Family ties heighten risk of enlarged heart

For years, heart researchers have speculated about the cause of cardiomyopathy, a mysterious and sometimes deadly disease of the heart muscle. Now, a study suggests that genetic heritage may play a stronger role in the development of cardiomyopathy than previously believed.

In some cases, alcohol abuse or a viral infection damages the heart muscle so that the lower chambers, or ventricles, enlarge and fail to pump blood effectively. However, most cases of cardiomyopathy occur for no known reason.

Although researchers had identified several large families with a tendency to the disease, they considered such "familial" cardiomyopathy uncommon. But when cardiologists at the Mayo Clinic in Rochester, Minn., noticed a number of families prone to the disease, they decided to take a closer look at the frequency of familial cardiomyopathy.

Mayo geneticist Virginia V. Michels and her colleagues studied 59 unrelated individuals with cardiomyopathy of unknown origin, as well as 315 of their relatives. Using echocardiography, a sound-wave method of determining the heart's size, the researchers discovered that 18 relatives of 12 cardiomyopathy patients also suffered from the heart ailment.

Thus, the team concludes that 12 of the 59 cardiomyopathy patients (20 percent) had a familial form of the disease. This suggests that cardiomyopathy may run in families more frequently than believed, says James H. Chesebro, a coauthor of the study. The researchers describe their findings in the Jan. 9 NEW ENGLAND JOURNAL OF MEDICINE.

Of the 18 relatives identified, 15 first learned that they had cardiomyopathy during the study, Michels says, and eight of these had no idea they had any heart problem at all.

Healthy people with a family history of cardiomyopathy may run a risk of eventually developing the disease, the researchers note. The team identified 22 healthy relatives who had slightly enlarged ventricles. Although their hearts still pumped normally, Michels says she wonders whether the slight swelling of the ventricles represents an early sign of a diseased heart.

"It could mean nothing, or it could mean that these are people who have a genetic predisposition to developing full-blown disease," Michels says. Her team will monitor these 22 people to see whether they develop cardiomyopathy later in life.

Scientists still don't know how cardiomyopathy originates. Indeed, Michels says, the new findings don't rule out the possibility of other factors playing a role in the disease. The observation that cardiomyopathy runs in families doesn't necessarily mean the cause is genetic. Michels notes that family members often share the same environment, which may harbor some unidentified, heart-damaging factor — a virus, perhaps, or a dietary deficiency (SN: 9/27/86, p.201).

However, she suspects that one or more genes play a hefty role in making some people vulnerable to the disease. The Mayo team is now searching for a specific genetic culprit. Identifying the defective gene or genes might enable researchers to pinpoint the biochemical defect causing the muscle damage, and perhaps to devise a treatment for preventing the heart's decline, Michels says.

The new evidence suggests that people with a family history of cardiomyopathy should ask their doctors about getting an echocardiogram, Chesebro adds. This painless test can reveal swollen ventricles and impaired pumping ability.

Shortness of breath, weakness and other symptoms of cardiomyopathy might seem harmless, yet the disease, if left untreated, can leave some people prone to a type of erratic heartbeat that can cause sudden death, Chesebro notes. With early diagnosis and treatment, doctors hope to prevent such lethal heartbeats and forestall further weakening of the body's powerhouse pump, he adds.

— K.A. Fackelmann

Ancient quakes signal future Northwest risk

Geologists have discovered evidence that at least three large earthquakes have rocked the coast of northern California in the past two millennia, bolstering the theory that massive tremors may lurk somewhere in the near or distant future for a large stretch of the Pacific Northwest coast.

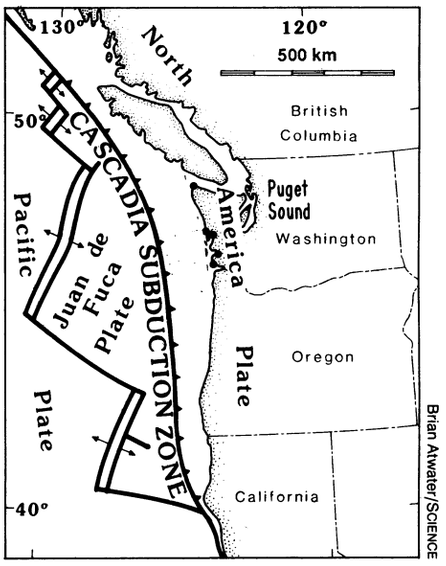
"Most people now acknowledge that a preponderance of the evidence supports the idea of huge earthquakes periodically affecting the Pacific Northwest," says Gary A. Carver of Humboldt State University in Arcata, Calif. He and Samuel H. Clarke Jr. of the U.S. Geological Survey in Menlo Park, Calif., present their findings in the Jan. 10 SCIENCE.

The coastline between northern California and southern British Columbia lies along a subduction zone — a place where large pieces of the Pacific ocean floor have crashed against North America and are sliding into Earth's interior. At similar subduction zones elsewhere in the world, seafloor-continent collisions have spawned the largest known earthquakes: Alaska in 1964 and Chile in 1960.

Some scientists have argued that such superquakes might not occur along the Pacific Northwest's subduction zone. But four years ago, geologists uncovered evidence of extreme prehistoric shocks in Washington state (SN: 7/18/87, p.42; 2/17/90, p.104). Clarke and Carver have now extended the record by showing that large earthquakes have hit the southern end of the subduction zone.

Whereas critical faults in the northern end of the subduction zone lie far offshore, the southern end curves toward shore, providing researchers with an opportunity to study such faults on land. Using the carbon-14 dating technique, Clarke and Carver found evidence of three earthquakes on such faults within the last 1,700 years.

In nearby locations, they discovered other signs that ancient earthquakes had altered the land surface. One beach had been pushed upward repeatedly, while another area had quickly dropped below sea level several times in the last few thousand years. The most recent quake occurred 300 years ago, they report.



Brian Atwater/SCIENCE

Seafloor plunges beneath North America along the Cascadia subduction zone.

The carbon-14 dates indicate that earthquakes may have rattled the north and the south at about the same time, suggesting that the entire subduction zone can slip at once, generating great quakes comparable to the magnitude 9.2 Alaskan shock of 1964, say the researchers. In another scenario, the southern end might move on its own, spawning a magnitude 8.4 quake followed by a similarly large quake in the north. In any case, says Carver, buildings in the Pacific Northwest were not built to survive a severe shaking, and the region is generally unprepared for a major quake.

Carver, Clarke and their colleagues who study other parts of the subduction zone say they have no idea when the next quake might strike. It could be hundreds of years from now, they note.

— R. Monastersky