

Parkinson's Disease: An Integrative Approach

A Natural Standard Monograph

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- Parkinson's disease (PD) is a movement disorder that is chronic and progressive, meaning that symptoms continue and worsen over time. PD affects nerve cells in a part of the brain that controls muscle movement.
- PD occurs when a group of cells in an area of the brain called the substantia nigra begin to malfunction and die. The cells in the substantia nigra produce a chemical called dopamine. Dopamine is a neurotransmitter, or chemical messenger, that sends information to the parts of the brain that control movement and coordination. When an individual has PD, dopamine-producing cells begin to die and the amount of dopamine produced in the brain decreases. Messages from the brain telling the body how and when to move are therefore delivered more slowly, leaving a person incapable of initiating and controlling movements in a normal way.
- PD is the most common form of parkinsonism. Parkinsonism is a group of movement disorders that have similar features and symptoms. When the cause of PD is unknown, it is called idiopathic Parkinson's disease.
- The four primary symptoms of PD are tremor, or trembling in hands, arms, legs, jaw, and face; rigidity, or stiffness of the limbs and trunk; bradykinesia, or slowness of movement; and postural instability, or impaired balance and coordination (parkinsonian gait). As these symptoms become more severe, patients may have difficulty walking, talking, or completing other simple tasks.
- Early symptoms of PD are subtle and occur gradually. In some people, the disease progresses more quickly than in others. As the disease progresses, the shaking, or tremor, which affects the majority of PD patients, may begin to in-

terfere with daily activities. Other symptoms may include depression and other emotional changes; difficulty in swallowing, chewing, and speaking; urinary problems or constipation; skin problems; and sleep disruptions.

- PD usually affects people over the age of 50. According to the National Institute of Neurological Disorders and Stroke (NINDS), at least 500,000 people in the United States are estimated to have Parkinson's disease, and about 50,000 new diagnoses are made each year. The disorder occurs in all races but is somewhat more prevalent among Caucasians. Men are affected slightly more often than women.
- Symptoms of PD may appear at any age, but the average age of onset is 60. It is rare in people younger than 30, and risk increases with age. It is estimated that 5%–10% of patients experience symptoms before the age of 40.
- Currently, there is a lack of blood or laboratory tests that have been proven to help in diagnosing PD. Therefore, the diagnosis is based on medical history and a neurological examination. The disease can be difficult to diagnose accurately. Doctors may sometimes request brain scans or laboratory tests in order to rule out other diseases.
- Although clinical studies using integrative therapies for the treatment of PD are limited, there have been studies in other neurological disorders that may present with similar symptoms as PD. Listed below are integrative therapies that have been studied clinically in various movement disorders, including PD.

Good Scientific Evidence

5-HTP—5-HTP [5-hydroxytryptophan] is the precursor for serotonin. Serotonin is the brain chemical associated with sleep, mood, movement, feeding, and nervousness. Cerebellar ataxia results from the failure of part of the brain to regulate body posture and limb movements. 5-HTP has been observed to have benefits in some people who have difficulty standing or walking due to cerebellar ataxia. However, current evidence is mixed. Further research is needed before a strong conclusion can be drawn.

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Avoid 5-HTP if allergic or hypersensitive to it. Signs of allergy to 5-HTP may include rash, itching, or shortness of breath. Avoid with eosinophilia syndromes, Down's syndrome, or mitochondrial encephalomyopathy. Use cautiously if taking antidepressant medications, 5-HTP receptor agonists, carbidopa, phenobarbital, pindolol, reserpine, tramadol, or zolpidem. Use cautiously with kidney insufficiency, HIV/AIDS (particularly HIV-1 infection), epilepsy, or with a history of mental disorders. Avoid if pregnant or breastfeeding.

Music therapy—Music therapy has been reported to reduce symptoms in people with Parkinson's disease. Modest reductions were seen in symptoms, including those affecting motor coordination, speech intelligibility and vocal intensity, bradykinesia (slow movement), emotional functions, activities of daily living, and quality of life. Music therapy is generally known to be safe.

Unclear or Conflicting Scientific Evidence

Acupressure, shiatsu—The practice of applying finger pressure to specific acupoints (energy points) throughout the body has been used in China since 2000 BC. Shiatsu technique involves finger pressure at acupoints and along body meridians (energy lines). Shiatsu can incorporate palm pressure, stretching, massaging, and other manual techniques. Shiatsu practitioners commonly treat musculoskeletal and psychological conditions, including neck/shoulder and lower-back problems, arthritis, depression, and anxiety. Acupressure may benefit patients with several measures of severity of Parkinson's disease. Preliminary clinical evidence from one small study with individuals with facial spasms reported improvement when using Shiatsu acupressure. Further study is needed before a conclusion can be made.

Acupressure appears to be safe if self-administered or administered by an experienced therapist. Serious, long-term complications have not been reported, according to available scientific data. Hand-nerve injury and herpes zoster ("shingles") cases have been reported after shiatsu massage. Forceful acupressure may cause bruising.

Acupuncture—Acupuncture has been reported to help relieve symptoms of some neurological disorders, including nerve damage, Parkinson's disease (characterized by poor fine-muscle coordination and tremors), and trigeminal neuralgia. More trials are needed.

Needles must be sterile in order to avoid disease transmission. Avoid with valvular heart disease, infections, bleeding disorders, medical conditions of unknown origin, neurological disorders, or if taking anticoagulants. Avoid on areas that have received radiation therapy and during pregnancy. Avoid electroacupuncture with irregular heartbeat or in patients with pacemakers. Use cautiously with pulmonary disease (like asthma or emphysema). Use cautiously in elderly or medically compromised patients, diabetics, or patients with a history of seizures.

Alexander Technique—The Alexander Technique is an educational program that involves teaching movement patterns and postures to improve coordination and balance, reduce tension, relieve pain, alleviate fatigue, alleviate various medical conditions, and promote well-being. Preliminary research suggests that Alexander Technique instruction may improve fine and gross movements and reduce depression in patients with Parkinson's disease. Well-designed human trials are necessary.

Serious-side effects have not been reported in the available literature. It has been suggested that the technique may be less effective with patients who have learning disabilities or mental illnesses. The Alexander Technique has been used safely in pregnant women.

Ashwagandha—Ashwagandha (*Withania somnifera*) is widely cultivated in India and the Middle East for the herb's medicinal properties, and it is also found in parts of Africa. There is insufficient scientific evidence to determine if ashwagandha is a safe and effective treatment for Parkinson's disease.

Avoid if allergic or hypersensitive to ashwagandha products or any of their ingredients. Dermatitis (allergic skin rash) was reported in 3 of 42 patients in one ashwagandha trial. There are few reports of adverse effects associated with ashwagandha, but there are few human trials using ashwagandha, and most do not report the doses or standardization/preparation used. Avoid with peptic-ulcer disease. Ashwagandha may cause abortions, based on anecdotal reports. Avoid if pregnant or breastfeeding.

Ayurveda—Ayurveda is a form of natural medicine that originated in ancient India more than 5000 years ago. Ayurveda is an integrated system of techniques that uses diet, herbs, exercise, meditation, yoga, and massage or bodywork to achieve optimal health. There is evidence that the traditional herbal remedy *Mucuna pruriens* may reduce symptoms in Parkinson's disease and may offer advantages over conventional L-dopa preparations in the long-term management of the disorder. More studies are needed in this area.

Ayurvedic herbs should be used cautiously, because they are potent and some constituents may be potentially toxic if taken in large amounts or for a long time. Some herbs imported from India have been reported to contain high levels of toxic metals. Ayurvedic herbs may interact with other herbs, foods, and drugs. A qualified health care professional should be consulted before taking these herbs.

Belladonna—Belladonna (*Atropa belladonna*) has been used for centuries to treat many medical conditions. To date, human studies have shown a lack of benefit from belladonna in treating autonomic nervous system disorders.

Avoid if allergic to belladonna or plants of the Solanaceae (nightshade) family (bell peppers, potatoes, eggplants). Avoid with a history of heart disease, high blood pressure, heart attack, abnormal heartbeat, congestive heart failure, stomach ulcers, constipation, stomach acid reflux (serious heartburn), hiatal hernia, gastrointestinal disease, ileostomy, colostomy, fe-

ver, bowel obstruction, benign prostatic hypertrophy, urinary retention, narrow angle glaucoma, psychotic illness, Sjögren's syndrome, dry mouth, neuromuscular disorders (such as myasthenia gravis), or Down's syndrome. Avoid if pregnant or breastfeeding.

Caffeine—Based on clinical evidence, coffee and caffeine consumption may be inversely related to Parkinson's disease risk. Further study is required before conclusions can be drawn.

Use cautiously in individuals with heightened sensitivity to caffeine, clotting disorders, hypertension, hyperlipidemia, diabetes, movement disorders, osteoporosis, sleep disorders, seizure disorders, urologic disorders, glaucoma, psychiatric disorders, fibrous benign breast lumps, acute kidney inflammation; or high-grade inflammation; pregnant women; breastfeeding women; people with immune disorders or eating disorders; recreational enthusiasts and athletes; patients at risk for nephrolithiasis; or patients using diuretics or ephedrine. Avoid in patients with preexisting mitral valve prolapse, Marfan syndrome, or autosomal recessive polycystic kidney disease.

Chiropractic—Chiropractic is a health care discipline that focuses on the relationship between musculoskeletal structure (primarily the spine) and body function (as coordinated by the nervous system) and how this relationship affects the preservation and restoration of health. Although there is not enough reliable scientific evidence to conclude the effects of chiropractic techniques in the management of Parkinson's disease, anecdotal reports suggest a positive impact on fine-muscle coordination in some individuals. More clinical research is necessary.

Avoid with symptoms of vertebrobasilar vascular insufficiency, aneurysms, unstable spondylolisthesis, or arthritis. Avoid with agents that increase the risk of bleeding. Avoid in areas of para-spinal tissue after surgery. Avoid if pregnant or breastfeeding due to a lack of scientific data. Use extra caution during cervical adjustments. Use cautiously with acute arthritis, conditions that cause decreased bone mineralization, brittle bone disease, bone-softening conditions, bleeding disorders, or migraines. Use cautiously with a risk of tumors or cancers.

Choline—Data regarding the effectiveness of choline in the treatment of Parkinson's disease are conflicting and inconclusive at this time.

Avoid if allergic/hypersensitive to choline, lecithin, or phosphatidylcholine. Use cautiously with kidney or liver disorders or trimethylaminuria. Use cautiously with a history of depression. If pregnant or breastfeeding it seems generally safe to consume choline within the recommended adequate intake (AI) parameters; supplementation outside of dietary intake is usually not necessary if a healthy diet is consumed.

Chromium—Chromium is an essential trace element that exists naturally in trivalent and hexavalent states. Chromium has been studied for its protective benefits in Parkinson's dis-

ease and is included in antioxidant multivitamins. However, there is lack of scientific evidence in humans in this area. Additional research is needed.

Trivalent chromium appears to be safe, because side-effects are rare or uncommon. However, hexavalent chromium may be poisonous. Avoid if allergic to chromium, chromate, or leather. Use cautiously with diabetes, liver problems, weakened immune systems (such as HIV/AIDS patients or organ-transplant recipients), neurological or behavioral disorders (such as depression or Parkinson's disease), heart disease, and stroke and in patients who are taking medications for these conditions. Use cautiously if driving or operating machinery. Use cautiously if pregnant or breastfeeding.

Coenzyme Q10—Coenzyme Q10, or CoQ10, is produced by the human body and is necessary for the basic functioning of cells. There is promising evidence to support the use of CoQ10 in the treatment of symptoms associated with Parkinson's disease. Better-designed trials are needed to confirm early study results.

Allergic reactions have not been associated with CoQ10 supplements, although rash and itching have been reported rarely. Stop use 2 weeks before and immediately after surgery/dental/diagnostic procedures with bleeding risks. Use cautiously with a history of blood clots, diabetes, high blood pressure, heart attack, or stroke, or if taking anticoagulants (blood thinners) or antiplatelet drugs, blood pressure drugs, blood sugar drugs, cholesterol drugs, or thyroid drugs. Avoid if pregnant or breastfeeding.

Cowhage—Cowhage (*Mucuna pruriens*) seeds have been used in traditional Ayurvedic medicine to treat Parkinson's disease. Traditional Ayurvedic medicine and preliminary evidence suggests that cowhage contains 3.6%–4.2% levodopa, the same chemical used in several Parkinson's disease drugs. Cowhage treatments have yielded positive results in early studies. However, more research should be conducted to determine the treatment that is most effective.

Avoid if allergic or hypersensitive to cowhage, its constituents, or members of the Fabaceae family. Avoid with psychosis or schizophrenia. Use cautiously with diabetes or Parkinson's disease or if taking levodopa, dopamine, dopamine agonists, dopamine antagonists, or dopamine reuptake inhibitors. Use cautiously if taking monoamine oxidase inhibitors (MAOIs) or other antidepressants or anticoagulants (blood thinners). Avoid if pregnant or breastfeeding, as cowhage may inhibit prolactin secretion.

Creatine—Numerous studies suggest that creatine may help treat various neuromuscular diseases and may delay the onset of symptoms when used with standard treatment. However, creatine ingestion does not appear to have a significant effect on muscle creatine stores or high-intensity exercise capacity in individuals with multiple sclerosis, and supplementation does not seem to help people with tetraplegia. Although early studies were encouraging, recent research reports no beneficial ef-

fects on survival or disease progression. Additional studies are needed to provide clearer answers.

Avoid if allergic to creatine or if taking diuretics. Use cautiously with asthma, diabetes, gout, kidney disorders, liver or muscle problems, stroke, or with a history of these conditions. Avoid dehydration. Avoid if pregnant or breastfeeding.

DHEA—There is conflicting scientific evidence regarding the use of DHEA [dehydroepiandrosterone] supplements for myotonic dystrophy. Better research is necessary before a clear conclusion can be drawn.

Avoid if allergic to DHEA. Avoid with a history of seizures. Use cautiously with adrenal or thyroid disorders or if taking anticoagulants or drugs, herbs, or supplements for diabetes, heart disease, seizure, or stroke. Stop use 2 weeks before and immediately after surgery/dental/diagnostic procedures with bleeding risks. Avoid if pregnant or breastfeeding.

Dong quai—*Dong quai* (*Angelica sinensis*), also known as Chinese Angelica, has been used for thousands of years in traditional Chinese, Korean, and Japanese medicine. There is insufficient evidence to support the use of *Dong quai* as a treatment for nerve pain. High-quality human research is lacking.

Although *Dong quai* is accepted as being safe as a food additive in the United States and Europe, its safety in medicinal doses is unknown. Long-term studies of side-effects are lacking. Avoid if allergic/hypersensitive to *Dong quai* or members of the Apiaceae/Umbelliferae family (like anise, caraway, carrot, celery, dill, parsley). Avoid prolonged exposure to sunlight or ultraviolet light. Use cautiously with bleeding disorders or if taking drugs that may increase the risk of bleeding. Use cautiously with diabetes, glucose intolerance, or hormone-sensitive conditions (like breast cancer, uterine cancer, or ovarian cancer). Do not use before dental or surgical procedures. Avoid if pregnant or breastfeeding.

Feldenkrais Method[®]—The Feldenkrais Method involves stretching, reaching, and changing posture in specific patterns. In some cases, it includes a form of massage. Patients who practice complementary and alternative medicine methods have reported that the Feldenkrais Method, as well as breathing therapy, massage, and relaxation techniques, helped reduce symptoms of dystonia. Further data are needed before a firm conclusion can be made.

There is currently a lack of available scientific studies or reports of safety of the Feldenkrais Method.

Ginseng—A clinical study found that patients with neurological disorders may improve when taking Asian ginseng (*Panax ginseng*). This supports research findings that report *Panax ginseng* improving cognitive function. More research is needed in this area.

Avoid with known allergy to plants in the Araliaceae family. There has been a report of a serious life-threatening skin reaction, possibly caused by contaminants in ginseng formulations.

Kava—Kava beverages, made from dried roots of the shrub *Piper methysticum* (kava), have been used ceremonially and socially in the South Pacific for hundreds of years and in Europe since the 1700s. There is currently unclear evidence on the use of kava for Parkinson's disease. Kava has been shown to increase "off" periods in Parkinson's patients taking levodopa and can cause a semicomatose state when given with alprazolam. Patients should consult with a qualified health care professional before taking kava due to the risk of harmful side-effects.

Avoid if allergic to kava or kavapyrones. Avoid with liver disease, a history of medication-induced extrapyramidal (the motor system related to the basal ganglia) effects, and chronic lung disease. Avoid if taking medications for liver disease or central nervous system depressants such as alcohol or tranquilizers. Avoid while driving or operating heavy machinery (may cause drowsiness). Use cautiously with depression or if taking antidepressants. Avoid if pregnant or breastfeeding.

Lecithin—Indications of a positive treatment effect of lecithin were seen with regard to memory, cognition, and motility associated with Parkinson's disease. Further study is required before firm conclusions can be drawn.

Use cautiously in patients with liver disease, coagulation or bleeding disorders, or in patients taking anticoagulants or antiplatelets. Avoid in patients with allergies to lecithin, egg, or soy.

Massage—Early evidence suggests a possible benefit of massage for Parkinson's disease. However, evidence is insufficient on which to base recommendations.

Avoid with bleeding disorders, low platelet counts, or if taking blood-thinning medications (such as heparin or warfarin/Coumadin[®]). Areas should not be massaged where there are fractures, weakened bones from osteoporosis or cancer, open/healing skin wounds, skin infections, recent surgery, or blood clots. Use cautiously with a history of physical abuse or if pregnant or breastfeeding. Massage should not be used as a substitute for more proven therapies for medical conditions. Massage should not cause pain to the client.

Melatonin—Melatonin is a naturally occurring hormone that helps regulate sleep/wake cycles (circadian rhythm). Melatonin has been reported useful in neurological conditions including Parkinson's disease, periodic limb-movement disorder, and tardive dyskinesia (abnormal movements that can occur after long-term use of some older antipsychotic drugs). The use of melatonin in these conditions, however, is not supported by rigorous scientific testing. Better-designed research is needed to determine if melatonin is beneficial in individuals with neurological disorders.

Avoid melatonin supplementation in women who are pregnant or attempting to become pregnant. Use cautiously with bleeding disorders, seizure disorders, or if taking anticoagulants.

Methionine—Methionine may have a role in treating the clinical symptoms associated with Parkinson's disease. However, few data from clinical studies are available. A small study suggests some benefit from supplementary methionine; however, additional studies are required before any conclusion can be made.

Use cautiously in patients with elevated homocysteine levels, liver disease, or those who are taking agents that are toxic to the liver. Avoid large amounts (> 100 mg/kg) of methionine, as it may lead to severe brain effects.

Moxibustion—Moxibustion uses the principle of heat to stimulate circulation and break up congestion or stagnation of blood and *qi* (also known as *chi*; energy). One small study reported treatment of trigeminal neuralgia with cupping to have a significant therapeutic effect. However, there is insufficient available evidence and more clinical studies are needed in this area.

Avoid with aneurysms, any kind of "Heat Syndrome," heart disease, convulsions or cramps, diabetic neuropathy, extreme fatigue and/or anemia, fever, or inflammatory conditions. Avoid areas with an inflamed organ, contraindicated acupuncture points, allergic skin conditions, ulcerated sores, or skin adhesions. Avoid over the face, genitals, head, or nipples. Avoid in patients who have just finished exercising or taking a hot bath or shower. Avoid if pregnant or breastfeeding. Use cautiously over large blood vessels and thin or weak skin. Use cautiously with elderly people with large vessels. It is considered not advisable to bathe or shower for up to 24 hours after a moxibustion treatment.

Physical therapy—There is evidence for the use of physical therapy for nerve or neurological disorders such as Parkinson's disease. Additional high-quality studies are needed.

Not all physical therapy programs are suited for everyone, and patients should discuss their medical histories with their qualified health care professionals before beginning any treatments. Physical therapy may aggravate preexisting conditions. Persistent pain and fractures of unknown origin have been reported. Physical therapy may increase the duration of pain or cause limitation of motion. Pain and anxiety may occur during the rehabilitation of patients with burns. Both morning stiffness and bone erosion have been reported in the literature, although causality is unclear. Erectile dysfunction has also been reported. Physical therapy has been used in pregnancy, and although reports of major adverse effects are lacking in the available literature, caution is advised nonetheless. All therapies during pregnancy and breastfeeding should be discussed with a licensed obstetrician/gynecologist before initiation.

Qigong—*Qigong* is a type of Traditional Chinese Medicine (TCM) that is thought to be at least 4000 years old. It is traditionally used for spiritual enlightenment, medical care, and self-defense. There is promising early evidence suggesting that internal *qigong* may help in the treatment of Parkinson's disease. However, the evidence is somewhat unclear, and further research is needed.

Qigong is generally considered to be safe in most people when learned from a qualified instructor. Use cautiously with psychiatric disorders.

Reiki—Reiki is a system of laying on of the hands that originated in as a Buddhist practice approximately 2500 years ago. Human study suggests that reiki may have an effect on autonomic nervous system functions such as heart rate, blood pressure, or breathing activity, which are important in neurological disorders that may damage autonomic function, including neurological conditions. Large, well-designed studies are needed before conclusions can be drawn.

Reiki is not recommended as the sole treatment approach for potentially serious medical conditions and should not delay the time it takes to consult with a health care professional or receive established therapies. Use cautiously with psychiatric illnesses.

Selenium—Studies have consistently shown that antioxidants may not have clinical benefits in motor-neuron diseases. Although the research thus far does not discourage selenium supplementation in patients, more research is needed to determine if selenium is an effective treatment for central nervous system disorders.

Avoid if allergic or sensitive to products containing selenium. Avoid with a history of nonmelanoma skin cancer. Selenium is generally regarded as safe for pregnant or breastfeeding women. However, animal research reports that large doses of selenium may lead to birth defects.

T'ai chi—*T'ai chi* is a system of movements and positions believed to have developed in twelfth century China. *T'ai chi* techniques aim to address the body and mind as an interconnected system and are traditionally believed to have mental and physical health benefits to improve posture, balance, flexibility, and strength. Community-based fitness programs, which include *t'ai chi* classes, may improve balance in patients with Parkinson's disease and may motivate individuals to participate in routine exercise. Additional research is warranted in this area.

Avoid with severe osteoporosis or joint problems, acute back pain, sprains, or fractures. Avoid during active infections, right after a meal, or when very tired. Some researchers believe that visualization of energy flow below the waist during menstruation may increase menstrual bleeding. Straining downward or holding low postures should be avoided during pregnancy and by people with inguinal hernias. Some *t'ai chi* practitioners believe that practicing for too long or using too much intention may direct the flow of *chi* (*qi*) inappropriately, possibly resulting in physical or emotional illness. *T'ai chi* should not be used as a substitute for more-proven therapies for potentially serious conditions. Advancing too quickly while studying *t'ai chi* may increase the risk of injury.

Taurine—Taurine may affect cellular hyperexcitability by increasing membrane conductance to potassium and chloride ions, possibly by altering intracellular (within the cell) availability of calcium. Study results suggest that taurine supple-

mentation may result in improvements in myotonic dystrophy. Well-designed clinical trials are needed.

Taurine is an amino acid, and it is unlikely that there are allergies related to this constituent. However, allergies may occur from multi-ingredient products that contain taurine. Use cautiously in patients with high cholesterol, low blood pressure, bleeding disorders, potential for mania, or epilepsy. Avoid consuming energy drinks containing taurine, caffeine, glucuronolactone, B vitamins, and other ingredients before drinking alcohol or exercising. Use cautiously if pregnant or breastfeeding because taurine is a natural component of breast milk.

TENS—Transcutaneous electrical nerve stimulation (TENS) is a noninvasive technique in which a low-voltage electrical current is delivered through wires from a small power unit to electrodes located on the skin. Electrodes are temporarily attached with paste in various patterns, depending on the specific condition and treatment goals. Several studies have reported benefits of TENS therapy in patients with trigeminal neuralgia (facial pain) or hemiplegia/hemiparesis. Additional research is needed before a firm conclusion can be drawn.

Avoid with implantable devices, such as defibrillators, pacemakers, intravenous-infusion pumps, or hepatic-artery infusion pumps. Use cautiously with decreased sensation (such as neuropathy) or with seizure disorders. Avoid if pregnant or breastfeeding.

Therapeutic Touch—Therapeutic Touch (TT) practitioners hold their hands a short distance from the patient without actually making physical contact. The purpose of this technique is to detect the patient's energy field, allowing the TT practitioner to correct any perceived imbalances. There is some evidence that TT may affect some properties of the central nervous system. However, further research is needed to examine whether TT could have any effects on central nervous system disorders.

TT is believed to be safe for most people. TT should not be used for potentially serious conditions in place of more-proven therapies. Avoid with fever or inflammation and on body areas with cancer.

Vitamin B₆—Vitamin B₆ (pyridoxine) is required for the synthesis of the neurotransmitters serotonin and norepinephrine and for myelin formation. Pyridoxine deficiency in adults principally affects the peripheral nerves, skin, mucous membranes, and the blood cell system. In children, the central nervous system is also affected. Major sources of vitamin B₆ include cereal grains, legumes, vegetables (carrots, spinach, and peas), potatoes, milk, cheese, eggs, fish, liver, meat, and flour. Some prescription drugs called neuroleptics, which are used in psychiatric conditions, may cause movement disorders as unwanted side-effects. Vitamin B₆ has been studied for the treatment of acute neuroleptic-induced akathisia (NIA; a neuromuscular disorder characterized by a feeling of "inner restlessness" or a constant urge to be moving) in schizophrenic

and schizoaffective disorder patients. Preliminary results indicate that high doses of vitamin B₆ may be useful additions to the available treatments for NIA, perhaps due to the vitamin's combined effects on various neurotransmitter systems. Further research is needed to confirm these results.

There is also early evidence that pyridoxine supplementation may be of benefit in hyperkinetic cerebral dysfunction syndrome and tardive dyskinesia. Further research is needed before a recommendation can be made.

Vitamin B₆ is likely to be safe when used orally in doses not exceeding the recommended dietary allowance. Avoid vitamin B₆ products if sensitive or allergic to any of their ingredients. Some individuals seem to be particularly sensitive to vitamin B₆ and may have problems at lower doses. Avoid excessive dosing. Use cautiously if pregnant or breastfeeding.

Vitamin E—Vitamin E has been studied in the management of tardive dyskinesia (abnormal movements that can occur after long-term use of some older antipsychotic drugs) and Parkinson's disease, although the results of existing studies are not conclusive enough to form a clear recommendation. More research is needed.

Avoid if allergic or hypersensitive to vitamin E. Avoid with retinitis pigmentosa (loss of peripheral vision). Use cautiously with bleeding disorders or if taking blood thinners. Avoid doses greater than the recommended daily level in pregnant women and breastfeeding women.

Yohimbe bark extract—The terms yohimbine, yohimbine hydrochloride, and yohimbe bark extract are related but not interchangeable. Yohimbine is an active chemical (indole alkaloid) found in the bark of the *Pausinystalia yohimbe* tree. Yohimbine hydrochloride is a standardized form of yohimbine that is available as a prescription drug in the United States. It is theorized that yohimbine may improve orthostatic hypotension (lowering of blood pressure with standing) or other symptoms of autonomic nervous system dysfunction. However, yohimbe bark extract may not contain significant amounts of yohimbine, and therefore may not have these proposed effects. More research is needed before a recommendation can be made.

Yohimbine is generally well-tolerated in recommended doses. However, many side-effects have been reported with yohimbine hydrochloride and may apply to yohimbe bark. Avoid if allergic to yohimbe, any of its components, or yohimbine-containing products. Use cautiously with peptic ulcer disease, kidney disease, high blood pressure, heart disease, or if taking drugs that affect blood sugar levels. Avoid with benign prostate hypertrophy (enlarged prostate), anxiety, mania, depression, stress disorders, post-traumatic stress disorders, bipolar disorders, or schizophrenia. Avoid use in children or in pregnant or breastfeeding women. ■

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