**Vitamin B6 (Pyridoxine)**

**Snapshot Monograph**

**Nutrient name(s):**
- Vitamin B6
- Pyridoxine
- Pyridoxine HLC
- Pyridoxal 5’-phosphate
- Pyridoxamine

**Introduction:**
Pyridoxine is a water-soluble B vitamin that functions as a cofactor in more than one hundred enzyme reactions. Many of its activities are related to the metabolism of amino acids and other proteins including hemoglobin, serotonin, hormones, and prostaglandins. After entering a cell, vitamin B₆ is phosphorylated and converted into its active form, pyridoxal-5-phosphate (PLP).

Vitamin B₆ exists in three different forms. Pyridoxine phosphate occurs mainly in plants while the other two forms, pyridoxamine phosphate and pyridoxal phosphate occur...
mainly in animals. Since these forms have approximately the same biological activity, they are collectively referred to as vitamin B₆. Pyridoxal 5’-phosphate is the metabolically active coenzyme form of vitamin B6.

Functions:
- **Regulation of Amino Acid Metabolism**: Includes transamination (transfer of amino groups), deamination (removal of amino groups), desulfuration (transfer of sulfhydro groups), decarboxylation (removal of carboxyl or COOH groups). Animal and human studies have reported that decreased levels of vitamin B6 can result in decreased plasma levels of omega-3 and omega-6 fatty acids and increase the N-6:n-3 PUFA ratio (Zhao et al, 2012).
- **Cardiovascular**: Along with vitamins B12 and B9 (folate), B6 helps decrease the risk of developing atherosclerosis through homocysteine regulation (Marti-Carvajal et al, 2013). Vitamin B6 has antioxidant and anti-inflammatory activity, further contributing to cardiovascular health (Lotto et al, 2011).
- **Red Blood Cells**: Necessary for the formation of hemoglobin and the growth of red blood cells.
- **Niacin Conversion**: Essential for the conversion of tryptophan to niacin.
- **Neurotransmitter Production**: Required for the production of neurotransmitters derived from amino acids such as serotonin, gamma amino butyric acid (GABA), norepinephrine, acetylcholine, and histamine. The risk of mood disorders are reported to be increased when levels of vitamin B6 are low (Pan et al, 2012).
- **Energy Production**: Facilitates conversion of glycogen to glucose for energy production.
- **Monosodium glutamate protection**: Ingestion of monosodium glutamate (MSG) on foods is responsible for symptoms in sensitive people including headache, weakness, stiffness, heartburn among others (collectively called “Chinese Restaurant Syndrome”). Pre-treatment with vitamin B6 (pyridoxine) is reported to prevent the reactions (Ebadi et al, 1982).

Dosage:
**DRI***
Women: 2.0 mg daily
Men: 2.2 mg daily

**ODA**
10 – 20 mg daily

* The Dietary Reference Intakes (DRI) are the most recent set of dietary recommendations established by the Food and Nutrition Board of the Institute of Medicine, 1997-2001. They replace previous RDAs, and may be the basis for eventually updating the RDIs.

**The Optimum Daily Allowance (ODA) represents a reference level beyond the RDI, and is often many times higher than the RDI to prevent diseases such as aging or cancer. These numbers are based on clinical use.
Symptoms of Deficiency:

- Vitamin B₆ deficiency is one of the most common nutritional deficiencies, which is partially due to large amounts being lost during cooking and food processing. A U.S. Department of Agriculture study reported that 80 percent of Americans consume less than the RDA for pyridoxine.

- The symptoms of vitamin B₆ deficiencies manifest primarily as dermatologic, circulatory and neurological problems. Because of its many metabolic roles, there are a wide variety of deficiency symptoms, which include the following: depression, sleep disturbances, nerve inflammation, PMS, lethargy, decreased alertness, anemia, altered mobility, elevated homocysteine, nausea, vomiting, and seborrheic dermatitis.

- Since vitamin B6 is partially metabolized in the gastrointestinal tract, support of digestion plays a key role in vitamin B6 balance in the body (Albersen et al, 2013).

- Those with an increased need for vitamin B6 include:
  - Pregnancy and Breastfeeding
  - Substance Abusers
  - Excessive Stress
  - Estrogen and Oral Contraceptive Users
  - Hyperthyroidism
  - High Homocysteine Levels
  - Improved Serotonin Production

- The following drugs can cause a depletion of vitamin B6, which may increase an individual’s need for vitamin B6:
  - Antibiotics
  - Estrogen-containing medications including oral contraceptives and estrogen replacement therapy
  - Hydralazine
  - Isoniazid
  - Loop diuretics including furosemide, bumetanide, ethacrynic acid, and torsemide
  - Penicillamine
  - Phenelzine
  - Tetracyclines
  - Theophylline

Side Effects and Warnings:

- There are no known toxicities associated with vitamin B₆. However, vitamin B₆ can be neurotoxic when taken in large doses. Several cases have been reported in people taking 2 grams or more per day. Symptoms included tingling in the hands and feet, decreased muscle coordination, and a stumbling gait. All recovered without problems after discontinuing or substantially reducing their intake of the vitamin.

Food Sources:

- The best sources of pyridoxine are brewer’s yeast, wheat germ, organ meats (especially liver), peanuts, legumes, potatoes, and bananas. The normal flora in the human intestinal tract also synthesize vitamin B₆.
Vitamin B6 (Pyridoxine)

Patient Snapshot

**Uses:**
- Vitamin B6 (pyridoxine) is important for the healthy production of the metabolism of amino acids and other proteins including hemoglobin, serotonin, hormones, and prostaglandins.
- Vitamin B6, along with vitamins B12 and B9 (folic acid), helps regulate homocysteine levels in the blood, which is important in heart health.

**Dosage:**

- **DRI***
  - Women: 2.0 mg daily
  - Men: 2.2 mg daily

- **ODA**
  - 10 – 20 mg daily

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**ODA** represents a reference level beyond the RDI, and is often many times higher than the RDI to prevent diseases such as aging or cancer. These numbers are based on clinical use.

**Special Concerns:**
- If you are taking prescription or non-prescription medications, have a pre-existing medical condition, or are pregnant and/or breastfeeding, talk with your healthcare provider before taking any dietary supplement.
- Do not take if there is an allergy to any component of this dietary supplement.
- Those with an increased need for vitamin B6 include:
  - Pregnancy and Breastfeeding
  - Substance Abusers
  - Excessive Stress
  - Estrogen and Oral Contraceptive Users
  - Hyperthyroidism
  - High Homocysteine Levels
  - Improved Serotonin Production
- The following medications may deplete vitamin B6 from the body. When taking these medications, it is best to supplement your diet with vitamin B6:
  - Antibiotics
  - Estrogen-containing medications including oral contraceptives and estrogen replacement therapy
  - Hydralazine
  - Isoniazid
  - Loop diuretics including furosemide, bumetanide, ethacrynic acid, and torsemide
  - Penicillamine
  - Phenelzine
  - Tetracyclines
  - Theophylline

**DISCLAIMER:** Statements made are for educational purposes and have not been evaluated by the US Food and Drug Administration. They are not intended to diagnose, treat, cure, or prevent any disease. If you have a medical condition or disease, please talk to your doctor prior to using the recommendations given.
References:


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