



How vitamins work

By Matt Jacks

PO Box 2065
Bondi Junction
NSW 1355

info@healthyintentions.com.au
www.healthyintention.com.au

fact sheet

Vitamins are vital for our health and wellbeing, which is beyond doubt, having been proved on many occasions. A look at vitamins in the history of the world —and unfortunately still today in developing third world countries—has led and is leading to many people suffering from preventable killer diseases and other general complaints of ill health. So don't groan when your mum checks if you're taking your vitamins!

What they're not

So they're good for us, but they don't actually give us energy. That's the job of stuff like carbohydrates, fats and proteins. These are known as macronutrients, with vitamins and minerals being micronutrients.

Vitamins should be thought of being more like a hard working growth and maintenance crew, involved in watching over the everyday upkeep (and development, when young) of our bodies. Helping to keep things running smoothly and efficiently, preventing some things from going wrong, and putting other things right.

What they are

So what are they then? Vitamins are molecular compounds made of organic chemicals that cannot be produced by the human body, but are necessary for its survival. Organic means they contain carbon, and in addition to which they are made up from hydrogen, oxygen, and a few with nitrogen and/or other elements in lesser quantities. They can vary quite a bit in chemical structure and this can affect how they work, but all the possibilities are known and quite well understood by nutritionists today thanks to decades of research by American, British, and European scientists.

Thirteen is lucky for some

They are thirteen in number and come in two broad types: fat-soluble and water-soluble. This means that when solid they either dissolve in a solution of water or in fats and oils. The word solution comes from the Latin 'solutio' which means, 'a loosening', and this is crucial to the process of absorption into our bodies. So that the vitamin molecules can get to where they are either stored for future use, or used right away.

The fat-soluble are vitamins A, D, E and K. The water-soluble are the vitamin B group and vitamin C.

The water-soluble vitamins are like fast livers, they come and go. Being easily lost to us in perspiration (sweat) or urine (you know what that is). So consequently our bodies have a difficult job in holding onto them, and demand a constant repeat of supply.

The fat-soluble vitamins are less easy to get rid of, which can be a good thing, and a bad thing. It's good because the human body can build up stocks in case of a lack of supply; but if that supply line keeps on coming in too fast daily, then the advantage turns to disadvantage. The body's metabolism can't get rid of the excess amount, and in extremes, this can result in toxins being produced (known as hypervitaminosis).

So skipping your vitamins A, D, E and K now and then won't be a problem. But the body soon craves for the vitamin B's (there are eight of them) and vitamin C. They'll be quickly missed so make sure you don't develop a rapid deficiency. Especially so if you have a high intake of caffeine and alcohol (which are known as diuretics) as these could lead to increased vitamin loss.

Made to measure

Luckily though, not much is required in quantity. Vitamins are so effective that only tiny amounts need to be taken in each day through food or supplements. This is because they can be re-used several times before exhausting their goodness.

Due to this fact, only minute measurements are used for our US RDA's (United States Recommended Daily Amounts) like milligrams and micrograms. One milligram (1mg) is only one thousandth of one gram (1g), and one microgram (1mcg) is one millionth of one gram (1g). Sometimes other abbreviations like DV (Daily Values) or RDA may be used, this stands for Recommended Dietary Allowance, and these are slightly different from US RDA, which are based on them, as they use broader values.

Sometimes you may find IU on the packaging of purchased vitamin supplements. This means International Unit, and is an internationally recognised standard for biological activity of vitamins A, D, and E. One IU is a different amount, depending on which vitamin is expressed.

If your vitamins are of foreign origin, a strange symbol looking like a stylised letter 'u' with an extra stroke dropping down from the lower left. This represents microns (one micron is one millionth of a meter) in the metric system, and although being a unit measure length rather than weight, can often be found on imported dietary supplement labelling and packaging, particularly from Europe.

Meet the family

So we know vitamins are vital, now let's meet them individually, find out some of the places where they can be found, and what they do.

- **Vitamin A (an anti-cancer vitamin also known as Retinol)**
Vitamin A is very important for healthy eyes, especially for the formation of visual purple, which increases night vision. It also helps to keep our eyes from drying out and is good for nourishing the white of the eyeball. As well as eyes, vitamin A also aids the healthy upkeep and growth of our bones, hair, skin, teeth, mucous membranes and benefit's the immune system. The chief source of vitamin A is carotene or beta-carotene, which can be found in egg yolks, butter, cheese and yellow or orange fruits and vegetables. So carrots really do make you see in the dark!
- **Vitamin B1 (Thiamine)**
This vitamin helps growth, digestion and the health of nerves and muscles. With the latter using up roughly a half of all the body's thiamine take up. A severe deficiency of this leads to the deadly disease known as beriberi, which causes paralysis and then death. Vitamin B1 is found in pulses, whole-wheat and other breads, pork, liver, milk, oysters and potatoes.
- **Vitamin B2 (Riboflavin)**
Vitamin B2 is very important to the body's metabolism, in freeing energy from carbohydrates, fats and proteins in our food. It is very common in milk, pulses, eggs, cheese, nuts, yeast, mushrooms, dark green leaves, liver and kidneys. Its lack of presence can cause dandruff, cracked lips, other skin disorders and an inflamed tongue.
- **Vitamin B4 (Folic Acid)**
Extremely important for the development of fetuses and for healthy blood by increasing the

production of red blood cells (which carry oxygen around the body). It also aids in replacing cells and the use of amino acids for genes. A lack of this vitamin will result in certain forms of anaemia. It is to be found in many green vegetables, liver, kidneys, pulses, yeast, and mushrooms.

- **Vitamin B6 (Pyridoxine)**

This vitamin helps in the absorption of proteins and the health of red blood cells. Its sources are red meat, poultry, fish, potatoes and bananas. If not present in sufficient quantities, it too can lead to anaemia.

- **Vitamin B7 (Niacin or Nicotinic Acid)**

Needed for the freeing of energy from carbohydrates and fats, and for better cellular properties. To be found mostly in red meats, fish and poultry, as well as bread and milk. Without it pellagra and other skin conditions and diseases will occur.

- **Vitamin B12 (Cyanocobalamin or Cobalimine)**

B12 is good for cell reproduction, especially in bone marrow where red blood cells come from, and healthy nerve tissue. The best sources for vitamin B12 are meat, fish, eggs and milk. A lack of B12 will result in anaemia or nervous disorders.

- **Biotin (previously known as vitamin H)**

This works for our growth and delivery of energy through fatty acids, and probably aids healthy skin. Chief sources are milk, butter, egg yolks and yeast and liver, also, green beans. Consuming too many raw (uncooked) eggs will work against this vitamin. Deficiency problems are unknown though may include depression, nausea, and a lack of appetite.

- **Pantothenic Acid**

This vitamin is needed for the body's metabolism and the production of hormones. It is very common in all foodstuffs and therefore deficiency conditions are unknown, but could be fatigue, stomach pains and skin complaints.

The vitamin B group numbers are apparently haphazard in fashion here because there used to be more which later proved to be vitamin like substances, and not actually vitamins. The difference being, these others whilst having similar properties and tasks could be produced by humans within our own bodies unaided, and proper vitamins cannot be.

- **Vitamin C (an anti-cancer vitamin also known as Ascorbic acid)**

This vitamin is famous for curing scurvy. While most animals can make it internally, humans cannot. It's most important duties are the healthy upkeep of arteries, bones and teeth, the immune system (helping to fight against colds and the flu), the production of collagen for healthy skin and the healing of wounds and burns. It is to be found in all fruit and vegetables, specially the citrus fruits, tomatoes and potatoes. Severe lack of vitamin C will result in scurvy, teeth loss, bleeding gums and muscle wastage.

- **Vitamin D (Calciferol)**

Vitamin D is indispensable for bone formation, helping to control their mineral composition, and keeping them strong and healthy. It is to be found in milk, eggs, margarine, butter, fish and fish oils; and also can be formed in our skin when we expose it to sunshine. Deficiency causes rickets in children and weakened bones in adults.

- **Vitamin E (Tocopherol)**

Another anti-cancer vitamin. This keeps our cells healthy and was thought to affect fertility. It helps vitamin A to work better and might have anti-aging properties. It is present in green leaves, beans, wheat bread, margarine and vegetable oils, nuts and seeds. When lacking, unhealthy blood is the result.

- **Vitamin K**

Vital for stemming blood flow from cuts and wounds (coagulating), it can be found in all green vegetables and as vitamin K2 can be formed by bacteria in our intestines. Deficiency will result in haemorrhaging of wounds (an inability to stop bleeding).

So there they are, helping us along our way, but we also need to help them by not over cooking our meals which leads to reduced vitamin content in the food we eat. Don't undercook mind, as that will lead to the much more immediate and serious problem of food poisoning!

Vitamins are also more common in fresh vegetables than frozen and steamed foods as opposed to boiled. Pesticide free and unprocessed foodstuffs are also more vitamin rich. So use them wisely and they'll pay you back, with interest!

About the author

Matt Jacks is a successful freelance copywriter who provides valuable tips and advice for consumers on a range of topics including weight loss. His numerous articles offer moneysaving tips and valuable insight on typically confusing topics.

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