

## Vitamin B6

### AT A GLANCE

#### Introduction

Vitamin B6 is a water-soluble vitamin. There are three different natural forms of vitamin B6: pyridoxine, pyridoxamine, and pyridoxal, all of which are normally present in foods. Humans depend on external sources to cover their vitamin B6 requirements and the pyridoxal 5'-phosphate (PLP) form is of major importance.

#### Health Functions

An adequate intake of vitamin B6 (pyridoxine) is essential as it helps the body to

- convert food into glucose, which is used to produce energy
- make neurotransmitters, which carry signals from one nerve cell to another
- produce hormones, red blood cells, and cells of the immune system
- control (along with vitamin B12 and vitamin B9) blood levels of homocysteine, an amino acid that may be associated with heart disease.

The European Food Safety Authority (EFSA), which provides scientific advice to assist policy makers, has confirmed that clear health benefits have been established for the dietary intake of vitamin B6 in contributing to:

- normal protein and glycogen metabolism;
- the normal function of the nervous system;
- normal red blood cell formation;
- the normal functioning of the immune system;
- the regulation of hormonal activity;
- normal homocysteine metabolism;
- normal energy-yielding metabolism;
- normal cysteine synthesis;
- normal psychological functions;
- regulation of mental performance;
- maintenance of normal bone, teeth, hair, skin, nails;
- the reduction of tiredness and fatigue.

#### Disease Risk Reduction

##### Heart disease

Several observations have suggested that low dietary intake of vitamin B6 is associated with higher risk of having heart disease. In addition, vitamin B6 has been shown to play a role in lowering blood levels of homocysteine; high levels of this amino acid appear to be associated with heart disease, but it is not clear whether lowering levels of homocysteine will reduce risk of heart disease.

### **Immune function**

Studies indicate that an adequate vitamin B6 intake is especially important in the elderly, as this group often suffers from impaired immune function. The amount of vitamin B6 required to improve the immune system has been shown to be higher (2.4 mg/day for men; 1.9 mg/day for women) than the current recommended intake.

### **Cognitive function**

Because of mixed study findings, it is presently unclear whether supplementation with vitamin B6 and other B vitamins might lessen age-related cognitive decline (e.g., perception, attention, reaction time, and memory).

### **Kidney stones**

Some study findings suggest that increased intake of vitamin B6 might decrease the risk of developing kidney stones, while other trials have not shown such relationship.

### **Other Applications**

*Please note:*

*Any dietary or drug treatment with high-dosed micronutrients needs medical supervision.*

### **Side effects of oral birth control medication**

While early assessments suggested a vitamin B6 treatment of women experiencing side effects of contraceptives (e.g., nausea, vomiting, depression), more recent research did not show any benefit in preventing side effects.

### **Premenstrual syndrome (PMS)**

Some studies of poor design have shown that vitamin B6 may help improve PMS symptoms. However, some better designed trials found no benefit.

### **Depression**

As it has been shown that vitamin B6 elevates levels of the neurotransmitter serotonin in the blood, and low levels of serotonin are associated with depression, it has been proposed that vitamin B6 might help reduce symptoms of depression.

## **Nausea and vomiting during pregnancy**

Several studies indicate that a daily dose of vitamin B6 may help to reduce morning sickness in pregnancy, while other studies have found no benefit. A systematic review showed evidence that vitamin B6 was associated with improved mild symptoms.

## **Carpal tunnel syndrome**

Some early studies suggested that vitamin B6 might help to reduce inflammation and symptoms of carpal tunnel syndrome, but not all studies have shown it to be effective. To date, no evidence exists to justify a treatment of carpal tunnel syndrome with vitamin B6 supplements.

## **Intake Recommendations**

The recommended daily intake of vitamin B6 (pyridoxine) varies according to age, sex, risk group and criteria applied. In adults, a range between 1.3 and 1.6 mg/day for women, and between 1.5 and 1.7 mg/day in men has been established.

Vitamin B6 requirement is increased when high-protein diets are consumed, since protein metabolism can only function properly with the assistance of pyridoxine.

## **Supply Situation**

National nutrition surveys have shown that the estimated daily intakes of vitamin B6 in most people meet the recommendations.

## **Deficiency**

A deficiency of vitamin B6 alone is uncommon because it usually occurs in combination with a deficit in other B-complex vitamins (especially with vitamin B2).

Population groups at risk of vitamin B6 deficiency are pregnant and breast-feeding women (additional demands), women taking oral contraceptives, the elderly (due to lower food intake), underweight people, chronic alcoholics, and people with a high protein intake. genetic disorders, liver disease, renal dialysis, rheumatoid arthritis can cause deficiency; malabsorption can occur by HIV (50).

Symptoms of deficiency include nervous system disorders (irritability, depression, and confusion), impairment of the immune system, and inflammation of skin and mucosa, muscle twitching, difficulty walking, convulsions, fatigue, numbness, headache.

## **Sources**

Excellent sources of vitamin B6 (pyridoxine) are chicken, beef liver, pork and veal. Good sources include fish (salmon, tuna, sardines, halibut, and herring), nuts (walnuts, peanuts), bread, corn and whole grain cereals. Generally, vegetables and fruits are rather poor sources of vitamin B6.

### Safety

Vitamin B6 in all its forms is well tolerated, but large excesses are toxic. Prolonged intake of daily doses of 500 mg and more may cause damage to the sensory nerves.

### Tolerable upper intake level

To avoid adverse effects, health authorities in Europe and the U.S. have set tolerable upper intake levels for vitamin B6. While in the U.S. 100 mg pyridoxine per day is the recommended upper dose for adults, 25 mg/day have been established in the European Union.

### Drug interactions

*Please note:*

*Because of the potential for interactions, dietary supplements should not be taken with medication without first talking to an experienced healthcare provider.*

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