Schizophrenia Yields New Gene Clues

Scientists' limited understanding of how genes contribute to schizophrenia just got a shot in the arm. Four independent research teams now report that one relatively small DNA segment, containing several hundred genes at most, includes a gene that confers a susceptibility to schizophrenia—at least in a substantial minority of cases.

The new studies support earlier evidence of a connection between schizophrenia and a gene somewhere in a short stretch of chromosome 6 (SN: 5/13/95, p.297). However, two other research efforts failed to link the chromosome 6 region to this severe mental disorder, which afflicts an estimated 1 in 100 people worldwide.

All six investigations appear in the November NATURE GENETICS.

Despite the contradictory results, evidence of a schizophrenia susceptibility site on chromosome 6 is "significant—and probably confirmed," write Eric Lander and Leonid Kruglyak, both geneticists at the Massachusetts Institute of Technology in an editorial accompanying the reports.

"I wouldn't go as far as that," responds Elliot S. Gershon, director of the neurogenetics branch of the National Institute of Mental Health in Bethesda, Md. "This new evidence is encouraging and a positive step forward, but further replications are still needed."

One study, which included data from the previous chromosome 6 analysis, consisted of 265 Irish families, each having at least two members diagnosed with schizophrenia or related psychotic disorders. A total of 1,408 individuals gave blood samples for DNA analysis.

Special enzymes snipped out DNA segments at 16 known locations. The researchers, led by Richard E. Straub of Virginia Commonwealth University in Richmond, analyzed the rates and patterns of alterations in the chemical sequence of these sections in both healthy and schizophrenic volunteers.

Only in the chromosome 6 area did variations show a statistical link to schizophrenia. In perhaps one-quarter of the families, a gene in this region raised the likelihood that a person would develop schizophrenia, Straub's team contends.

Both the identity of the gene and the way it works remain unknown.

An international study directed by Hans W. Moises of Kiel University Hospital in Germany connects schizophrenia susceptibility to the same chromosome 6 region, as well as to segments of chromosomes 9 and 20. Human DNA contains 23 pairs of chromosomes.

Moises' team studied 65 families, each with two or more schizophrenic members. Families came from Austria, Canada, Germany, Italy, Scotland, Sweden, Taiwan, and the United States.

Similar chromosome 6 findings come from two additional DNA analyses of families with multiple schizophrenic members. A team led by Sibylle G. Schwab of the University of Munich in Germany studied 43 German families and 11 Israeli families. And a group directed by Ann E. Pulver of the Johns Hopkins University School of Medicine in Baltimore examined 57 U.S. families.

However, teams led by Bryan J. Mowry of the University of Queensland in Australia and Hugh Gurling of University College, London found no evidence that chromosome 6 variations create a vulnerability to schizophrenia in 68 families from Australia, England, Iceland, and the United States.

Initial studies linking DNA regions to schizophrenia were abandoned for lack of confirming evidence. Those studies relied on statistical models derived from genetic diseases that cannot be compared to schizophrenia, which appears to be influenced in complex ways by a number of genes, asserts Virginia Commonwealth's Kenneth S. Kendler, coauthor of the Straub study.

A "high probability" now exists that a schizophrenia predisposition gene lies on chromosome 6, Kendler contends. Future studies must search for schizophrenia-related alterations in much smaller pieces of the identified DNA segment, in his view.

In fact, a family study presented last week in Minneapolis at the annual meeting of the American Society of Human Genetics did just that. A specific pattern of repeated chemical units in a chromosome 6 area containing about a dozen genes shows a strong link to schizophrenia, reported Scott R. Diehl of the National Institute of Dental Research in Bethesda and his coworkers. One of those genes causes a disease of the cerebellum and may play a role in some cases of schizophrenia, Diehl theorized.

— B. Bower

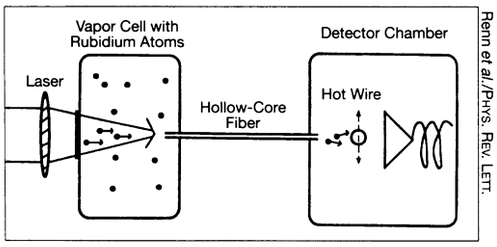
Taking atoms for a tunnel-of-light ride

When it comes to moving atoms from one place to another, light can lead the way.

Researchers have succeeded in getting a string of atoms to thread a hollow glass fiber by filling the tube with laser light. The resulting optical forces pull the atoms in and steer them through the fiber, even when the tube is bent.

M.J. Renn, Dana Z. Anderson, Eric A. Cornell, and their coworkers at the University of Colorado in Boulder describe their use of lasers to guide atoms along optical fibers in the Oct. 30 PHYSICAL REVIEW LETTERS.

This technique offers a potentially convenient and flexible method of controlling the paths of atoms. The transparency of the optical fiber walls also allows researchers to use another laser to manipulate atoms as they travel down the tube.



Focused laser light enters and fills a hollow glass fiber (3.1 centimeters long and 144 micrometers wide) to guide rubidium atoms from the vapor cell to the detection chamber.

"Fiber-guided atoms may facilitate many atomic physics experiments," the researchers say.

For example, at sufficiently low temperatures, atoms confined to narrow enough tubes begin to behave like waves. "This presents the exciting prospect of fiber-atomic interferometry in analogy with fiber-optic interferometry," they note.

To guide atoms along a hollow-core optical fiber, Renn and his colleagues make the laser light brightest at the tube's center and tune its frequency to a value just below that at which rubidium atoms absorb the maximum amount of light. This light enters the fiber's hollow core, glancing off the inner surface as it propagates from one end to the other.

The electric fields created inside the fiber attract atoms to the core's central region and keep them confined as they travel along the glass tube.

The Colorado team has already guided atoms in short fibers with holes as small as 10 micrometers in diameter. Guiding atoms down smaller fibers is feasible, though more challenging, the researchers say.

— I. Peterson

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