Vitamin B6

SCIENTIFIC NAME
Pyridoxine, Pyridoxal, Pyridoxamine, Pyridoxine-5'-Phosphate, Pyridoxal-5'-Phosphate, Pyridoxamine-5'-Phosphate

FAMILY

...read less

Other Common Names

Adermine Chlorhydrate, Adermine Hydrochloride, B Complex Vitamin, B6, Chlorhydrate de Pyridoxine, Complexe de Vitamines B, Phosphate de Pyridoxal, Phosphate de Pyridoxamine, Piridoxina, Pyridoxal Phosphate, Pyridoxal 5 Phosphate, Pyridoxal-5-Phosphate, Pyridoxamine Hydrochloride, Pyridoxamine Phosphate, Pyridoxine HCl, Pyridoxine Hydrochloride, Pyridoxine Phosphoserinate, Pyridoxine-5-Phosphate, P5P, P-5-P, Vitamin B-6, Vitamina B6, Vitamine B6.

Overview

Vitamin B6 is a member of the vitamin B family. It is present in many foods including cereal grains, legumes, vegetables, liver, meat, and eggs (15). Pyridoxine, pyridoxal, and pyridoxamine are all forms of vitamin B6 and are considered to be equivalent in the human body (93048). Dietary supplements containing vitamin B6 frequently also contain other B vitamins in vitamin B complex formulations (3022).

Safety

LIKELY SAFE ...when used orally and appropriately in doses that do not exceed the tolerable upper intake level (UL) of 100 mg daily for adults (15). ...when used parenterally and appropriately. Injectable vitamin B6 (pyridoxine) is an FDA-approved prescription product (15).

POSSIBLY SAFE ...when used orally and appropriately in doses of 101-200 mg daily (6243,8558).

POSSIBLY UNSAFE ...when used orally in doses at or above 500 mg daily. High doses, especially those exceeding 1000 mg daily or total doses of 1000 grams or more, pose the most risk. However, neuropathy can occur with lower daily or total doses (6243,8195). ...when used intramuscularly in high doses and frequency due to potential for rhabdomyolysis (90795).

CHILDREN: **LIKELY SAFE** ...when used orally and appropriately (3094). **POSSIBLY SAFE** ...when used orally and appropriately in amounts exceeding the recommended dietary allowance (5049,8579,107124,107125,107135). **POSSIBLY UNSAFE** ...when used orally in excessive doses, long-term (3094).

PREGNANCY: **LIKELY SAFE** ...when used orally and appropriately. A special sustained-release product providing vitamin B6 (pyridoxine) 75 mg daily is FDA-approved for use in pregnancy. Vitamin B6 (pyridoxine) is also considered a first-line treatment for nausea and vomiting in pregnancy by the American College of Obstetrics and Gynecology (111601). However, it should not be used long-term or without medical supervision and close monitoring. **POSSIBLY UNSAFE** ...when used orally in excessive doses. There is some concern that high-dose maternal vitamin B6 (pyridoxine) can cause neonatal seizures (4609,6397,8197).

LACTATION: **LIKELY SAFE** ...when used orally in doses not exceeding the recommended dietary allowance (RDA) (3094). The RDA in lactating women is 2 mg daily. There is insufficient reliable information available about the safety of vitamin B6 when used in higher doses in breast-feeding women.

Adverse Effects

General: Orally or by injection, vitamin B6 is well tolerated in doses less than 100 mg daily.

Most Common Adverse Effects:

Orally or by injection: Abdominal pain, allergic reactions, headache, heartburn, loss of appetite, nausea, somnolence, vomiting.

Serious Adverse Effects (Rare):

Orally or by injection: Sensory neuropathy (high doses).

Dermatologic

Orally, vitamin B6 (pyridoxine) has been linked to reports of skin and other allergic reactions and photosensitivity (8195,9479,90375). High-dose vitamin B6 (80 mg daily as pyridoxine) and vitamin B12 (20 mcg daily) have been associated with cases of rosacea fulminans characterized by intense erythema with nodules, papules, and pustules. Symptoms may persist for up to 4 months after the supplement is stopped, and may require treatment with systemic corticosteroids and topical therapy (10998).

Gastrointestinal

Orally or by injection, vitamin B6 (pyridoxine) can cause nausea, vomiting, heartburn, abdominal pain, mild diarrhea, and loss of appetite (8195,9479,16306,83064,83103,107124,107127,107135). In a clinical trial, one patient experienced infectious gastroenteritis that was deemed possibly related to taking vitamin B6 (pyridoxine) orally up to 20 mg/kg daily (90796).

One small case-control study has raised concern that long-term dietary vitamin B6 intake in amounts ranging from 3.56-6.59 mg daily can increase the risk of ulcerative colitis (3350).

Hematologic

Orally or by injection, vitamin B6 (pyridoxine) can cause decreased serum folic acid concentrations (8195,9479). One case of persistent bleeding of unknown origin has been reported in a clinical trial for a patient who used vitamin B6 (pyridoxine) 100 mg twice daily on days 16 to 35 of the menstrual cycle (83103). It is unclear if this effect was due to vitamin B6 intake.

Musculoskeletal

Orally or by injection, vitamin B6 (pyridoxine) can cause breast soreness or enlargement (8195).

Neurologic/CNS

Orally or by injection, vitamin B6 (pyridoxine) can cause headache, paresthesia, and somnolence (8195,9479,16306). Vitamin B6 (pyridoxine) can also cause sensory neuropathy, which is related to daily dose and duration of intake. Doses exceeding 1000 mg daily or total doses of 1000 grams or more pose the most risk, although neuropathy can occur with lower daily or total doses as well (8195). The mechanism of the neurotoxicity is unknown, but is thought to occur when the liver's capacity to phosphorylate pyridoxine via the active coenzyme pyridoxal phosphate is exceeded (8204). Some researchers recommend taking vitamin B6 as pyridoxal phosphate to avoid pyridoxine neuropathy, but its safety is unknown (8204). Vitamin B6 (pyridoxine) neuropathy is characterized by numbness and impairment of the sense of position and vibration of the distal limbs, and a gradual progressive sensory ataxia (8196,10439). The syndrome is usually reversible with discontinuation of pyridoxine at the first appearance of neurologic symptoms. Residual symptoms have been reported in patients taking more than 2 grams daily for extended periods (8195,8196). Tell patients daily doses of 100 mg or less are unlikely to cause problems (3094).

Oncologic

In females, population research has found that a median intake of vitamin B6 1.63 mg daily is associated with a 3.6-fold increased risk of rectal cancer when compared with a median intake of 1.05 mg daily (83024). A post-hoc subgroup analysis of results from clinical research in adults with a history of recent stroke or ischemic attack suggests that taking folic acid, vitamin B12, and vitamin B6 does not increase cancer risk overall, although it was associated with an increased risk of cancer in patients who also had diabetes (90378). Also, in patients with nasopharyngeal carcinoma, population research has found that consuming at least 8.6 mg daily of supplemental vitamin B6 during treatment was associated with a lower overall survival rate over 5 years, as well as a reduced progression-free survival, when compared with non-users and those with intakes of up to 8.6 mg daily (107134).

Effectiveness

EFFECTIVE

Pyridoxine-dependent epilepsy. Intravenous vitamin B6 is effective for controlling pyridoxine-dependent seizures.
Details: Pyridoxine-dependent seizures are a rare type of refractory seizures in neonates that do not respond to anticonvulsant drugs. These seizures are typically controlled within minutes of intravenous administration of pyridoxine, a form of vitamin B6. Pyridoxine-dependent seizures can be due to genetic (autosomal recessive) pyridoxine dependency, or more commonly, a result of the use of high-dose pyridoxine during pregnancy (8197,8198).

Sideroblastic anemia. Oral vitamin B6 is effective for treating hereditary sideroblastic anemia.
Details: Taking vitamin B6 (pyridoxine) orally is effective for treating hereditary sideroblastic anemia (15,9518). Taking the active form of vitamin B6 (pyridoxal-5'-phosphate) also seems to be effective in cases in which the patient does not respond to pyridoxine (93049).

Vitamin B6 deficiency. Oral vitamin B6 is effective for preventing and treating vitamin B6 deficiency.
Details: Taking oral vitamin B6 can prevent and treat vitamin B6 deficiency (15).

LIKELY EFFECTIVE

Hyperhomocysteinemia. Taking vitamin B6 orally, alone or in combination with folic acid, is effective for reducing hyperhomocysteinemia.
Details: Vitamin B6 (pyridoxine) seems to lower homocysteine concentrations when folic acid and vitamin B12 are at physiologic levels or when given with folic acid and vitamin B12 supplements (9451,83042,107136). A combination of vitamin B6 100 mg and folic acid 0.5 mg daily seems to lower homocysteine levels by about 35% and is recommended for people with postprandial hyperhomocysteinemia (1489,9406). Other research shows that taking pyridoxine 50-200 mg daily reduces postprandial homocysteine levels by 32% to 35% (9406,10350). Pyridoxine also seems to reduce homocysteine levels in patients with kidney failure, kidney transplant patients (1489,6884,9414,9415), or patients who receive general anesthesia with nitrous oxide (9481). However, some research in healthy adults suggests that adding pyridoxine to folic acid might not provide any additional benefit over folic acid alone (9400,9405,9409,50145).

Hyperhomocysteinemia is considered by some to be an independent risk factor for atherosclerosis, recurrent thromboembolism, deep vein thrombosis, myocardial infarction, and ischemic stroke (1899,3323,9402,9405,9408,9409). However, elevated homocysteine levels may be a marker, as opposed to a cause, of vascular disease (11387,11388). A 5 µmol/L increase in plasma homocysteine increases the risk of cerebrovascular disease by 50% and the odds of coronary heart disease by 60% and 80% in males and females, respectively (9407,9411). However, it is not clear if reducing homocysteine levels results in reduced cardiovascular morbidity and mortality (1489,6883,6884,9308,9400,9405,9409). Folic acid, vitamin B6, and vitamin B12 supplementation can reduce total homocysteine from 13.4 to 11 µmol/L. However, this reduction does not seem to help with secondary prevention of death or myocardial infarction, and some research even suggests an increase in cardiovascular disease (CVD) risk (11387,13482,50423,83050,97619). There is also debate about whether supplementation with homocysteine-lowering B vitamins can reduce the risk of stroke. A number of large clinical studies and meta-analyses show that supplementation with folic acid, vitamin B6, and vitamin B12, alone or in combination, does not reduce the risk of stroke in patients with CVD or impaired renal function (11387,13482,50423,83050,96150). However, a more recent meta-analysis shows that B vitamin supplementation modestly reduces the relative risk of stroke by 10% when compared with placebo in patients at risk for or with

a history of CVD (97619). Also, a meta-analysis in patients with a history of stroke shows that B vitamin supplementation modestly reduces the relative risk of stroke recurrence by 13% and the risk of vascular death by 11% when compared with placebo (107136).

POSSIBLY EFFECTIVE

Antipsychotic-induced hyperprolactinemia. It is unclear if oral vitamin B6 is beneficial for patients with antipsychotic-induced hyperprolactinemia.

^ Details: Clinical research in male patients with hyperprolactinemia who are on a consistent antipsychotic dose shows that taking vitamin B6 300 mg twice daily for 16 weeks reduces serum prolactin levels by 68%, compared with 37% in patients taking aripiprazole 5 mg twice daily. Also, 67% of patients taking vitamin B6 had prolactin levels less than 40 mcg/mL versus 2% of those taking aripiprazole (107128).

Kidney stones (nephrolithiasis). Oral vitamin B6 seems to decrease urinary oxalate levels and decrease the risk of kidney stone formation in some patients.

^ Details: There is some evidence that taking vitamin B6 (pyridoxine) orally, alone or in combination with magnesium, can decrease urinary oxalate levels in people with type I primary hyperoxaluria, a hereditary disorder (1201,6437,6438,6439,6440,8548,8549,8550). Additionally, a small clinical study in this population suggests that intravenous pyridoxine hydrochloride can reduce urinary oxalate by 25.5% when compared to baseline (90796). In patients with idiopathic hyperoxaluria, taking a combination of pyridoxine 25mg and magnesium oxide 400 mg for 3 months decreases urinary oxalate by approximately 16%, with 68% of patients experiencing a reduction. However, supplementation is less effective than following a low-oxalate diet, which reduces urinary oxalate in 91% of patients by an average of 31% (107127). There is also preliminary evidence that higher pyridoxine intake in females with no history of kidney stones is associated with decreased risk of kidney stone formation (6441), but this association has not been found in males (6442).

Pregnancy-induced nausea and vomiting. Oral vitamin B6 may reduce nausea and vomiting in some pregnant patients and is sometimes used in combination with doxylamine.

^ Details: While some conflicting evidence exists, most small clinical studies suggest that oral vitamin B6 is effective for improving nausea and vomiting associated with pregnancy when compared with baseline or placebo. However, vitamin B6 may not be as effective as ginger (110459). Two small clinical studies show that taking vitamin B6 (pyridoxine) 25 mg every 8 hours for 3-4 days decreases pregnancy-induced nausea severity and vomiting incidence when compared with placebo (6168,16306). A larger clinical trial shows that taking lower doses of vitamin B6, 10 mg every 8 hours over 5 days, improves pregnancy-induced nausea, but not vomiting, when compared with placebo (6167). A small clinical study in patients with mild to moderate nausea and vomiting shows that taking a higher dose of 40 mg twice daily for 4 days is more effective than placebo, but no better than ginger 500 mg twice daily (99404). The American College of Obstetrics and Gynecology (ACOG) considers vitamin B6 at a dose of 10-25 mg 3 to 4 times daily a first-line treatment for pregnancy-induced nausea and vomiting due to its benign safety profile (111601). However, it is not effective for all patients, such as those with hyperemesis gravidarum, a severe form of pregnancy-induced nausea and vomiting. Adding vitamin B6 20 mg three times daily for 2 weeks to intravenous rehydration, metoclopramide, and thiamine seems to be no more effective than placebo for reducing vomiting in hyperemesis gravidarum (99405).

Vitamin B6 is also sometimes used in combination with doxylamine. In fact, a combination of vitamin B6 plus doxylamine (Diclegis or Bonjesta, Duchesnay Inc., and various generics) has been approved by the US Food and Drug Administration (FDA) as a prescription product111601). ACOG recommends vitamin B6 in combination with doxylamine as another first-line treatment option (111601). However, the clinical trial used to obtain FDA approval has some methodological problems, and the significance of the results has been questioned. The improvement in symptom scores seen with Diclegis was less than one point on a 13-point scale, which is unlikely to be clinically significant (97998). Also, some clinical research shows that taking pyridoxine 25 mg and doxylamine 12.5 mg is less effective than ondansetron 4 mg when taken every 8 hours for 5 days. Only 41% of the patients using pyridoxine and doxylamine had a clinically significant reduction in nausea, compared to 92% of patients using ondansetron (90797).

The combination of vitamin B6 and doxylamine is also studied with acupuncture. A large clinical study in patients with moderate to severe pregnancy-induced nausea and vomiting conducted in China shows that taking vitamin B6-doxylamine (Diclegis, Duchesnay, Inc) 20 to 40 mg each at bedtime for 14 days in combination with daily acupuncture modestly improves patient-reported nausea and vomiting scores when compared with either intervention alone (111820). However, it is unclear whether this improvement is clinically significant.

Premenstrual syndrome (PMS). Oral vitamin B6 seems to reduce PMS symptoms.

^ Details: There is some evidence that taking vitamin B6 (pyridoxine) orally can improve symptoms of PMS such as breast pain or tenderness (mastalgia) and depression in some patients. Pyridoxine in doses of at least 50 mg daily, plus magnesium oxide 200 mg daily, seems to relieve PMS-related anxiety and other symptoms (8555,39007,82962). Although some clinicians advocate doses of pyridoxine 200-500 mg daily for PMS, doses of 50-100 mg daily seem to work just as well. There is no apparent dose-response curve for PMS, so the lowest effective dose should be used. Higher doses might increase the risk of side effects (3093).

POSSIBLY INEFFECTIVE

Age-related cognitive decline. Oral vitamin B6 does not seem to slow age-related cognitive decline.

^ Details: One clinical trial in elderly people with memory complaints shows that taking a combination of B vitamins, including folic acid 0.8 mg, vitamin B12 0.5 mg, and vitamin B6 (form not specified) 20 mg daily for 24 months reduces cerebral atrophy in the gray matter regions associated with Alzheimer disease by up to seven-fold when compared with placebo. However, this protection does not occur in patients with the lowest average blood levels of homocysteine (90374). Furthermore, other clinical research shows that taking vitamin B6 (pyridoxine) 3-75 mg daily in combination with folic acid and vitamin B12 does not improve cognitive function in elderly adults (14392,50225,50510).

Alzheimer disease. Oral vitamin B6 does not seem to improve cognitive function in patients with Alzheimer disease when used in combination with other B vitamins. Also, oral vitamin B6 does not seem to reduce the risk of developing this condition.

^ Details: Clinical research in patients with probable Alzheimer disease taking routine medications shows that taking vitamin B6 25 mg with folic acid 5 mg and vitamin B12 1 mg daily for 18 months does not have a beneficial effect on cognitive function or the severity of disease when compared with placebo. In this study, all patients were consuming a folate-fortified diet (50319). Also, population research in elderly adults has found that a high intake of vitamin B6 from dietary or supplemental sources is not associated with a decreased risk of Alzheimer disease when compared to lower vitamin B6 intake (13165,15270).

Carpal tunnel syndrome. Oral vitamin B6 does not seem to reduce symptoms of carpal tunnel syndrome.

^ Details: Most research shows that people with carpal tunnel syndrome are not generally deficient in vitamin B6 and do not benefit from taking vitamin B6 supplements (8203,8937,9448,9450,9478,9482). Although early studies by a single group of researchers, as well as anecdotal reports, suggest that taking vitamin B6 may relieve carpal tunnel symptoms, more reliable research has not supported these findings (8202,9445,9447,9449,9483,15955,83086).

Cataracts. Oral vitamin B6 does not seem to slow cataract development.
^ Details: Clinical research in females with existing cardiovascular disease (CVD) or at increased risk of CVD shows that taking a combination of folic acid 2.5 mg, vitamin B6 (form not specified) 50 mg, and vitamin B12 1 mg daily for an average of 7.3 years does not reduce the risk of cataracts when compared with placebo. Furthermore, the risk of cataract extraction was increased by 28% (96149).

Chemotherapy-induced acral erythema. While some conflicting evidence exists, most research suggests that oral or topical vitamin B6 does not seem to prevent or reduce the severity of acral erythema induced by chemotherapy.
^ Details: A meta-analysis of 10 clinical trials and 4 observational studies shows that taking vitamin B6 60-500 mg daily for up to 8 chemotherapy cycles does not prevent chemotherapy-induced acral erythema or reduce the incidence of severe cases when compared with control. Most studies used capecitabine chemotherapy alone or in combination, and one study used pegylated liposomal doxorubicin; however, no subgroup analysis was conducted to differentiate chemotherapy regimens. Results did not seem to vary based on study location, study design, or vitamin B6 dose (104930). However, a more recent preliminary clinical study in patients receiving doxorubicin for multiple myeloma shows that taking vitamin B6 100 mg on the first day of chemotherapy then twice daily for 7 days with each cycle reduces the risk of developing acral erythema by 72%, but does not improve the severity of acral erythema, when compared with no vitamin B6 supplementation (110458). Also, one small, low-quality clinical study suggests that taking vitamin B6 400 mg daily reduces the risk of moderate or severe chemotherapy-induced acral erythema when compared with vitamin B6 200 mg daily; however, the higher dose also seems to be associated with worsened tumor response and increased treatment failure (97620).

Topical vitamin B6 has also failed to show benefit. A small clinical study in patients with acral erythema from capecitabine or pegylated liposomal doxorubicin shows that applying vitamin B6 1% cream to affected areas three times daily for 6 weeks does not improve symptoms when compared with placebo (104929).

Colorectal adenoma. Oral vitamin B6 does not seem to reduce the risk of developing colorectal adenomas.
^ Details: Clinical research shows that taking a combination of B vitamins, including folic acid 2.5 mg, vitamin B6 (pyridoxine) 50 mg, and vitamin B12 1 mg, daily for up to 9.2 years does not reduce the risk of colorectal adenoma in females at high risk of cardiovascular disease when compared with placebo (90389).

Eclampsia. Oral or intramuscular vitamin B6 does not seem to reduce the risk of eclampsia.
^ Details: Meta-analyses of limited clinical research in pregnant patients show that taking vitamin B6 (pyridoxine), either as 25 mg daily or a single dose of 100 mg orally or intramuscularly, does not reduce the risk of eclampsia when compared with control (83046,96166).

Osteoporosis. Oral vitamin B6 does not seem to reduce the risk of osteoporotic fractures.
^ Details: Clinical research in patients with cerebrovascular disease shows that taking a combination of B vitamins, including folic acid 2 mg, vitamin B6 (form not specified) 25 mg, and vitamin B12 500 mcg daily for up to 10.5 years does not prevent osteoporotic fractures when compared with placebo (90377). Furthermore, a secondary analysis of two large studies in patients with cardiovascular disease has found that taking vitamin B6 (pyridoxine) 40 mg daily in addition to folic acid and vitamin B12 for 1-3 years is associated with a 42% increased risk of hip fracture over an 11-year period when compared with only folic acid and vitamin B12 (96163). This finding is limited because these studies were not designed to assess the effects of vitamin B6 on fracture risk and the analyses were not adjusted for baseline bone health or fall risk.

Pre-eclampsia. Oral or intramuscular vitamin B6 does not seem to reduce the risk of pre-eclampsia.
^ Details: Meta-analyses of limited clinical research in pregnant patients show that taking vitamin B6 (pyridoxine), either as 25 mg daily or a single dose of 100 mg orally or intramuscularly, does not reduce the risk of pre-eclampsia when compared with placebo (83046,96166).

Preterm labor. Oral or intramuscular vitamin B6 does not seem to reduce the risk of preterm labor.
^ Details: Meta-analyses of limited clinical research in pregnant patients shows that taking vitamin B6 (pyridoxine), either as 25 mg daily or a single dose of 100 mg orally or intramuscularly, does not reduce the risk of preterm labor when compared with placebo (83046,96166).

INSUFFICIENT RELIABLE EVIDENCE to RATE
Acne. Oral vitamin B6 has only been evaluated in combination with other ingredients; its effect when used alone is unclear.
^ Details: Preliminary clinical research in adults and children with inflammatory acne shows that taking 1-4 tablets of a specific product (NicAzel, Elorac Inc.) containing vitamin B6 (pyridoxine), nicotinamide, azelaic acid, zinc, copper, and folic acid for 8 weeks reduces inflammatory lesions and improves appearance in 88% and 81% of patients, respectively, when compared to baseline (90800). The validity of these findings is limited by the lack of a comparator group.

Age-related macular degeneration (AMD). Oral vitamin B6 has only been evaluated in combination with other ingredients; its effect when used alone is unclear.
^ Details: A large-scale clinical study shows that taking vitamin B6 (pyridoxine) 50 mg, vitamin B12 1000 mcg, and folic acid 2.5 mg daily reduces the risk for AMD in females over 40 years of age with a history of cardiovascular disease (CVD) or with risk factors for CVD. Those who took this combination for an average of 7.3 years had a 34% reduced risk of developing AMD and a 41% reduced risk of visually significant AMD when compared with placebo (14620). It is unclear if this effect is due to vitamin B6, other ingredients, or the combination.

Angioplasty. Oral vitamin B6 has only been evaluated in combination with other ingredients; its effect when used alone is unclear.
^ Details: Some evidence suggests that vitamin B6 (pyridoxine) 10 mg, folic acid 1 mg, and vitamin B12 400 mcg daily can decrease the rate of restenosis in patients treated with balloon angioplasty (8009,9412). However, this combination does not seem to be as effective for reducing restenosis in patients after coronary stenting (8009). An intravenous loading dose of folic acid, vitamin B6 (pyridoxine), and vitamin B12 followed by oral administration of folic acid 1.2 mcg, vitamin B6 (pyridoxine) 48 mg, and vitamin B12 60 mcg daily after bare metal coronary stenting also does not seem to reduce restenosis and might actually increase restenosis (12150,12151). Due to the lack of evidence of benefit and potential for harm, this combination of vitamins should not be recommended for patients receiving coronary stents (12151). It is unclear if any effects are due to vitamin B6, other ingredients, or the combination.

Antipsychotic-induced metabolic side effects. It is unclear if oral vitamin B6, as an adjunct to progesterone, is beneficial in patients with antipsychotic-induced amenorrhea.
^ Details: A small clinical study in females with antipsychotic-induced amenorrhea shows that taking vitamin B6 80 mg three times daily for 1 month plus intramuscular progesterone daily for 5 days increases levels of estradiol and follicle stimulating hormone, reduces prolactin levels, and increases the rate of clinical efficacy, defined as the normalization of menstruation and improvement in endocrine indicators, by 14% when compared with progesterone alone (110457).

Anxiety. It is unclear if oral vitamin B6 is beneficial in patients with anxiety.
^ Details: Clinical research in college students shows that taking vitamin B6 100 mg daily for one month does not reduce anxiety scores when compared with placebo (110453). However, because a diagnosis of anxiety was not a requirement for study participation, it is unclear if these findings can be generalized to patients diagnosed with anxiety.

Asthma. It is unclear if oral vitamin B6 is beneficial in patients with asthma.
^ Details: Preliminary clinical studies show that taking vitamin B6 (pyridoxine) 200-300 mg daily may improve symptoms of asthma in some patients, but not others, when compared with placebo (7064,7065). Studies have yielded conflicting results, with some research suggesting that it may only be beneficial in children with severe asthma (7065). Additionally, some research suggests that theophylline may lower vitamin B6 levels, although it is unclear if vitamin B6 supplementation is beneficial (4522,7066,9503).

Atherosclerosis. Oral vitamin B6 has only been evaluated in combination with other ingredients; its effect when used alone is unclear.
^ Details: Clinical research in patients with intermediate risk for coronary heart disease shows that taking a specific supplement (Kyolic, Total Heart Health, Formula 108, Wakunga) containing vitamin B6 12.5 mg, aged garlic extract 250 mg, vitamin B12 100 mcg, folic acid 300 mcg, and L-arginine 100 mg daily for 12 months reduces coronary artery calcium progression when compared with placebo (88385). It is unclear if this effect is due to vitamin B6, other ingredients, or the combination.

Atopic dermatitis (eczema). It is unclear if oral vitamin B6 is beneficial in patients with eczema.
^ Details: A small clinical study in children with eczema shows that taking vitamin B6 (pyridoxine hydrochloride) 50 mg daily for 4 weeks does not reduce symptoms such as redness and itchiness when compared with placebo (83090).

Attention deficit-hyperactivity disorder (ADHD). It is unclear if oral vitamin B6 is beneficial for ADHD.
^ Details: A small crossover study in children with ADHD shows that taking vitamin B6 600 mg, niacinamide and ascorbic acid 3 grams, and calcium pantothenate 1.2 grams daily for 6 weeks does not improve behavior scores when compared with placebo (9957).

Autism spectrum disorder. Although there is interest in using oral vitamin B6 for autism, there is insufficient reliable information about the clinical effects of vitamin B6 for this condition.

Bipolar disorder. It is unclear if oral vitamin B6 is beneficial in patients with bipolar disorder.
^ Details: A small clinical trial in patients with type 1 bipolar disorder who are taking lithium and experiencing an acute episode of mania shows that taking vitamin B6 80 mg daily for 8 weeks does not improve cognitive function or the severity of mania when compared with placebo. Cognitive function was reduced in patients taking vitamin B6; any effect on sleep was unclear (107132).

Cancer. It is unclear if oral vitamin B6 reduces overall cancer risk.
^ Details: Population research has found that higher dietary intake of vitamin B6 is associated with a 22% reduced risk of cancer, including esophageal, pancreatic, gastric, colorectal, and breast cancer. However, when dietary and supplemental vitamin B6 intake is considered, the inverse association between vitamin B6 and cancer risk is weaker and limited to fewer tumor sites. Furthermore, a meta-analysis of 9 clinical studies shows that taking vitamin B6 3-100 mg orally daily for 2-7.3 years, in combination with vitamin B12 and folate, does not reduce the risk of cancer in patients with cardiovascular disease or kidney failure (96164).

Cardiovascular disease (CVD). Oral vitamin B6, taken along with other B vitamins, does not seem to improve secondary prevention of death or myocardial infarction in patients with CVD. However, it might slightly lower the risk of stroke.
^ Details: Overall evidence from clinical research and meta-analyses shows that taking vitamin B6 in combination with folic acid and/or vitamin B12 does not seem to help with secondary prevention of death or myocardial infarction in patients with or at risk for CVD (11387,13482,34540,50423,83050,90379,97619). In fact, some research suggests that long-term supplementation with vitamin B6, folic acid, and vitamin B12 for secondary prevention increases the risk of CVD by 20% despite lowering homocysteine levels by 30% (13482). However, some research shows that taking vitamin B6 in combination with other B vitamins modestly reduces the risk of stroke, although results are conflicting (11387,13482,50423,83050,96150,96165,97619,107136). Additionally, it is unclear which specific combination of B vitamins is optimal for reducing stroke risk and which patients are most likely to benefit.

In 2001, prior to the publication of the highest quality research on this topic, the US Food and Drug Administration (FDA) approved a qualified health claim stating that, as part of a well-balanced diet that is low in saturated fat and cholesterol, folic acid, vitamin B6, and vitamin B12 may reduce the risk of vascular disease (102368).

Cognitive function. Oral vitamin B6 has only been evaluated in combination with other ingredients; its effect when used alone is unclear.
^ Details: A moderate-sized clinical study in healthy adults aged 40-65 years shows that taking a supplement containing vitamin B6, ginkgo leaf, bacopa, and other B vitamins twice daily for 12 weeks does not improve memory or attention when compared with placebo (111334).

Colorectal cancer. It is unclear if oral vitamin B6 reduces the risk of colorectal cancer.
^ Details: A meta-analysis of observational studies suggests that the highest dietary intake of vitamin B6 is associated with a 20% reduced risk of colorectal cancer when compared with the lowest dietary intake. However, this association was not shown in subgroup analyses of studies conducted in Australia, Europe, or North America (111600). The validity of this analysis is limited by the heterogeneity of the included studies.

Dental caries. There is limited evidence on the oral use of vitamin B6 for dental decay during pregnancy.
^ Details: Meta-analyses of limited clinical research show that taking vitamin B6 (pyridoxine), 25 mg daily or a single dose of 100 mg orally or intramuscularly, may reduce the risk of dental decay during pregnancy when compared with placebo

(83046,96166).

Depression. It is unclear if oral vitamin B6 reduces the risk of developing depression or improves symptoms of depression.
^ Details: Clinical research in healthy college students shows that taking vitamin B6 100 mg daily for one month does not reduce depression scores when compared with placebo (1104453). However, because a diagnosis of depression was not a requirement for study participation, it is unclear if these findings can be generalized to patients diagnosed with depression.

Whether vitamin B6 reduces the risk of developing depression is also unclear. A meta-analysis of population research has found that the highest dietary intake of vitamin B6 is associated with a 19% lower risk of depression when compared with the lowest intake. However, sub-analyses suggest that this association is only relevant in females and not males (107133). In one individual population study in community dwelling older adults included in the analysis, the consumption of at least 1.71 mg of vitamin B6 daily from food was associated with a 43% reduction in the likelihood of becoming depressed when compared with the consumption of 1.33 mg or less daily in females. However, there was no association between vitamin B6 levels and risk of depression in males, and the finding in females was no longer significant when adjusted for total energy intake, since foods rich in vitamin B6 are energy-dense (96168). Another observational longitudinal study in healthy adults starting oral contraceptives containing ethinyl estradiol and levonorgestrel has found that taking vitamin B6 25 mg daily for 6-12 months is associated with a 40% lower risk of depression when compared with no supplementation (90789). Most available studies are cross-sectional in nature, making any conclusions related to causation difficult.

Diabetes. It is unclear if oral vitamin B6 is beneficial in patients with type 2 diabetes or gestational diabetes.
^ Details: Observational research in Chinese adults with type 2 diabetes has found that dietary intake of vitamin B6 in the highest quartile is associated with 53% lower odds of developing cardiovascular disease, defined as a non-fatal myocardial infarction, non-fatal stroke, or hospitalization for unstable angina, when compared with vitamin B6 intake in the lowest quartile (110452).

Small clinical studies in patients with gestational diabetes and vitamin B6 deficiency shows that taking vitamin B6 (pyridoxine) 100 mg daily for 2 weeks improves glucose tolerance and blood glucose levels when compared with baseline (82967,83088). However, there is concern that these findings were confounded by dietary alterations. This benefit was not observed in a subsequent small case series in patients with gestational diabetes (22380).

Diabetic neuropathy. Oral vitamin B6 has only been evaluated in combination with other ingredients; its effect when used alone is unclear.
^ Details: Clinical research suggests that taking a combination of B vitamins, including folic acid (L-methylfolate), vitamin B12 (methylcobalamin), and vitamin B6 (pyridoxal-5'-phosphate) for 24 weeks does not improve neural dysfunction based on vibration perception when compared with placebo in patients with diabetic neuropathy. However, taking this combination appears to modestly improve neuropathy symptoms and quality of life related to mental functioning when compared with placebo (90375).

Dysmenorrhea. It is unclear if oral vitamin B6 is beneficial in patients with dysmenorrhea.
^ Details: Preliminary clinical research shows that taking vitamin B6 (form not specified) 200 mg daily reduces pain associated with dysmenorrhea when compared with placebo. However, taking vitamin B6 in combination with magnesium does not reduce pain when compared with placebo (77388).

Fibromyalgia. It is unclear if oral vitamin B6 is beneficial in patients with fibromyalgia.
^ Details: A small clinical study in patients with fibromyalgia shows that taking vitamin B6 80 mg daily for 8 weeks does not improve pain, disease severity, anxiety, depression, or quality of life when compared with placebo (110454).

Gastroenteritis-associated nausea and vomiting. It is unclear if oral vitamin B6 is beneficial in children with gastroenteritis.
^ Details: A small clinical study in children aged 6 months to 12 years with acute viral gastroenteritis shows that taking vitamin B6 (form not specified) does not improve symptoms of dehydration or the frequency of vomiting when compared with placebo (90793).

Hypertension. It is unclear if oral vitamin B6 reduces blood pressure.
^ Details: One small clinical study in patients with essential hypertension shows that taking vitamin B6 (pyridoxine hydrochloride) 5 mg/kg daily for 4 weeks can reduce systolic and diastolic blood pressure when compared with baseline (83091). The validity of this finding is limited by the lack of a control group.

Hypertriglyceridemia. It is unclear if oral vitamin B6 reduces triglyceride levels.
^ Details: Preliminary clinical research shows that vitamin B6 (form not specified) 50 mg daily for 12 weeks does not reduce triglyceride levels in people with hypertriglyceridemia when compared with placebo. However, vitamin B6 appears to decrease total cholesterol and high-density lipoprotein (HDL) cholesterol by approximately 9% in these patients (59028).

Infertility. Although there is interest in using oral vitamin B6 for infertility, there is insufficient reliable information about the clinical effects of vitamin B6 for this condition.

Insomnia. Oral vitamin B6 has only been evaluated in combination with other ingredients; its effect when used alone is unclear.
^ Details: Clinical research in healthy adults with self-reported sleep difficulty shows that taking a specific product (LZ Complex3, Sanofi Consumer Healthcare Pty Ltd.) containing vitamin B6, zizyphus extract, hops extract, hydrolyzed milk protein (Lactium), and magnesium oxide nightly, 30 minutes before bed, for 2 weeks does not improve sleep quality, daytime functioning, or physical fatigue when compared with placebo. However, due to the large improvement seen in both the treatment and placebo groups, the effectiveness of this product is unclear (95971).

Isoniazid-induced neuropathy. It is unclear if oral vitamin B6 prevents the development of neuropathy in patients taking isoniazid.
^ Details: Preliminary clinical research in patients taking isoniazid for tuberculosis shows that taking vitamin B6 (pyridoxine) 6 mg daily reduces the development of neuropathy when compared with control (83068).

Lactation. It is unclear if oral vitamin B6 helps to suppress postpartum lactation.
^ Details: A meta-analysis of two small clinical trials shows that taking vitamin B6 (pyridoxine) 400-600 mg daily for 6-7 days postpartum does not suppress lactation when compared with no treatment (83047).

Levetiracetam-induced side effects. While some conflicting evidence exists, several small, low-quality studies suggest that oral vitamin B6 (pyridoxine) may reduce some neuropsychiatric adverse effects related to the use of levetiracetam.

^ Details: In an analysis of case reports, retrospective studies, and a single low-quality prospective study, improvement in levetiracetam-associated neuropsychiatric symptoms occurred in approximately 73% of patients taking pyridoxine (107137). A more recent preliminary clinical trial in children ages 1-17 years shows that taking pyridoxine 10 or 15 mg/kg daily as needed based on symptoms improves behavioral side effects associated with levetiracetam by a small amount when compared with low-dose pyridoxine 0.5 mg/kg daily used as placebo (107124). Also, observational research in children ages 9 months to 14 years has found that taking vitamin B6 is associated with improved behavior and a 44% lower risk of levetiracetam discontinuation when compared with no vitamin B6 supplementation (110455). Some observational research in adults with levetiracetam-associated irritability has found that taking vitamin B6 is associated with an improvement in irritability in 45% of patients when compared to baseline (107129). However, a small clinical trial in adults with epilepsy shows that taking pyridoxine 40 mg daily for 3 weeks does not improve levetiracetam-related psychiatric adverse effects when compared with placebo (110456). This study may have been underpowered to detect differences between groups. Pyridoxine doses used in the studies above have ranged from 50-400 mg daily in children and 40-600 mg daily in adults (107124,107129,107137,110456).

Lung cancer. It is unclear if dietary or oral vitamin B6 reduces lung cancer risk.
^ Details: Epidemiological research has found that higher serum levels of vitamin B6 in male smokers is associated with a lower risk of lung cancer (9454). Also, people with blood levels of vitamin B6 in the top quartile have a modestly lower risk of lung cancer when compared with those whose levels are in the lowest quartile. The association is stronger for males and for people who have smoked (97999). However, other epidemiological research found that increased dietary intake of vitamin B6 is not associated with a reduced risk of lung cancer (96164).

Menopausal symptoms. Although there is interest in using oral vitamin B6 for menopausal symptoms, there is insufficient reliable information about the clinical effects of vitamin B6 for this condition.

Motion sickness. Although there is interest in using oral vitamin B6 for motion sickness, there is insufficient reliable information about the clinical effects of vitamin B6 for this condition.

Nausea and vomiting. It is unclear if oral vitamin B6 is beneficial for nausea and vomiting in patients using oral contraceptives.
^ Details: An observational longitudinal study in healthy females taking oral contraceptives containing ethinyl estradiol and levonorgestrel has found that taking vitamin B6 25 mg daily for 6-12 months is associated with a 43% reduced risk of nausea when compared with no supplementation (90789).

Nonalcoholic fatty liver disease (NAFLD). It is unclear if oral vitamin B6 for patients with NAFLD.
^ Details: A small clinical trial in patients with NAFLD shows that taking vitamin B6 (pyridoxine) 30 mg three times daily for 12 weeks does not reduce levels of liver transaminases or plasma lipids when compared with baseline. However, hepatic fat accumulation was modestly reduced (107130). The validity of this study is limited by the lack of a comparator group.

Obesity. It is unclear if oral vitamin B6 in beneficial in overweight or obese individuals.
^ Details: A small clinical trial in females with a body mass index (BMI) of at least 25 kg/m^2 shows that taking vitamin B6 as pyridoxine 80 mg daily for 8 weeks reduces fat mass and improves insulin resistance and triglyceride levels by a small amount when compared with placebo. Although some other anthropometric and metabolic indices were improved when compared with baseline, there was no effect of pyridoxine on body weight, visceral adiposity, or other endpoints when compared with placebo (107131).

Overall mortality. It is unclear if oral vitamin B6 reduces the risk of overall mortality.
^ Details: Observational research in US adults has found that dietary intake of vitamin B6 in the highest quintile is associated with a 12% to 21% lower risk of all-cause mortality and a 31% to 44% lower risk of cardiovascular mortality when compared with the lowest quintile of dietary vitamin B6 intake (110451).

Pancreatic cancer. It is unclear if oral vitamin B6 reduces the risk of pancreatic cancer.
^ Details: Observational research has found that higher dietary intake of vitamin B6 is associated with a 37% lower risk of developing pancreatic cancer when compared with lower intake (104927).

Postpartum depression. It is unclear if oral vitamin B6 is beneficial in patients with postpartum depression.
^ Details: Preliminary clinical research in individuals considered at increased risk for postpartum depression, but without clinical depression, shows that taking vitamin B6 80 mg daily from the 28th week of pregnancy until birth, and then 40 mg daily for one month, reduces symptoms of depression 1.5 months after birth when compared with baseline (measured during the third trimester) and when compared with placebo. However, it is unclear if any of the patients included in the study developed postpartum depression, as there were no changes in overall symptoms in patients taking placebo (107126).

Restless legs syndrome (RLS). It is unclear if oral vitamin B6 is beneficial in patients with RLS.
^ Details: A small clinical study in adults with RLS who are beginning treatment with pramipexole shows that also taking vitamin B6 40 mg daily for 2 months moderately improves RLS scores and sleep quality scores when compared with pramipexole and placebo (110052).

Schizophrenia. It is unclear if oral vitamin B6 is beneficial for patients with treatment-resistant schizophrenia.
^ Details: Clinical research in male patients with treatment-resistant schizophrenia who are on a consistent antipsychotic dose shows that adding vitamin B6 300 mg twice daily for 16 weeks modestly improves psychotic symptoms and some measures of cognitive performance when compared with adding aripiprazole 5 mg twice daily (107128). More research is needed to determine if these benefits are clinically relevant.

Seizures. It is unclear if oral vitamin B6 is beneficial for preventing seizures in patients with glycosylphosphatidylinositol (GPI) deficiency.
^ Details: Observational case series in a small number of children and young adults with GPI deficiency has found that taking vitamin B6 20-30 mg/kg daily for 3-12 months is associated with some reduction in seizure frequency in 9 of 13 patients. However, no patient reached seizure freedom (107125,107135). In one case series, treatment for 12 months was associated with modest developmental improvements in almost all patients (107135). The study patient populations were slightly different in terms of age and underlying genetic causes for GPI deficiency.

Sickle cell disease. Oral vitamin B6 has only been evaluated in combination with other B vitamins; its effect when used alone is unclear.
^ Details: Preliminary clinical research in adults with sickle cell disease shows that taking vitamin B6 4.2-6 mg, vitamin B12 4.2-6 mcg, and folic acid 700 mcg daily might lower homocysteine levels. However, it is unknown if this will reduce the risk of endothelial damage in these patients (9324).

Stroke. It is unclear if oral vitamin B6, either alone or with other B vitamins, is beneficial for stroke prevention.
^ Details: There is some debate about whether supplementation with homocysteine-lowering B vitamins, including vitamin B6, can reduce the risk of stroke. A number of clinical studies and meta-analyses show that supplementation with folic acid, vitamin B6, and vitamin B12, alone or in combination, does not reduce the risk of stroke in patients with cardiovascular disease (CVD) or impaired kidney function (11387,13482,50423,83050,96150). However, a more recent meta-analysis of 10 clinical trials, including over 44,000 patients at risk for or with a history of CVD, shows that B vitamin supplementation reduces the relative risk of stroke by 10% when compared with placebo (97619). This meta-analysis differed from some of the earlier analyses due to the inclusion of several additional clinical trials. Also, another meta-analysis of three clinical trials including 9900 patients with a history of stroke shows that B vitamin supplementation reduces the relative risk of stroke recurrence by 13% when compared with placebo, although this finding was determined to have a low level of certainty. Based on two clinical trials, there was also a 17% reduced risk of vascular death and an 11% reduction in the combined risk of stroke, myocardial infarction, and vascular death (107136).

In 2001, prior to the publication of the highest quality research on this topic, the US Food and Drug Administration (FDA) allowed a qualified health claim stating that, as part of a well-balanced diet that is low in saturated fat and cholesterol, folic acid, vitamin B6, and vitamin B12 may reduce the risk of vascular disease (102368). Unfortunately, even after the publication of higher quality research, it is still unclear which specific combination of B vitamins is optimal and which patients are most likely to benefit. One network meta-analysis shows that a combination of folic acid and vitamin B6 lowers the risk of stroke more effectively than B vitamin mixtures that include vitamin B12 (96165). However, this analysis is limited because it didn't account for dosing. Exposure to low, but not high amounts, of vitamin B12 (cyanocobalamin) seems to reduce stroke risk (96150).

Tardive dyskinesia. It is unclear if oral vitamin B6 prevents tardive dyskinesia in patients taking neuroleptic drugs.
^ Details: A small clinical study in patients taking neuroleptic drugs for schizophrenia shows that taking vitamin B6 (form not specified) 400 mg daily seems to improve Parkinsonian, dystonic, and dyskinetic symptoms when compared with placebo (8558).

Tourette syndrome. Oral vitamin B6 has only been evaluated in combination with other ingredients; its effect when used alone is unclear.
^ Details: A small, nonblinded clinical study in children aged 4-17 years with untreated Tourette syndrome or with chronic tic disorder and associated symptoms of anxiety shows that taking a liquid nutritional supplement providing vitamin B6 2.8 mg and L-theanine 200 mg daily for 2 months improves scores on the Yale Global Tic Severity Scale, but does not reduce anxiety, when compared with patients receiving psychoeducation (108555). This study may have been inadequately powered to detect a difference between groups.

Vincristine-induced neuropathy. Oral vitamin B6 has only been evaluated in combination with pyridostigmine; its effect when used alone is unclear.
^ Details: A small clinical study in children ages 11 months to 13 years with neuropathy due to vincristine treatment for acute lymphoblastic leukemia, shows that taking vitamin B6 150 mg/m2 and pyridostigmine 3 mg/kg twice daily for 3 months is associated with reduced severity of sensory and motor neuropathy when compared with baseline (104928). The validity of this finding is limited by the lack of a control group.

More evidence is needed to rate vitamin B6 for these uses.

Dosing & Administration

- **Adult**

  Oral:

  General: The daily recommended dietary allowances (RDAs) of vitamin B6 are: males 19-50 years, 1.3 mg; males over 50 years, 1.7 mg; females 19-50 years, 1.3 mg; females over 50 years, 1.5 mg; pregnancy, 1.9 mg; and lactation, 2 mg (3094).

- **Children**

  Oral:

  General: The daily recommended dietary allowances (RDAs) of vitamin B6 by age are: 0-6 months, 0.1 mg; 7-12 months, 0.3 mg; 1-3 years, 0.5 mg; 4-8 years, 0.6 mg; 9-13 years, 1 mg; males 14-18 years, 1.3 mg; females 14-18 years, 1.2 mg (3094).

- **Standardization & Formulation**

  In most clinical studies, vitamin B6 has been given alone or in combination with other B vitamins, usually folic acid and vitamin B12. In most trials, vitamin B6 is administered as pyridoxine or pyridoxal-5'-phosphate. The absorption of vitamin B6 from food or supplements appears to be similar. Also, absorption of vitamin B6 from different supplement forms (e.g., pyridoxine vs. pyridoxal-5'-phosphate) is similar (3094).

Interactions with Drugs

AMIODARONE (Cordarone)
Interaction Rating = **Moderate** Be cautious with this combination.
Severity = Moderate • Occurrence = Possible • Level of Evidence = **B**
Theoretically, vitamin B6 might increase the photosensitivity caused by amiodarone.
^ Details
Despite initial case reports suggesting that pyridoxine may have a protective effect against amiodarone-induced photosensitivity, preliminary clinical research suggests that pyridoxine may actually exacerbate this adverse effect (8892,8893).

ANTIHYPERTENSIVE DRUGS
Interaction Rating = **Moderate** Be cautious with this combination.
Severity = Moderate • Occurrence = Possible • Level of Evidence = **B**

Theoretically, vitamin B6 may have additive effects when used with antihypertensive drugs.
Details
Research in hypertensive rats shows that vitamin B6 can decrease systolic blood pressure (30859,82959,83093). Similarly, clinical research in patients with hypertension shows that taking high doses of vitamin B6 may reduce systolic and diastolic blood pressure, possibly by reducing plasma levels of epinephrine and norepinephrine (83091).

LEVODOPA
Interaction Rating = **Minor** Be watchful with this combination.
Severity = Moderate • Occurrence = Unlikely • Level of Evidence = **D**
Vitamin B6 may increase the metabolism of levodopa when taken alone, but not when taken in conjunction with carbidopa.
Details
Vitamin B6 (pyridoxine) enhances the metabolism of levodopa, reducing its clinical effects. However, this interaction does not occur when carbidopa is used concurrently with levodopa (Sinemet). Therefore, it is not likely to be a problem in most people (3046).

PHENOBARBITAL (Luminal)
Interaction Rating = **Moderate** Be cautious with this combination.
Severity = High • Occurrence = Possible • Level of Evidence = **D**
High doses of vitamin B6 may reduce the levels and clinical effects of phenobarbital.
Details
Preliminary clinical evidence suggests that vitamin B6 200 mg daily can reduce plasma levels of phenobarbital, possibly by increasing metabolism. It is not known whether lower doses have any effect. Advise people taking phenobarbital to avoid high doses of vitamin B6 (3046,10801).

PHENYTOIN (Dilantin)
Interaction Rating = **Moderate** Be cautious with this combination.
Severity = High • Occurrence = Possible • Level of Evidence = **D**
High doses of vitamin B6 may reduce the levels and clinical effects of phenytoin.
Details
Preliminary clinical evidence suggests that vitamin B6 200 mg daily can reduce plasma levels of phenytoin, possibly by increasing metabolism. It is not known whether lower doses have any effect. Advise people taking phenytoin to avoid high doses of vitamin B6 (3046,10801).

Interactions with Supplements

HERBS AND SUPPLEMENTS WITH HYPOTENSIVE EFFECTS: Theoretically, taking vitamin B6 with other herbs and supplements with hypotensive effects might increase the risk of hypotension.
Details
Vitamin B6 might lower blood pressure (30859,82959,83091,83093). Other natural products can have additive hypotensive effects when used with vitamin B6.

Interactions with Conditions

ANGIOPLASTY

There is some concern that B vitamins might increase the rate of restenosis after bare metal stent placement. An intravenous loading dose of folic acid, vitamin B6, and vitamin B12, followed by oral administration of folic acid 1.2 mcg, vitamin B6 (pyridoxine) 48 mg, and vitamin B12 60 mcg daily after coronary stenting might actually increase restenosis rates (12150). Due to the potential for harm, this combination of vitamins should not be recommended for patients receiving coronary stents (12151).

BARIATRIC SURGERY

Following bariatric surgery, a 50-year-old female taking vitamin B6 300 mg daily for 6 months developed plasma levels of pyridoxal phosphate that were at least 61 times higher than normal levels. The elevated pyridoxal phosphate level was associated with nausea, vomiting, and browning skin (96169). Due to the potential for harm, supplemental vitamin B6 at levels above the dietary reference intakes (DRI) should not be recommended following bariatric surgery.

Interactions with Lab Tests

UROBILINOGEN

There is concern that vitamin B6 can cause a false positive result in the spot test with Ehrlich's reagent (15).

Nutrient Depletion

SOME DRUGS CAN AFFECT VITAMIN B6 LEVELS:

ANTIBIOTIC DRUGS
Depletion Rating = **Insignificant Depletion** A supplement is not needed for most patients.
Theoretically, antibiotics might reduce levels of vitamin B6 in the blood.
Details

Some sources suggest that destruction of the normal gastrointestinal flora by antibiotics can decrease production and plasma levels of vitamin B6. However, there is no evidence that the gastrointestinal flora is a significant source of vitamin B6 in humans (4436,4437,9502). Supplementation with vitamin B6 is not necessary during antibiotic therapy. For information on foods that are rich in vitamin B6, see our **chart**.

CYCLOSERINE (Seromycin)

Depletion Rating = **Major Depletion** A supplement is needed for most patients.

Cycloserine increases vitamin B6 excretion and can cause vitamin B6 deficiency.

Details

Cycloserine interacts with pyridoxal phosphate to form inactive hydrazones, which inhibit pyridoxal kinase and increase vitamin B6 excretion in the urine (2677,4459,9501). This loss of vitamin B6 likely contributes to the neurotoxicity and seizures associated with cycloserine (2677,9501). Vitamin B6 supplements reduce the incidence of these side effects. It is recommended that people taking cycloserine also take vitamin B6 (pyridoxine) 150-300 mg/day (3022,8894,9501). For information on foods that are rich in vitamin B6, see our **chart**.

ESTROGENS

Depletion Rating = **Insignificant Depletion** A supplement is not needed for most patients.

Estrogens might reduce blood levels of vitamin B6. However, low doses are unlikely to have a clinically meaningful effect.

Details

Estrogens can interfere with vitamin B6 metabolism. Reduced plasma pyridoxal phosphate levels may occur with oral contraceptives and estrogen replacement therapy (4459,4498,9504,9505,9506). It is suggested that low vitamin B6 levels contribute to depression, lethargy, and fatigue sometimes associated with oral contraceptives (4459,9504,9505). But there is not reliable evidence that vitamin B6 supplements prevent or treat these symptoms. Also, there is some evidence that with low-dose estrogen contraceptives, levels return to normal despite continued therapy (9510). In general, use of oral contraceptives or postmenopausal estrogens does not necessitate vitamin B6 supplementation. For information on foods that are rich in vitamin B6, see our **chart**.

FUROSEMIDE (Lasix)

Depletion Rating = **Insignificant Depletion** A supplement is not needed for most patients.

Furosemide might modestly reduce blood levels of vitamin B6 in patients with kidney failure.

Details

Limited data suggests that acute use of intravenous furosemide in people with kidney failure increases urinary excretion of vitamin B6 (8896,9525). However, people with hypertension treated with oral diuretics for several years seem to have normal serum vitamin B6 levels (1898). Vitamin B6 supplements are not usually necessary with furosemide or other diuretics. For information on foods that are rich in vitamin B6, see our **chart**.

HYDRALAZINE

Depletion Rating = **Moderate Depletion** Monitor for depletion; a supplement is needed in some patients.

Hydralazine might increase vitamin B6 excretion and reduce blood levels.

Details

Hydralazine can cause vitamin B6 deficiency in some patients, probably by reacting with pyridoxal phosphate to form an inactive hydrazine, which is excreted (2677,4533). Give vitamin B6 supplements to people taking hydralazine who develop early signs of peripheral neuropathy, such as paresthesias, numbness, and tingling (3022,4533). For information on foods that are rich in vitamin B6, see our **chart**.

ISONIAZID

Depletion Rating = **Moderate Depletion** Monitor for depletion; a supplement is needed in some patients.

Isoniazid might increase vitamin B6 excretion and lead to symptoms of deficiency.

Details

Isoniazid interacts with vitamin B6 to form an inactive hydrazine, which inhibits pyridoxal kinase and increases vitamin B6 excretion in the urine. This depletes body stores of vitamin B6 and can lead to peripheral neuritis (2677,4459). It is rare in people receiving up to 5 mg/kg daily isoniazid (8894). With higher doses of isoniazid, consider vitamin B6 supplements, 40-250 mg daily, especially in people with a history of seizures, and in those with other risk factors for neuropathies, including malnutrition, uremia, diabetes, alcoholism, or liver disease (2677,4459,4481,4482,8894). For information on foods that are rich in vitamin B6, see our **chart**.

PENICILLAMINE (Cuprimine, Depen)

Depletion Rating = **Major Depletion** A supplement is needed for most patients.

Penicillamine might reduce vitamin B6 activity and lead to symptoms of deficiency.

Details

Penicillamine inhibits the activity of vitamin B6, possibly by forming an inactive complex with pyridoxal phosphate (4534). This has been linked to the development of peripheral and optic neuropathy (8897). When penicillamine is used for treatment of Wilson's Disease, it's recommended that patients take vitamin B6 (pyridoxine) 25 mg dilay (3092). Guidelines haven't been established for the use of vitamin B6 with penicillamine in the treatment of other conditions, although supplements of 50-150 mg daily have been used (4534,8897). Monitor patients for early signs of peripheral neuropathy, such as paresthesias, numbness, and tingling, and give vitamin B6 supplements if these occur. For information on foods that are rich in vitamin B6, see our **chart**.

THEOPHYLLINE

Depletion Rating = **Moderate Depletion** Monitor for depletion; a supplement is needed in some patients.
Theophylline might lower vitamin B6 levels, although the clinical effects of this depletion are unclear.
Details

Theophylline inhibits pyridoxal kinase, which catalyzes phosphorylation of vitamin B6 to its active form, pyridoxal-5'-phosphate. People treated with theophylline tend to have reduced plasma pyridoxal-5'-phosphate levels (4522,7064,7066,8898,9480,9503). The clinical significance of this is not clear, although it is suggested that vitamin B6 deficiency contributes to neurological and CNS side effects of theophylline, including seizures (7066,8899,9503). Vitamin B6 (pyridoxine) supplements of 10-300 mg daily have been tried in people taking theophylline, but results are conflicting (7064,8898,8899,9503). Although plasma levels are sometimes returned to normal, it's not clear if there is any clinical benefit.

Overdose

There is insufficient reliable information available about the presentation or treatment of overdose with vitamin B6.

Commercial Products Containing: Vitamin B6

View All
View Health Canada Licensed Products
View Certified Products
USP Verified Products
NSF Contents Certified Products
NSF Certified for Sport Products
ConsumerLab Quality Certified Products

Pharmacokinetics

Absorption: Vitamin B6 is absorbed passively in the upper gastrointestinal tract (90790).

Metabolism: In the liver, vitamin B6 is converted to the coenzyme pyridoxal phosphate (15,90790).

Excretion: Vitamin B6 metabolites are excreted in the urine (93501).

Mechanism of Action

General: Vitamin B6 is required for amino acid metabolism. It is also involved in carbohydrate and lipid metabolism (15). In the body, vitamin B6 is converted to the coenzyme pyridoxal phosphate for a wide variety of metabolic reactions. These reactions include transamination of amino acids, conversion of tryptophan to niacin, synthesis of gamma-aminobutyric acid (GABA) in the CNS, metabolism of serotonin, norepinephrine and dopamine, metabolism of polyunsaturated fatty acids and phospholipids, and the synthesis of the heme component of hemoglobin (15). Vitamin B6 deficiency in adults principally affects the peripheral nerves, skin, mucous membranes, and hematopoietic system. In children, the CNS is also affected. Deficiency can occur in people with uremia, alcoholism, cirrhosis, hyperthyroidism, malabsorption syndromes, congestive heart failure (CHF), and in those receiving certain drugs (15).

Anti-inflammatory effects: Decreased vitamin B6 concentrations are associated with increased plasma levels of C-reactive protein (CRP). CRP is an indicator of inflammation that is implicated in increased cardiovascular morbidity (9452).

Antioxidant effects: Vitamin B6 (pyridoxine) has some antioxidant and free radical scavenging activities, which might explain its beneficial effects on tardive dyskinesia (8558).

Blood pressure lowering effects: Preliminary clinical and animal research suggests that vitamin B6 (pyridoxine) can reduce blood pressure. Potential mechanisms of action included prevention of overproduction of endogenous aldehydes and improved glucose metabolism (30859,82959,83091,83093).

Carpal tunnel effects: It has been suggested that large doses of vitamin B6 may be useful in carpal tunnel syndrome, based on an observation of low vitamin B6 tissue levels in autopsy specimens from people who had the syndrome (6885). However, tissue levels decline in dead or infarcted tissue, and the existence of vitamin B6 deficiency during life cannot be deduced from these observations (6885).

Homocysteine-lowering effects: Vitamin B6 is a cofactor for enzymes involved in one of the two pathways for the metabolism of homocysteine. Remethylation of homocysteine to methionine requires folate and vitamin B12 (9407,9409). Folic acid supplements increase the activity of this pathway, lowering fasting homocysteine levels. Vitamin B6 is not involved in this pathway and therefore does not affect fasting homocysteine levels (9400,9406). Trans-sulfuration of homocysteine to form cystathionine is catalyzed by cystathione-beta-synthase, which is vitamin B6 dependent (2148,9407,9409). This pathway is primarily active after ingesting a methionine load (i.e., after a meal). Deficiencies of vitamin B6 or cystathione-beta-synthase impair this pathway, raising post-methionine load homocysteine levels (1489,2148,9408). Vitamin B6 supplements can lower post-methionine load homocysteine levels (1489,7881). Evidence suggests elevated homocysteine levels might cause vascular endothelial cell damage, impaired endothelium dependent vasodilation due to reduced nitric oxide activity, increased oxidation

and arterial deposition of low-density lipoproteins (LDL), increased platelet adhesiveness, and activation of the clotting cascade (9403,9408,9411).

Immune effects: Vitamin B6 is thought to be beneficial in the immune response. Vitamin B6 is required for antibody production (83017). Also, in critically ill patients, vitamin B6 increases the number of T lymphocyte, T helper, and T suppressor cells (83008).

Oxalate excretion effects: For kidney stones, vitamin B6 is thought to be beneficial by decreasing urinary excretion of oxalate in some patients. Most kidney stones are composed of calcium oxalate, and high urinary oxalate has been associated with development and recurrence of kidney stones. In patients with type I primary hyperoxaluria, vitamin B6 (pyridoxine) seems to reduce stone formation by shifting the breakdown of the oxalic acid precursor, glyoxalic acid, to glycine as opposed to oxalic acid (6437,6438,6439,6440,6441,6442,8205).

Serotonin effects: In attention deficit-hyperactivity disorder (ADHD), some kids can have low serotonin levels (41). However, this is controversial (6444). It's thought that vitamin B6 can increase serotonin levels and might improve symptoms in some kids with low serotonin levels (41). Some researchers think vitamin B6 (pyridoxine) supplementation might also be useful for some dysphoric mental states because it increases the production of serotonin and GABA, but the evidence is still preliminary (8554).

Classifications

Immunomodulators, Water-Soluble Vitamins

References

See Monograph References

Monographs are reviewed on a regular schedule. See our Editorial Principles and Process for details. The literature evaluated in this monograph is current through 7/31/2024. This monograph was last modified on 12/5/2023. If you have comments or suggestions, please tell the editors.