

Short notes on Vitamins and Minerals required by healthy body

1. Essential nutrients for your body

Key Points

- Vitamins and minerals are essential nutrients because they perform hundreds of roles in the body.
- There is a fine line between getting enough of these nutrients (which is healthy) and getting too much (which can end up harming you).
- Eating a healthy diet remains the best way to get sufficient amounts of the vitamins and minerals you need.
- Every day, your body produces skin, muscle, and bone. It churns out rich red blood that carries nutrients and oxygen to remote outposts, and it sends nerve signals skipping along thousands of miles of brain and body pathways. It also formulates chemical messengers that shuttle from one organ to another, issuing the instructions that help sustain your life.
- But to do all this, your body requires some raw materials. These include at least 30 vitamins, minerals, and dietary components that your body needs but cannot manufacture on its own in sufficient amounts.
- Vitamins and minerals are considered essential nutrients—because acting in concert, they perform hundreds of roles in the body. They help shore up bones, heal wounds, and bolster your immune system. They also convert food into energy, and repair cellular damage.
- But trying to keep track of what all these vitamins and minerals do can be confusing. Read enough articles on the topic, and your eyes may swim with the alphabet-soup references to these nutrients, which are known mainly by their initials (such as vitamins A,B,C,D,E, and K—to name just a few).
- **The main sources of vitamin C—causes the bleeding gums and listlessness of scurvy** (disease caused by deficiency of vitamin C).
- **Blindness.** In some developing countries, people still **become blind from vitamin A deficiency.**
- **Rickets.** A deficiency in **vitamin D can cause ricketa (deficiency disease in children with softening of bones), a condition marked by soft, weak bones that can lead to skeletal**
- **Prevents birth defects.** Taking folic acid supplements early in pregnancy helps prevent brain and spinal birth defects in offspring.
- **Healthy teeth.** The mineral fluoride not only helps bone formation but also keeps dental cavities from starting or worsening.

- Vitamin D enables your body to pluck calcium from food sources passing through your digestive tract rather than harvesting it from your bones. Vitamin C helps you absorb iron.
- Because much of your body consists of water, many of the water-soluble vitamins circulate easily in your body. Your kidneys continuously regulate levels of water-soluble vitamins, shunting excesses out of the body in your urine.

Water-soluble vitamins

(Click on the links below for more information from the Harvard School of Public Health nutrition source website)

B vitamins

- Biotin (vitamin B7)
- Folic acid (folate, vitamin B9)
- Niacin (vitamin B3)
- Pantothenic acid (vitamin B5)
- Riboflavin (vitamin B2)
- Thiamin (vitamin B1)
- Vitamin B6
- Vitamin B12

Vitamin C

Although water-soluble vitamins have many tasks in the body, one of the most important is helping to free the energy found in the food you eat. Others help keep tissues healthy.

What they do

Although water-soluble vitamins have many tasks in the body, one of the most important is helping to free the energy found in the food you eat. Others help keep tissues healthy. Here are some examples of how different vitamins help you maintain health:

- **Release energy.** Several B vitamins are key components of certain coenzymes (molecules that aid enzymes) that help release energy from food.
- **Produce energy.** Thiamin, riboflavin, niacin, pantothenic acid, and biotin engage in energy production.
- **Build proteins and cells.** Vitamins B6, B12, and folic acid metabolize amino acids (the building blocks of proteins) and help cells multiply.
- **Make collagen.** One of many roles played by vitamin C is to help make collagen, which knits together wounds, supports blood vessel walls, and forms a base for teeth and bones.

Words to the wise

Contrary to popular belief, some water-soluble vitamins can stay in the body for long periods of time. You probably have several years' supply of vitamin B12 in your liver. And even folic acid and vitamin C stores can last more than a couple of days.

Just be aware that there is a small risk that consuming large amounts of some of these micronutrients through supplements may be quite harmful. For example, very high doses of B6—many times the recommended amount of 1.3 milligrams (mg) per day for adults—can damage nerves, causing numbness and muscle weakness.

Generally, though, water-soluble vitamins should be replenished every few day

A closer look at fat-soluble vitamins

Absorption of fat-soluble vitamins: Fat-soluble vitamins gain entry to the blood via lymph channels in the intestinal wall (see illustration). Many fat-soluble vitamins travel through the body only under escort by proteins that act as carriers.

1. Food containing fat-soluble vitamins is ingested.
2. The food is digested by stomach acid and then travels to the small intestine, where it is digested further. Bile is needed for the absorption of fat-soluble vitamins. This substance, which is produced in the liver, flows into the small intestine, where it breaks down fats. Nutrients are then absorbed through the wall of the small intestine.
3. Upon absorption, the fat-soluble vitamins enter the lymph vessels before making their way into the bloodstream. In most cases, **fat-soluble vitamins must be coupled with a protein in order to travel through the body.**
4. These vitamins are used throughout the body, but excesses are stored in the liver and fat tissues.
5. As additional amounts of these vitamins are needed, your body taps into the reserves, releasing them into the bloodstream from the liver.

Fatty foods and oils are reservoirs for the four fat-soluble vitamins. Within your body, fat tissues and the liver act as the main holding pens for these vitamins and release them as needed.

To some extent, you can think of these vitamins as time-release micronutrients. It's possible to consume them every now and again, perhaps in doses weeks or months

apart rather than daily, and still get your fill. Your body squirrels away the excess and doles it out gradually to meet your needs.

Fat-soluble vitamins

(Click on the links below for more information from the Harvard School of Public Health nutrition source website)

- [Vitamin A](#)
- [Vitamin D](#)
- [Vitamin E](#)
- [Vitamin K](#)

What they do

Together this vitamin quartet helps keep your eyes, skin, lungs, gastrointestinal tract, and nervous system in good repair. Here are some of the other essential roles these vitamins play:

- **Build bones.** Bone formation would be impossible without vitamins A, D, and K.
- **Protect vision.** Vitamin A also helps keep cells healthy and protects your vision.
- **Interact favorably.** Without vitamin E, your body would have difficulty absorbing and storing vitamin A.
- **Protect the body.** Vitamin E also acts as an antioxidant (a compound that helps protect the body against damage from unstable molecules).

Words to the wise

Because fat-soluble vitamins are stored in your body for long periods, toxic levels can build up. This is most likely to happen if you take supplements. It's very rare to get too much of a vitamin just from food.

A closer look at major minerals

The body needs, and stores, fairly large amounts of the major minerals. These minerals are no more important to your health than the trace minerals; they're just present in your body in greater amounts.

Major minerals travel through the body in various ways. Potassium, for example, is quickly absorbed into the bloodstream, where it circulates freely and is excreted by the kidneys, much like a water-soluble vitamin. Calcium is more like a fat-soluble vitamin because it requires a carrier for absorption and transport.

Major minerals

- Calcium
- Chloride
- Magnesium
- Phosphorus
- Potassium
- Sodium
- Sulfur

What they do

One of the key tasks of major minerals is to maintain the proper balance of water in the body. Sodium, chloride, and potassium take the lead in doing this. Three other major minerals—calcium, phosphorus, and magnesium—are important for healthy bones. Sulfur helps stabilize protein structures, including some of those that make up hair, skin, and nails.

Words to the wise

Having too much of one major mineral can result in a deficiency of another. These sorts of imbalances are usually caused by overloads from supplements, not food sources. Here are two examples:

- **Salt overload.** Calcium binds with excess sodium in the body and is excreted when the body senses that sodium levels must be lowered. That means that if you ingest too much sodium through table salt or processed foods, you could end up losing needed calcium as your body rids itself of the surplus sodium.
- **Excess phosphorus.** Likewise, too much phosphorus can hamper your ability to absorb magnesium.

Source: http://www.netdoctor.co.uk/health_advice/facts/vitamins_which.htm

Recommended daily amounts (RDAs)

Micro vs milli

Check the letters after the RDA carefully.

One microgram (mcg or µg) is a thousand times smaller than a milligram (mg).

Throughout this factsheet the recommended daily amount (RDA) refers to the EU guidance that is used for nutrition tables on food products.

Nutritional requirements are often slightly different for young children, adolescents, and during [pregnancy](#) and [breastfeeding](#).

Ask your doctor or pharmacist if you are concerned about your vitamin intake.

Vitamins

Vitamin A (retinol) properties

Good for	Eyesight, growth, appetite and taste.
Signs of	Night-blindness
RDA	800 micrograms
Good sources	Liver, cod liver oil, carrots, green leafy vegetables, egg yolks, enriched margarine, milk products and yellow fruits.
Poisoning	This vitamin is fat-soluble and so is stored in the body for a long time, especially in pregnancy. An overdose may be dangerous.
Destroyed by	Fatty acids.

Vitamin B1 (thiamine) properties

Good for	Nervous system, digestion, muscles, heart, alcohol-damaged nerve tissues.
Signs of	Tingling in fingers and toes, confusion, difficulties in maintaining balance, loss of appetite, exhaustion and weakened powers of concentration.
RDA	1.4mg
Good sources	Liver, yeast, egg yolk, cereal, red meat, nuts and wheatgerm.
Poisoning	No danger. It dissolves in water, so any excess is passed in urine.
Destroyed by	High temperatures, alcohol and coffee.

Vitamin B2 (riboflavin) properties

Good for	Growth, skin, nails, hair, sensitive lips and tongue, eyesight, the breakdown of protein, fat and carbohydrates .
Signs of deficiency	Itchy irritated eyes, itchy mucous membranes (nose, mouth, throat) and cracked corners of lips.
RDA	1.6mg
Good sources	Milk, liver, yeast, cheese, green leafy vegetables, fish.
Poisoning	No danger. It dissolves in water, so any excess is passed in urine.
Destroyed by	Alcohol and light (this is why milk-cartons are better than bottles).

Vitamin B6 (pyridoxine) properties

Good for	Preventing skin conditions, nerve problems, helps the body absorb protein and carbohydrate.
Signs of	Skin inflammation.

RDA	2mg – women taking the contraceptive pill may need more.
Good sources	Fish, bananas, chicken, pork, wholegrains and dried beans.
Poisoning	May cause nerve problems in large doses. Evidence is conflicting about the maximum safe dose, so get medical advice before exceeding the RDA.
Destroyed by	The contraceptive pill, roasted or boiled food, alcohol and oestrogen (the female hormone).

Vitamin B12 (cobalamin) properties

Good for	Making red blood and the formation of the nerves.
Signs of deficiency	Tiredness and fatigue , tingling and numbness in hands/feet, memory problems and anaemia .
RDA	1 microgram
Good sources	Eggs, shellfish, poultry, meat, liver, milk, cheese and fortified cereal.
Poisoning	No danger. It dissolves in water, so any excess is passed in urine.
Destroyed by	Water, sunlight, alcohol, oestrogen and sleeping pills.

Vitamin C (ascorbic acid) properties

Good for	Immune defence system, protection from viruses and bacteria, healing wounds, reducing cholesterol, cell lifespan and preventing scurvy.
Signs of	Tiredness, bleeding gums and slow-healing wounds.
RDA	60mg

Good sources	Citrus fruits, kiwi fruit, berries, tomatoes, cauliflower, potatoes, green leafy vegetables and peppers.
Poisoning	Large doses can cause diarrhoea and nausea, eg 2g/day . Some scientists have argued that 1000-5000mg per day may damage your DNA.
Destroyed by	Boiling food, light, smoking and heat.

Vitamin D properties

Good for	Strong bones and teeth.
Signs of	Unhealthy teeth, osteomalacia (causes weakening of bones), rickets in children.
RDA	5 micrograms
Good sources	Sunlight (the action of sunlight on the skin allows our bodies to manufacture vitamin D), cod liver oil, sardines, herring, salmon, tuna, milk and milk products.
Poisoning	This vitamin is fat-soluble so can accumulate in the body. Overdoses are dangerous, but there is wide variability in the toxic level, eg 400IU for children.
Destroyed by	Mineral oil.

Vitamin E (tocopherol) properties

Good for	Fighting toxins – vitamin E is a powerful antioxidant.
Signs of	Weak muscles and fertility problems.
RDA	10mg

Good sources	Nuts, soya beans, vegetable oil, broccoli, sprouts, spinach, wholemeal products and eggs.
Poisoning	Potential effect with warfarin increasing risk of bleeding, more than 400IU/day can increase risk of heart failure and death in long term illness.
Destroyed by	Heat, oxygen, frost, iron and chlorine.

Folic acid properties

Good for	Production of red blood cells. It is essential in the first three months of pregnancy to prevent birth defects such as spina bifida, cleft palate or cleft lip.
Signs of	Tiredness due to anaemia and red tongue.
RDA	200 micrograms. Women planning to conceive should take a daily supplement of 400mcg, continued for the first 12 weeks of pregnancy.
Good sources	Carrots, yeast, liver, egg, yolks, melon, apricots, pumpkin, avocado, beans, rye and wholewheat and green leafy vegetables.
Poisoning	No danger. It dissolves in water, so any excess is passed in urine.
Destroyed by	Water, sunlight and heat.

Minerals

Calcium

Good for	Strong bones and teeth, nerve function, muscle contraction, blood clotting.
Signs of	Poor teeth and brittle bones.

RDA	800mg
Good	Milk, cheese, butter, yoghurt and green leafy vegetables.
Poisoning	High doses can lead to headaches , stomach pain, high blood pressure and diarrhoea . Excess calcium can be deposited as kidney and gall bladder stones. It has been linked to an increased risk for heart attack in recent research.

Iron

Good for	Red blood cells and muscle function, white blood cells and the immune system.
Signs of	Tiredness, irritability, difficulties concentrating.
RDA	14mg
Good sources	Lean red meat, oily fish, egg yolks, green leafy vegetables, nuts, wholegrains and wholewheat.
Poisoning	Iron is stored in the body and high doses (over 17mg) can lead to constipation, vomiting, nausea and diarrhoea. Very high doses can be fatal.

Magnesium

Good for	Converting energy from food, cell repair, building strong bones, teeth and muscles and regulating body temperature.
Signs of	Muscle spasms, and has been associated with heart disease, diabetes, high blood pressure and weak bones.

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RDA	300mg
Good sources	Green leafy vegetables, wholegrains and nuts.
Poisoning	High doses can cause diarrhoea.
Zinc	
Good for	Immune system, the breakdown of protein, fat and carbohydrate.
Signs of	Lesions on skin, eyes and in throat, loss of taste and smell, hair loss, diarrhoea, slow healing of wounds and growth problems in children.
RDA	15mg
Good sources	Meat, shellfish, milk brown rice and wholegrains.
Poisoning	High doses can lead to stomach cramps, nausea and vomiting, 100mg a day is the current advised maximum daily limit

Who takes MVM supplements?

Research has shown that more than one-third of Americans take MVMs. About one in four young children takes an MVM, but adolescents are least likely to take them. Use increases with age during adulthood so that by age 71 years, more than 40% take an MVM.

Women; the elderly; people with more education, more income, healthier diets and lifestyles, and lower body weights; and people in the western United States use MVMs most often. Smokers and members of certain ethnic and racial groups (such as African Americans, Hispanics, and Native Americans) are less likely to take a daily MVM.

What are some effects of MVMs on health?

People take MVMs for many reasons. Here are some examples of what research has shown about using them to increase nutrient intakes, promote health, and reduce the risk of disease.

Increase nutrient intakes

Taking an MVM increases nutrient intakes and helps people get the recommended amounts of vitamins and minerals when they cannot or do not meet these needs from food alone. But taking an MVM can also raise the chances of getting too much of some nutrients, like iron, vitamin A, zinc, niacin, and folic acid, especially when a person uses more than a basic, once-daily product.

Some people take an MVM as a form of dietary or nutritional "insurance." Ironically, people who take MVMs tend to consume more vitamins and minerals from food than those who don't. Also, the people

least likely to get enough nutrients from diet alone who might benefit from MVMs are the least likely to take them.

Health promotion and chronic disease prevention

For people with certain health problems, specific MVMs might be helpful. For example, a study showed that a particular high-dose formula of several vitamins and minerals slowed vision loss in some people with age-related macular degeneration. Although a few studies show that MVMs might reduce the overall risk of cancer in certain men, most research shows that healthy people who take an MVM do not have a lower chance of getting cancer, heart disease, or diabetes. Based on current research, it's not possible to recommend for or against the use of MVMs to stay healthier longer.

One reason we know so little about whether MVMs have health benefits is that studies often use different products, making it hard to compare their results to find patterns. Many MVMs are available, and manufacturers can change their composition at will. It is therefore difficult for researchers to study whether a specific combination of vitamins and minerals affects health. Also, people with healthier diets and lifestyles are more likely to take dietary supplements, making it hard to identify any benefits from the MVMs.

Should I take an MVM?

MVMs cannot take the place of eating a variety of foods that are important to a healthy diet. Foods provide more than vitamins and minerals. They also have fiber and other ingredients that may have positive health effects. But people who don't get enough vitamins and minerals from food alone, are on low-calorie diets, have a poor appetite, or avoid certain foods (such as strict vegetarians and vegans) might consider taking an MVM. Health care providers might also recommend MVMs to patients with certain medical problems. Some people might benefit from taking certain nutrients found in MVMs. For example:

- Women who might become pregnant should get 400 mcg/day of folic acid from fortified foods and/or dietary supplements to reduce the risk of birth defects of the brain and spine in their newborn babies.
- Pregnant women should take an iron supplement as recommended by their health care provider. A prenatal MVM is likely to provide iron.
- Breastfed and partially breastfed infants should receive vitamin D supplements of 400 IU/day, as should non-breastfed infants who drink less than about 1 quart per day of vitamin D-fortified formula or milk.
- In postmenopausal women, calcium and vitamin D supplements may increase bone strength and reduce the risk of fractures.
- People over age 50 should get recommended amounts of vitamin B12 from fortified foods and/or dietary supplements because they might not absorb enough of the B12 that is naturally found in food.

Can MVMs be harmful?

Taking a basic MVM is unlikely to pose any risks to health. But if you consume fortified foods and drinks (such as cereals or beverages with added vitamins and minerals) or take other dietary supplements, make sure that the MVM you take doesn't cause your intake of any vitamin or mineral to go above the upper safe levels. (Use the [Online DRI tool](#) to learn the upper safe level of each nutrient.)

Pay particular attention to the amounts of vitamin A, beta-carotene (which the body can convert to vitamin A), and iron in the MVM.

- Women who get too much vitamin A during pregnancy can increase the risk of birth defects in their babies. This risk does not apply to beta-carotene, however. Smokers, and perhaps former smokers, should avoid MVMs with large amounts of beta-carotene and vitamin A because these ingredients might increase the risk of developing lung cancer.

Adult men and postmenopausal women should avoid taking MVMs that contain 18 mg or more of iron unless their doctor has told them that they have iron deficiency or inadequacy. When the body takes in much more iron than it can eliminate, the iron can collect in body tissues and organs, such as the liver and heart, and damage them. Iron supplements are a leading cause of poisoning in children under age 6, so keep any products containing iron (such as children's chewable MVMs or adults' iron supplements) out of children's reach