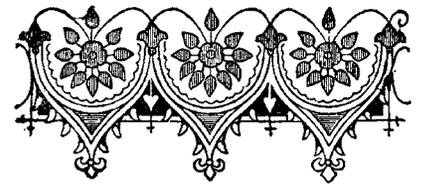


# Health & Wellness



## Is Your Micronutrient Status Adequate?



Dr. Kate Thomsen and Silky

Sometime ago, in high school probably, we learned that controlling the balance of the macronutrients (proteins, carbohydrates and fats) was the key to our weight, our health and our longevity. The simple carbohydrates like bread and pasta and the complex carbohydrates like fruits and vegetables were on the bottom of the food pyramid and we were supposed to eat a lot of those. Fats like salad oils and butter were at the top with protein (red meat, poultry and fish) just below that. We were to eat these judiciously.

How's that advice been working out for us? Not so good in my opinion. The bagels are bigger, the plate of pasta is larger and modern farming is producing gigantic apples, bananas and strawberries. Our intake of both the refined and the complex carbohydrate foods has increased dramatically. Big bagel or big fruit, both equal big sugar content and big bellies. We're all getting bigger, and bigger...

We were taught that food is just fuel for the cells in our body. Given too much fuel we would gain weight, and given too little fuel we would starve. But now we know that it is no longer a calories in-calories out equation. We know that the micronutrients in food direct HOW we use our fuel - whether we store it, burn it or put it to good or destructive use. Without the proper micronutrients, we can still look like we are over fed, but we can actually be "undernourished".

Micronutrients are often described as the vitamins and minerals that are required for life. We could also include amino acids, antioxidants, and fatty acids in the required "micro" mix. If we eat a meal containing a variety of high

quality, nutrient dense foods, then a properly functioning digestive tract should be able to release these micronutrients out of the foods. We should absorb them into our blood and deliver them to our cells. At the cell level, these breakdown products of foods do not act as calories but act as information to our cells, directing and allowing their proper function.

So what is the function of a cell? And what do the micronutrients do? Basically a cell is a protein making machine. There are over 200 different types of cells in a human (eg, liver cells, brain cells...) each with different jobs to do. But they are all making proteins because protein is what makes up your structure (skin, hair, bones, muscles...) and function (digestive enzymes, neurotransmitters, transporters...). Proteins can act as little machines that make your bodies' internal processes run smoothly.

How do our bodies' cells make proteins? Think of a cell as a factory. It needs a plan, the raw materials, assemblers, catalysts, a boss, fuel and a custodial service. The "plans" for making proteins are called genes. Our DNA, contains around 20,000 genes hooked together in a long strand. It is curled up and protected inside a compartment called a nucleus inside the cell. A fatty membrane surrounds the DNA keeping this compartment separate from the rest of the cell. Think of the DNA as the blueprints for making the 50,000 - 100,00 proteins necessary for the functioning of the human body. When your body needs to make a protein, it first must tell the DNA to uncurl the blueprint for that specific protein. The DNA has many bosses that can give it that message. These messages can come from inside or outside the factory. A boss may be a hormone like insulin or estrogen, a plant compound like ECGC from green tea, or a number of other compounds. The boss slips its message into the cell membranes - the "doorway" to the DNA. It acts like a key that fit into a specific lock embedded in the membrane. These locks are called receptors. When the right message

fits the right receptor, the message will be sent into the cell or into the nucleus and the DNA will know just which blueprint to copy to make the needed proteins. The desired proteins will be assembled according to the plans by assembler proteins. Think of them as robots along an assembly line hooking together the raw materials like putting legos together.

Where do we get the raw materials to build protein? Actually from other proteins like the dietary protein we ingest. Every time you eat protein (say, a piece of chicken meat) your digestive processes break it down into it's constituent amino acids. These amino acids are stored in the cells and like legos, they can be snapped together to make specific human proteins according to the DNA blueprint. So, what happens when a hormone fits into it's receptor and orders a specific protein but the cell is lacking the raw materials needed to make that protein? In the absence of adequate amino acids from dietary protein, we will break down our own muscle to provide the needed amino acids. Have I made the case for the importance of dietary protein yet?

The assemblers of the new proteins are actually fully formed working proteins called enzymes. Enzymes work best when catalysts are present, passing by the assembly line, attaching on or donating help. The vitamins and minerals in our foods are catalysts. They are essential for the factory to make proteins. If a certain vitamin or mineral is missing or deficient, some proteins will not be able to be made and consequently their functions will not be carried out.

All factories have a power plant that makes energy to run the operation. Our cells have many mitochondria that use fuel (carbohydrates or fats) to produce ATP, the energy for the cell.

Power plants produce a damaging smoke as they burn fuel to make energy. As a by-product of making ATP, mitochondria also produce a damaging waste product called free radicals. Scattered throughout the cell but particularly in the

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**Micronutrients originate from the food you eat:**

- Blueprints (DNA, nucleic acids)
- Membrane rings studded with locks (healthy fats)
- Raw materials (amino acids from protein),
- Assemblers (proteins functioning as enzymes)
- Catalysts (vitamins and minerals)
- Bosses (hormones, plant compounds)
- Fuel (carbohydrates or fats)
- Custodial service (antioxidants)

**Some reasons you may not have enough micronutrients:**

- You only eat bagels and spaghetti
- You don't absorb them because you over exercise, smoke, drink alcohol, are sedentary, are over stressed, have a chronic illness, take prescription drug, are elderly
- You require more because you have a chronic illness, are exposed to 21st century NJ toxins, are elderly, have genetic variations

**Some chronic conditions related to micronutrient deficiencies):**

- Heart disease and stroke
- Obesity
- Cancer
- Osteoporosis
- Diabetes

**Something you can do about it:**

- Eat a wide variety of nutrient dense food
- Lead a healthier lifestyle
- Get your micronutrient status tested at our office and replace the ones you need

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mitochondria, we have antioxidants from our food that can neutralize the free radicals before they create damage. The antioxidants are the custodians, mopping up the mess.

So health is not just about calories or sugars, fats and protein. It is about having sufficient amino acids available from your dietary protein, specific fatty acids to make healthy cell membranes with well functioning receptors. It is about choosing foods with appropriate amounts of vitamins, minerals and antioxidants. If we are undernourished with these micronutrients our factories can't make the proteins we need, and our structure and function suffer. Uncorrected, this becomes a downward spiral toward poor

health. It's at the micronutrient level where "you are what you eat" really starts.

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