High Insulin in Blood Ups Heart Risk

The first extensive study of the role of insulin in heart disease in a diverse population suggests that insulin resistance, a condition in which cells lack sensitivity to the hormone, may be nearly as potent a risk factor for obstructive artery diseases as smoking or high blood pressure.

"The effect we saw for insulin resistance was smaller but in the same neighborhood," says George Howard of the Bowman Gray School of Medicine at Wake Forest University in Winston-Salem, N.C.

This means that insulin resistance may predict heart disease risk in tens of thousands of people and compel authorities to rewrite their dietary prescriptions for a healthy heart.

Doctors had linked insulin to heart disease almost a decade ago in two remarkably different groups, South Asian immigrants and Italian pasta makers (SN: 9/16/89, p. 184). At the time, cholesterol and high blood pressure were regarded as the key risk factors. Those studies, however, indicated that high concentrations of insulin in the blood, combined with excess circulating fats known as triglycerides and low concentrations of high-density lipoproteins, increase the risk of heart disease.

Some estimate that as many as one-fourth of the people in the United States inherit a lax response to insulin, the hormone that signals cells to take up sugar from the blood. In these people, the pancreas must pour out more insulin to hold blood sugar to normal. As a result, they may be prone to type II, or non-insulin-dependent diabetes, in which the overworked pancreas can't supply enough insulin to satisfy the body's demand. Ten million people nationwide suffer from this form of the disease.

"The study suggests that coronary heart disease and type II diabetes may have a common root," says Richard Bergman of the University of Southern California School of Medicine in Los Angeles. "Insulin resistance could cause diabetes in one set of individuals, heart disease in a second set, and possibly both in a third."

The new study, published in the May 15 CIRCULATION, involved 1,397 volunteers. The group included non-Hispanic whites, African Americans, and Hispanics. All were insulin-resistant.

To measure resistance, doctors gave each participant a glucose shot and then measured sugar and insulin in blood samples collected over a 3-hour period. The results were fed into a computer programmed to calculate how readily the body responded to insulin.

Insulin resistance was then correlated with ultrasound measurements of the thickness of each person's carotid artery. This measurement reflects the degree of arteriosclerosis and, ultimately, susceptibility to heart attacks.

The results were dramatic in the insulin-resistant Hispanics and non-Hispanic whites. When adjusted for the traditional risk factors, the data indicate that their carotid artery walls are, on average, 50 micrometers thicker than the normal 700-micrometer wall. Similarly, a smoker's artery wall is 70 micrometers thicker than it should be, while a hypertensive person's artery wall measures about 60 micrometers thicker than normal.

"We believe their demonstration of a relationship between insulin resistance and [artery wall thickness] is a finding of enormous importance," assert Gerald M. Reaven of Stanford University School of Medicine and Shaman Pharmaceuticals in South San Francisco and Y.-D.I. Chen, also of Stanford. In 1988, Reaven recognized the complex of heart disease risk factors that includes insulin.

Reaven and Chen take issue with two aspects of the study, however. The first is the perplexing finding that the risk relationship didn't hold up for African Americans, a result the investigators couldn't explain. "It would be inappropriate at this time to rule out the possibility that one exists," Reaven says. Moreover, the researchers focused only on insulin and did not measure triglycerides. This represents a lost opportunity to examine the entire complex of risk factors, Reaven says. — *S. Sternberg*

DNA diversifies domestication's roots

Scientists generally trace the domestication of the wild ox, or aurochs, to about 10,000 years ago in ancient Turkey or nearby parts of southwest Asia. These beasts of burden then served as the founding population for modern cattle breeds throughout the world, the predominant theory holds.

A new mitochondrial DNA study in living cattle breaks from the scientific herd on this issue. Genetically discrete breeds of African, Asian, and European cattle existed 22,000 years ago or more, suggesting that domestication arose separately on each continent, assert Daniel G. Bradley, a geneticist at Trinity College in Dublin, and his colleagues.

The genetic findings lend support to the controversial proposal, advanced by Fred Wendorf of Southern Methodist University in Dallas and his coworkers, that cattle domestication emerged in northeastern Africa around 9,000 years ago, independent of any other domestications. At that time, summer rains in the eastern Sahara attracted seasonal occupations by herders, Wendorf argues.

"[Bradley's] article presents strong evidence that African domestic cattle have long been genetically separate from European and Asian cattle," Wendorf says. "Three centers of cattle domestication may have existed, with no crossbreeding of animals until sometime after 2,000 years ago."

The Irish researchers extracted mitochondrial DNA, which is inherited only through the mother, from blood samples of 90 living cattle in Africa, Europe, and India. The animals represented 13 breeds. Analyses focused on a region of mitochondrial DNA that undergoes rapid chemical alterations.

Cattle from each continent displayed signature chemical sequences in their mitochondrial DNA, Bradley's group reports in the May 14 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES.

In a comparison of cattle mitochondrial DNA to genetic data already obtained from living bison, the scientists estimated that a common ancestor of aurochs and bison lived at least 1 million years ago. A genetic split occurred between Indian cattle and those in Africa and Europe between 117,000 and 275,000 years ago, according to a calculation based on differences in mitochondrial DNA across cattle populations. African and European cattle parted genetically between 22,000 and 26,000 years ago, the researchers maintain.

Differences in mitochondrial DNA might stem from the incorporation of local wild oxen into early African and European herds that derived from a single population, but the researchers favor separate domestication centers.

The data tentatively support an early date of Saharan domestication, they add. More than 20 bones found at Saharan sites dating to 9,500 years ago probably come from cattle that belonged to herders, Wendorf argues. Several other scientists assign the same bones to wild oxen or bison. — *B. Bower*