MS Families: It's Genes, Not a Virus

Multiple sclerosis (MS) clusters in families because family members share genes that make them susceptible to the disease, a new study concludes—not because a virus that directly causes the illness spreads within the family, as some investigators have suggested.

"The increased risk seems entirely attributable to genes," says George C. Ebers of the University of Western Ontario in London, Canada. Ebers and his colleagues, who include physicians across Canada, discuss their study of 15,000 MS patients in the Sept. 14 NATURE.

In MS, an autoimmune disease, the body attacks its own nervous system, dispatching immune cells to destroy the insulating sheaths around nerve cells. This damage prevents nerve cells from properly transmitting signals and can lead to coordination difficulties or paralysis, as well as to visual impairment and other sensory difficulties.

Only about one-tenth of a percent of the population suffers from MS. Yet epidemiological studies show that an individual's risk of getting the disease rises to 3 or 4 percent if someone in that person's immediate family—a parent, sibling, or child—has the disease. And if one identical twin has MS, the chance that the other will have it too reaches about 30 percent.

Those pieces of evidence strongly suggest that genes constitute an important factor in whether a person contracts the disease. But there remained another possible explanation, notes Ebers.

A small number of researchers, pointing to what they believe have been epidemics of the disease, have argued that a transmissible virus may directly cause MS. According to this hypothesis, someone with the virus would probably pass it on to others in close proximity, notably members of his or her immediate family, leading to family clusters of the disease, says Ebers.

Ebers' inspiration for resolving the issue came when he was talking to one of his MS patients. The patient told him she had learned that the daughter she had given up for adoption 30 years earlier had also developed MS. Ebers wondered whether families that adopted an individual who developed MS have a greater than normal incidence of the disease. Would children who had an adoptive parent with MS face a greater risk of the disease?

The answer to both questions is apparently no. The researchers tracked down 1,201 nonbiological parents, siblings, or children among the families of the 15,000 MS patients in their study group. Among these nonbiological relatives, they found only one case of the disease—an incidence rate comparable to that in the general population. This means that the family clusters of the disease stem from genes that predispose family members to the illness, conclude Ebers and his colleagues.

"There has been a strong suggestion that there is a specific multiple sclerosis virus. This data says that can't be true," agrees Byron H. Waksman of New York University in New York City.

Still, notes Waksman, the data say nothing about what triggers MS in genetically susceptible people. Many researchers, he notes, still speculate that viruses are indirectly responsible for the disease.

In people predisposed to MS, Waksman explains, infection by viruses that cause other diseases may generate an immune response that mistakenly targets the nervous system as well.

Researchers have recently begun a number of efforts to find the genes that make people vulnerable to MS. For instance, they're examining families that have more than one case of the disorder. By comparing the DNA of family members who have the disease with the DNA of those who escaped it, investigators should be able to home in on susceptibility genes, says Ebers.

"In the next few years, I think we will have our hands on a few genes," adds Abraham Eastwood of the U.S. National Multiple Sclerosis Society, which has provided around $700,000 for one ongoing search for susceptibility genes.

— J. Travis

How tiny crystals decorate iris agates

Agate, a type of quartz whose iridescent patterns sparkle with color, has long been valued as a semiprecious stone. Now, scientists can explain how its elegant swirls form.

Peter J. Heaney, a geologist at Princeton University, and Andrew M. Davis, a geological chemist at the University of Chicago, show that concentric shells of fine and coarse crystals alternate to create agate's light-diffracting "iris" bands.

Agate, formed when mineral-rich water flows through volcanic rock, consists of millions of micrometer-sized crystals. Those crystals, the researchers observe in the Sept. 15 SCIENCE, come in different sizes and contain varying degrees of impurities, caused by changes in the water's mineral concentrations.

Observing agate slices with transmission electron microscopy and ion mass spectroscopy, the two scientists found that the size of the tiny crystals and the degree of impurities change cyclically, forming the iris band's crystal pattern. When scrutinized, agate slices reveal a self-similar pattern, which repeats itself at various levels of magnification: on the micrometer scale (a), on the millimeter scale (b), and on the centimeter scale (c).

"Agates show us one way that nature makes repetitive patterns," Heaney says. "Self-similarity is fascinating because it's largely unexplained.

"Understanding this process may shed light on how materials scientists can mimic those textures in new materials."

— R. Lipkin