

# Thiamine (B<sub>1</sub>)

## A Requirement for Life



Michael Smith, PhD MDsc

**B<sub>1</sub>** is the common designation for thiamine, which is a vitamin required for human life. The chemical structure has been known for decades and knowledge of the important activities of this vitamin is slowly accumulating.

### How much vitamin B<sub>1</sub> is in the body?

There is not much total thiamine in the human body, only about 30 mg. Before thiamine can be utilized for enzyme catalysis it must be activated by ATP. This form of thiamine, thiamine pyrophosphate, is quickly synthesized once thiamine enters a cell and is very water soluble. Because of this thiamine can be quickly eliminated by the kidneys and there is not much thiamine stored in fat tissues; a different situation from vitamins A and E. Thiamine reserves are depleted as quickly as 20 days of inadequate oral intake.

### How does vitamin B<sub>1</sub> support energy needs?

As you oxidize sugars, the alpha-keto acid pyruvate and the related lactic acid accumulate. Thiamine and alpha lipoic acid are required in the mitochondria to oxidize pyruvate, and pyruvate from lactate, to acetic acid and carbon dioxide. The acetic acid formed is almost totally converted into energy as ATP and NADH, via the citric acid cycle. *The citric acid (energy) cycle, itself, has an absolute requirement for thiamine.*

Thiamine is also required by the enzyme which breaks down the branched chain amino acids (BCAA), leucine, isoleucine, valine and since leucine is also an important signal for fatigue it is important to tightly control the concentration of this BCAA. Both complex carbohydrate rich diets and junk food diets require higher than normal thiamine intake to assist in carbohydrate metabolism.

### Does supplemental vitamin B<sub>1</sub> offer benefits?

Supplemental vitamin B<sub>1</sub> should be considered necessary for people with a gastric bypass and those with high alcohol and drug intakes. People suffering AIDS or undergoing cancer treatment also run a very high risk of thiamine deficiency and should take supplements. This means millions of Americans are at risk of thiamine deficiency.

### Will vitamin B<sub>1</sub> help FMS brain fog?

Lack of thiamine causes fatigue and "brain fog". Fatigue resulting from a diet primarily consisting of refined grains (a carbohydrate rich diet) was the starting point for the research leading to thiamine discovery. Lack of vitamin B<sub>1</sub> results in neurological abnormalities, mental changes, congestive heart failure and metabolic acidosis. The acidosis is manifested both

systemically and locally; lactate acidosis effects vulnerable brain structures and can even elicit neuronal cell death due to the build-up of N-methyl-D-aspartate. Symptoms of neuronal damage caused by thiamine deficiency are apathy, inability to concentrate, spatial disorientation, confusion, delirium, psychosis and eventually coma. Neuronal damage due to thiamine deficiency is non-reversible. Once your neurons have died they are not replaced.

### What compromises B<sub>1</sub> absorption and utilization?

B<sub>1</sub> is easily absorbed by small intestines but disorders of the GI tract, such as gastric bypass, can compromise absorption. Though meats are high in thiamine, cooking destroys this required nutrient so those following the paleo diet should also supplement with B<sub>1</sub>.

### What about toxicity and safety?

As mentioned above there is not much thiamine in the body and this vitamin is easily destroyed during catalysis, as

well as during cooking. It is better to be on the high side of thiamine intake since the toxic level is many times the RDI (1.5 mg/day).

### Are deficiency symptoms obvious?

It can take a month for a thiamin deficit diet to show the effects of fatigue, memory loss, gastric irritability and insomnia. Often subtle subclinical signs can be the first warning. The most common medical condition in the US is the Wernicke-Korsakoff (WE) syndrome which is typically caused by chronic alcohol abuse – common enough.

### Why is B<sub>1</sub> in Fibro-Care™ & Fibro-Care Cal™?

Thiamine supplementation is required for those unfortunates who must take drugs for FMS, chronic pain and diabetes. Many drugs deplete the body of thiamine and there is not much natural reserve. In FMS particularly, there is a suspected mitochondria dysfunction. B<sub>1</sub> is very important for ATP and NADH biosynthesis in the mitochondria. The consequences of thiamine deficiency are severe and irreversible.

©Michael Smith & TyH Publications

For informational purposes only and not intended diagnose, cure, treat or prevent any medical condition.



- ◆ Energy
- ◆ Fibro-Fog
- ◆ Magnesium Absorption