioned benefits. This, absent a superfluous dosage which might otherwise cause digestive upset and be merely passed through the urine.
It's important to note that while these statements are based on available information in the scientific literature, it is always advisable to consult with a healthcare professional before making any changes to your supplementation or health routine.

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