Biomedicine

John Travis reports from Washington, D.C., at the International Diabetes Federation Congress

Tuberculosis vaccine: Diabetes defense?

The BCG vaccine, used against tuberculosis for more than 50 years, may still have a few tricks up its sleeve. In initial tests, a single dose suppressed the development of diabetes in mice prone to the insulin-disrupting disease, report researchers from the University of Michigan Medical Center in Ann Arbor.

Richard Guytingo and his colleagues injected the vaccine into prediabetic mice aged 5 to 8 weeks. A month later, they extracted spleen cells from the mice and looked for immune cells called T-lymphocytes. Some T-lymphocytes, produced in the spleen, are believed to stimulate Type I diabetes by attacking the insulin-secreting islet cells in the pancreas. According to Guytingo, the vaccinated mice showed slower proliferation of these T-cells than did unvaccinated mice.

After three months, the researchers compared the actual islet cells of the vaccinated mice and the controls. The treated mice showed significantly less insulitis, or inflammation of the islet cells – a condition widely viewed as an early step toward diabetes.

"Potential applicability of BCG vaccination to the prevention of human autoimmune diabetes must be considered," the researchers assert. But they emphasize that many questions remain. For instance, results in mice don't necessarily apply to humans, and the timing and dosage of the vaccine may be critical. Guytingo's group will next try to determine whether countries where children routinely receive BCG vaccinations have a lower incidence of Type I diabetes.

Diabetic distinction debated

A rare form of diabetes, which mainly strikes adolescents in developing tropical nations, has sparked a controversy among medical researchers. In 1985, the World Health Organization officially recognized this disease, called malnutrition-related diabetes mellitus (MRDM), as distinct from Type I and Type II diabetes. But Frances Lester of the Montreal General Hospital, who has studied thousands of diabetics in Ethiopia, contends the distinction should be removed.

Most researchers studying MRDM think malnutrition during childhood and toxic foods such as cassava – a cyanide-rich root – cause the disease, which differs subtly from other forms of diabetes. Lester argues that the malnutrition is a result, not a cause, of most MRDM cases. Any clinical differences between MRDM and Type I diabetes, she says, arise from the patients' emaciated state.

Battle of the T-cells

Last year, experiments suggested that two types of T-lymphocytes – CD4 and CD8 – spar with each other in diabetes-prone mice. Researchers concluded that CD8 cells may play a protective role in these mice by suppressing the CD4 cells, which attack pancreatic islet cells (SN: 3/31/90, p.198).

Now, another T-cell has entered the fray. Charles Janeway Jr. and his colleagues at Yale University propose that "autoreactive" T-lymphocytes are the real protecting influence and that CD4 and CD8 cells combine forces for a destructive effect.

The Yale group injected irradiated mice, which normally do not develop diabetes, with cloned CD4 and CD8 cells. The majority of the mice receiving a mix of the two types became diabetic, Janeway reports, while most of those receiving either cell type alone have so far avoided the disease.

In another experiment, the researchers injected cloned autoreactive T-cells into prediabetic mice. So far, only a few have developed the disease. "A single injection greatly retards the onset of diabetes," concludes Janeway. He theorizes that the autoreactive T-cells help regulate diabetes by suppressing the production of islet-attacking T-cells and by protecting the islets themselves.

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Kathy A. Fackelmann reports from Boca Raton, Fla., at the annual meeting of the Teratology Society

Epilepsy and pregnancy: A drug dilemma

While scientists suspect that some anticonvulsant drugs used to control epilepsy may harm a developing fetus if taken during pregnancy, the actual risk to the fetus remains murky. Boston researchers now report that fetuses exposed to such drugs may fall short of their peers later in life.

Gerald Raymond and his colleagues at Massachusetts General Hospital studied 64 children and adults, aged 3 to 28, who had been exposed to anticonvulsant drugs in the womb, and 27 others whose mothers had not taken such drugs while pregnant. In seven of the drug-exposed participants, they discovered at least one sign of growth problems; no such problems turned up in the control group, Raymond says.

Six of the seven with growth failures were abnormally short for their age, and three had abnormally small heads, a factor sometimes linked with learning disabilities, Raymond says.

He cautions, however, that epileptic women who consider going off anticonvulsants during pregnancy must also weigh the risk of seizure, especially if they are prone to grand mal seizures, which can seriously damage a fetus. Many pregnant women with epilepsy can minimize drug-related problems, he says, by using low doses of a single anticonvulsant. In any case, epileptic women who plan to become pregnant should see a physician months before conception.

Simple shield against birth defects?

For some women with a history of multiple miscarriages, vitamins and amino acid supplements may provide the key to a healthy baby, two new studies suggest. The findings, if confirmed in clinical trials, could point to a relatively simple way to reduce the risk of certain types of birth defects.

Several years ago, researchers reported epidemiologic evidence that infants whose mothers regularly took vitamins during pregnancy ran a lower risk of neural-tube defects (SN: 12/10/88, p.380). Norman W. Klein of the University of Connecticut in Storrs now reports further evidence that nutrients might help guard against such defects.

Klein's team obtained blood samples from 89 women who had suffered at least one miscarriage and 15 women whose pregnancies had all led to the delivery of healthy babies. In the lab, the researchers placed rat embryos in the clear portion, or serum, of each volunteer's blood. They reasoned that the rat embryos' development in the serum would offer clues to how a human embryo might respond to the woman's blood *in utero*.

The rat embryos grown in serum from women with a history of spontaneous abortion were more likely to show defects, especially neutral-tube defects, than were rat embryos that developed in serum from controls. Klein says this suggests that some women have an "embryo toxin" in their blood. The problem seems more severe for women who have experienced many miscarriages, he adds.

But adding vitamin and amino acid supplements to their serum boosted the chance of normal rat-embryo development, hinting at a way to improve these women's chances of a normal pregnancy, says Klein.

In a very preliminary trial, the researchers gave nutritional supplements to eight women who were attempting to become pregnant after many miscarriages. Four subsequently became pregnant, delivering healthy babies.

Preliminary findings from a separate study appear to confirm Klein's results with the rat embryos. The study, led by Thomas Flynn of the FDA's Beltsville (Md.) Research Facility, indicates that the blood serum of women who suffer repeated miscarriages is more likely to lead to defective rat embryos. Both Flynn and Klein emphasize, however, that further study is needed to establish whether their findings apply to human embryos.