

Genetics may underlie some artery ruptures

Genetic tests of a Texas family with a marked vulnerability to aortic aneurysms — silent and sometimes fatal weakenings in the walls of the main artery leading from the heart — show that many members inherited a faulty gene, report researchers at Thomas Jefferson University in Philadelphia. “Our study proves for the first time that there is a genetic cause for aortic aneurysms,” asserts study leader Darwin J. Prockop.

He and his colleagues have also developed a simple saliva test that offers hope for identifying others who carry aneurysm-associated genetic defects, perhaps in time to prevent a catastrophic blowout of the aorta wall.

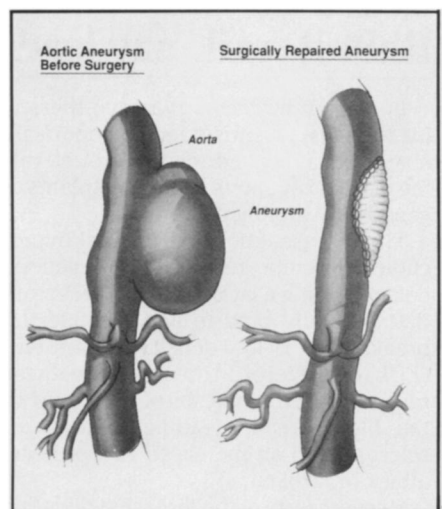
The researchers initially focused their investigation on an apparently healthy 37-year-old woman, Michele Hegler, whose mother, aunt and 15-year-old cousin had died of aortic aneurysms. While analyzing DNA from Hegler’s skin cells, the team homed in on the gene coding for collagen III—the tough, fibrous protein that gives aortic walls their strength. The analysis, described in the November *JOURNAL OF CLINICAL INVESTIGATION*, revealed that the genetic instructions for producing collagen III contained a mutation resulting in the substitution of

just one improper amino acid.

Prockop and his co-workers then examined aortic tissues that had been preserved after the death of Hegler’s mother and aunt. DNA analysis confirmed that these contained the same flawed collagen III gene. This genetic error, though tiny, appears to result in flimsy, rupture-prone aorta walls, the researchers say. They went on to develop a saliva test that identified the defect in several other family members, including Hegler’s teenage son and daughter.

Aneurysms might result from any of a variety of mutations in the collagen III gene or in other genes that code for proteins used in constructing the aorta wall, Prockop suggests. In collaboration with other scientists, including vascular surgeon R. Clement Darling at the Harvard Medical School in Boston, Prockop’s team is now studying 410 people with a family history of aortic aneurysm to see whether they carry such mutations.

If that study similarly turns up mutations responsible for weak aortas, clinicians might one day find it useful to screen relatives of aneurysm victims for signs of a genetic predisposition to this life-threatening condition, Prockop says. Identifying high-risk individuals might



Ballooning aneurysm (left) repaired with a synthetic patch (right).

enable physicians to stave off aneurysms with preventive treatment such as beta-blocker drugs that reduce the pounding pressure in blood vessels, he says. In addition, these people could undergo periodic ultrasound examinations to detect early signs of balloon-like aortic swellings. Darling predicts that some patients might opt for elective surgery to patch the damaged aorta wall rather than wait for the balloon to burst.

— K.A. Fackelmann

Radwaste dump gets permit

The U.S. Department of Energy has moved one step forward in its efforts to open the nation’s first underground nuclear waste repository, the Waste Isolation Pilot Plant (WIPP). But the agency must clear several more hurdles before it can move the first drums of waste into the facility, located about 25 miles east of Carlsbad, N.M.

Last week, the Environmental Protection Agency granted the Energy Department a critical permit allowing WIPP to accept up to 8,500 drums of mixed hazardous and nuclear waste for a five-year testing phase, during which engineers must demonstrate that the waste will not migrate out of the disposal site. That number of drums represents 1 percent of WIPP’s capacity.

Before testing can begin, though, the Energy Department must obtain a land-withdrawal permit from the Interior Department or Congress. It also must prepare the repository for the tests, which will involve placing canisters in a sealed room to measure the pressure of gas generated by the waste. But engineers have had trouble sealing the rooms and do not expect to achieve a successful seal before early 1992, says Lokesh Chaturvedi of the Environmental Evaluation Group, a New Mexico task force charged with overseeing the WIPP project. □

Biological clues linked to criminal record

By following the fates of British schoolboys for nearly a decade, researchers have identified three physiological markers that, combined with other factors, may help predict criminal behavior among young men.

Students who went on to commit serious criminal offenses as young adults had significantly lower heart rates and decreased electrical activity in the skin and brain during adolescence, report psychologist Adrian Raine of the University of Southern California in Los Angeles and two British colleagues. This represents the first good evidence from a prospective study that many criminals experience subdued physiological arousal, the researchers maintain.

From three schools in England, Raine’s team recruited 101 15-year-old boys whose academic and social backgrounds represented a national cross-section of male teenagers. In 1978 and 1979, they obtained physiological measures from each youth.

In 1988, a search of the British government’s computerized record of serious criminal offenses turned up 17 of the study participants, then 24 years of age. Their most common crimes were burglary and theft, with a few instances including the wounding of another person during the offense. Five had been imprisoned at some time.

The three measures of physiological arousal during adolescence correctly classified the adult criminal status of three-quarters of the entire sample, the scientists point out in the November *ARCHIVES OF GENERAL PSYCHIATRY*. Overall, criminals began the study with substantially lower arousal levels than did men with no criminal record.

Since one in four of the young men eluded accurate classification based on physiological responses, the results “do not negate the potential role of social and psychological variables in predicting criminal behavior,” Raine says. The researchers note, however, that physiological differences between criminals and noncriminals were not statistically linked to several important environmental factors, including family income, neighborhood crime rate and academic performance. Other, undetermined environmental influences may promote the connection between crime and lowered physiological arousal, they add.

Genetic inheritance plays a partial role in determining an individual’s heart rate and the electrical activity level of the skin and brain, the investigators assert. Thus, lowered arousal on these measures may reflect a genetic predisposition to criminality that responds to certain psychological and social circumstances, they conclude.

— B. Bower