Imaging Psychiatric Conditions

Brain imaging may be able to detect changes that contribute to schizophrenia, depression, post-traumatic stress disorder, and other psychiatric conditions. In a 2011 paper published in *Neurotherapeutics*, Joseph C. Masdeu, M.D., Ph.D., a physician and scientist with the National Institutes of Health, described how functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) scans have revealed abnormal activation of the frontal lobes and other brain structures in schizophrenia. These scans have also helped to distinguish clinical depression from the apathy produced by frontal lobe damage.

One of the more interesting recent applications of brain imaging has been to investigate a peculiar and very disruptive side effect of treatment for Parkinson’s disease (PD): a delusional form of jealousy known as Othello syndrome. While receiving L-dopa to replenish the dopamine that their brain no longer produces in sufficient quantities, some PD patients start to accuse their spouse of sexual infidelity. Keith Josephs, M.D., professor of neurology at the Mayo Clinic College of Medicine in Rochester, MN, and member of the American Academy of Neurology, encountered a 42-year-old man with PD who—while taking pramipexole, a drug that mimics the action of dopamine—started accusing his wife of having an affair. He watched the driveway obsessively, expecting to find her lover waiting to pick her up. He also began to gamble and shop compulsively.

In 2012, Dr. Josephs published a study in the *European Journal of Neurology* that examined 105 cases of Othello syndrome. He found that 73 of them had overt brain damage—revealed through brain imaging—that involved the right frontal lobe. Some of the causes include Lewy body dementia, tumor, and stroke. How does damage to the right frontal lobe produce psychiatric symptoms? Richard Camicioli, M.D., a clinical neurologist at the University of Alberta in Canada, believes impairment of the right hemisphere weakens normal inhibition and gives impulses a chance to express themselves without restraint. In a 2011 paper, “Othello syndrome: At the interface of neurology and psychiatry,” published in *Nature Reviews Neurology*, Dr. Camicioli said the left hemisphere generates interpretations of experience, while the right hemisphere monitors those interpretations and inhibits the impulse to act on them. However, when brain imaging shows that patients with PD show no signs of dementia or damage to the right hemisphere, their delusions may be caused by drugs that boost dopamine levels, such as levodopa and amantadine. These agents apparently can compromise the right hemisphere’s ability to inhibit impulses, because when the patients go off the medication, their Othello syndrome usually disappears.