

Complementary & Alternative Management of Parkinson's Disease: An Evidence-Based Review of Eastern Influenced Practices

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ABSTRACT

The prevalence of Parkinson's disease (PD) appears to be lower in Asia compared to the Western world. It is unclear if this is related to the ubiquitous use of traditional medicine in Eastern healthcare, but the use of complementary and alternative medicine (CAM) modalities in countries like Korea may be as high as 76%. Among patients with PD, herbal medicines, health supplement foods, and acupuncture are interventions which are increasingly used throughout the world. Countries like Korea, China, India, and Japan have long embraced and incorporated traditional medicine into modern management of conditions such as PD, but research into various CAM modalities remains in its infancy limiting evidence-based recommendations for many treatments. We reviewed the literature on CAM treatments for PD, focusing on mind-body interventions and natural products. Based on evidence limited to randomized-controlled trials we found that mind-body interventions are generally effective forms of physical activity that are likely to foster good adherence and may reduce disability associated with PD. Based on the current data, modalities like Tai Chi and dance are safe and beneficial in PD, but better studies are needed to assess the effects of other frequently used modalities such as yoga and acupuncture. Furthermore, despite centuries of experience using medicinal herbs and plants in Eastern countries, and despite substantial preclinical data on the beneficial effects of nutritional antioxidants as neuroprotective agents in PD, there is insufficient clinical evidence that any vitamin, food additive, or supplement, can improve motor function or delay disease progression in PD.

Key Words

Parkinson's disease;
Complementary and alternative medicine;
Korean medicine; Herbal medicine;
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Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by loss of dopamine producing cells in the substantia nigra pars compacta (SNC). The prevalence of PD increases with age, impacting about 1% of the population over the age of 60 throughout Europe, Australia, and the Americas. In contrast, the prevalence in this age group may be as low as 0.6% in certain Asian countries.¹ Whether the difference in prevalence is associated with factors such as geography, genetics, lifestyle, or simply methodological differences in data gathering is unclear, but it is of interest that patients in many Asian countries are more likely to incorporate elements of traditional medicine in their health-care decisions. Among patients with PD, where no modern treatment has yet been proven to slow down or stop the disease progression, the use of some of these Eastern-based medicine modalities is becoming ubiquitous.

Patients with PD exhibit various degrees of motor impairment as well as a constellation of non-motor symptoms which include depression, apathy, cognitive impairment, sleep disturbances, and autonomic dysfunction. In the absence of any disease modifying therapy, the mainstay of treatment in PD is pharmacologic management aimed at dopamine replacement. While this is generally effective for motor symptoms, it may become complicated by disabling motor fluctuations and dyskinesias. Furthermore, dopamine replacement may fail to treat, or worsen, troublesome non-motor symptoms which in some cases impact quality of life to a greater extent than motor symptoms.^{2,3} It is perhaps not surprising then that a 2001 survey of outpatient PD clinics in the United States (US) found that nearly 40% of patients were using complementary and alternative medicine (CAM) practices in addition to or instead of conventional treatment options.⁴ In Eastern countries like Korea where traditional medicine practice is endemic, the rates of CAM use in PD are as high as 76%.⁵

Complementary and alternative medicine is awkwardly defined as a diverse group of medical therapies, interventions, treatments, practices, and products that share in common their exclusion from conventional western medicine practices. In Western countries, CAM modalities are not routinely taught in medical schools nor routinely underwritten by third-party payers. Perhaps because of their

diversity, CAM practices are often defined by these exclusionary criteria, but at the core, CAM therapies are tied together by a focus on individuality over typology, a holistic approach to wellness, and an emphasis on the importance of patient empowerment in the healing process. In Korea and many other Asian countries, the meaning of conventional medicine is somewhat different from that in Western countries; for instance, traditional Korean medicine is recognized as a form of medicine by law in Korea. Furthermore, unlike in the US, public insurance covers the cost of many traditional treatments in Korea.⁶ While some CAM modalities are only beginning to gain acceptance in Western culture, countries like Korea, China, India, and Japan have long embraced and incorporated traditional medicine into modern management of conditions such as PD. In light of possible differences in disease prevalence, the question of whether some of these traditional practices may affect disease course must be answered.

Complementary and alternative medicine interventions can be divided into the following groups: 1) natural products such as herbals, vitamins, minerals, and probiotics; 2) mind and body practices such as acupuncture, massage, meditation, movement therapies, relaxation techniques, tai chi, and yoga; 3) alternative systems such as traditional Korean or Chinese medicine, Ayurvedic medicine, and homeopathy. The two-thirds of the Korean population that use at least one of these modalities usually do so in conjunction with conventional medicine, and often without discussing these practices with their physicians. Among Koreans, herbal medicines, health supplement foods, and acupuncture are the interventions used the most often.⁶ The following is a review of evidence-based recommendations for CAM practices in PD from the English literature. Despite the public demand and expectation for traditional and alternative solutions to chronic diseases like PD, modern medicine cannot be practiced responsibly without evidence to guide physicians and patients in making safe and effective choices.

METHODS

Medline and Cochrane Library electronic databases were searched from inception up until July 2014. Several search terms were used to identify

publications on CAM and PD, with specific interventions chosen based on surveys of the most commonly used CAM practices.⁶ Articles were restricted to English language publications. Only those articles which reported a randomized controlled trial design in human subjects with PD were included in this review.

RESULTS

Mind-body & manual practices

A purveying philosophy in Eastern medicine is that disruptions in the balance and flow of energy cause illness, and that the body's response to energetic imbalance leads to perceptible disease. Traditional Chinese and Korean medicine often includes spiritual and manual practices aimed at restoring this balance. Essential to these practices is a holistic rather than piecemeal view of health and healing. Over the past few decades there has been increasing awareness of the importance of both motor and non-motor disability associated with PD, and how these symptoms can be intimately connected. Physicians who take care of patients with PD are increasingly cognizant of the interplay of motor and non-motor dysfunction and the impact on quality of life. In conventional Western practice, physicians tend to address and manage each problem separately; typically, motor and non-motor issues are addressed one at a time, and as an example a patient may leave the office with a medication for tremor, a medication for depression, and a separate medication for sleep dysfunction. An alternative approach subsumed by many CAM modalities, is to direct treatment to individual wellness through mindfulness and mind-body interventions. These practices may be particularly apt to address the motor and non-motor dysfunction in PD simultaneously. The following is a summary of the review of mind-body interventions for PD.

Tai Chi & Qigong

Tai Chi is a traditional Chinese martial art which combines deep breathing and relaxation with slow movements that maintain various postures. Anecdotally, the practice of Tai Chi has been associated with stress reduction, improved agility and balance, better postural control, and improved strength. There have been 7 Randomized Controlled Trials

(RCTs) of Tai Chi in the PD population, all of which have been published in the last decade, and all of which demonstrated the safety and feasible of Tai Chi practice in patients with PD.⁷⁻¹³ In three of these studies^{7,8,11} an active intervention comparator group was utilized to assess the relative effects of Tai Chi compared to other active therapies; in the remaining four studies, however, the comparator group was passive. The largest and most frequently cited Tai Chi trial included 195 subjects with PD who were randomized to either Tai Chi or conventional resistance training or stretching exercises.⁷ Over 6 months, all groups in the study showed improved motor function, but the Tai Chi group performed significantly better on a measure of postural stability and recorded fewer falls over the period of observation.

A similar practice found in many Asian countries, but not explored as extensively as Tai Chi, is Qigong. Qigong is a predecessor of Tai Chi that focuses on the internal movement of energy through the practice of meditation and focused movements. One non-blinded RCT demonstrated short-term motor benefits of Qigong in PD patients, as well as improvements on several quality of life measures, when compared to a no intervention control, but effects were not sustained.¹⁴ In contrast, the only blinded high quality study of Qigong did not demonstrate any significant benefits when compared with conventional aerobic exercise.¹⁵

Thus, there is sufficient evidence from high quality studies that Tai Chi is safe, feasible, and can improve postural stability in PD. Since long-term outcome data is lacking, the duration of benefit from Tai Chi is unclear. Furthermore, while the largest study of Tai Chi demonstrated significant benefits compared to other conventional physical activities, this needs to be replicated, as other studies have failed to demonstrate benefit beyond that of other active interventions. No recommendations about Qigong can be made from the limited available data, but due to the mixed results from two studies further investigations are needed to ascertain the effectiveness of Qigong for motor and non-motor symptoms in PD.

Acupuncture & moxibustion

Acupuncture has been a part of Traditional Eastern Medicine for thousands of years. It is based on

the premise that disease states are characterized by imbalances in flow of energy, or “Qi”, and that insertion of needles along various points within energy channels can restore balance and health. As an adaptation of this technique, bee venom acupuncture has gained some popularity particularly for the treatment of pain, arthritis, and cancer. This treatment involves the injections of dilute bee venom into acupuncture points which is thought to convey anti-inflammatory effects. Another adaptation found commonly in Eastern countries in needle moxibustion.

Ten published trials on the effects of acupuncture in PD were available in English. Among these, only three were RCTs,¹⁶⁻¹⁸ and only one had a sham-intervention controlled design.¹⁷ Among the studies comparing acupuncture to no-intervention, some improvements in measures of mobility were described,^{16,18} but even among observational studies there were inconsistencies in outcomes.¹⁹⁻²² In a well-designed sham-controlled study, Cristian et al.¹⁷ examined the effects of acupuncture compared to an intervention with sham points in 14 PD patients, and found no difference in motor and non-motor outcomes measured. In a review article, Lee et al.²³ describe two additional sham-procedure controlled trials in Chinese publications which also failed to demonstrate a significant effect of true acupuncture over sham points. This raises concern about the possibility of placebo response in studies that failed to include a sham-controlled design. Therefore, while acupuncture appears to be safe, and many patients anecdotally describe benefit, there is not sufficient evidence to recommend it to patients with PD at this time given inconsistencies in the data.

Often acupuncture is wedded to the practice of moxibustion. Like acupuncture, the goal of moxibustion is to regulate the flow of qi. The technique involves burning the leaves of the moxa plant (*artemesia vulgaris*) to warm regions and meridian points with the intention of stimulating circulation through the points and inducing smoother flow of blood and qi. When combined, the techniques are often referred to by the Chinese term *zhen jiu*, meaning “needle moxibustion”. At this time there are no clinical trials involving the use of moxibustion for the treatment of PD symptoms.

Art, music, & expressive therapy

Expressive therapies are commonly used as complementary to conventional treatment of PD, although there is little objective data assessing the benefits of these interventions. Active theater combines movements with stimulation of different sensory pathways and emotions, enforcing socialization through the continuous interaction between performers. In one RCT, the effect of three years of theater therapy was found to delay the need to increase dopaminergic therapy when compared with conventional physiotherapy of the same duration.²⁴ Further investigations are needed to clearly assess the role of specific forms of theater and other expressive therapies in PD.

Music therapy uses music or any of its elements (sound, rhythm, melody, or harmony) to facilitate and promote mobilization and expression in order to meet physical, emotional, mental, social, or cognitive needs. Over the last decade, data has emerged to suggest that music may have an ability to impact social function, cognition, psychological function (such as anxiety, apathy, and depression), and mobility (including gait and dexterity) by inducing unique chemical, physiological, and anatomic changes which may have particular relevance to neurodegenerative diseases like PD. Music has been associated with the release of certain neurochemicals and hormones in both animal and human studies,²⁵⁻²⁷ and functional magnetic resonance imaging based studies have demonstrated an association between music and increased mesolimbic dopamine release.²⁸ Finally, a number of studies have shown that musical rhythm, or auditory cueing, can entrain gait and other movements, potentially bypassing affected circuitry and promoting the reorganization of new neural networks through neuroplasticity.²⁹

Dance incorporates elements of musical cueing, and in observational studies, different forms of dance have been associated with improved motor function and quality of life ratings in PD.^{30,31} In the US, tango dancing has gained popularity among some PD patients because it combines aerobic activity with movements that challenge gait and balance. Tango dancing also utilizes external cues provided by both the partner and the music. Out of five published RCTs of Tango dancing in PD,³²⁻³⁶ only one compared Tango to conventional exercise. This

study found that while motor function improved in all participants over a 3 month period, only the Tango group demonstrated improved balance scores.³² Whether other forms of dance show similar benefits to Tango in PD is unclear at this time, although a study by Hackney and Earhart³⁵ demonstrated that Waltz-Foxtrot also improved measures of gait and balance when compared to a no intervention control group. Similarly, studies of music-based physical therapy in PD have demonstrated significant improvements in measures such as stride length, gait velocity, cadence, and quality of life.^{37,38}

Based on the existing data, there is sufficient evidence to support the use of music and dance therapy as safe, non-invasive, and inexpensive interventions for patients with PD. Dance therapy, and tango in particular, has demonstrated efficacy in several high quality trials. Compliance with these interventions is thought to be high due to the enjoyability and social aspect of these practices.

Yoga

Yoga is a discipline which dates back to India circa 2000 BC but has only recently gained popularity throughout the Western world. It is a unique form of mindfulness-based exercise which has been shown to significantly improve measures of gait, flexibility, muscle force, fatigue, and quality of life in healthy elderly and people with medical disorders including back pain, arthritis, hypertension, anxiety, and depression.³⁹⁻⁴¹ Yoga breathing has been shown to decrease cortisol levels, increase GABAergic activity, and in turn improve mood and reduce anxiety in healthy patients.³⁹ Yoga may be suited to PD because it can be adapted to participants with different abilities and be tailored to focus on different issues including flexibility, strength, postural alignment, and relaxation.

A single pilot study demonstrated the feasibility of a yoga treatment program in patients with PD, and no published trials have compared yoga to other active interventions in this population. In this 13 subject, 12 week RCT, yoga practice resulted in improved Unified Parkinson's Disease Rating Scale (UPDRS) motor scores and balance scores compared to a non-intervention control group. Non-motor outcomes were not assessed.⁴² Based on this limited data from one small study, no clear recommendations can be made regarding the safety, effi-

cacy, or feasibility of yoga in the PD population at this time. Given the rising popularity and availability of yoga classes, further studies are needed, with additional attention paid to improvement in non-motor functions.

Massage, manual therapies, & Alexander technique

Anecdotally, PD patients have described transient improvement in stiffness and posture after massage therapy. In observational studies of massage for PD, improvement in gait speed as well as subjective self-confidence and well-being have been described.^{43,44} Similarly, Japanese massage was associated with improvement in gait speed and shoulder range of motion in an observational study of 10 PD patients.⁴³ Alexander technique uses hand contact to assess and manipulate changes in muscle activity by addressing the relationship between thought and the resultant muscle activity. Stallibrass et al.⁴⁵ published the only RCT of massage and Alexander technique in 93 subjects with PD followed with bi-weekly sessions for 3 months. Compared with a no intervention group, only the Alexander technique participants improved on self-assessment disability scores and depression ratings. More objective motor assessments were not performed. On the other hand, one study that did look at objective motor outcomes was conducted by Craig et al.⁴⁶ They demonstrated that neuromuscular therapy, a technique similar to massage but which relies on direct compression of trigger points, was more effective than relaxation at improving motor UPDRS scores in 36 PD patients over a 4 week intervention period.

While manual interventions appear to be safe, data is too limited to make any firm conclusions, particularly with regard to effects on motor function. Based on the limited data there is reason to believe that these techniques may positively impact mood and subjective assessments of quality of life, and that they may have a short-term impact on motor function, but these outcomes need to be reproduced with more carefully designed studies. With regard to other commonly used manual therapies, there are no RCTs investigating the effects of chiropractic manipulation in subjects with PD, therefore no comment can be made with regards to its safety or efficacy, and caution should be practiced.

Natural products (neutraceuticals & herbals)

As with mind-body interventions, Eastern medicine modalities often adhere to the principles that nutrients and other natural products contribute to the balance and flow of energy and are important sources of health and wellbeing. Plants in particular are sources of nutrients, oxygen, medicinal chemicals, essential oils, and vibrational energy. Multiple lines of evidence support oxidative stress and mitochondrial dysfunction as part of the pathogenic cascade in PD, with the SNc being particularly susceptible to injury. To this end, modern medicine practices that integrate traditional beliefs often focus on nutrition, neutraceuticals, and antioxidants, as part of a healthy lifestyle, with the expectation that lowering inflammation and free radical damage may protect against further cell death and thus delay or halt disease progression. On the other hand, the idea that “natural” products are safer and more beneficial than pharmaceutical products is also pervasive throughout much of the PD community and requires closer examination; some of these commonly encountered products are reviewed here.

Vitamin E, coenzyme Q10, and creatine

Alpha-tocopherol is a biologically active component of vitamin E which attenuates the effects of lipid peroxidation by trapping free radicals. Nearly three decades ago, this was one of the first potential neuroprotective agents to be tested in PD. Coenzyme Q10 (Co-Q10) is an essential cofactor in the electron transport chain and a potent antioxidant. In PD, reduced levels of Co-Q10 and mitochondrial complex I activity have been described. Creatine is a nutritional supplement that enhances cellular energy function and, like vitamin E and Co-Q10, also has antioxidant properties. In each of these cases, well-designed multicenter trials have provided strong evidence against their use as neuroprotective agents in PD. In the seminal DATATOP study,⁴⁷ a multicenter placebo-controlled RCT of 800 *de novo* PD patients randomized to tocopherol (2000 IU per day), selegiline, a combination of both, or placebo, tocopherol did not have any benefit over placebo in delaying disability or the need to initiate conventional treatment with levodopa. In 2002, a placebo-controlled trial of 80 PD subjects raised hope that Co-Q10 may have protective benefits in PD in a dose-dependent

manner.^{48,49} The definitive study published by the Parkinson Study Group in 2014 examined the effects of Co-Q10 at 1200 mg and 2400 mg compared to placebo in 600 PD patients over a 16 month period. The study was terminated early for futility as subjects in all groups worsened and required conventional treatment at similar rates.⁵⁰ Finally, creatine demonstrated neuroprotective effects in pre-clinical models of parkinsonism and was shown to be non-futile in a Phase II study.⁵¹ The National Institute of Neurological Disorders and Stroke NIH Exploratory Trials in Parkinson’s Disease investigators conducted the definitive human trial of creatine in PD in a 5 year placebo-controlled RCT in over 1500 patients. Unfortunately, the study was terminated for futility in 2013 as no clinical evidence of a protective effect was demonstrated.⁵²

Ginseng and Ginko Biloba

Ginseng is a plant substance which has been used in Eastern countries for centuries and is proposed to have anti-inflammatory properties, improve fatigue, and improve cognition. Extract from the Ginko tree or Ginko Biloba, have similarly been used for centuries in countries like China and Korea. In addition to containing anti-inflammatory flavanoids and terpenoids, Ginko extract is thought to exhibit important effects on multiple neurotransmitter pathways including acting as an MAO-Inhibitor (MAOI), and inhibiting reuptake of serotonin, dopamine, and norepinephrine. While neuroprotective effects of these substances have been demonstrated in PD rat models, there are no randomized controlled clinical trials in humans using either ginko or ginseng in this population to guide recommendations.^{53,54}

Uric acid (inosine)

Urate is the breakdown product of purine metabolism and possesses potent antioxidant properties. The neuroprotective benefits of urate have been demonstrated in rodent models of PD^{55,56} and higher serum and CSF urate levels have been associated with reduced risk of developing PD and slower clinical disease progression.⁵⁷ The Safety of Urate Elevation in PD investigators demonstrated the safety and feasibility of urate administration in a phase II study over 24 months in which 75 *de novo* patients with PD were randomized to receive placebo or

inosine (uric acid precursor).⁵⁸ While a relationship between higher uric acid and lower risk of disease has been repeatedly demonstrated, causality has not been established and no recommendation can be made regarding neuroprotective properties, but a phase III efficacy study is currently planned.

Mucuna pruriens

Mucuna pruriens (*M. pruriens*) is a legume endemic to India which has been used in Ayurvedic remedies for centuries. In the early 20th century it was discovered that levodopa could be isolated from the *M. pruriens* seeds and effects on parkinsonian symptoms were anecdotally described as similar to standard levodopa preparations. In 1995, the HP-200 Study Group reported a 3 months observational study of the effects of *M. pruriens* on 60 subjects with PD, and reported reduced disability ratings and motor function scores. Only one small RCT has compared the effects of *M. pruriens* to that of standard levodopa therapy, and in this study there was no difference in the impact on motor function or motor complications between the groups, although *M. pruriens* seemed to be associated with faster time to onset of action.⁵⁹ Further studies in the form of double-blinded, placebo-controlled trials, with long-term outcome assessments, are needed before comparisons to standard levodopa preparations can be made. In the absence of data regarding purity, potency, dosing, and drug-drug interactions, the use of *M. pruriens* cannot be recommended over standard therapy at this time but deserves further evaluation.

Traditional herbals

Various combinations of herbs have been used in traditional Chinese and Korean medicine for centuries, and recent research has suggested that some of these herbs may have neuroprotective effects in rat models of PD.⁶⁰ Anecdotal evidence shows that some of these herbs may offer beneficial effects in PD, although RCTs are needed to assess safety and efficacy. Herbal remedies may be employed as adjuvant to conventional treatments for the purpose of reducing the dose of dopaminergic drugs, or improving PD symptoms or adverse effects of dopaminergic drugs. Kim et al.⁶¹ reviewed 64 RCTs involving herbal remedies in PD, and identified 59 different herbal preparations most of which were composed of multiple different herbs. In this re-

view the authors identified that *Banisteriopsis caapi* extract (a jungle vine which may act as a natural MAOI) demonstrated short-term motor benefits when compared to placebo and that *Qingxinhuan tang* (a combination of 9 different plants and roots with various properties including anti-inflammatory and anti-oxidant effects) improved general symptoms of PD compared with conventional drug therapy. In a review of over 30 publications in the Chinese literature, Li et al.⁶² described reports of many different preparations and ingredients improving motor symptoms and quality of life in PD patients. However, these studies almost uniformly lack standardized ratings and randomized, blinded assessments. They also include substances which are combinations of multiple different herbs and plants, while being vague about dosing and other aspects of methodology. A new multi-center, open-label, randomized, active-controlled study is currently underway in China, to investigate the efficacy of the Chinese herbal medication Xifeng Dingchan, which is proposed to act both by reducing striatal dopamine metabolism, as well as protecting against cell death.⁶³ The study will enroll 320 subjects with early and middle stage PD over a 3 month treatment and 6 month follow-up period. At this time, there is not sufficient evidence to recommend the use of any specific Chinese or Korean herbal remedies for the treatment of PD. However, they are worthy of further well-designed studies to demonstrate safety and efficacy.

DISCUSSION

Countries like Korea, China, India, and Japan have long embraced and incorporated traditional medicine into modern management of conditions such as PD, but research into various CAM modalities remains in its infancy limiting evidence-based recommendations for many treatments. According to several surveys of PD patients around the world, the most commonly used non-conventional therapies include vitamins, herbs, massage, and acupuncture.^{4,64} The limited body of literature reviewed here fails to demonstrate convincing safety or efficacy for many CAM treatment modalities. Some CAM practices provide the theoretical hope of impacting neurogenesis, providing anti-inflammatory effects, improving mitochondrial dysfunction and oxidative

stress, and increasing brain connectivity through neuroplasticity and the release of neurotrophic factors. Unfortunately, both the clinical and molecular effects of many of these modalities are largely unexamined in humans. CAM modalities must be tested in the same rigorous manner as conventional therapies in order to provide an evidence based rationale for their use, and to avoid the possibility of ineffective or possibly harmful or costly treatments. As the use of CAM and traditional medicine practices spreads throughout the world, the extent and quality of studies seems to be improving.

Mind-body interventions are generally effective forms of physical activity that are likely to foster good adherence and may reduce disability associated with PD. Based on the current data, modalities like Tai Chi and dance are safe and beneficial in PD. Further studies are needed to determine if these effects are different from conventional exercise, and whether other interventions like yoga which emphasize the importance of the mind-body connection, are particularly useful in PD. It is possible that activities that are pleasurable, such as expressive therapies or music therapy, may additionally improve apathy, depression, and fatigue due to an arousing and motivating stimulus, although this needs to be studied in greater detail. No manual therapy has been shown to be definitively helpful in the treatment of PD. Acupuncture is perhaps the most commonly used manual therapy; in this regard, safety has been demonstrated and observational descriptions of benefit can be found, but study designs have failed to demonstrate a clear and consistent benefit over placebo in the PD population.

Despite centuries of experience using herbs and plants in Eastern countries, and despite substantial preclinical data on the beneficial effects of nutritional antioxidants as neuroprotective agents in PD, there is no clinical evidence that any vitamin, food additive, or supplement, can improve motor function or delay disease progression in PD. Vitamin E, creatine, and Co-Q10, have been among the promising neutraceuticals investigated for potential disease-modifying properties in PD. Unfortunately, in each of these cases, there has been convincing evidence against their use for neuroprotective purposes in humans. Ginseng and Ginko Biloba have demonstrated neuroprotective properties in some ani-

mal models of PD, but no well-designed clinical trials exist in humans. Questions regarding foods such as blueberries which are high in antioxidants are frequently raised, but there is no data to guide dosing and no trials to define clinical effects.

With the exception of a 2007 community-based study which reported the prevalence of PD in Koreans to be as high as 1–1.4%,⁶⁵ most indications are that Asians have a lower disease prevalence than those in the US, Europe, and Australia. One might postulate whether this could be related to neuroprotective effects of traditional Eastern practices, but geographic variation is hardly surprising in light of epidemiologic studies demonstrating correlations between PD risk and other lifestyle factors such as caffeine intake, cigarette smoking, and level of physical activity; while these associations are poorly understood, they highlight the intricate balance between genetic and environmental susceptibilities from which PD is likely manifest. Nevertheless, patients around the world are seeking traditional and alternative therapies in increasing numbers. In the absence of evidence-based neuro-restorative therapies for PD, the focus on symptom management in conventional Western practice often leads to frustration among patients and their caregivers, dissatisfaction with conventional healthcare, and a sense of loss of control over the future. Contrast this with a 2009 study from Korea, where patients described using CAM practices specifically to improve various symptoms of PD, the most common of which were motor symptoms, fatigue, pain, and constipation.⁶ In the US, PD patients who use CAM modalities are often younger, have higher income and education level, longer disease duration, and more severe symptoms or poorer health status.^{4,64,66} This is in contrast to Korea where users of traditional medicine are more likely to be older, have fewer years of education, and use practices irrespective of their incomes.⁶ On the other hand, a universal commonality among patients is the failure to discuss CAM practices with their practitioner.

The widespread use of CAM practices among PD patients throughout the world mandates that physicians educate themselves about evidence based CAM practices in order to better guide patients to make safe and appropriate decisions. Patients should be educated that all CAM therapies have to be evaluated based on the same principals of evi-

dence based medicine that guide the use of traditional therapies, and funding should be made available for well-designed studies.

Conflicts of Interest

The authors have no financial conflicts of interest.

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