Parkinson's Disease: An Overview and Update on the Research

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Parkinson's disease (PD) is a progressive neurologic condition that has no cure. Half a million Americans are currently diagnosed with PD, and, due to misdiagnosis/late diagnosis, experts estimate that the number of people living with PD is closer to 1 million.

Finding a cure for PD has proved challenging due to the variability of the diagnosis. There are four main motor symptoms associated with PD: **bradykinesia** (slow movement), **tremor** (more commonly at rest), **rigidity** (increased tone that makes muscles feel "tight"), and **postural instability** (balance issues). An affected individual can have these symptoms in any combination. The **loss of neurons** in the brain that produce the neurotransmitter (signaling molecule) **dopamine** is responsible for these motor symptoms.

Some of the earliest signs of PD include **resting tremor** (worse in times of physical or emotional stress), **small handwriting, difficulty initiating movement or getting "stuck" in the middle of movement** (often in narrow spaces such as doorways), **a change in your voice** (softer, raspier), **masked facial expressions, forward flexed posture, and lightheadedness when getting up from sitting or lying down**.

There are also several non-motor symptoms that have been identified, including **depression/ anxiety, cognitive changes, constipation and nausea, fatigue, breathing problems, poor sense of smell, disrupted REM sleep, and hyperhidrosis (excessive sweating)**. Recent research suggests additional damage to areas of the brain responsible for regulating pathways using norepinephrine, serotonin, and acetylcholine may explain the non-motor symptoms.

The cause of PD is not well understood, and, while there appears to be a family history in 15 to 25% of the cases, only about 30% of those with a family history have an identifiable genetic mutation. The origin of most cases is likely a result of a **combination of genetic and environmental factors**. "Early-onset" PD (diagnosis before the age of 50) is more likely to have a genetic component than onset later in life.

Current estimates are that diagnosis of PD occurs **5 to 10 years** from the onset of symptoms. In fact, most people have lost **60 to 80%** of the dopamine-producing neurons at the time of diagnosis. This prevents early treatment and may miss a therapeutic window that could potentially reverse or significantly slow the progression of the disease. In addition, exercise and lifestyle changes become more challenging as the disease progresses.

Because some of the non-motor symptoms (particularly olfactory dysfunction, sleep disruption, and fatigue) occur prior to identifiable motor changes, there is potential for earlier detection via non-motor symptoms. However, these symptoms are vague, common, and not specific to PD. Furthermore, there is no definitive test for PD, and medical professionals typically use a combination of symptoms, neurological examination, and brain scan tests such as DAT and SPECT to confirm suspicion.

In **September 2022**, a group of researchers from the UK published a study that suggests that a **3-minute skin swab test** for sebum (body's oily secretions) is sensitive enough to detect differences in people with PD versus controls. Although further research is needed to determine the implementation of this test in a clinical setting, this has the potential to dramatically improve early and definitive diagnosis of PD, thereby promoting early intervention and improved management of the disease.

Research to determine better treatment options for PD is ongoing. In **August 2022**, a study was published demonstrating that **irisin** (a hormone produced during exercise) was shown to prevent the misfolding of a protein responsible for causing cell death in the substantia nigra in mice with PD. This resulted in reduction of loss of dopamine-producing nerve cells which coincided with less motor dysfunction in the injection group versus the control group. It is important to note that the research was done in mice and may not translate to human models, but it does highlight a potential mechanism to explore for future treatment of PD.

Though drugs are available to treat the symptoms of PD, they come with unwanted side effects and over time require increasing doses to be effective. **Exercise, a healthy diet, and stress management** have been shown to reduce the symptoms of PD, thereby improving quality of life and requiring a smaller dose of medication. Exercise, particularly aerobic exercise, has been shown to promote neuroplasticity (the brain's ability to change and form new connections leading to functional and structural changes.) Research has shown that 2.5 hours of aerobic exercise/week is enough to slow the progression of PD symptoms. Aerobic exercise is defined as "exercise that increases the heart rate and the body's demand for oxygen." Think working at **7/10 effort**, or **feeling tired and out of breath** so that conversing would be difficult, but possible. Recommendations are to sustain this intensity for **20-30 minutes** at a time.

Much of the focus of **physical therapy treatment** specifically for PD is on **sensory recalibration**, which is teaching your brain and body to accept that movement patterns that seem "too big" are actually normal. Physical therapists are **experts** in movement. The physical therapists who specialize in treating PD will be able to observe these specific motor signs and teach you exercises to help combat the disease. This is accomplished by focusing on effort and amplitude of movement, which can help to improve gait, balance, posture, and function.

If you or a loved one is noticing a cluster of the above symptoms, bring it up with your doctor and seek the help of a physical therapist at WWSPT who specializes in treating PD. In Parkinson's disease, early exercise makes all the difference!

Sources/References: Parkinsons.org, Ninds.nih.gov, mayoclinic.org, parkinsonsnewstoday.com