What’s the difference between vitamins and minerals? [1]

Dear Alice,

What is the difference between vitamins and minerals? It seems like most Americans are taking a lot of vitamins more than they need to. Is it good to take a lot of vitamins?

Answer

Dear Reader,

There is a lot of conflicting information about the pros and cons of supplements, so thanks for asking an important question. A healthy and nutritious diet involves six classes of nutrients:

- Carbohydrates
- Fats
- Proteins
- Vitamins
- Minerals
- Water

Carbohydrate, fat, and protein are considered macronutrients [because our bodies require them in large quantities (grams/day)] and they yield energy. Vitamins and minerals are considered micronutrients [because our bodies need them in smaller amounts (milligrams or micrograms/day)] and instead of yielding energy, they help our bodies carry out necessary and important physiological processes. About 40 of these nutrients are essential for life because our bodies cannot synthesize enough to meet physiological needs (so our diet provides us with the bulk of these essential nutrients).

Vitamins are either water-soluble (water is required for absorption and are excreted in urine) or fat-soluble (requires fat for absorption and are stored in fat tissue). There are nine different water-soluble vitamins: vitamin C and the eight B vitamins (thiamin, riboflavin, niacin, vitamins B₆ and B₁₂, folate, biotin, and pantothenic acid); and, 4 different fat-soluble vitamins: vitamins A, D, E, and K. Each of these vitamins have unique roles and functions in our bodies. For example, vitamin A promotes eyesight and helps us see in the dark, and vitamin K helps blood to clot.

Minerals are categorized as major or macro- (calcium, phosphorus, potassium, sodium, chloride, magnesium, and sulfur), and trace or micro- (iron, iodine, zinc, chromium, selenium, fluoride, molybdenum, copper, and manganese) minerals, the former needed in quantities of 100mg/day or more, and the latter required in much smaller, or "trace," amounts. These 16
essential minerals also play vital roles in the body, such as calcium in osteoporosis prevention and iron in (iron-deficiency) anemia prevention; and, they can be found in the body dissolved in body fluids as ions and/or are part of important compounds, such as calcium and phosphorus in hydroxyapatite found in bones and teeth. Other minerals, such as lead, are contaminant minerals and not nutrients because they can cause harm by disrupting normal bodily functions and processes (i.e. lead poisoning).

Vitamins ("vita" = life and "amine" = containing nitrogen) are organic (containing carbon, which is an element found in all living things) compounds (containing atoms of one or more different elements). Minerals are pure inorganic elements (containing atoms of the same element), meaning they are much simpler in chemical form than vitamins. All vitamins are essential or required by our bodies, whereas only some minerals are essential nutrients. Vitamins are vulnerable to heat, light, and chemical agents, so cooking, food preparation, processing, and storage must be appropriate to preserve vitamins in food. Minerals, on the other hand, are more stable to food preparation, but mineral loss can occur when they are bound to other substances in foods (such as oxalates found in spinach and tea, and phytates found in legumes and grains), making them unavailable for the body to utilize.

There is not a lot of research to state unequivocally if taking extra vitamins or minerals is harmful or helpful for the body. Our bodies do have a natural maximum capacity for different types of vitamins and minerals, so taking a lot of supplements may result in nausea or other side effects as your system works to get rid of the excess. While some vitamins and minerals are water soluble and can be excreted through urine if they are in excess, others are absorbed in fat and can accumulate over time. Some supplements can also interact with prescribed medications, so you may want to include them when asked about any medications during medical exams. You may also want to speak to your health care provider before adding any new supplements to your diet.

Health care professionals do agree that the best source of both macro and micro nutrients is from a well-balanced diet. Try visiting ChooseMyPlate.gov [2] for information on the health benefits, nutrients, and vitamins available in different foods. Depending on the person, current levels of vitamins and minerals may be higher or lower than necessary and may warrant a supplement or dietary changes. To understand what vitamins and minerals are most appropriate for you, you may want to consult with your health care provider or a registered dietician. The National Institutes of Health (NIH) [3] or the U.S. Food and Drug Administration (FDA) [4] websites have additional information about dietary supplements in general.

Here?s to finding the balance that?s right for you!

Alice!

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