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Health Information Series

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Parkinson's disease

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Parkinson's disease

Parkinson's is named after Dr James Parkinson, who first identified the condition Parkinson's producing a paper in 1817 entitled, 'The Shaking Palsy'. He was the first person to accurately record the symptoms of the condition, then described as Paralysis Agitans. Later, the French neurologist Dr. Jean-Martin Charcot added further symptoms to the description and named the condition 'Parkinson's disease' in recognition of the work of Dr Parkinson.

What is Parkinson's disease?

Parkinson's disease is a progressive neurological condition affecting the substantia nigra area of the brain, whose cells are responsible for producing the neurotransmitter dopamine. In Parkinson's disease, the loss of these cells reduces the production of dopamine (which is responsible for the brain processes that control movement and emotional response). Levels of dopamine continue to fall slowly during the progression of the condition; however, the body appears to continue to function with a reduced availability of dopamine. It is believed that symptoms of Parkinson's appear when approximately eighty percent of dopamine has been lost.

A condition known as Parkinsonism produces symptoms similar to those of Parkinson's disease. This can be a result of other disorders, a response to certain prescription drugs or exposure to toxins.

Onset of Symptoms

Symptoms of Parkinson's disease often first appear after the age of 50, although later onset or diagnosis is common. Young onset of Parkinson's does arise, and is referred to in those diagnosed before the age of 40: this age group is currently seeing an increase in diagnosis. Juvenile Parkinson's diagnosed before the age of 18 does occur but is rare. It is considered that men are more likely to develop the condition than women.

Symptoms of Parkinson's disease

The symptoms of Parkinson's can differ greatly from person to person; slow onset means that symptoms may have been present for some time before a diagnosis is made. Not all symptoms will be present in an individual, although others often develop as the condition progresses. The tremor of Parkinson's is perhaps one of the most well known symptoms, although not always present: early appearance may just involve

the hand. As the condition progresses, tremors may involve the arms, legs, head or jaw. The tremor is more noticeable when relaxing, but reduced when moving or sleeping.

Bradykinesia, which simply means 'slowness of movement', is also a recorded symptom: patients experience difficulty initiating movement (akinesia) , often referred to as freezing, or movement taking longer to perform. Walking can become progressively difficult and slow, with patients needing to make a conscious effort to lift their feet to prevent shuffling or falling.

Mobility problems occur due to a stiffness or rigidity of muscles, which can also result in falls. As different muscles become affected, facial expression may be affected, speech may become quiet or rapid and small or difficult handwriting is noted by some.

Additional symptoms may occur of anxiety or low mood. Memory and reasoning ability can also become part of the symptom picture, particularly as the condition progresses.

There is no specific test currently available that can confirm the presence of the condition: diagnosis is made on symptom observations and after tests have eliminated other potential causes or conditions.

NHS National Guidelines advise that Parkinson's should be suspected in people presenting with tremor, stiffness, slowness and balance or gait problems. Doctors should refer patients prior to treatment to a specialist in differential diagnosis of Parkinson's disease. The condition should be diagnosed clinically and based on the UK Parkinson's Disease Society Brain Bank Criteria. Regularly reviews of the diagnosis of PD should be undertaken.

Treatment

Currently there is no cure for Parkinson's disease: treatment focuses on the use of medication to control the symptoms with a variety of drugs, including:

- Drugs which replace dopamine
- Drugs which mimic the action of dopamine
- Drugs which prevent the breakdown of dopamine
- Drugs which inhibit the action of acetylcholine

As the symptoms of the condition vary between individuals, patients'

responses to drugs can be variable and it can take time to find the most suitable. Early response to treatment is usually good: as the condition progresses symptoms may be more difficult to resolve, and increased dosage, additional or changes of medication are used.

A number of surgical procedures are used to address symptoms such as tremor. New treatments for Parkinson's, currently in the early stages, include stem cell and gene therapy.

Research

Research is progressing into both the cause and treatment of Parkinson's disease, and although as yet no single clear cause for the condition has been found, the following factors are considered as relevant:

Genetics

Hereditary links are not conclusive; it is thought that although Parkinson's disease is not inherited, some may have a genetic susceptibility to developing the condition. Scientists have identified a number of genes linked to Parkinson's: however, the majority of cases of Parkinson's appear to have no indication of a hereditary link, and these are described as 'idiopathic', having no known cause.

Information

Environment

Environmental toxins are suggested as a link, and several toxins have been shown to cause Parkinson's-like symptoms: a potential causative factor identified as the herbicides and insecticides used in agriculture.[1,2,3,4,5] Contact with some of these chemicals is possible as a result of occupational exposure or garden and domestic insecticide use.

One of these chemicals, pyrethroid (a synthetic form of pyrethrum found in mosquito spray and mosquito burners) has been found to modulate the dopaminergic system. Researchers believe low doses in a persistent manner may render neurons more vulnerable to toxicant injury.[6]

Whilst many may consider they do not use such products, we must consider the heavy use of pesticides and herbicides in the food production industry. Whilst research does not always evidence nutritional benefits for organically produced food, the avoidance of potential chemical residue is preferable.

A Multi-factorial condition

One area on which most agree is that Parkinson's is a multi-factorial condition with toxic exposure, genetic predisposition and diet playing a potential part for the onset of the condition. Susceptibility, it appears, may also be influenced by some rather surprising factors: one well-known toxin, nicotine, may well offer some protection from Parkinson's, and whilst smoking would not be recommended as a preventative treatment, the authors of this research suggest that nicotine may be of potential therapeutic value.[7]

Nutrition

Parkinson's disease, as with many conditions, is believed to have links with diet in both the development of the condition and control of symptoms. A dietary study carried out with both males and females and followed up after sixteen years found that, 'Dietary patterns with a high intake of fruit, vegetables, legumes, whole grains, nuts, fish, and poultry and a low intake of saturated fat and a moderate intake of alcohol may protect against PD'.[8] Much of the interest in neurological conditions such as Parkinson's and nutrition looks at the impact of exposure to free radicals or pro-oxidants and the corresponding lack of antioxidants in the individual's diet. The cells of the brain are considered particularly susceptible to oxidative stress, including the cells in the substantia nigra, the dopamine-producing area of the brain.

Antioxidants have the ability to protect cells from damage, and many studies have been carried out in this area with papers dating back to 1998 considering the part that oxidative stress might play in the development of diseases such as Parkinson's disease.[9]

Inhibition of the oxidation of dopamine by antioxidants was the subject of research which found that certain plant-derived antioxidants can inhibit dopamine oxidation, with ascorbic acid (vitamin C) having the most effect.[10]

Iron

Research for the aetiology of Parkinson's disease has evidenced a potential disrupted iron metabolism together with the presence of increased iron levels found within the substantia nigra of Parkinson's disease patients. Oxidative damage to cells resulting from the Fenton reaction of iron and the accumulation of iron in the substantia nigra are associated with neuronal loss and Lewy body pathology.[11,12,13]

Intake of dietary iron and supplementation should be considered, with research identifying the dietary intake of iron in men and an increased risk of Parkinson's disease via oxidative stress; a combination of high iron intake and low cholesterol was considered to increase the risk.[14]
Lewy bodies are sticky clumps of protein found inside the brains of people with Parkinson's, they form inside nerve cells that produce the chemical dopamine. Lewy bodies are also found in a condition referred to as Dementia with Lewy bodies, a form of dementia that shares characteristics with both Alzheimer's and Parkinson's diseases.

Flavonoids

The benefits of flavonoids as potential antioxidants and anti-inflammatory agents have been documented considerably over the years,[15] with the antioxidant and free radical scavenging abilities identified.[16] It is therefore no surprise to discover the potential of flavonoids for conditions such as Parkinson's disease. Research has identified flavonoids as modulators of brain function and the central nervous system, providing protection for the neurons and suppressing neurological inflammation. They were considered relevant to the protective factors required for the prevention of Parkinson's disease.[17-21]

Dr. Jeremy Spencer of the University of Reading has carried out considerable research for the correlation between the consumption of diets rich in fruits and vegetables and a decreased risk of neurodegenerative disorders. His 2007 review suggested that dietary phyto-chemicals, in particular flavonoids, may exert beneficial effects in the central nervous system by protecting neurons against stress-induced injury, suppressing neuro-inflammation and by promoting neuro-cognitive performance.[17]

We should consider the whole remit of phyto-nutrients available in a varied diet and not follow many of the scientific trends in looking for single substance success: various flavonoids are identified in research as beneficial to Parkinson's disease:

- Polyphenol antioxidant and neuro-inflammation properties are highlighted in relation to the altered production of nitric oxide and Parkinson's disease.[22]
- Green Tea: catechins found in green tea are considered to offer benefits from metal chelating and antioxidant and anti-inflammatory activity in respect of neuronal death in the substantia nigra.[23,24]

- Resveratrol and quercetin are considered protective of dopaminergic neurons, diminishing apoptotic neuronal cell death by acting on the expression of pro- and anti-apoptotic genes.[25]
- The mulberry fruit has demonstrated neuroprotective effects in vitro and in vivo for Parkinson's disease models, providing a source of the anthocyanins. The mulberry was found to significantly protect the cells from neurotoxicity in a dose dependent manner.[26]
- Curcumin has demonstrated the ability to reduce reactive oxygen species and protect cells against apoptosis; the ability for curcumin to cross the blood brain barrier makes this particularly interesting for neurological conditions, with the potential therapeutic value for treating Parkinson's disease and other neurodegenerative diseases highlighted.[27] Curcumin and antioxidants have been identified as a potential pre-symptom therapeutic intervention in blocking or delaying the onset of Parkinson's disease.[28] Animals pre-treated with curcumin or naringenin, a citrus flavonoid, also showed clear neuroprotective properties in a model of Parkinson's disease.[29]
- Researchers identified extracts of tangerine peel, described as, 'rich in polymethoxylated flavones', cocoa, a specific 'rich in procyanidins', and red clover providing isoflavones as protective of the dopaminergic neurons with short term supplementation in a rat model of Parkinson's disease.[30]

Glutathione

An important antioxidant produced in the body, the levels of which are known to fall with aging, has been proposed for the pathogenesis of Parkinson's disease with decreased glutathione concentrations in the substantia nigra observed in preclinical stages.[31]

CoEnzyme Q10

Has been assessed in a double blind trial for the ability to slow functional decline in Parkinson's disease. Patients selected were those in the early stages of disease, not requiring treatment for their condition. At follow-up, less disability was found to have developed in those receiving CoQ10, with the greatest benefits linked to the higher doses of 1200mg per day.[32]

Vitamins

B6

A review for the dietary intake of vitamins for the incidence of Parkinson's disease indicated a low intake of vitamin B6 being independently

associated with an increased risk of the disease: this was via the potential for accelerated dopaminergic cell death resulting from increased homocysteine.[33]

Vitamin E

Research identified that the risk of Parkinson's disease was significantly reduced among men and women with high intake of dietary vitamin E from foods. Results did not concur when vitamin E was taken: they considered that other constituents in vitamin E-rich foods may be protective.[34] We should, of course, consider the form of delivery for the vitamin E used: vitamin E is naturally complexed with additional support nutrients such as bioflavonoids, carotenoids, lipids and more. The single nutrient, form of nutrient or additional co-factors would appear of relevance to these study results.

Vitamin D

Studies of vitamin D levels have shown them to be insufficient in 55% of patients with Parkinson's disease in comparison to 'healthy people', and those with Alzheimer's disease. The report advised that previous studies have shown the substantia nigra contains high levels of vitamin D receptors: they considered that further research is required to establish at what stage the deficiency occurs, and if supplementation or increased exposure to sunlight may be beneficial.[35]

An Individual and Holistic Approach

Research for Parkinson's disease shows a great number of nutrients have been the subject of interesting and positive research: those that are detailed are just a small sample. What becomes obvious is this disease, which appears to be multi-factorial, is both complex and variable across patients: we must concur with the researchers, who advised that 'optimal clinical effects may be obtained not by any individual agent, but by administering a rationally designed combination of therapies'.[36] Equally, there would appear potential negatives for adopting generic responses to health issues as, for example, with the treatment for cholesterol. Researchers using the Rotterdam Study of 6,465 subjects found that higher serum total cholesterol was associated with a significantly decreased risk of Parkinson's in women.[37] Previous research referred to also identified a higher cholesterol intake was associated with a decreased risk for Parkinson's disease in men: additionally, a lower saturated fat intake in combination with iron increased the risk in both genders.[14]

Dietary pattern

A study of dietary pattern and the risk of Parkinson's disease after a sixteen year follow-up identified two dietary patterns, 'prudent' containing high intakes of fruit, vegetables and fish, and the 'Western diet', characterised by a high intake of red meat, processed meats, refined grains, desserts and high fat dairy. On analysis, the prudent diet was found to be inversely associated with the risk for Parkinson's disease.[38] The similarity for the prudent diet and that of the Mediterranean diet, with the high intakes of fruit and vegetables, is also evident. A meta-analysis for adherence to the Mediterranean diet found a significant improvement in health, with a reduction in overall mortality from cardiovascular disease, cancer and reduced incidence of Parkinson's and Alzheimer's disease.[39] The beneficial impact of a Mediterranean style diet, improving nutritional balance of the diet and gastro-intestinal dysfunction, were also highlighted as providing an improved response to pharmacological treatment. The positive effects on levodopa pharmacokinetics were seen to be mainly due to the increased fibre intake from the plant derived foods.[40]

The diet that is low in processed foods and contains an increased intake of fruit and vegetables, nuts, seeds, natural wholegrains, healthy oils and lean proteins such as white meat and fish has much support for its health benefits across a wide range of research. The processed Western diet is associated with an excess of calories, increased saturated fats plus low nutrient and fibre intakes and a resultant decreased digestive and bowel function, leading to an increasing incidence of constipation.
The improved pharmacokinetics of the Parkinson's drug identified with increased fibre intake and improved gastro-intestinal function,[40] become relevant when the presence of constipation is considered. This is a frequently reported problem amongst Parkinson's patients, often considered an inevitable part of the disease or of the aging process.
A study reported in 2009 applies an interesting view to this, with constipation preceding Parkinson's disease seen in research, the association was significant and their findings suggest that constipation occurring as early as twenty years or more before the onset of motor symptoms is associated with an increased risk of Parkinson's disease.[41]

Ensuring a healthy digestive tract would therefore provide a further potentially preventative strategy with dietary assistance to alleviate constipation, also offering beneficial factors for those receiving treatment for Parkinson's.

A natural intake of dietary fibre to achieve improved gastro-intestinal function is the ideal: for those for whom constipation remains an issue, Plantago ovata husk may be a useful aid, with animal studies demonstrating by regulating stool transit time, improved pharmacokinetics of Levodopa were recorded.[42] Plantago ovata husk is known more frequently as Ispaghula or Psylllium husk, and is used frequently in natural health for the symptomatic relief of constipation. It is also available as a specific constipation medication classified as one of the bulk forming laxatives.

Prevention and Support for Parkinson's disease

It would appear that causative factors for Parkinson's disease may well be linked to susceptibility and poor dietary habits. Whilst at this time this cannot be confirmed, research evidence would appear to indicate this and provides an insight for the potential nutritional protective approach for those who may consider they are at an increased risk for the condition.

Early diagnosis is now seen as an important part for the treatment of Parkinson's disease; early diagnosis refers to the pre-motor phase before the classic motor symptoms of Parkinson's disease become apparent. A number of symptoms are detailed as present in the premotor stage: of interest to those with an interest in diet and nutrition will be the description of those of the gastro-intestinal tract, which again concurs that, 'constipation is the autonomic disturbance with the strongest and most consistent evidence for being one of the so-called premotor PD symptoms.'[43]

Whilst constipation has many implications for the health of the individual, obviously all will not go on to develop Parkinson's disease. Again, perhaps we are seeing an increased susceptibility created by this malfunction of the digestive system. It does, however, give us a clear indication for the importance of a healthy functioning gastro-intestinal tract including digestive function, intestinal permeability and the elimination of waste and toxins.

Points to consider in the nutritional support of those diagnosed with Parkinson's disease

- Patient, Medical Practitioner and Nutritional Therapist communication to ensure that at all times the Medical Practitioner is aware and in agreement to any proposed dietary changes or use of supplemental support.

- Nutrient/Drug interactions are important, and due to the varied and increasing number of new drugs used it is important that this is considered. For example, Levodopa, when prescribed alone, can be adversely affected by vitamin B6.
- Undesirable response to dietary changes: for example, those with poor motility may require a gradual dietary change to a natural, higher fibre diet. Those with conditions such as Diverticulitis may not be suitable for higher levels of fibre or some of the natural constipation preparations.
- In the elderly, consider issues such as food preparation and difficulties with eating a natural, higher fibre diet.

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