

# Regimen Slows Diabetic Complications

By keeping blood sugar concentrations as close to normal as possible, people with Type I diabetes can prevent or slow the life-threatening complications of this disease, according to a new study. An independent review panel halted the research after nine years—one year short of its planned length—because preliminary analysis of the data revealed such substantial benefits for people with Type I diabetes that continuing the study seemed unnecessary.

The findings surprised some researchers, who didn't expect to see such dramatic results. "I think we hit a home run. You can substantially reduce the risk of progression," says Julio V. Santiago, a diabetes specialist at Washington University in St. Louis and one of the study's principal investigators.

Type I diabetes, like other forms of the disease, makes it difficult for the body to process glucose, a simple sugar and the main source of energy for cells. People with Type I diabetes must get daily injections of the hormone insulin in order to use glucose in their bloodstream.

For years, some researchers had argued that by keeping a tight rein on glucose concentrations in the blood, patients could slow the development of medical conditions associated with diabetes. Those complications include retinopathy, a blinding disease in which tiny blood vessels in the retina begin to leak; nephropathy, in which blood vessels in the kidney are damaged; and neuropathy, in which nerves in the feet, legs, and fingertips are damaged.

Before advising diabetic patients to embark on more complicated treatment regimens, researchers had to confirm that tight control of blood glucose really provided significant gains. Thus, the National Institute of Diabetes and Digestive and Kidney Diseases sponsored a trial of 1,441 people with Type I diabetes, which usually develops before age 30.

Researchers at 29 medical centers throughout the United States and Canada randomly assigned volunteers, who had no complications or mild complications at the study's start, to either a standard treatment or a rigorous therapy group.

People getting standard care received one or two shots of insulin daily but did not make any extraordinary effort to keep blood sugar concentrations low.

By contrast, volunteers assigned to the more rigorous group received three or more injections of insulin per day or relied on a small, battery-powered device called an insulin pump to continuously deliver insulin through a tiny needle inserted under the skin. Volunteers assigned to this group had to measure their

blood sugar four times a day and then adjust their insulin intake accordingly. This regimen more closely resembles the way the body regulates glucose.

The researchers found that people getting the standard therapy had about 231 milligrams of glucose per deciliter of blood, an amount that far exceeds the norm of 110 mg/dl but falls within the usual range for diabetics. By contrast, people in the rigorous therapy group had glucose concentrations of about 155 mg/dl.

Despite the fact that their blood sugar was higher than normal, people in the rigorous therapy group experienced a 60 percent reduction in the risk of complications. Those results, which experts say will revolutionize the treatment of diabetes, were announced this week at the American Diabetes Association's annual scientific sessions held in Las Vegas.

Compared to the standard therapy, the new treatment delayed the onset or slowed the progression of retinopathy by 76 percent. It also prevented or delayed progression of kidney disease by 35 to 56 percent, the researchers found. And rigorous treatment forestalled nerve dam-

age that can lead to loss of sensation in the feet, legs, and fingertips.

Diabetics following the more exacting regimen also shouldered some risks. The trial revealed that people in the experimental therapy group faced three times the risk of developing hypoglycemia, a condition in which concentrations of blood sugar dip too low. These attacks can cause shakiness, disorientation, and in severe cases, coma.

Most Type I diabetics can reduce their risk of hypoglycemic attacks, adds James R. Gavin III, newly elected president of the American Diabetes Association. The danger of hypoglycemia can be reduced by frequent monitoring of blood sugar, fine-tuning of insulin dosage, and changes in diet and exercise, he says.

The new study focused on Type I diabetes patients, but many scientists think more rigorous glucose control may also benefit people with Type II diabetes, which generally strikes after age 40. Excessive glucose in the blood may also cause the eye, kidney, and nerve complications that afflict these people.

—K.A. Fackelmann

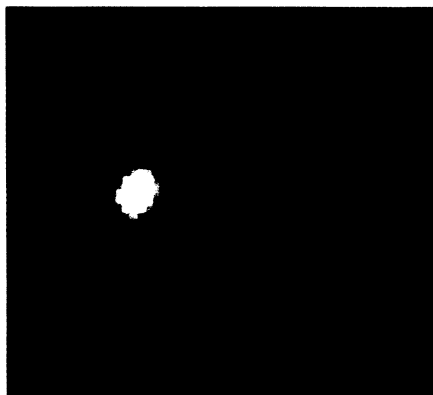
## Dawn of a telescope: Keck gets first images

For astronomers growing up in the 1950s, '60s, and '70s, one telescope symbolized the ultimate in viewing the distant reaches of the universe: the 5-meter Hale Telescope on Mt. Palomar. Now a new instrument has claimed the crown as the largest optical telescope in the world. Perched atop an extinct Hawaiian volcano, the 10-meter W.M. Keck Telescope made its debut in March, using a near-infrared camera to study the heavens.

Last week at a meeting of the American Astronomical Society in Berkeley, Calif., astronomers displayed Keck's first research images. None reveals major new discoveries, but the telescope's unusual optics—a mosaic of 36 mirrors that acts as a single 10-meter mirror—have probed gravitational lenses, distant galaxies, and quasars in unprecedented detail, says Jerry Nelson, director of the Keck Observatory.

Keck's near-infrared image of 4C41.17, the most distant galaxy known, reveals that at least five faint bodies surround it. If spectroscopic studies with Keck show that the objects lie at the same distance as 4C41.17, some 12 billion light-years from Earth, their proximity on the sky to 4C41.17 would suggest they are companion galaxies that will eventually merge, says James R. Graham of the University of California, Berkeley.

Spectroscopy should indicate the age



*Infrared image shows the ultraluminous galaxy FSC10214+4724, which appears surrounded by faint companions.*

of stars in these companions, he notes. If the companions are indeed as distant as 4C41.17, they would appear through the telescope as they did when the cosmos was just 10 to 25 percent of its current age. And if such galaxies contained stars 1 to 2 billion years old, this might set a new minimum age for the universe and pinpoint when most galaxies formed.

Keck's infrared view of another galaxy, one that ranks among the most luminous objects ever observed, may shed new light on the origin of its radiation. The image shows that some of the radiation comes from an elongated region, rather

Keck Obs./Matthews, Gerry Neugebauer