

Screening for Parkinson disease:

How, Who and When



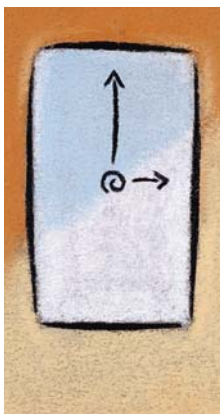
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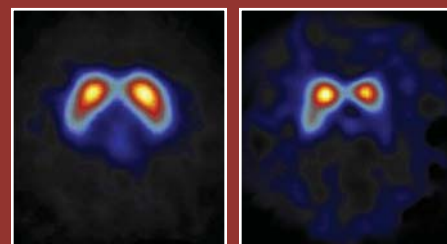
Screening in medicine has become so common that we take it for granted when the doctor checks our blood pressure or our cholesterol. Screening tests are done to detect risk factors for illnesses so that these conditions can be caught and corrected before serious problems develop. Throughout medicine, from diabetes to osteoporosis or even to glaucoma, screening and prevention have become a standard approach. It is only a matter of time before the same is true for Parkinson disease (PD).

How do currently available screening tests work?



The ability to detect PD before motor features develop already exists. Imaging tests such as fluorodopa-PET (positron emission tomography) and dopamine transporter SPECT (single photon emission computed tomography) (see figure 1) create pictures of the dopamine neurons in the brain. Up to 30–50% of these neurons are lost before the motor symptoms of PD become apparent. PET and SPECT scans are sensitive enough to show abnormalities that are less than this threshold. Several studies using imaging have shown abnormalities in at-risk people several years before they are diagnosed with PD.

FIGURE 1



HEALTHY CONTROL

EARLY PD

Dopamine transporter SPECT images of a normal subject (left) and a patient with early PD (right). The patient has loss of SPECT signal, which is greater on the right side than left. Individuals who are at risk for developing PD may show loss of SPECT tracer before any clinical symptoms are present.

Olfactory (smell) testing can also detect evidence of PD before tremor or rigidity become apparent. Unlike imaging, smell testing is inexpensive and can be done anywhere using portable scratch and sniff booklets such as the University of Pennsylvania Smell Identification Test (UPSIT) (see figure 2).

Genetic tests can also be used to identify people who are at risk of developing PD. About 5–10% of PD is now thought to be due to genetic causes. This number could climb much higher as progress in genetics continues at a rapid pace. Tests for genetic variants (mutations) known to cause PD are currently performed in research laboratories, and one test, for the *parkin* gene, is commercially available.

However, each of these technologies has limitations. Genetic testing is limited because only a fraction of PD is genetic. In addition, genetic tests give no indication of the age

at which PD will start. Imaging is probably very accurate, but is expensive and needs to be repeated every few years to catch the first evidence of brain degeneration. Olfactory testing, while inexpensive and portable, is less accurate than imaging, as there are many reasons for a reduced sense of smell other than insipient PD.

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One solution to the limitations of individual tests is to use them in combination. For example, an individual who is at increased risk due to genetic factors could be screened periodically with an olfactory test and have imaging only when impairment in smell testing is noted. This staged approach to screening is common throughout other areas of medicine.

Who might be a candidate for screening?

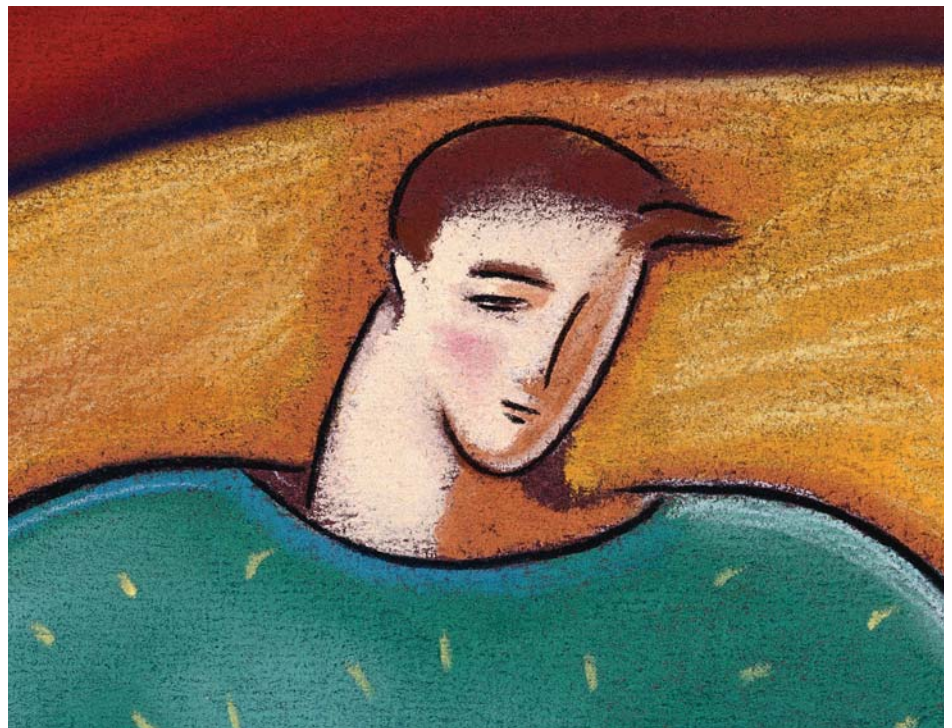
General population screening is usually reserved for very common disorders such as heart disease. Screening for PD is more likely to target high-risk groups, such as people with a family history of PD, or extremely high levels of exposure to environmental factors that may increase the risk of PD. Targeted screening is already used in other areas of medicine including some cancers and infectious diseases.

There are currently no guidelines that recommend routine screening for PD, and screening is not part of standard clinical practice, even at specialty clinics that care for families with multiple affected members. In select settings, individuals who are at high risk for PD may receive the results of genetic testing as part of a research protocol. In such cases, results of research screening tests need to be accompanied by substantial

FIGURE 2



The University of Pennsylvania Smell Identification Test (UPSIT) is made up of four scratch and sniff booklets. Many patients with Parkinson disease lose their sense of smell some time before other symptoms develop.





counseling to help the at-risk individual put the meaning of the test into the proper context.

When will screening for PD become commonplace?

Preventive therapy is the key missing ingredient that would rationalize wide-spread predictive testing for PD. Some at-risk individuals may decide to be tested to help with life planning or to reduce anxiety related to the belief that they may develop PD. However, without treatments that can delay the onset of motor symptoms once a person has a positive screening test, widespread screening programs for PD are probably not justified.

On the other hand, now is an appropriate time to develop and test screening strategies so they will be ready to use when they are needed. At some point in the future, effective neuroprotective therapies will exist, and efficient and reliable screening

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strategies should be in place so that these therapies can be used in a preventive fashion. As a clinical research agenda, screening tests and neuroprotective treatments should be developed in parallel to achieve the goal of preventing PD.

For the time being, screening for PD is being performed as clinical research rather than clinical practice. The Parkinson At-Risk Study (PARS) is a nationwide effort to test the screening strategy of olfactory testing followed by SPECT imaging in first-degree relatives of PD patients. The PARS study will screen up to 5,000 relatives of PD patients with olfactory testing over the next four years. People with a parent, sibling or child with PD, and who are either over 50 years old or within 10 years of the age of onset of their affected relative may be eligible. The study is being conducted at 20 clinical centers, including a number of NPF Centers of Excellence. For more information about PARS, visit www.parsinfosource.com. ■