

Gene may be tied to 'virulent' alcoholism

For the first time, scientists have evidence that a specific gene confers susceptibility to at least one type of alcoholism, according to a research paper in the April 18 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION.

One form of the dopamine D2 receptor gene appeared in DNA from 24 out of 35 alcoholics, report Kenneth Blum of the University of Texas Health Science Center in San Antonio and his co-workers. The same gene occurred in only seven of 35 nonalcoholics, they add.

The team obtained the DNA from brains of deceased individuals, predominantly men, and diagnosed alcoholism using several sources, including medical records and interviews with surviving relatives.

Since most alcoholics in the sample had not responded to treatment for the disorder and had died of alcohol-related causes, the dopamine D2 receptor gene tracked in the study may be linked to a "particular subtype of virulent alcoholism," the researchers contend.

"This observation is provocative and promising but must be regarded with caution," write Enoch Gordis, director of the National Institute on Alcohol Abuse and Alcoholism in Rockville, Md., and three colleagues in an accompanying editorial.

Recent failures to verify initial reports of DNA fragments associated with manic depression (SN: 11/18/89, p.327) and schizophrenia (SN: 6/10/89, p.359) emphasize the need to confirm the new results in genetic studies of large families with many alcoholic members, Gordis and his colleagues maintain.

In 1989, investigators identified the gene for the D2 receptor on chromosome 11 and provided Blum's group with a chemical probe for the gene. First, Blum and his co-workers used special enzymes to cut the DNA into fragments, which they placed in an electrically charged gel that separated the fragments into identifiable patterns. They then exposed the fragments to the gene probe.

The course of alcoholism and the personalities of alcoholics vary considerably, the scientists note. Thus, they were not surprised to find that nearly one-third of the alcoholics did not possess the dopamine D2 receptor gene. Such individuals may respond only to environmental influences or to other, unidentified genes that combine to foster a predisposition to alcohol use, Blum and his co-workers assert.

For now, they conclude, the findings suggest that an abnormality in the dopamine D2 receptor gene may cause susceptibility to a severe, life-threatening form of alcoholism.

Although the dopamine D2 receptor is "a plausible candidate gene" for alcohol-

ism susceptibility, other chemical messengers in the brain may play a greater role than dopamine in reinforcing alcohol use, Gordis and his colleagues point out. Moreover, they contend, Blum's team offers only a "sketchy clinical description" of alcoholic and nonalcoholic subjects based on retrospective evidence. Nor do the researchers define the "virulent alcoholism" linked to the dopamine D2 receptor gene.

Alcoholism subtypes are currently undergoing intensive scrutiny, with scientists questioning even the most commonly accepted breakdown of the disorder. That theory, proposed in 1987 by C. Robert Cloninger of Washington University in St. Louis, describes two types of alcoholism. Type 1 is more responsive to the environment and occurs after age 25. These alcoholics are eager to please, seek social approval, are cautious and anxious, and tend to be reserved. Type 2 is highly influenced by heredity and begins by adolescence. It is characterized by

impulsive novelty-seeking, the abuse of multiple drugs and involvement in violent and criminal acts.

But two new studies, directed by Marc A. Schuckit of the Veterans Administration Medical Center in San Diego, suggest Cloninger's theory needs considerable revision. In the April AMERICAN JOURNAL OF PSYCHIATRY, Schuckit's group reports that, among a sample of 66 young nonalcoholic men, self-reported Type 2 characteristics are not associated with heavier drinking or having an alcoholic father. And in the April ARCHIVES OF GENERAL PSYCHIATRY, they report that the severity of alcoholism among 171 men admitted to a hospital treatment program was not associated with their self-reports of Type 1 or Type 2 features.

Schuckit says Type 2 alcoholics may have a psychiatric disturbance known as antisocial personality disorder, which consists primarily of long-standing irresponsible, violent and criminal behavior. Further research into subtypes must concentrate on the approximately two-thirds of alcoholics with no preexisting psychiatric disorder, he adds. — B. Bower

Potential signs of an underground killer

Many people think of California as synonymous with earthquakes. But the largest quakes in the history of the contiguous United States have actually hit the supposedly stable heartland, far from the edges of the crustal plate that carries North America.

Geologists fear that such large "intra-plate" earthquakes will strike again, yet they have a hard time predicting where the shocks will occur. A new study points to a possible way of identifying earthquake-prone areas even in the middle of a plate.

Robert M. Hamilton of Reston, Va., and Walter D. Mooney of Menlo Park, Calif., both with the U.S. Geological Survey, examined data collected in 1980 during a series of experimental explosions set off in the New Madrid fault zone, where Missouri, Kentucky, Tennessee and Arkansas meet. In late 1811 and early 1812, a series of three shocks greater than magnitude 8 struck this area, shaking it so violently that scaffolding rattled at the U.S. Capitol building in Washington, D.C., more than 700 miles away.

Hamilton and Mooney analyzed recordings made by seismometers surrounding the experimental blasts. They found that seismic waves from the explosions weakened considerably when passing through active parts of the fault zone — areas that regularly produce small earthquakes. The waves traveled much farther when they went through inactive parts of the New Madrid fault zone, the researchers report in the April 20 SCIENCE. Previous studies had suggested a general relationship between quake-

prone regions and wave attenuation, or weakening, but they did not use experimental blasts to look at specific faults in detail.

Noting that repeated earthquakes can fracture rocks in a fault, the researchers propose rocks as a possible explanation for the wave attenuation recorded in seismically active areas. These rocks can absorb and scatter seismic waves, and can also funnel waves down into the crust, they say.

Tests of wave attenuation could serve as a diagnostic tool "to identify the zones that are prone to generating earthquakes," Hamilton and Mooney suggest. This is particularly important west of the Rockies, where seismologists remain unsure which fault zones can cause large earthquakes. Some faults may appear dormant for hundreds of years, then spring to action.

Attenuation tests might also reveal unknown faults buried beneath thick layers of surface rock and help researchers evaluate the threat of known faults in recently settled areas with limited historical records of seismic activity, Mooney says.

Seismologist Keiiti Aki told SCIENCE NEWS he's very excited by the recent results, which confirm some of his previous research findings. Aki, of the University of Southern California in Los Angeles, has observed that seismic waves from distant earthquakes tend to "ring" for a long time in stable, inactive regions, whereas the ringing dies down much more quickly in seismically active areas. — R. Monastersky