SCIENCE NEWS of the week

Schizophrenia: Genetic Clues and Caveats

For the first time, scientists have obtained evidence that a specific chromosome mutation contains a gene predisposing its bearers to schizophrenia and closely related mental disorders. In the Nov. 10 NATURE, psychiatrist Robin Sherrington of the University of London, England, and his colleagues say schizophrenia in seven Icelandic and English families is associated with inheriting a specific region of chromosome 5, indicating the presence of a gene influencing the occurrence of the disorder.

Another study in the same NATURE indicates, however, that schizophrenia is too complex to result from a single gene. Psychiatrist James L. Kennedy of Yale University and his co-workers report that the same region of chromosome 5 is unrelated to schizophrenia in several generations of a large Swedish family. The researchers suggest there may be several genes, each causing a different biochemical abnormality, that together result in a "final common pathway" to schizophrenia.

Although researchers cannot yet apply the findings to schizophrenics in general, who represent about 1 percent of the world's population, the new data "have broken the ice concerning the genetic mapping of schizophrenia," writes Eric S. Lander of Harvard University in a comment accompanying the reports.

Further information on how the specific chromosome 5 region relates to the inheritance of schizophrenia will come from studies underway at the National Institute of Mental Health (NIMH) in Bethesda, Md., and the University of Utah in Salt Lake City. Tentative results from four families with a large number of schizophrenic members do not suggest a "predisposition" gene lies in the identified chromosome 5 area, says psychiatrist Elliot S. Gershon, director of the NIMH project. Conclusive genetic data on several similar families in Utah will be available in a month or two, adds study director William Byerley.

In general, schizophrenia refers to a severe fragmentation of thought, emotion and behavior, often accompanied by delusions, hallucinations, apathy and an inability to take care of one's basic needs. Sherrington and his colleagues studied five Icelandic and two English families. Among a total of 104 individuals, 39 suffered from some form of schizophrenia, such as paranoid schizophrenia. Another five persons had a related disorder, called schizoid personality disorder, in which social relationships are shunned and strong emotions are rarely experienced. An additional 10 subjects had mental disorders unrelated to schizophrenia, such as severe depression.

The researchers took blood samples from each family member and isolated the DNA, which carries the entire human genetic code. To this they applied two enzymes known to cut DNA at recognizable sites on chromosome 5. The enzymes expose common genetic variations, such as a deletion or addition of a segment of DNA. If the variations, or mutations, show up predominantly in those with a particular disease, researchers assume the DNA segment contains a gene crucial to the disease.

A statistical link between psychiatric illness and a common mutation is strong in the seven families, particularly when all the psychiatric disorders, not just schizophrenia, are included. This suggests that the various diagnoses may be more closely linked than psychiatrists have thought, Lander says. Further genetic studies may "pave the way" to splitting schizophrenia into distinct diseases, he asserts.

Kennedy and his colleagues studied genetic material from 81 members of an isolated Swedish family living above the Arctic circle; 31 are diagnosed as schizophrenic, while the rest have no psychiatric disorders. Using five DNA-cutting enzymes on chromosome 5, including the two used by Sherrington and his coworkers, the researchers found no link between schizophrenia and irregularities in any of the DNA regions.

The most likely reason for the disparity between the two studies, according to Yale psychiatrist Kenneth K. Kidd, who participated in the Swedish research, is that a number of genes are involved in the expression of schizophrenia. Even in the Icelandic and English families, he says, there is nearly a 30 percent chance that someone with a chromosome 5 mutation will not develop schizophrenia. Genetic research on manic depression also suggests several genes are involved (SN: 3/28/87, p.199).

Genetic work does not rule out the occurrence of nongenetic forms of schizophrenia, notes Hugh Gurling of the University of London, who took part in the Iceland-England project. Relying on families with many schizophrenic members biases the sample, Kidd adds, since most schizophrenics have few schizophrenic relatives.

The researchers' goal is to develop DNA markers accurate enough to flank the crucial gene. The gene's biochemical code can then be uncovered. At this point, Gurling says, "we can't say what specific gene on chromosome 5 predisposes to schizophrenia [among our subjects] or what its biochemical basis is."

Remarks Kidd, "It will be a major problem to find additional large families with enough schizophrenic members to further test the chromosome 5 findings." Long-term follow-up of people with the chromosome 5 mutations is important, he says, "since we have no good idea how a genetic abnormality contributes to a disease as complex as schizophrenia."

– B. Bower

Double-strength cholesterol reducer?

Rice bran, an upstart competitor with oat bran for honors as the top cholesterol-reducing food, looks like a winner.

An ongoing study at the U.S. Department of Agriculture (USDA) research center in Albany, Calif., indicates rice bran works as well as oat bran in lowering blood cholesterol in hamsters. Moreover, the researchers have found that defatting – a common process for extracting oil from rice bran and other foods – may double rice bran's cholesterol-reducing efficiency. Oat bran's structure is not conducive to defatting, says study leader Talwinder S. Kahlon.

Preliminary results show a balanced diet including 10 percent dietary fiber from defatted rice bran reduces cholesterol in hamsters by more than 25 percent. The experiment needs verification, the researchers say. They also hope to determine why rice bran is more effective without its oil, which contains no saturated fat or cholesterol.

The researchers first fed 70 hamsters a special diet to increase their cholesterol levels. Then, for three weeks, groups of 10 hamsters each ate diets differing only in the source of fiber: defatted rice bran, rice bran, oat bran, wheat bran or a mixture of wheat and oat bran. One control group received no extra cholesterol, while another got cholesterol but no reducer. To equalize total oil content and calorie levels, the researchers added corn oil to all the diets except the ordinary rice bran diet.

An age-old livestock staple, rice bran – the brown shell removed during the milling of white rice – is used increasingly in U.S. snacks and cereals. Asian companies extract rice bran's oil, but they sell the oil for food products and the defatted bran primarily for use in agriculture and industry. *– C. Knox*