Biomedicine

Synthetic hormone spurs girls' growth

Treating short children with human growth hormone has shown mixed results. Although some studies have found short-term gains in height, these can be offset by accelerated puberty, which stunts growth later in adolescence.

Now, researchers at Southampton University Hospitals in England have found that a synthetic growth hormone called somatropin can increase girls' height by age 16 without any dire side effects. The researchers gave seven girls a daily injection of somatropin between the ages of 8 and 14. The girls started puberty at about the same age—13.5, on average—as 25 untreated girls.

All of the girls were chosen because they ranked in the lowest 2 percentile for height among roughly 14,000 girls surveyed, yet they didn't have abnormally low concentrations of growth hormone in their blood, says study coauthor Jean Mulligan. Most of the girls had short parents.

The study, funded by the pharmaceutical companies Pharmacia and Upjohn, appears in the March 28 LANCET.

On average, the girls who received somatropin grew to 5'1" by age 16, when most girls approach their adult height. That was 2.4 to 3.0 inches taller than the girls who didn't get the growth hormone.

Although the treatment appears safe and boosted height, it didn't improve the girls' psychological outlook noticeably, Mulligan said. "The girls who were 4' 10" appeared just as happy and well balanced," she said. In addition, the drug costs roughly $46,000 per inch gained in height, the researchers calculated. A similar test is under way with boys, Mulligan said. —*N.S.*

Genetic flaw linked to breast cancer

Much discussion of genetic links to breast cancer has centered on mutations in genes called *BRCA-1* and *BRCA-2*, which predispose some women to the disease. New research suggests that other genetic flaws also increase a woman's risk of breast cancer.

Among these flaws are variants of three *GST* genes, named for the glutathione S-transferase enzymes that they encode. GST enzymes act as roving cleanup crews to detoxify potential cancer-causing agents in the body. A flaw in the gene, *GSTM1*, that encodes one such enzyme has been associated with lung cancer. Other studies have hinted that cancer of the colon, bladder, and testicles could also be linked to *GST* variations.

To assess the role of these genetic variations in breast cancer, researchers at the Johns Hopkins Medical Institutions in Baltimore, Md., analyzed blood samples from 110 women who had breast cancer and 113 healthy women. Nearly all of the women were white, and most had gone through menopause.

A postmenopausal woman carrying a genetic variation of *GSTM1* faces a 2.5 times greater risk of developing breast cancer than do her peers without that genetic flaw, the scientists report in the April 1 JOURNAL OF THE NATIONAL CANCER INSTITUTE. Moreover, a woman carrying variants of two or three of these enzyme-encoding genes encounters nearly four times the minimal risk, says study coauthor and molecular epidemiologist Paul T. Strickland.

The *GST* variations are quite common. For example, while the *GSTM1* flaw appeared in 56 of 90 postmenopausal women who had breast cancer, it also showed up in 36 of 90 healthy women. The proportion of women carrying the flaws for the other genes was lower but still considerably above the few percent of the population that carry the *BRCA* mutations.

Although *GST* variations aren't as potent as *BRCA* mutations, Strickland says, they may play a role in a substantial fraction of breast cancers. For example, the *GST* flaws may prove most consequential in the face of cancer-causing chemicals in the environment, he speculates. —*N.S.*

Physics

Last of the normal mesons

Sifting through the debris of 100 million high-energy collisions between protons and their antimatter counterparts, researchers at the Fermi National Accelerator Laboratory in Batavia, Ill., found 19 events that pointed to a new particle. Measurements of the particle's mass, lifetime, and production rate confirmed it as a long-sought member of the meson family. Shin-Hong Kim of Tsukuba University in Japan, a member of the Collider Detector at Fermilab collaboration, announced the discovery last month at Fermilab.

A meson is a particle made up of a quark paired with an antiquark. There are six types of quarks—up, down, strange, charm, bottom, and top. The top quark, however, doesn't survive long enough to allow meson formation (SN: 7/1/95, p. 10). That leaves 25 possible combinations, of which 10 are merely the antiparticles of another 10. Physicists had identified all but one of these mesons in previous experiments. The Fermilab discovery fills in the final blank: a meson consisting of a charm quark and an antibottom quark.

In addition to these normal mesons, theorists have proposed that other types of quark combinations, known as exotic mesons, may also exist (SN: 9/6/97, p. 148). —*I.P.*

A half-life for titanium

The supernova explosion of a massive star produces a variety of radioactive elements, including the isotopes nickel-56, cobalt-57, and titanium-44. Instruments aboard spacecraft such as the Compton Gamma Ray Observatory can detect the radiation emitted by these unstable nuclei when they decay. The observation of radiation from the decay of titanium-44 in a supernova remnant, in particular, serves as a powerful tool for stringently testing theoretical predictions of the conditions inside a catastrophically collapsing star.

Now, several research teams have independently determined the half-life of titanium-44 with much greater accuracy than ever before, considerably reducing the main uncertainty in determining the abundance of that isotope in a supernova remnant. Reporting in the March 23 PHYSICAL REVIEW LETTERS, one group working at the National Superconducting Cyclotron Laboratory at Michigan State University in East Lansing and another group running experiments at three different laboratories obtained a value of 59.2 years as the time it takes half a sample of titanium-44 to decay. —*I.P.*

Microdrops of superfluid

Liquid helium cooled to temperatures lower than 2.12 kelvins can become a superfluid, flowing without friction. Now, researchers have shown experimentally that superfluidity can occur in a cluster consisting of as few as 60 helium-4 atoms. J. Peter Toennies and his colleagues at the Max Planck Institute in Göttingen, Germany, report their findings in the March 27 SCIENCE.

The scientists studied the rotation of a single molecule of oxygen carbon sulfide (OCS) inside a tiny droplet of helium-3 at a temperature at which helium-4 is a superfluid but helium-3 is not. When helium-4 atoms are injected into the helium-3 droplet, they collect in the droplet's center around the molecule. The presence of sufficient helium-4 allows the molecule to rotate nearly without friction—an effect detectable in the spectrum of infrared light absorbed by the OCS molecule. The molecule does not rotate freely in pure helium-3.

"These experiments indicate that superfluidity sets in gradually with the addition of about 60 atoms," the researchers say. In other words, only about two layers of helium-4 atoms surrounding the molecule are needed for the effect to show. Scientists had found earlier that it takes at least two layers of helium-4 atoms in a thin film on a solid surface to obtain superfluidity. —*I.P.*