

# PLACES IN THE HEART

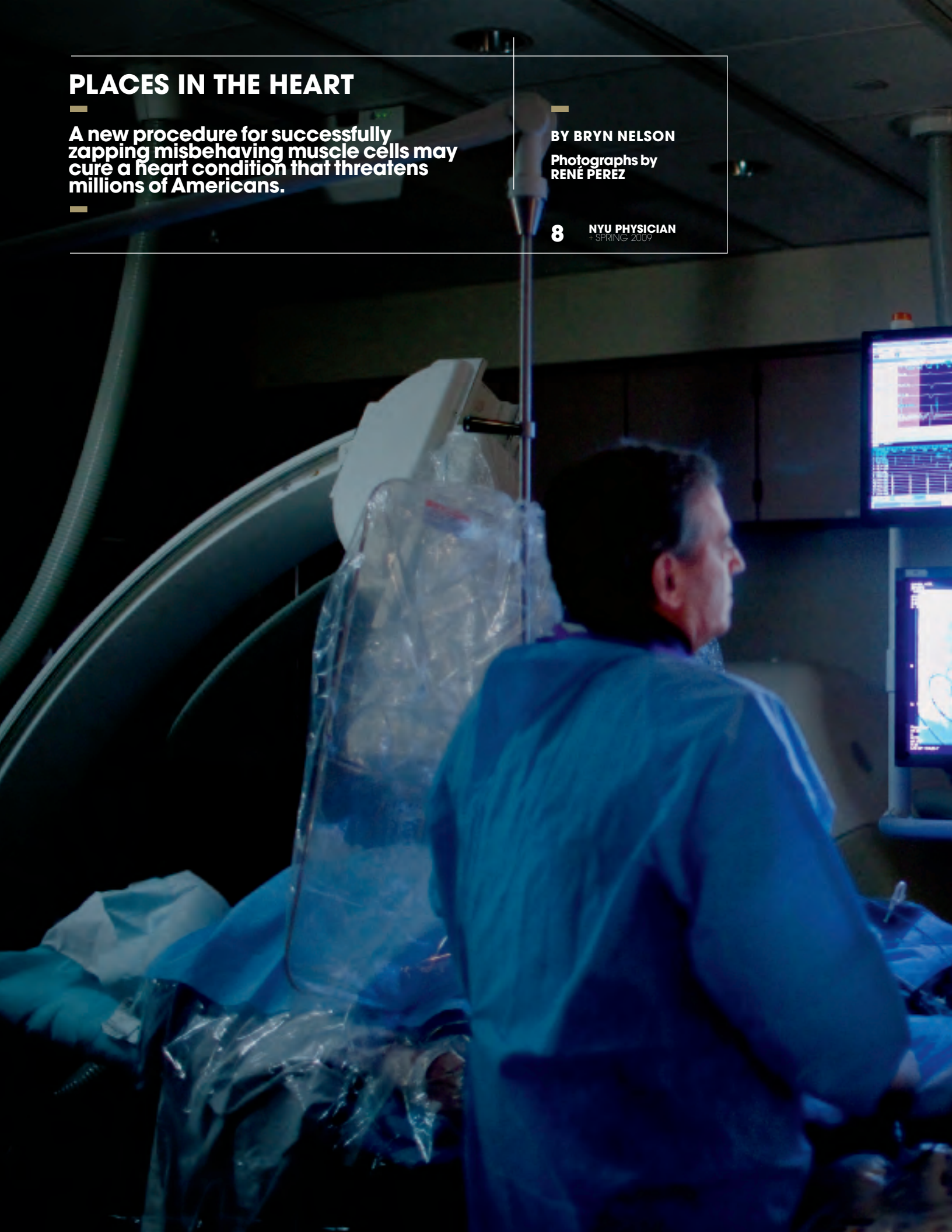
A new procedure for successfully zapping misbehaving muscle cells may cure a heart condition that threatens millions of Americans.

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**RONNIE SCHULTZ** loves photography and her pet pug, Lily Rose. Early this year, when Schultz and her partner saved Lily Rose's life after the dog began to choke on a treat, Ronnie learned that one of the lives saved in the mishap may very well have been her own.

"I was off the charts with anxiety," says Schultz, recalling the hour it took her own rapidly beating heart to recover. Yet despite the fact that the petite and energetic 52-year-old photographer suffers from atrial fibrillation, the world's most-common heart arrhythmia, her heart did not revert to the terrifying and chaotic rhythm such anxiety could easily have caused at an earlier time.

Instead, the impromptu stress test handed a hard-won triumph to both Schultz and her NYU Langone medical team, led by cardiac electrophysiologist Larry A. Chinitz, M.D. Over the last decade, Dr. Chinitz and his colleagues at the Leon H. Charney Heart Rhythm Center have become a major force behind a rapidly evolving method for treating atrial fibrillation. Ronnie Schultz is one of Dr. Chinitz's most challenging patients.

In many ways, Schultz's uneven but steady progress mirrors the progression of a technique known as catheter ablation, from a makeshift intervention introduced by French doctors in 1997, to a second-line therapy, to a treatment Dr. Chinitz believes could soon be considered an outright cure. "Many patients have been told that this is a chronic condition," he says, "and that they're sort of doomed to long-term medical therapy and drugs. But often—not always, but often—catheter ablation gives us the opportunity to really cure it."

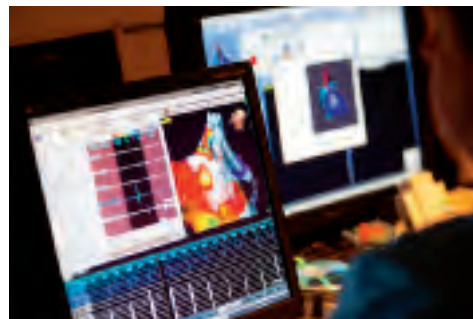
Its scope and severity vary considerably, but atrial fibrillation affects an estimated 2.3 million Americans; 340,000 new cases are diagnosed every year. For Schultz, the sensation is one that goes far beyond the occasional syncopation of her heart palpitations, or extra heartbeats within an otherwise normal rhythm. Atrial fibrillation leaves her exhausted, with chaotic and rapid-fire beats. "Picture yourself on a treadmill at one of the fastest settings, and that's how you feel 24/7," she says.

Schultz's persistent bouts have never resolved on their own. Doctors have had to electrically shock her heart into resuming its normal rhythm more than a dozen times. Unlike nearly all other patients,

she has undergone the ablation procedure four times in seven years in her quest for a lasting solution. So far, she says, the fourth time is the charm.

Medical researchers link the haywire rat-a-tat beats of atrial fibrillation to electrical disturbances within the heart's upper chambers, or atria, causing them to quiver rather than contract. In many patients, these disturbances are concentrated in the left atrium, adjacent to the pulmonary veins leading to the lungs. The lack of synchronicity with the lower ventricle can drop overall cardiac output by as much as 20 to 25 percent.

Among patients with heart failure, valve problems, or other preexisting conditions, fibrillation can lead to chronic



The screen (above) displays electrical signals arising from the patient's atrium and a three dimensional map of the heart in multiple colors. To the right, Steven Fowler, M.D., a cardiac electrophysiology fellow, and Dr. Chinitz.

shortness of breath and substantial physical limitations, such as difficulty climbing stairs or exercising. Even more troubling, the inability of the atrium to empty properly can dramatically boost the risk of stroke due to blood clot formation.

For Robert Conklin, a retired marine biology schoolteacher and avid fisherman from Riverhead, N.Y., a catheter ablation procedure in February offers new hope for reclaiming 15 to 20 percent of his cardiac output—and returning to a life spent on the water.

Seventy-year-old Conklin lives with an enlarged heart and hypotension, or

dangerously low blood pressure. In 2002, cardiologists replaced his badly disintegrated mitral valve, the crucial two-part flap that directs blood from the left atrium to the left ventricle during atrial contractions. Two subsequent episodes of atrial fibrillation required doctors to shock his heart using the same cardioversion technique used for Schultz.

Catheter ablation, Dr. Chinitz believes, could cure up to 85 percent of patients who have structurally normal hearts and lack other complications. Atypical patients, such as Schultz and Conklin, present special challenges. But improved imaging and mapping strategies, specialized catheters, and deepening knowledge about the disease's underlying mechanisms are spurring a fast-growing optimism.

"In the last three to four years, it's really come around," Dr. Chinitz says. In his practice, he and his team ablate six to nine patients every week, possibly the busiest schedule for this procedure in New York State. He already sees a "very promising" potential for reducing stroke risk and mortality while increasing patients' quality of life.

It wasn't always that way. Until recently, patients had few treatment options beyond often toxic antiarrhythmic drugs to control their atrial fibrillation episodes and a lifetime of blood-thinning drugs such as warfarin to reduce the likelihood of stroke. Even when effective, Dr. Chinitz says, the drugs don't offer a cure, often lose their effectiveness, and have yet to



demonstrate long-term improvement in reducing stroke or mortality. “Most often, the fibrillation just overcomes the efficacy of the medication,” he says.

After her diagnosis, Schultz undertook an intense drug regimen, including warfarin, an anticoagulant; a beta blocker called metoprolol tartrate to lower her heart rate; and two antiarrhythmic drugs that proved to be ineffectual for her. The first of the antiarrhythmics, propafenone, gave her premature ventricular contractions. It resulted in a “skipped beat” sensation and even more palpitations, and it did little to halt her atrial fibrillation. The second antiarrhythmic, amiodarone, was even worse. It initially prevented fibrillation, but led to thyroid toxicity, severe kidney pain, and pulmonary fibrosis. After she refused a third alternative, she made an appointment with Dr. Chinitz just as he was about to begin applying the catheter ablation technique to cases such as hers.

Dr. Chinitz’s catheter ablation technique for atrial fibrillation cases relies on long flexible wires threaded through a patient’s femoral vein in the groin until they reach the atrium. Once in place, the electrode tips of these catheters can be used to scout out and cauterize the electrically unstable groups of muscle cells triggering fibrillation. As the catheter passes over specific spots, an intracardiac electrogram monitor reveals telltale differences in the heart’s electrical activity. A similar technique has long been successful in treating simpler arrhythmias—those which typically involve a single electrically abnormal area. But researchers were initially wary of the prospects for overcoming atrial fibrillation’s notorious variability.

“The problem is that it’s not always the same triggers or same muscle engaged from patient to patient,” Dr. Chinitz says. For those with heart disease, for example, more of the atrium is often involved. “And that’s where mapping comes in,” he says.

On a mid-February afternoon in 2009, a team of doctors, nurses, and an anesthesiologist on the fifth floor of NYU Langone’s Tisch Hospital are showing how far the process has come since Dr. Chinitz’s first pulmonary vein mapping procedure in 1999. Their patient is all but hidden beneath sterile blankets while a doctor monitors a black-and-white fluoroscopy screen to track the X-ray-guided progress of two flexible catheters as they move through the patient’s left atrium. Steven Fowler, M.D., a cardiac electrophysiology fellow, seated behind a clear Plexiglas room divider, is acting as copilot. His role is to help navigate

the patient’s anatomy with three additional points of reference. To his left, a screen displays discrete electrical signals arising from specific spots within the patient’s atrium. To his immediate right, a CT scan shows a model of the outer atrium. In front of him, a visually stunning map depicts the three-dimensional heart and pulmonary vein in multiple colors. The real-time model will eventually be filled with dozens of yellow and blue dots indicating the tiny spots where muscle has been cauterized.

Dr. Chinitz moves the catheter through the heart and monitors closely as its tip

**“We do have patients whom we treated 10 years ago who have never had fibrillation again,”** says Dr. Chinitz.

picks up a signal sent from an electrode pad attached to the patient’s chest and assigns that signal to a three-dimensional space. In this way, the colored electro-anatomical map pinpoints both the geography and electrical activity of every spot within the atrium, while the CT scan confirms the locations.

“By understanding the relationship between the left atrium and pulmonary veins, we can first measure the electrical signals that come from the catheter, and use both the electrical and anatomic data to know where to deliver our lesions,” Dr. Chinitz says.

Additional advances are already in play or near at hand. A collaboration with the Department of Radiology, for example, has yielded technology that can fuse the CT scan and three-dimensional model into a single image. A cutting-edge prototype will go even further, peeling back the outer lining of the CT scan to reveal fine-resolution details of the intracardiac surface and the catheter as it moves over that terrain. Other collaborative efforts will incorporate magnetic resonance imaging and intracardiac ultrasound to further enhance the precision and efficacy of the procedure.

The efficacy of atrial ablation may be far from settled in the medical community, but many are taking notice. A study in the *New England Journal of Medicine* suggests that, among patients with congestive heart failure, catheter ablation can improve



Larry Chinitz, M.D.

overall heart function by restoring a normal rhythm. A more recently published study in *Circulation* suggests a clear “superiority” of catheter ablation in maintaining rhythm and improving symptoms, exercise capacity, and quality of life.

For the first time ever, the American Heart Association and the American

College of Cardiology listed ablation in their 2008 guidelines as a second-line treatment for treating atrial fibrillation. “In other words, try a drug. If you fail the drug, then ablation is a suitable alternative,” says Dr. Chinitz.

To become a first-line treatment, the technique will have to prove itself over time. “We do have patients whom we treated 10 years ago who have never had fibrillation again,” he continues, “so we do know that it is a curable disease certainly in some populations.”

A randomized prospective clinical trial may help determine whether that promise holds up in the longer run. Sponsored by the National Institutes of Health, the multicenter trial should answer whether ablations are better than the current drug regimens at reducing strokes, heart attacks, and patient deaths.

The procedure is not without risk. Serious complications have fallen significantly as the ablation technique, equipment, and monitoring all improve. But Dr. Chinitz still worries about the potential for blood clots to form as a side effect of manipulating the catheter or cauterizing the heart muscle, and his team must be vigilant to avoid unintended damage to the heart and pulmonary veins or to the neighboring esophagus, lungs, and coronary artery.

NYU Langone’s progress is attracting notice, and investment. St. Jude Medical, a technology company (continued on page 35)

## Places in the Heart

*(continued from page 11)* based in St. Paul, Minn., has awarded the NYU team a large grant to continue its pursuit of better catheters, mapping technologies, and energy sources. Already the partnership has led to a specialized catheter that cools the heart surface even as it heats the deeper muscle, reducing the incidence of char and clot formation. Dr. Chinitz is heartened by the investment. "It's one thing to know the physiology and to understand what has to be done," he says. "But large investments from industry are required in order to make really significant advances in safety and efficacy."

Beyond physical interventions, fellow NYU cardiologist William J. Cole, M.D., contends that doctors still possess a range of options for treating atrial fibrillation. One promising new drug in Phase III clinical trials, dronedarone, is aimed at replacing less-effective and more-toxic antiarrhythmic drugs. But Dr. Cole concedes that even dronedarone will not eliminate the need for warfarin, and that younger patients determined to avoid a lifetime on the blood thinner are driving the push toward catheter ablation.

Meanwhile, for Ronnie Schultz and Robert Conklin, the benefits continue to outpace the inconveniences. A bout of the flu has slowed Conklin's recovery since his ablation, but he can now climb his home's steep cellar stairs without pausing halfway to catch his breath. He acknowledges that his preexisting problems make his case more difficult, and that no one can guarantee his atrial fibrillation has now been cured. Even so, he has high praise for Dr. Chinitz and his "top drawer" staff, and high hopes that he'll be able to fish and do some light clamming this summer. "So far everything seems to be great," he says.

Ronnie Schultz appreciates what the procedure has done for her quality of life. "My feeling was: I was in my late 30s, I'm an active person, I'm not 75 and just going to the supermarket," she says. "I did not want to take these toxic drugs any longer." Nor did she want to return to the days when it was all but impossible to do the job she loves: photographing dogs and children.

It is now several months since Schultz's January scare with her pug provided a real-life stand-in for the intravenous stimulants and physical tests the medical team often uses to locate hidden trigger points set off by stress. The fact that Schultz didn't go into full-blown

Dr. Fowler and Dr. Chinitz.



fibrillation suggests that her last ablation may have neutralized most, if not all, of her triggers.

Dr. Chinitz, she says, did some "extra credit" on the last ablation, cauterizing every problem spot he could find. And so far, her palpitations have been less frequent, and she has felt a definite improvement in quality of life. But she still takes a beta blocker as a heart-slowng precaution, and avoids stimulants and unnecessary stress. "I still think I have a weakness in my heart, but I don't have that chronic atrial fibrillation," she says. She accepts that no one can tell what the shelf life of her last ablation will be, given her history. Even so, she says, "I'm remarkably better."

Dr. Chinitz points to Schultz's story as that of an ever-advancing intervention. "I think she reflects the evolution of our procedure and the theme that in some patients, if you work hard enough, ultimately you can be successful," he says.

More than just "cranking out the procedure," though, he is quick to emphasize his 12-member team's focus on caring for patients during what can be a lengthy process. Nearly a decade into her own healing, Schultz is unequivocal about the importance of that approach. "I think Larry is not only very, very skilled at what he does, he does some of that hand-holding that I as a patient need, and I feel very comforted by him," she says.

And she has drawn support from the entire team. "They don't just treat my heart," she says. "They treat the whole body, and they know me as a person." A person who once again is focusing on her passion for pugs and photography. ●

## Minding the Body

*(continued from page 29)* develop ways of coping with the disease's challenges."

NYU's approach to Parkinson's includes a clinical facility where comprehensive care is delivered by an interdisciplinary team, ongoing research into the disease's causes and potential treatments, psychological counseling for patients and support groups for family members, community outreach to promote Parkinson's awareness, and exercise. Dr. DiRocco once encouraged patients to take regular fitness classes, but he became discouraged by the lack of support they received. One patient, he remembers, was banned from a yoga class because her tremors disturbed the other participants.

In search of a more welcoming environment, NYU recently partnered with the Jewish Community Center of Manhattan to establish the NYU/JCC Parkinson Wellness Program. The program, supported by the Edmond J. Safra Philanthropic Foundation, offers classes in tai chi, yoga, Pilates, the Alexander technique, and Nia, which combines music and movement—all taught by specifically trained instructors—and educational workshops.

For Frank D'Andrea, the weekly classes have been very helpful: "I take tai chi and Pilates," he says. "The tai chi keeps me flexible, while Pilates is great for my midsection strength and my breathing." D'Andrea supplements the classes with long daily walks, even though his legs sometimes freeze when he is walking. He takes several medications for his symptoms—including dopamine, a dopamine agonist (which mimics dopamine's actions), and amantadine (which makes more dopamine available to the brain).

"One of Parkinson's ironies is that someone like Frank may look good on a given day," notes Amy Lemen, LMSW, social worker and coordinator of the wellness program. "We can't tell what's really going on inside. At other times, a person may have very obvious symptoms. The disease can be isolating for both of these reasons. That's an additional advantage of our wellness program, because it gets patients out into a vibrant community hub where people have been educated about Parkinson's. It's one important way to keep them moving and enjoying life." ● —ROYCE FLIPPIN