

## **When Viruses Invade the Brain**

Neurodegenerative diseases may result from a nasal infection

By Stephani Sutherland | December 28, 2011 | 5

Neurodegenerative diseases were once considered disorders of the mind, rooted in psychology. Now viruses rank among the environmental factors thought to trigger brain-ravaging diseases such as multiple sclerosis (MS) and Alzheimer's disease. Human herpesvirus-6 (HHV-6), in particular, has been linked to MS in past studies. Neuroscientist Steven Jacobson and his colleagues at the National Institute of Neurological Disorders and Stroke have determined that the virus makes its entry to the human brain through the olfactory pathway, right along with the odors wafting into our nose.

The researchers tested samples of brain cells from people with MS and healthy control subjects and found evidence of the virus in the olfactory bulb in both groups. Infection via the nasal passage is probably quite common, as is harboring a dormant reservoir of HHV-6, but in people with MS, the virus is active. Genetics and other unknown environmental factors probably determine the likelihood of the virus reactivating once inside the brain, which can cause the disease to progress.

The virus appears to invade the brain by infecting a type of glial cell called olfactory ensheathing cells (OECs), which nourish smell-sensing neurons and guide them from the olfactory bulb to their targets in the nervous system. These targets include the limbic system, a group of evolutionarily old structures deep in the brain, "which is where viruses like to reactivate," Jacobson explains. He points out that olfactory neurons and their OECs are among the few brain cells known to regenerate throughout our life. This neurogenesis may keep our sense of smell sharp, but at the cost of providing the virus the opportunity to spread.