Riboflavin, The Vitamin "Behind The Scenes"

There are many things in life that we all have a minimal understanding of, but are vitally important to our wellbeing.

Take a car for example. I'm sure that if you asked the majority of people what a clutch is, they would respond something akin to, "It's the peddle on the left." They could at best describe its purpose, but how it works they *have no idea.*

The human body is no different. If you asked the common person to describe what exactly happens to the food you eat, they may give some basic description of stomach acid and the obvious conclusion based on what comes out the other end, but in reality they don't really know.

Obviously these are very broad generalizations. There are definitely health conscious people out there who make an effort to know more. They count calories. They watch how much fat they eat. They avoid too many carbs, and so on. Sometimes, however, a more intimate knowledge of the chemistry of the body is necessary to turn all of that knowledge and interest into results.

The best place to start is by learning about the basic vitamins and amino acids. Many of our newsletters and publications have been focused on these basic nutrients to facilitate this necessary understanding in easy-to-understand terms.

This particular article, we are going to learn about a particular vitamin that, for lack of better terms, we can refer to as the vitamin "administrator". He is definitely not in charge, but they all need him. He keeps everybody organized and he facilitates the group so that everyone is prepared to do their best work. What's his name? Riboflavin.

Riboflavin gets its name from *ribose*, which is a type of simple sugar found in cells, and *flavus* the Latin word for yellow.

Commonly known as vitamin B2, it is easily recognized by anyone who has ever taken a B complex vitamin. It has a bright orange color and it is the substance that turns urine the bright yellow color after consumption. This is one of the reasons that it is used as a food-coloring agent. B2 serves some other industrial purposes, but we are much more interested in the role it plays in the body.

Riboflavin primary function is to facilitate metabolism. There are a great many metabolic processes in the body and B2 is involved in many of them. Metabolism, in general, is performed by the thousands upon thousands of enzymes that exist throughout your entire body. Metabolism usually means turning one substance into another substance in order to achieve an end, either so it can be excreted from the body, or so that it can be transported to another area of the body, or so that it can now perform a specific function. The food that you eat gets broken down into tiny pieces so that the enzymes can harvest the nutrients within and turn them into

usable materials that the body uses to function.

Riboflavin is an essential nutrient that is needed to produce the enzymes that metabolize fats, proteins, and carbohydrates. Essentially, the three energy-producing food groups that require certain enzymes to extract essential nutrients and in order for those enzymes to function, they require B2.

Not just in digestive enzymes, but in order for many different vitamins to be effective, they must be metabolized into their 'active' forms. This requires various enzymes. For example, one method the body uses to produce niacin (B3) is by metabolizing tryptophan. This process requires a riboflavin-dependent co-enzyme in order to be effectively completed.

The same is true of many other vitamins including, vitamin A (for healthy retinas), folic acid (B9), pyridoxal phosphate (B6), as well as the extremely powerful antioxidant glutathione.

In order for glutathione produced in the body to be able to enter the brain where it is vitally needed, it must be molecularly reshaped into order to cross the blood brain barrier. This shape of glutathione is referred to as its 'reduced' form. The enzymes that accomplish this reduction are dependent upon sufficient B2.

Because of its important relationship to the usability and function of essential vitamins, energy producing nutrients, and other essential substances in the body, a deficiency in riboflavin can create a systemic deficiency in many other vitamins and essential substances as well.

A typical healthy individual with a properly balanced diet should be able to obtain sufficient B2 from their diet. There are certain individuals who are at greater risk of developing a B2 deficiency, either from lifestyle choices, or from underlying absorption impairments.

The primary food sources of B2 are dairy products and animal proteins. Whole, unprocessed grains are another good source, but the majority of grains in the US are processed and then 'fortified' by adding various lost nutrients back to the product, among them B2. Also, individuals that have an issue consuming dairy products, either due to allergenic reasons, or for religious/moral reasons, B2 may become difficult to obtain in sufficient quantities.

Riboflavin deficiency in animals creates some very severe consequences including impaired growth and in extreme cases death. Studies on B2 deficiency in dogs showed that they eventually developed extreme fatigue, dermatitis, and hair loss. Eventually, they collapse into a coma and die.

Thankfully, in humans the body has a number of safety mechanisms to prevent such extreme symptoms. The liver tends to store large amounts of B2 in order to prevent severe deficiency. Even with this reserve, deficiencies are not as uncommon as you may presume. The U.S. Department of Health

conducts regular health surveys, particularly on children and one of the most common deficiencies among preschool children is riboflavin deficiency. Childhood deficiencies have been known to impair growth. Mostly, the deficiency does not show outward signs, but a blood test can reveal the many impairments that are being created upon the body. Some people refer to this type of condition as a "sub-clinical" deficiency since it has not manifested into more severe symptoms like trembling, dizziness, insomnia, and mental sluggishness.

Though children need adequate B2 for their growth and function, so too do adults, particularly those who have particular conditions that may increase the likelihood of a deficiency. People who are diabetic, have HIV, elderly, chronic heart disease and those with eating disorders are at an increased risk of developing a B2 deficiency, as well as compromising the function and metabolism of other essential vitamins and nutrients.

Another interesting category that increases riboflavin deficiency risk is in women taking oral contraceptives.

Individuals with a diet of dairy, meat, and processed grains may have sufficient B2, but at the cost of sufficient nutrient density and variety. Individuals with an alternative diet may be wealthier in a wider range of vitamins and nutrients, but be lacking the key invisible hand that makes them all function properly and at their fullest, B2.

One solution would be to supplement B2. Dietary supplements that contain *only* B2 are somewhat uncommon. This is because of their importance with other members of the B vitamin family; it is usually included in B complex vitamin supplements.

Riboflavin has no known toxicity since any riboflavin that is not used or needed is simply excreted in the urine, which typically turns a bright neon yellowish green color. Because it is one of the only nutrients that have this effect, it is sometimes used as a method for determining if patients are taking their medications.

Even though riboflavin has no toxicity, taking B complex supplements that contain other essential B vitamins should only be added to your diet under the guidance and supervision of a qualified medical professional.

There is a saying, "Behind every great man is a woman." Sometimes the figures in the spotlight get all the attention and credit for the work and effort put in by many. Those people sometimes go unnoticed and under appreciated by those who simply don't know better or are uninformed. Riboflavin doesn't have to be one of those vitamins anymore. Give it the respect it deserves and it will give you great rewards.

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