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A quarterly newsletter dedicated to awareness about the latest research, resources, advances and treatments for Parkinson's disease.

NANOSCALE MAGNETO

January 18, 2024

A wireless platform that uses tiny magnets to activate nerve cells in the brain could offer less invasive deep-brain stimulation to ease motor symptoms for people with early- and late-stage Parkinson's disease.

Electrical deep brain stimulation (DBS) is a well-established method for treating disordered movement in Parkinson's disease. However, implanting electrodes in a person's brain is an invasive and imprecise way to stimulate nerve cells. Researchers report in ACS' Nano Letters a new application for the technique, called magnetogenetics, that uses very small magnets to wirelessly trigger specific, gene-edited nerve cells in the brain. The treatment effectively relieved motor symptoms in mice without damaging surrounding brain tissue.

In traditional DBS, a battery pack externally sends electrical signals through wires, activating nerve cells in a region of the brain called the subthalamic nucleus (STN). STN activation can relieve motor symptoms of Parkinson's disease, including tremors, slowness, rigidity and involuntary movements. However, because the potential side effects, including brain hemorrhage and tissue damage, can be severe, DBS is usually reserved for people who have late-stage



Parkinson's disease or when symptoms are no longer manageable with medication. In a step toward a less invasive treatment, Minsuk Kwak and Jinwoo Cheon worked with their colleagues to develop a wireless method to effectively reduce motor dysfunction in people with Parkinson's disease.

For their wireless technique, the researchers tagged nanoscale magnets with antibodies to help the molecules "stick" to the surface of STN nerve cells. Then they injected the sticky magnets into the brains of mice with early- and late-stage Parkinson's disease. Prior to the injection in the STN, those same nerve cells had been modified with a gene that caused them to activate when the modified magnets on the cell's surface twisted in reaction to an externally applied magnetic field of about 25 milliteslas, which is about one- thousandth the strength of an MRI.

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In demonstrations of the magnetized and modified neurons in mice with Parkinson's disease, the mice exposed to a magnetic field showed improved motor function to levels comparable to those of healthy mice. The team observed that mice that received multiple exposures to the magnetic field retained more than one-third of their motor improvements while mice that received one exposure retained almost no improvements. Additionally, the nerve cells of treated mice showed no significant damage in and around the STN, which suggests this could be a safer alternative to traditional implanted DBS systems, the researchers say. The team believes its wireless magnetogenetic approach has therapeutic potential and could be used to treat motor dysfunction in people with early- or late-stage Parkinson's disease as well as other neurological disorders, such as epilepsy and Alzheimer's disease.

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HELP YOURSELF by **EXERCISING**

Although exercise will not reverse the symptoms of PD, it retains your functioning potential for a longer period of time. Exercise can also help prevent complications due to long-term immobility, such as contractures. Regular exercise is one of the most important self-help strategies for those living with PD. The phrase “use it or lose it” definitely applies. Exercise is just as important as medication in helping to manage the symptoms of PD.

Exercise will slow the progression of symptoms, improve balance, increase mobility, strengthen muscles, increase circulation, improve quality of life, increase ability to function independently for longer, improve emotional state and help lift depression.

What Type of Exercise Should I Do?

All types of exercise help. Your choice depends on your symptoms, your age, your physical strength and your interests. The best program is one that combines a number of different activities and allows you to change as symptoms and capabilities change. It is important to choose a form of exercise that you enjoy or your tendency might be to quit.

A Formal Exercise Group

Some people find that an exercise group helps them adhere to consistent exercise. In a class setting, people with varying levels of ability can be accommodated when each participant competes only with them self, supports each other and works within their personal limits. Go to www.ParkinsonPlace.org to join their exercise Zoom classes.

Beginning an Exercise Program

When you begin to exercise, make sure that your expectations are realistic. You may not be able to perform at the same level as you did before PD. Exercise helps you to maintain a better quality of life and gives you a sense of control and accomplishment. Your goal should be to work at your personal best.

How Much Should I Exercise?

An ideal goal is to perform some form of exercise every day. However, because of the nature of PD, there may be some days when this is not possible. Accept this and return to exercise when you are able.

Last but not least - HAVE FUN!



Travel Tips for Those with *Parkinson's Disease*



Whereas travel is a wonderful thing for people of all ages, it can create multiple challenges for those with Parkinson's disease. The following tips will help assure a happy, stress free and safe trip.

MAKE PLANS EARLY – Map out your trip well in advance and make a check list of things you need to do prior to your trip. Confirm who will be traveling with you as it's best to travel with your caregiver or a companion.

START PACKING EARLY – This will help you feel less rushed the day you leave. Make sure all the clothes you want to wear are washed, folded and ready to go. Pack comfortable clothing that will allow you to move freely while on the go. Don't over pack.

CHARGE YOUR CELL PHONE – Carry your mobile phone at all times in case of an emergency. Make sure all contacts are current.

CARRY IMPORTANT INFORMATION IN YOUR WALLET OR PURSE – Emergency contact information; card stating that you have Parkinson's disease; name of physician; complete list of medications and other pertinent information.

MAKE TRAVEL EASY

- Use a back pack to keep both arms free for ease and better balance especially if walking any distance.
- Carry a water bottle to stay hydrated and take medications on time. Use a timer so not to get distracted and miss a dose.
- Pack snacks - Portable fruit (apple, banana, etc.), energy bars and trail mix so no need to stop and shop.
- Wear comfortable, loose-fitting clothing and appropriate walking shoes. Remember a sweater or jacket for change in temperature on bus, train and plane or destination spot.
- For hotel reservations, always request a room on the first floor or close to the elevator; confirm in advance the availability of handicap accessible rooms.
- If you have a service animal, confirm in advance that the hotel has the necessary accommodations.



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MEDICAL CONSIDERATION

- Consult with your physician before taking a long trip or traveling out of the country to identify specific healthcare needs during your trip.
- Carry medical alert information and a letter from your doctor describing your medical condition, medications, potential complications and other pertinent information.
 - Carry at least one day's dosage in your pocket or purse; carry all of your medications with you should your trip get delayed or luggage gets misplaced. Bring plenty, even extra, of any medications that you take.
 - Check with your doctor regarding over-the-counter drugs for motion sickness or diarrhea prior to use.
 - Check with your doctor if any of your drugs are "sun sensitive" and plan accordingly.

PACE YOURSELF – Don't wear yourself out by trying to do and see everything. Be realistic how much energy you have for sightseeing. Take rest periods when need be.

DRIVING CONSIDERATIONS

- Consider having a family member or friend drive you to your destination or look to alternative transportation.
- Avoid eating two to three hours before driving as eating enhances drowsiness. Take a nap prior to departure so you are well rested when you depart for your trip.

PLANE TRAVEL

- Consider a non-stop flight and ask for handicap assistance.
- Don't forget transportation to and from airport. If you have a wheelchair, make arrangements, in advance, to have an accessible vehicle pick you up in your destination city.

- Make sure you take with you any medical cards, Medicare cards, auto insurance policy numbers and agent's phone number, passport, airline tickets, debit/credit cards and driver's license.
- Reserve aisle seat for easiest access to restroom.
- Arrive early at airport – It's better to wait around rather than miss your plane.
- Fill your carry-on bag – Pack all your medications and supplements; extra eye glasses & sunglasses; list of your doctor, dentist, and other healthcare providers with their address and phone number; doctor's fax number for prescriptions in case you lose your medications; and a list and dosing schedule of all medications.
- Tell flight attendants when you board of any medical problems you might encounter during the flight.
- Note the nearest restroom and tell the attendants if you feel you might need assistance getting to it during the flight.
- Check in with your flight attendant before plane lands to make a plan for exit.

DON'T STAY HOME – Travel can be a wonderful adventure for those living with Parkinson's disease. Make plans in advance and go have fun!



Glossary of Parkinson's Disease Terms



- **Affect:** One's mood conveyed through facial expression, voice, body language and appearance. PD patients may seem depressed or down to others because they lose facial expressions and can speak with a muted voice.
- **Akathisia:** Restlessness somewhat relieved by standing and moving about.
- **Akinesia:** Literally, not-moving. In general, reduced or absent movement. People with PD blink, swallow and move less than others.
- **Anhedonia:** The inability to enjoy or experience pleasure.
- **Anticholinergic:** Medications that block the action of acetylcholine, an important neurotransmitter; benztropine (Cogentin), trihexyphenidyl (Attane) procyclidine (Kemadrine) and Akineton.
- **Apathy:** Indifference, or not caring, having reduced emotions and dulled interest.
- **Ataxia:** Loss of balance.
- **Bradykinesia:** Gradual loss of spontaneous movement; slowness of movement. This is often the most disabling of symptoms.
- **Carbidopa (Lodosyn):** A drug that is usually given in combination with a Parkinson's drug called levodopa; the combination drug's brand name is Sinemet. Carbidopa improves the effectiveness of levodopa and can be used to reduce the side effects of levodopa.
- **Cholinesterase Inhibitors:** These medications increase acetylcholine in the brain by preventing the enzyme from breaking it down. These work in the opposite way of anti-cholinergic drugs. These are used a lot in Alzheimer's disease and other dementing illnesses including PD, and may help memory, concentration and mood; donepezil (Aricept), glantamine (Reminyl) and rivastigmine (Exelon).
- **Cognition:** Ability to think, understand and solve problems.
- **COMT Inhibitors:** Catechol-O-Methyltransferase inhibitors increase the bioavailability of levodopa in the brain and subsequent conversion into dopamine by reducing the peripheral metabolism of levodopa used to extend benefits of levodopa, lessen fluctuations particularly "wearing off". Side effects include difficulty performing voluntary muscle functions, excessive muscle activity, nausea, diarrhea and discolored urine.
- **Corpus Striatum:** A part of the brain that helps regulate motor activities.
- **Deep Brain Stimulation (DBS):** A surgical procedure that is very effective in treating Parkinson's disease. The surgery includes the implantation of permanent electrodes in various parts of the brain through which continuous pulses of electricity are given to control the symptoms of Parkinson's.
- **Dopamine:** A chemical messenger, or neurotransmitter, deficient in the brains of Parkinson's disease patients that transmits impulse from one nerve cell to another.

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- **Dopamine Agonist:** Stimulates dopaminergic terminals within the striatum: benefits include a longer half-life that results in less pulsatile stimulation of dopaminergic receptors. Usually given in combination with levodopa containing medications. Side effects include nausea, vomiting, anorexia, malaise, positional low blood pressure-orthostatic hypotension and psychiatric reactions.
- **Dyskinesias:** Abnormal involuntary movement that can result from long-term use of high doses of levodopa.
- **Festination:** A symptom characterized by small, quick forward steps.
- **Levodopa:** A drug, containing a form of the important brain chemical dopamine, commonly used to treat symptoms of Parkinson's disease. In combination with carbidopa, it is called Sinemet.
- **Lewy Body:** A ball of proteins lodged within cells, visible microscopically and usually present in PD.
- **MAO Inhibitors:** Monoamine oxidase inhibitors. Dopamine is a component of MAO. Non-specific MAO inhibitors are known for provoking hypertensive crises when combined with tyramine-rich foods, typically cheese or red wine. Selegiline, developed in the late 1960s has MAO-B class of enzymatic activity inhibitor, in the brain MAO-B preferentially metabolizes dopamine. The inhibitor slows reuptake of dopamine and increases its production. Side effects may be caused by its metabolites, yielding excitement, irritability and anxiety. Most side effects are not brought on by the drug itself, but by increasing the effects of levodopa yielding nausea, vomiting and dizziness.
- **Micrographia:** The tendency to have very small handwriting due to difficulty with fine motor movements in Parkinson's disease.
- **On-off Effect:** A change in the patient's condition with sometimes rapid fluctuations between uncontrolled movements and normal movement, usually occurring after long-term use of levodopa and probably caused by changes in the ability to respond to this drug.
- **Postural Instability:** Impaired balance and coordination, often causing patients to lean forward or backward and to fall easily.
- **Propulsive Gait:** Disturbance of gait typical of people with symptoms of Parkinson's in which, during walking, steps become faster and faster with progressively shorter steps that passes from a walking to a running pace and may precipitate falling forward.
- **Resting Tremor:** Shaking that occurs in a relaxed and supported limb.
- **Retropulsion:** The tendency to step backwards if bumped from the front or upon initiating walking, usually seen in patients who tend to lean backwards because of problems with balance.
- **Rigidity:** A symptom of the disease in which muscles feel stiff and display resistance to movement even when another person tries to move the affected part of the body, such as the arm.
- **Substantia Nigra:** Movement control center in the brain where loss of dopamine producing nerve cells triggers symptoms of Parkinson's disease, substantia nigra means "black substance: so called because the cells in this area are dark.
- **Tremor:** Shakiness or trembling, often in a hand which in Parkinson's disease is usually most apparent when the affected part is at rest.
- **Unilateral:** Occurring on one side of the body. Parkinson's disease symptoms usually begin unilaterally.
- **Wearing-off Effect:** The tendency, following long-term levodopa treatment, for each dose of the drug to be effective for shorter periods of time.

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Please give serious consideration to the designation of PRF in your Will, Charitable Trusts, Life Insurance, Appreciated Securities and Real Estate as this offers preplanned giving opportunities that will serve the Parkinson community for years to come. Please call Lynne Henry (941) 893-4389 at the Parkinson Research Foundation, today, for personal assistance in initiating this effort.

The following language has been reviewed and is deemed a legally acceptable form for including such a bequest in a will:

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The Parkinson Research Foundation Federal ID number is 20-0205035

Memorial and Honor Giving

Honor a family member, friend or special event by donating to PRF. Pay tribute to someone you love whose life has been impacted by Parkinson's disease. In lieu of flowers, please consider designating Parkinson Research Foundation as your charity of choice.

Workplace Giving: Launch a Giving Campaign

Please consider leading a team at work by encouraging your colleagues and staff to join together to help those living with Parkinson disease. Launch a workplace giving campaign today.

Ask about Matching Gifts

Many gracious employers double even triple charitable donations made by individual employees. Some companies will match gifts made by retirees and/or their spouses. Contact your employees for matching gift eligibility as this allows you to maximize your personal donation.



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