How Does the Brain Keep Track of Time?

For decades, scientists have wondered, how does the brain keep track of time? Encoding time is universally required for learning how to perform daily tasks such as walking up and down stairs or more complicated tasks like playing the piano. Neuroscientists have theorized that the brain “time stamps” events as they happen; however, they couldn’t find any evidence that such time stamps existed. In 2009, a group of neuroscientists at the Massachusetts Institute of Technology (MIT) uncovered some important evidence about how primate brain cells actually keep track of time.

The team was led by Professor Ann Graybiel of MIT’s McGovern Institute for Brain Research, a NPF-supported scientist who has dedicated her career to uncovering the brain circuitry underlying medical issues such as Parkinson’s disease, and included Dr. Naotaka Fujii of the RIKEN Brain Institute in Japan, and Dr. Dezhe Jin of Penn State.

Why is timing important in Parkinson’s disease?

Most people’s brains seem to provide timing information that is used in purely cognitive activities such as learning and also providing rhythm in motion. Playing a musical instrument or even clapping in time with music take advantage of this timing circuit in the brain. Simple reward-based learning—if you put a piece of chocolate in your mouth, you experience a pleasurable taste—is believed to be intuitively connected by the brain properly attributing the reward to the activity that generated it. For some things, like eating chocolate, people know the connection between activity and reward, but in some more complex situations, this intuitive circuit plays a role. It is believed that this timing function is impaired in some people with Parkinson’s disease. In addition, actions that are normally managed by timing a sequence of actions, like walking, can require much more conscious thought when the timing does not occur naturally.

CONTINUED ON PAGE 2
How did Professor Graybiel investigate timing?

The MIT team reasoned that, by using a set of complex electrodes they had developed, they could be able to detect neurons that didn’t do any thinking but just provided a regular “tick” for other neurons to listen to in order to track time. Researchers taught two macaque monkeys to perform a simple eye-movement task in which they took direction from visual signals on a computer screen. After receiving a “go” signal, the monkeys were free to perform the task at their own speed. After filtering out the neurons whose activity was associated with the action of the task, there remained a set of neurons that just consistently fired at specific intervals—100 milliseconds, 110 milliseconds, 120 milliseconds, and so on. These cells in the monkeys’ brains coded time with great precision.

Professor Graybiel’s revolutionary tools allowed, for the first time, the observation of the activity of individual neurons in the brain. These observations were aggregated to give a clear picture of the function of the basal ganglia as a whole, rather than one specific area as had been done previously. This method, focused on the area of the brain associated with Parkinson’s disease, offers a powerful tool that can be leveraged to develop new insight into how the brain works and also understanding of how therapies for Parkinson’s actually affect neuron function.

“The results raise the possibility that the representation of time may reflect an inherent tendency for the brain to represent time as part of ongoing task-specific information processing. If so, neural circuits might build time representations as an infrastructure to use when needed,” explains Professor Graybiel. “Such encoding would have major advantages for neural processing related to learning how to control actions, because all of the elements needed to form on demand new associations between events and precisely timed actions would be available. This may help to target DBS-type therapies to the actual moment of initiation, for example, or to the right loop.”

What does this mean for the future of Parkinson’s treatment?

Methodology developed by Professor Graybiel opens a powerful new pathway to understanding the inner workings of the brain. These techniques offer a way to do direct measurement of neurons and neuron function, with the ability to detect neuronal activity as fast as it occurs. These findings may facilitate the development of neural prosthetic devices or drugs for conditions such as Parkinson’s disease.

“The relevance to PD is potentially tremendous, as the last several decades of clinical research experience have revealed that much of the PD disability results from issues in timing. Therefore, some of the next generation of treatment paradigms and technological advances could be directed toward brain cell time stamps,” said Dr. Michael S. Okun, NPF’s National Medical Director.

Professor Ann M. Graybiel has been researching Parkinson’s disease since 1986. She received a 3-year grant from the National Parkinson Foundation entitled, “Analysis of Cortico-Basal Ganglia Loop Function in Macaque.” Dr. Graybiel served on the National Parkinson Foundation Scientific Advisory Board from 1997-2008.

The results of her research were published in the Proceedings of National Academy of Sciences of the U.S.A. in October 2009.
The National Parkinson Foundation (NPF) and American Parkinson Disease Association (APDA), in collaboration with the Northwest Georgia Parkinson Disease Association, present the third in a series of conferences for those living with young-onset Parkinson’s disease. This conference will offer programs for people of all ages who are living with Parkinson’s.

Watch the webcast from the March 2010 Sacramento conference and see the experts speak about DBS, Complimentary Therapies, Gene Therapies, and Exercise. Visit www.parkinson.org/library and click on Videos & Webcasts.

PROGRAM:

Friday, October 15, 2010
6:30 pm - 8:30 pm Welcome Reception & Exhibits

Saturday, October 16, 2010
8:45 am - 4:30 pm Welcome / General Session / Breakout Sessions

6:30 pm - 7:00 pm Cocktail Reception

7:00 pm - 10:00 pm Dinner & Entertainment

Sunday, October 17, 2010
8:45 am - 4:30 pm Welcome / General Session / Breakout Sessions

PROGRAM HIGHLIGHTS:

Stem Cell and Gene Therapies for Parkinson’s Disease
Penelope Hallett, PhD
Harvard Clinical and Translational Science Center

Neuropsychological Aspects of Parkinson’s
Paul Short, PhD, Clinical Psychologist

Parkinson’s & Sleep Disorders
Joel Greenberg, MD, Savannah Neurology

Sex & Intimacy
Gila Bronner, MD
Sexual Medicine Center, Sheba Medical Center, Israel

Deep Brain Stimulation
Darlene Lobel, MD, Northeast Georgia Physicians Group

Clinical Trials Participation
Stewart Factor
Emory Comprehensive Movement Disorders Program

REGISTRATION:

Visit www.parkinson.org/yopc

FEE:

$79, Includes Friday night reception, Saturday breakfast, lunch and dinner, and Sunday breakfast and lunch.

LOCATION:

Sheraton Gateway Hotel, Atlanta
Knock Parkinson’s Out of the Park!

Gordon Beckham, second baseman for the Chicago White Sox, is making a donation to the National Parkinson Foundation for every home run that he hits during the 2010 season and he has asked his fans to join him. Out of the Park for Parkinson’s is an awareness campaign he’s launched, in partnership with the National Parkinson Foundation, to help end Parkinson’s disease.

Gordon Beckham and his family understand the challenges of Parkinson’s firsthand: his grandfather has been living with the disease for nearly a decade. “Living and helping my grandfather cope with Parkinson’s has given me an up-close look at the suffering it causes,” said Beckham. “I want to do something to raise awareness and funds to help eradicate the disease so future generations do not have to go through what our family and countless others have been through with Parkinson’s.”

NPF has a strong presence in Chicago, Illinois, supporting the work of Northwestern University’s Parkinson’s Disease and Movement Disorder Center, NPF Center of Excellence, as well as the local NPF chapter, the Parkinson Association of Illinois (PAIL).

For more information about Gordon Beckham and the Chicago White Sox, visit http://www.chicago.whitesox.mlb.com.

Fans of Gordon Beckham can send him a fan letter or make a donation on www.outofthepark.org:

- **Per Home Run Pledge Superstar**: Make a pledge per home run.
- **World Series Champion**: $1000 donation guarantees a ticket to attend a post-season bash with Gordon.
- **All Star**: $500 donation.
- **Gordon’s #1 Fan**: $250 donation.
- **Major League Fan**: $100 donation.
- **Team Player**: $50 donation.

ABOUT GORDON BECKHAM

A native of Atlanta, GA, 23-year-old Gordon Beckham plays second base for the Chicago White Sox. Gordon made his major league baseball debut on June 4, 2009, and had a remarkable season for a rookie. He hit 14 home runs, had 63 RBIs, and his batting average was .270. He was named the 2009 American League Rookie of the Year, and was also voted Rookie of the Year by the Major League Baseball Players Association.
Living with Parkinson’s: Andrew Albert

What do Andrew Albert, a 64-year-old Chicago native, and Gordon Beckham, a 23-year-old Major League baseball player, have in common?

A love of baseball and first-hand knowledge of Parkinson’s disease; Andrew was recently diagnosed and Gordon watched his grandfather fight it for ten years. The two met for the first time in April of this year when Gordon announced his partnership with the National Parkinson Foundation.

Andrew started to notice symptoms, such as trembling feelings, last summer. At first, he went to his local doctor who referred him to NPF’s Center of Excellence at Northwestern University in Chicago. A neurologist at Northwestern, Dr. Cindy Zadikoff, diagnosed Andrew with Parkinson’s disease last year. He is now taking Azilect to control his symptoms and is enrolled in a clinical trial at Northwestern, under the leadership of Dr. Tanya Simuni, the medical director of the Parkinson’s Disease & Movement Disorders Center, and a leading clinical researcher in the field.

“I am thankful to Gordon Beckham, the Chicago White Sox, the National Parkinson Foundation and Northwestern for working towards a cure for Parkinson’s and giving me state-of-the-art care and treatment.”

Dr. Simuni encourages all of the patients at her center to participate in the research projects they conduct. She explained that, “The scope of research projects ranges from studies of potential neuroprotective agents for Parkinson’s disease (medications that can slow progression of the disease), to novel treatment options to improve the control of PD symptoms, to investigating the role of physical therapy and other non-pharmacological interventions in the management of PD.”

Andrew says that his biggest challenge is, “balancing the stress and demands of work and family with the effects of Parkinson’s disease.” He is a Partner at Svoboda Capital Partners LLC, a private equity firm in Chicago. Andrew and his wife have five children and six grandchildren.

Share Your Story about living with Parkinson’s. Visit www.parkinson.org/community today!

Gordon Beckham, the second baseman for the Chicago White Sox, presented Andrew Albert with a signed #15 Chicago White Sox jersey.

October 27-31, 2010
Chicago, Illinois

NPF’s Allied Team Training for Parkinson (ATTP) teaches health care professionals how to build and maintain comprehensive, interdisciplinary health care teams.

For more information: www.parkinson.org/attp
**Top Questions and Answers from NPF’s “Ask the Doctor” Forum**

Before you leave for summer vacation, make sure you visit the new and improved free online forum at [www.parkinson.org](http://www.parkinson.org). Login from the top right-hand corner of the home page and ask the National Parkinson Foundation doctors, surgeons, nutritionist, pharmacist and speech clinician your most pressing questions about Parkinson’s disease. There are also open forums which allow caregivers and people living with young-onset Parkinson’s disease to connect with others in the community. The following questions and answers from the forum all pertain to recent items in the news: removal of the Neupro patch from the U.S. market, dopamine agonist withdrawal symptoms, increasing uric acid levels in the blood as a PD treatment, and chewing gum to improve swallowing.

**Q** What is the update on the Neupro (Rotigotine) dopamine agonist patch?

**A** Many patients with Parkinson’s disease reported the patch concept to be desirable. The patch enhanced quality of life by reducing the need for continuous re-dosing of medications throughout the day. Although there are many dopamine agonist pill formulations available, many patients were extremely disappointed when the patch left the market. The patch issue that precipitated removal from pharmacies in the United States was an observed “crystallization” of the medication into what appeared to be “snowflakes” which appeared on the exterior surface of the patch. After scientific review, it was discovered that storage in a refrigerated environment was a potential solution. The patch underwent review by the FDA this spring, and a panel determined that to be re-approved, the drug would require reformulation. This reformulation process could take as long as a year or two (the patch is still available in Europe). In the meantime for those patients with Parkinson’s disease who continue to wait for the patch, please see your doctor to discuss alternative strategies with the many tablet form medications.

**Q** What are dopamine agonist withdrawal symptoms (D.A.W.S.), and should I be worried about them?

**A** The team of Dr. Rabinak and Dr. Nirenberg coined the term D.A.W.S., reported in a recent article in the *Archives of Neurology*, which stands for dopamine agonist withdrawal symptoms. The doctors closely examined 26 Parkinson’s disease patients who had their dopamine agonist therapy tapered off or stopped for a variety of reasons. They identified in select patients a “severe, stereotyped cluster of physical and psychological symptoms that correlated with withdrawal in a dose-dependent manner, and this caused clinically significant distress or social/occupational dysfunction.” It is important to note that only 19% of those who tapered off of dopamine agonists developed symptoms, and all of the patients with symptoms had some sort of impulse-control disorder prior to initiation of dopamine agonist therapy (compulsive gambling, shopping, etc.). The authors noted that “symptoms of D.A.W.S. resembled those of other drug withdrawal syndromes and they included anxiety, panic attacks, agoraphobia (fear of going out in public), depression, dysphoria (sadness), diaphoresis (sweating), fatigue, pain, orthostatic hypotension (dizziness when standing), and drug cravings.” Parkinson’s disease patients need to be aware of the potential for these symptoms to emerge if for any reason they are taken off of dopamine agonist therapy (leg swelling, dizziness, nausea, behavioral impulse control problem, etc.). If the dopamine agonist is taken away, patients and their physicians should be ready to address the potential withdrawal symptoms.

**Q** What do I need to know about uric acid, gout and Parkinson’s disease?

**A** There has been a relatively recent observation that the levels of a marker in the blood called uric acid may be associated with the risk of developing Parkinson’s disease. Uric acid is thought to function as an antioxidant, and
this effect may in some way decrease the risk of Parkinson's disease, or alternatively delay its appearance. When uric acid levels are high, people may develop angry, red, inflamed joints, and be diagnosed by their primary doctors with a disease referred to as gout. There is now an interest in examining whether increasing uric acid levels in the blood of patients with Parkinson's disease may be a useful treatment, and may even lessen decline. Massachusetts General Hospital has been leading an effort to study this effect in a well-designed clinical trial. Investigators have set out to study inosine, a nutritional supplement which raises urate levels in the blood (Schwarzchild and Ascherio). Parkinson's disease patients need to be aware that the safety of inosine needs to be established (make sure there are not side effects including the development of gout). It is best if patients either enroll in a clinical trial, or wait for the results of studies before trying to initiate treatment.

Q Does chewing gum really help swallowing in Parkinson’s disease?

A A recent paper in the journal Neurology reminded us that the simple things in life can sometimes make a difference (South, Somers and Job). The study was based on the fact that Parkinson’s disease patients have less frequent swallows, and that gum chewing may improve swallow frequency. Twenty Parkinson’s disease patients participated in this pilot study, which revealed that swallowing was indeed improved, and that this technique could in future studies prove to be a potentially effective management tool. Caution should be exercised as the patients were only studied before and after five minutes of gum chewing, so longer term studies are needed. Patients included in their study also did not have severe swallowing problems, so this may or may not benefit a more severely affected group. If Parkinson’s disease patients decide to use this trick to decrease saliva/drooling or to improve their swallow, they should be careful to use sugar-free gum and to consult their dentist for advice on strategies for appropriate dental health. Also of note, many patients at the University of Florida have reported that gum chewing is an effective way to combat mild to moderate drooling.

The information published in this “Ask the Doctor” Forum is not intended to replace, and should not be interpreted or relied upon, as professional advice, whether medical or otherwise. Accordingly, please consult your own professional for all advice concerning medical, legal, or other matters published in connection with this Forum. NPF assumes no liability of any kind for the content of any information transmitted to or received by any individual or entity in connection with their use of the “Ask the Doctor” Forum on the NPF website, and NPF does not endorse or recommend any such information.

Quality Improvement Research Initiative Expanding to 17 Centers

After a successful pilot, NPF’s Quality Improvement Research Initiative has expanded to 17 of our Centers of Excellence including the 6 centers from Phase I; 9 additional centers in the United States (Baylor College of Medicine, Beth Israel Deaconess, Johns Hopkins, Medical College of Georgia, Mt. Sinai, Muhammad Ali Parkinson Center, Parkinson’s Institute, University of South Florida, University of Kansas); and 2 international centers in Israel and the Netherlands.

With over 2,200 patients in the registry, making it the largest clinical PD database, the data is now beginning to tell a story, showing how neurologists adopt various strategies to attack PD. Over the next year, NPF will be identifying and adopting care quality initiatives and measuring their adoption through this initiative.

To date, the registry has shown that each center has very different approaches to care; for example, one may prescribe medication only, while others may combine medication with counseling. As we collect data, we will be able to say definitively whether one approach is better for patients or another, or if they are all equally good. As we establish these findings, we will publish them and promote them to ensure that these best practices are available to improve care for everyone, whether seen at a top movement disorders center or in primary care in the community.
Falls in Parkinson’s disease occur mostly when turning or changing directions and is often related to a “freezing episode.” A freezing episode is defined as the inability to move the feet or other parts of the body when wanting to initiate movement. Not all people with Parkinson’s disease experience freezing episodes but those who do are at a much higher risk of falling.

**Facts about Falls Related to PD:**
- Approximately 38% of people with PD fall each year.
- People with PD may require more time for rehabilitation as hospitalization usually affects their "normal routine" and renders a patient less mobile.
- Research shows that exercise is just as important as medication.

**HERE ARE SOME HELPFUL TIPS FOR MINIMIZING YOUR RISK FOR FALLS:**

1. Don’t think you are immune to a fall or a balance problem.
2. Take an honest inventory of your abilities and limitations.
3. Don’t get distracted: slow down and focus on what you are doing.
4. Plan complex movements carefully and don’t hurry (e.g., sit down to put on your pants).
5. Take charge of your physical condition (Nutrition, rest, exercise, mental activity).
6. Reduce your environmental risks (Indoors and outdoors).
7. Consider adapting your surroundings for improved safety (Grab bars, ramp).
8. Consider utilizing an assistive device (Cane, walker).
9. Divide and conquer: split challenging tasks (e.g., put down what you are carrying before sitting down).
10. If doing something led to a fall before, do it differently next time!

**NPF’S PD LIBRARY INCLUDES TWO VIDEOS ON THE TOPIC OF FALLS PREVENTION:**

**“WHAT ARE SOME STRATEGIES TO PREVENT FALLS IN PD PATIENTS?”**
Professor Bastiaan Bloem, from the Nijmegen Parkinson Center in the Netherlands, gives helpful tips in this four-minute video. He recommends using a team approach—working with a neurologist, a physiotherapist, an occupational therapist and a rehabilitation specialist—to prevent falls and by taking protective measures such as using hip and knee protectors, helmets and/or walking aids.

**“HOW CAN FALLS BE PREVENTED?”**
John Nutt, MD, from the Oregon Health and Science University, explains the three major causes of falls in this six-minute video: changing positions, freezing and low blood pressure. He recommends that people with PD avoid multi-tasking when walking. Simple tasks like trying to talk to someone when walking may increase your risk of a fall.

**You can also go online to www.parkinson.org/Library and print out helpful checklists:**

- “Balance Checklist”
- “Mobility and Parkinson’s: Simple Compensations to Enhance Movement”
What’s Hot in Parkinson’s Disease?

More Evidence and More Choices for DBS Therapy: The Time Has Come to Tailor Surgical Therapies

Two new important deep brain stimulation (DBS) trials highlight the importance of tailoring therapy for individual Parkinson’s disease patients. The PD SURG trial results (conducted by a multicenter team of collaborative investigators from all over Britain) include a one year follow-up of Parkinson’s disease deep brain stimulation (DBS) patients. The trial was randomized, and it compared DBS to best medical therapy. The primary outcome variable was quality of life, and interestingly, patients in the best medical therapy arm had access to apomorphine pumps. Though sites were allowed to use the subthalamic nucleus target (STN), the globus pallidus interna target (GPI), and even lesion therapy (e.g. pallidotomy), 174/178 (98%) of patients in the surgery group were implanted with subthalamic nucleus DBS. There was a five point improvement noted in quality of life scores in the surgical compared to medical group. Although compared to other studies the quality of life improvement was less robust, this may have reflected a longer study duration, or potentially even disease progression. There were unmistakable improvements in dyskinesias, and on time in the surgical group, although diaries were not utilized.

Though not a perfect trial, its large size and use of a medical control group along with access to apomorphine pumps made it unique among recent DBS studies. The results underscored the powerful influence that DBS can have on motor fluctuations. Additionally, these SURG investigators plan in the future a long term (9 year) follow-up, and this will surely enlighten the field as to disease progression, and other issues potentially important to DBS cohorts.

One hidden aspect of this trial was the report of the “reasons why patients sought DBS surgery.” Severe off periods, dyskinesia and tremor were far and away the most common indications cited for DBS therapy. As DBS moves into a tailoring phase, (the right target and approach for a particular symptom or symptom cluster) this type of information will be very useful to clinicians.

It is fascinating to see that 98% of implants were placed in the subthalamic nucleus in this study, despite the option for surgeons to use a different target. Though the subthalamic target has many strengths, it also has relative weaknesses. Emerging data is now strongly suggestive that the motor outcomes in pallidum and subthalamic nucleus are actually similar, and that targets in the future should be tailored for individual patients and individual symptoms.

The results of the long-awaited Department of Veterans Affairs “Subthalamic Nucleus (STN) Versus Globus Pallidus (GPI) Trial” were announced shortly after the PD SURG trial. Two hundred and ninety-nine patients were randomized and patients were followed carefully for two years post-implantation. The results of this study, like the NIH COMPARE trial published in 2009, confirmed that motor outcomes were equivalent whether implanted in STN or in GPI. There were however, subtle differences between brain targets, and as more data emerges we will hopefully be able to start matching patient profiles to specific brain targets.

Can we say the PD-SURG trial and the Veterans Affairs DBS trial were a surge forward for the PD community? The answer is certainly yes, as the publication of more carefully controlled DBS trials will be important in guiding the therapy. There is now solid evidence supporting the efficacy of DBS in select patient populations, and emerging data that may help us in selecting the right target for the right patient to create “a truly tailored approach.”

Read Dr. Okun’s monthly column, “What’s Hot in PD?” online at www.parkinson.org.

AUTHOR: MICHAEL S. OKUN, MD, NPF National Medical Director


Play the Music for Parkinson’s

In 2009, a seventeen-year-old named Emily Luther from Woonsocket, Rhode Island entered the Miss Rhode Island Outstanding Teen contest. Little did she know that when she signed up for this contest, she would end up inspiring an entire community to take a stand against Parkinson’s disease.

As a participant, she chose Parkinson’s disease as her platform because she had watched her grandfather, whom she called Pepéré (French), slowly decline from the disease. He was diagnosed with Parkinson’s disease in 2000 and he passed away nine years later, at the age of eighty-one, before she was crowned Miss Rhode Island Outstanding Teen that spring.

After Emily’s victory, she decided to further her commitment to Parkinson’s disease by creating an event that would honor her grandfather, as well as raise funds and awareness of the disease. Emily had been singing professionally since she was twelve, so the obvious choice was to establish a musical celebration. She gathered together a few close friends—including one with a business degree and a graphic designer—and coined the event, “Play the Music for Parkinson’s.” They helped her design a logo for the event posters, tickets, and stationary.

The celebration was held on Valentine’s Day eve of this year, the one-year anniversary of her grandfather’s funeral. Emily sent letters to local businesses asking them to make a donation for the silent auction and eventually accumulated over thirty items, one of which was valued over one-thousand dollars. The sold-out event was held at a local restaurant and attracted nearly 200 people, including the mayor of Woonsocket and Congressman Jim Langevin. The evening incorporated a live five-piece band, featuring Nick King, a Broadway star in New York. Emily wrote a special song for her grandfather and performed it for the guests.

Lyrics from a song that Emily wrote and sang at the event:

“So many things I wish you could see
I truly hope you are proud of me
And when I sing I hope you know it’s for you
You inspire everything I do.”

“Play the Music for Parkinson’s” raised close to $4,500 which Emily donated to the National Parkinson Foundation’s Team Hope community fundraising program.

At NPF, we are tremendously inspired by Emily’s creative approach to raising funds and awareness to support the Parkinson’s community. “Play the Music for Parkinson’s” galvanized support from an entire town and provides a great example of what Team Hope is all about.

After the event, Emily’s grandmother said, “I’m so glad we did this. This was therapy for me.” Emily hopes to make this an annual event in her community.

Emily will be attending the Berklee College of Music in the fall 2010, specializing in vocal performance. She would like to pursue music therapy in order to help people with Parkinson’s disease.

For more information about starting your own community fundraiser, visit www.parkinson.org/teamhope.
Answers To Your Planned Giving Questions Are a Click Away!

Visit NPF’s new interactive planned giving website: www.parkinson.org/plannedgiving.

Find useful tools including gift calculators, planning by life stage and compare the advantages of various gifts with a few simple clicks!

EXPLORE YOUR OPTIONS:
- Build Your Gift
- Goals & Gifts
- Compare Gifts
- Plan By Age
- Gift Calculator

Navigating a New World:
Wellness Retreat for Recently Diagnosed Parkinson’s Patients & their Care Partners

November 1-5, 2010
Kripalu Center, Stockbridge, MA

Take charge of your health and learn from leading medical and holistic professionals how best to care for yourself and your family. Join us for this 4-day program designed for people in the early stages of Parkinson’s disease. You’ll participate in workshops covering the latest information on Parkinson’s research, medication and lifestyle changes that can impact the course of the disease, improve quality of life, and support personal relationships in a small group setting of 60 people.

For more information, please contact:
Denise Beran, National Parkinson Foundation
800.327.4545
dberan@parkinson.org

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ASK THE DOCTOR:
A team of Parkinson’s specialists answers medical questions about Parkinson’s disease.

ASK THE PHARMACIST:
Mark Comes, RPh, fields questions about medication management.

ASK THE SPEECH CLINICIAN:
A team of experts answers questions regarding speech and swallowing.

PREGÚNTELE AL MÉDICO:
Ramon L. Rodriguez, MD contesta preguntas con respecto a la enfermedad de Parkinson y materias relacionadas.