Biomedicine

Kathy A. Fackelmann reports from Atlanta at the American Diabetes Association meeting

Early warning of Type II diabetes?

The Pima Indians of southern Arizona have the world's highest rate of Type II diabetes (SN: 6/2/90, p.350). More than 50 percent of Pimas aged 35 and older suffer from this non-insulin-dependent, adult-onset form of diabetes, which involves high blood sugar levels and causes such symptoms as blurry vision, numbness and drowsiness.

Now, evidence indicates that an early warning of Type II diabetes may appear among Pima children decades before the full-blown disease strikes.

In the new study, healthy, nondiabetic Pima youngsters showed significant levels of insulin resistance, a condition in which cells respond sluggishly to insulin's sugar-uptake message (SN: 6/23/90, p.389). This finding fits with the notion that many people with insulin resistance eventually go on to develop full-fledged Type II diabetes, says Peter H. Bennett, who heads the Phoenix-based clinical research branch of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK).

David J. Pettitt of NIDDK's Phoenix branch compared 439 nondiabetic Pima children and young adults, aged 6 to 19, with 449 age-matched nondiabetic Caucasians living in Rochester, Minn. He and his colleagues discovered that, on average, the Pima youths had blood insulin levels 15 to 20 percent higher than their Caucasian peers. The finding, they say, suggests that Pima children are prone to insulin resistance.

"Already at this young age, [Pimas] don't handle glucose as well," Pettitt told SCIENCE NEWS.

The new research raises the question of whether large numbers of Pimas are born with insulin resistance, Bennett says. The researchers plan to test Pima newborns to see if they have higher blood insulin levels than Caucasian infants, he adds.

The results also support the belief that some people inherit a predisposition to insulin resistance, comments diabetes researcher Jay S. Skyler of the University of Miami. If scientists can come up with drugs to combat insulin resistance, he says, they may be able to protect Pima children—and others with the disorder—from progressing to Type II diabetes.

Some scientists have suggested that Pimas might help stave off Type II diabetes by returning to their traditional low-fat, high-carbohydrate diet. Pettitt maintains that Pimas, both adults and children, can lower their diabetes risk by staying physically fit and lean. Adults who develop insulin resistance can sometimes reverse the condition through exercise or weight loss, Bennett says.

But other new findings suggest that weight control alone may not shield adult Pimas from Type II diabetes.

Marie A. Charles, who also works at NIDDK's Phoenix branch, reports that adult Pimas can develop moderately elevated blood sugar without gaining weight. Such elevations, although not technically considered diabetic, increase a person's risk of developing the disease within a few years.

Charles and her colleagues studied 309 non-obese Pima men and women, aged 18 to 77, who had normal blood sugar levels at the study's start. About seven years later, the researchers found that 51 (16.5 percent) of these individuals had developed moderately elevated, but still nondiabetic, blood sugar levels. Of that group, 21 had not gained weight since the study began. This discovery suggests that some people begin their slide toward Type II diabetes without putting on extra pounds, Charles says.

She and her co-workers suggest that other factors—such as aging, physical inactivity or certain drugs—may tip the balance in people who are genetically predisposed to insulin resistance, raising their blood sugar levels and eventually leading to full-fledged Type II diabetes.

Environment

What home radon monitors don't monitor

The Public Health Service recommends that homeowners monitor for radon-222 and take corrective action where levels of this natural, radioactive pollutant prove high (SN: 9/24/88, p.206). The concern is not the radon itself but the hazard it signals: decay products, called "daughters," that account for roughly 55 percent of human radiation exposure and up to 20,000 lung cancers annually in the United States. However, radon monitors don't assay all the features that determine the threat these daughters pose. Reports in the June HEALTH PHYSICS highlight two such features: the presence of radon-220 and the fraction of daughters that do not cling to dust.

The radons descend from different families. Radon-220 is a fifth-generation daughter of thorium-232, and radon-222 is a sixth-generation descendant of uranium-238. As gases, each of these is the only member of its family's decay chain that can percolate from its source in rocks or soil through cracks into a building.

Radon-220's fleeting nature explains why most current radon monitoring ignores it, says Dowell E. Martz, a physicist with the U.S. Department of Energy in Grand Junction, Colo. Radon-222's 3.8-day half-life means that a week's collection in charcoal canisters—the most common home monitors—yields enough for a reasonable gauge of room levels. But with a half-life of only 55 seconds, most of the radon-220 collected will decay before a laboratory analyzes the canisters, Martz explains. Even the more sensitive "alpha-track" monitors can easily miss this radon, because it will not last long enough to disperse throughout a room. Unless one looks for its longer-lived (and better dispersed) daughters—something not usually done—documenting radon-220's brief appearance requires blanketing a room with monitors.

Martz and his co-workers designed a portable spectrometer to record week-long, round-the-clock emissions of alpha radiation in eight Colorado buildings. Using the known characteristic alpha energy of each radon daughter, they established that roughly one-quarter of the alpha radiation in the buildings' air had been emitted by daughters of radon-220.

Accounting for these emissions should not increase the estimates of lung dose to occupants of these buildings by more than about 8 percent, observes Naomi Harley, a radiation oncologist at New York (City) University Medical Center. That's because she and others have shown that radon-220's daughters deliver only one-third the dose to the lung that radon-222's do, per unit of exposure. But she adds that "this doesn't necessarily mean [radon-220 is] a nonproblem." While Colorado's geology does not include much thorium (radon-220's progenitor), large thorium deposits in other areas, including Canada, might make radon-220 a serious indoor hazard, she says.

Another HEALTH PHYSICS report from researchers at Georg August University in Göttingen, West Germany, indicates that the tiny fraction of radon daughters that don't attach to airborne dust in relatively clean rooms is three times higher than the value ordinarily used to estimate radiation doses to room occupants. The scientists found rates reaching the standard value only in rooms with large sources of aerosols such as heaters, burning cigarettes, lit candles, cooking, or excessive outdoor ventilation.

Quantifying this "unattached" fraction of daughters is important because virtually all of them, when inhaled, will deposit their radiation in the upper bronchial tree, where most lung cancers begin. In contrast, fewer than 5 percent of the heavier, slower-moving dust-bound daughters tend to irradiate the lungs, Harley notes. The new data suggest that human-dose estimates for any given radon level in a relatively aerosol-free environment should be increased, though "not dramatically—certainly less than 25 percent," she says.