Insulin-resistance gene defect identified

Insulin, the hormone that directs metabolism of glucose in the body, has long been suspected to have a link to fat breakdown. Even though insulin doesn't itself guide fat metabolism, scientists have noticed that people with a lot of fatty acids—derivatives of fats—in the bloodstream don't use insulin efficiently, a condition called insulin resistance.

Insulin resistance, which frequently appears in obese people and those with high blood pressure, is a hallmark of type II diabetes. In contrast, type I, or juvenile, diabetes arises because pancreas cells fail to produce enough insulin.

A team of European and U.S. scientists now reports that insulin-resistant rats have a defect in a gene involved in fat metabolism. The gene, *Cd36*, encodes a protein that sits on the surface of fat cells, muscle cells, and heart cells.

Among its many roles, the CD36 protein transports fatty acids into a cell for processing. A dearth of CD36 leaves these fatty acids in the bloodstream, which not only abets obesity but seems to disrupt the insulin pathway and prevent cells from taking in glucose properly, says study coauthor Timothy J. Aitman, a diabetologist at the MRC Clinical Sciences Centre in London.

The researchers compared rats bred to have high blood pressure with a group of normal rats. They found *Cd36* defects only in hypertensive rats that were also insulin resistant. Moreover, a group of mice with an overactive *Cd36* gene proved to have low concentrations of fat in the blood. The scientists report their findings in the January NATURE MEDICINE.

"This is a very intriguing study," says Ping H. Wang, an endocrinologist at the University of California, Irvine. "This is the first report actually showing, at the genetic level, a defect that may link insulin resistance to fatty acid metabolism."

"If human diabetes is shown to be due, even in some cases, to CD36 deficiency, then it gives us a handle on a primary cause of the disease," says Aitman.

Insulin controls glucose metabolism by ushering the sugar into cells. The exact pathway is still unclear, as is the means by which excess fatty acids disrupt that process. However, the new findings suggest a genetic basis for a theory holding that, in the body, fat metabolism has priority over sugar use.

"With free fatty acids around, you don't burn a lot of glucose," says molecular biologist Graeme I. Bell of the Howard Hughes Medical Institute at the University of Chicago. "You burn the fat first."

"Diabetes has been viewed as a disorder of sugar metabolism," Aitman says. "But if [defective] *Cd36* is a cause of insulin resistance . . . some forms of diabetes may be more a result of defective fat metabolism."

Noting that obese people often develop high blood pressure and type II diabetes, Wang says that the new study "provides a very good argument" that the same genetic defects could underlie these three disorders.

The *Cd36* genetic defect appears in roughly 2 to 3 percent of Japanese, Thai, and African people but in less than 1 percent of whites in the United States. Type II diabetes, however, currently affects about 10 percent of African Americans and 7 percent of U.S. whites. —*N. Seppa*

Getting under a dinosaur's skin

Paleontologists spend their careers trying to reconstruct animals from meager piles of bones, but recent discoveries of fossilized dinosaur skin are providing researchers with a whole new feel for these ancient behemoths.

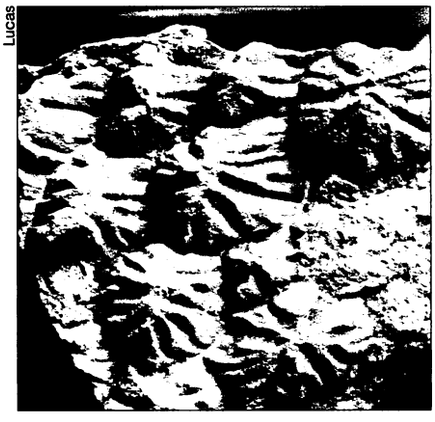
"This is about as close as you can get to petting a dinosaur," says Brian G. Anderson of the Mesa (Ariz.) Southwest Museum. In the Dec. 28, 1998 JOURNAL OF VERTEBRATE PALEONTOLOGY, Anderson and his colleagues describe a set of exquisite skin impressions associated with bones from a hadrosaur, or duckbilled dinosaur.

Found in southwest New Mexico, the impressions provide the best look yet at the outer covering of hadrosaurs, says coauthor Spencer G. Lucas of the New Mexico Museum of Natural History in Albuquerque. The fossils have small ridged bumps that look like miniature mountain peaks. "That skin would have felt like running your hand over a knobby mountain bike tire," says Lucas.

In a related discovery reported in the Nov. 19, 1998 NATURE, researchers in Patagonia found fossilized dinosaur embryos, complete with skin impressions. These embryos were the first discovered for the four-footed giant herbivores known as sauropods.

The recent discoveries feed into a growing interest in the exterior of dinosaurs. "It's causing us to look at the way we name dinosaurs," says Kenneth Carpenter of the Denver Museum of Natural History. Paleontologists designate dinosaur species by bones alone, but many modern animal species are defined by their skin or feathers and cannot be distinguished solely from their bones.

As researchers collect more examples of skin fossils, says Carpenter, "we may see that there is a lot more variation among dinosaurs."—*R. Monastersky*



Lucas

Fossilized skin impressions, with bumps reaching the size of dimes, came from a dinosaur that inhabited New Mexico roughly 70 million years ago.

Tiny galaxies have hearts of darkness

Small ghost galaxies, devoid of stars but harboring dense clumps of invisible matter, may outnumber the entire population of luminous galaxies in the universe.

John Kormendy of the University of Hawaii in Honolulu and Kenneth C. Freeman of the Mt. Stromlo Observatory in Canberra, Australia, base that assertion on studies by several teams over the past 20 years that have traced the motion of stars and gas in a wide range of galaxies. Kormendy reported the results Jan. 6 at a meeting of the American Astronomical Society in Austin, Texas.

Since the late 1970s, astronomers have come to accept that at least 90 percent of the matter in the universe is invisible. Studies of gas at the fringes of many galaxies show greater orbital velocities than the gravity exerted by visible matter can explain. Researchers conclude that some kind of unseen matter, dubbed dark matter, keeps the rapidly orbiting material from flying away. Other studies have shown that the tug of visible matter is too small to account for the velocity of stars in gas-poor galaxies.

Analysis of several studies led Kormendy and Freeman to conclude that the tinier the galaxy, the higher its density of dark matter. Although dwarf galaxies are barely detectable fuzz balls of gas and dust, they contain dark matter with densities 100 times larger than those in giant galaxies, notes Kormendy.

"That's a result that has been hinted at for quite a long time," comments Rosemary F.G. Wyse of Johns Hopkins University in Baltimore. Kormendy agrees, noting that the finding only became clear-cut as more and diverse galaxies have been studied.

Dwarf galaxies are known to be far more numerous than larger galaxies. By extrapolation, Kormendy and Freeman