Biomedicine

Diabetic link to lumpy breasts

Women with type 1 diabetes, the more serious form of the blood sugar disorder, face a slew of complications as they grow older. A new report highlights one of these: lumpy breasts.

Yogish C. Kudva of the Mayo Clinic in Rochester, Minn., looked closely at this little-known complication of diabetes. He and his colleagues reviewed Mayo medical records and found 12 women with type 1 diabetes who had lumpy breast tissue. They then studied the charts of 64 additional women participating in a diabetes study. That effort turned up four more women with the condition, known as diabetic mastopathy.

The study revealed that the risk of diabetic mastopathy is high in diabetic women in their late thirties, especially those who have had trouble keeping their blood sugar concentrations in check. Women who suffer from retinopathy, a blinding eye disorder that's another complication of diabetes, also had a greater chance of developing lumpy breasts.

Although not cancerous, the lumps can trigger repeated medical testing, Kudva notes. He says that 14 of the 16 women had undergone one or more surgical biopsies to rule out cancer of the breast. The researchers followed up on the women and found no cases of breast cancer after 7 years. "This [condition] does not seem to go on to form a tumor," Kudva says. Nonetheless, a woman who finds a lump in her breast, whether she has diabetes or not, should always get it checked by a physician, he adds.

To complicate matters, this condition makes it harder to find a breast cancer. Women with diabetic mastopathy often have dense breast tissue, which can confuse the results of mammography, an X-ray technique that identifies breast tumors. Kudva presented his team's findings last month at the American Diabetes Association's 57th Annual Scientific Sessions, held in Boston.

No one knows what causes diabetic mastopathy. However, when the researchers analyzed breast tissue, they found it had been infiltrated with T and B lymphocytes, a sign of an autoimmune blitzkrieg. Diabetes itself is caused when the immune system attacks and destroys the insulin-producing beta cells in the pancreas. The researchers don't know why the immune system would also take aim at breast cells. —*K.F.*

Early menopause for diabetic women

Women with type 1 diabetes face not only lumpy breasts but also another little-known condition—premature menopause.

Using histories of 122 women with type 1 diabetes and 147 of their sisters who were not diabetic, Janice Dorman of the University of Pittsburgh Graduate School of Public Health focused on the 30 who had already gone through menopause, the phase during which menstruation stops. The researchers found that the diabetics were, on average, 9 years and 2 months younger than the nondiabetic women when menopause occurred.

"This was a very surprising finding," Dorman says, adding that their results must be tested. She suggests that premature menopause may be a manifestation of the accelerated aging process that affects people with diabetes.

Researchers know that postmenopausal women suffer an elevated risk of heart disease, but for diabetic women, who already have a high risk of cardiac trouble, the threat to the heart could be even greater. "It's a double hit," Dorman says.

Women with diabetes should seriously consider hormone replacement therapy after menopause to reduce their risk of heart disease, Dorman says. Such therapy replaces the hormone estrogen (SN: 6/21/97, p. 383), which drops dramatically after menopause and is thought to protect younger women from cardiovascular disease. Dorman presented her team's work at the American Diabetes Association's 57th Annual Scientific Sessions in Boston. —*K.F.*

Chemistry

Fireworks linger long after colors fade

For scientists at the University of California, Riverside, the Fourth of July means more than picnics, pyrotechnics, and patriotism. It gives them an opportunity to do some chemistry.

During a fireworks show on July 4, 1995, Kimberly A. Prather and her colleagues first tested a method they had developed to monitor airborne particles. Called aerosol time-of-flight mass spectrometry, the technique rapidly provides information on both particle size and chemical composition. Other methods measure only one or the other, says Prather.

She and her coworkers monitored the air outside their lab from July 3 to July 7. Most of the particles they detected probably came from a fireworks display on Mount Rubidoux, about 3 miles west, Prather says. The fireworks show was an ideal test source of particles because it had a well-defined start time and location. Also, "it had a distinctive [chemical] signature, so we could pick it out easily," Prather adds.

The peak number of particles arrived the morning of July 5, about 12 hours after the start of the show. The number didn't trail off significantly until 7 hours after that, and particles were still detected as late as July 19. The group's findings appear in the May 15 ANALYTICAL CHEMISTRY.

Most other techniques rely on collecting particles on filters, which can take hours. The material must then be sent away for expensive and time-consuming analysis. "There's no way to say what's out there now," Prather says. The ability of their technique to give immediate results makes it good for applications such as detecting biological and chemical warfare. The group is testing new, portable versions of the device now.

"This is a demonstration of the ability to pick out one modest source among a complicated mix of sources," says Glen R. Cass of the California Institute of Technology in Pasadena. Concern over the health effects of particles (SN: 5/6/89, p. 277) and the Environmental Protection Agency's upcoming standards on atmospheric particles indicate "there will be more interest in measuring them," Cass says. —*C.W.*

Natural antibiotic found on human skin

Human skin produces a natural antibiotic that protects it against bacterial infection, according to a new study. Dermatologists at the University of Kiel in Germany identified a small protein, called human beta-defensin-2, that kills bacteria such as *Escherichia coli* and *Pseudomonas aeruginosa* as well as the common yeast *Candida albicans*.

The protein punches holes in the membranes of the bacteria, making them "look like a sieve," says chemist Jens-Michael Schröder. "The strategy to kill the bacteria is totally different from other antibiotics because they do it mechanically," rather than biochemically. By exploiting the newly discovered strategy, scientists might be able to avoid the problem of bacteria developing drug resistance.

Schröder and his colleagues began with the observation that patients with psoriasis—an inflammatory disease that causes large amounts of skin to scale off—rarely developed infections despite ever-present injuries to their skin. They analyzed skin cells from patients in their clinic and eventually identified defensin as an antimicrobial agent. The researchers then found the same defensin in patients' lungs and throats, they report in the June 26 NATURE.

The antibiotic closely resembles one found on the tongues and throats of cattle (SN: 3/18/95, p. 166). Humans also produce another antibiotic, human beta-defensin-1, in the urogenital tract. What makes human beta-defensin-2 different, Schröder says, is that it is only made when bacteria are present.

The researchers are now looking for additional antibiotics, especially ones that defend against bacteria such as *Staphylococcus aureus*. —*C.W.*