Biomedicine

Test may improve Alzheimer's diagnosis

Diagnosing Alzheimer's disease, the progressive neurological disorder, isn't easy, short of an autopsy. Relying on psychological testing, ruling out other disorders, and the identification of apparent abnormal brain growths that can not be verified until after death, physicians correctly diagnose the disease only about two-thirds of the time. But a new antibody test for a brain protein that only Alzheimer's patients appear to harbor may yield a more accurate and earlier diagnosis.

The protein, known as Alzheimer's disease-associated protein (ADAP), concentrates in brain areas that process and store memory. Researchers detected it in autopsied brain tissue from 48 (86 percent) of 56 people who died with Alzheimer's. In contrast, the antibody test found no ADAP in tissue from any of 27 people who died without nervous system impairment, or in 28 persons who had suffered other, unrelated neurological disorders, report Hossein A. Ghonbari of Abbott Laboratories in Abbott Park, Ill., and his colleagues in the June 6 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION.

The team also detected ADAP in the spinal fluid of Alzheimer's patients, but in concentrations too low for the current antibody test to detect, says Ghonbari. He estimates that a more sensitive assay designed for spinal fluid likely will become available within two years, allowing detection of the telltale protein in living people without removing brain tissue. Ghonbari adds that the protein appears to precede structural nerve damage in Alzheimer's patients, indicating that ADAP may allow earlier diagnosis and earlier treatment.

Foot feat: Transplant treats dystrophy

Nine-year-old Sam Looper still has difficulty walking. But in April, he began wiggling the four biggest toes of his left foot more vigorously, giving new hope to the boy and thousands like him with Duchenne's muscular dystrophy, a genetic disease characterized by defective muscle cells that cannot produce a protein called dystrophin (SN: 1/2/88, p.4).

In February, researchers injected Looper's big-toe muscle with clones of immature muscle cells, or myoblasts, from his father. The healthy myoblasts fused with some of the boy's defective cells, enabling the resulting hybrid to make dystrophin. Peter K. Law of the University of Tennessee in Memphis says his research team's results are the first to show that such cell transplants can treat the effects of muscular dystrophy. But he cautions that investigators must demonstrate that the transplants can fuse with cells in larger muscle groups, such as those of the chest, in order to significantly benefit people with the ailment and perhaps those with other genetic defects of muscle cells. Law reported the work earlier this month at the annual meeting of the Muscular Dystrophy Association in Tucson, Ariz. He told SCIENCE NEWS his group recently had similar success in treating two other boys with the illness.

Gene therapy proposal gains acceptance

On June 1, a National Institutes of Health (NIH) subcommittee approved use of an experimental gene therapy to treat children with a severe, inherited immune disorder. The project must clear other regulatory hurdles, but federal scientists say they may begin treating three or four children with adenosine deaminase deficiency as early as this fall.

Children afflicted with this disorder lack the enzyme adenosine deaminase, a problem that results in destruction of white cells that help the body fight infection. Under the plan, scientists would engineer white cells to carry healthy genes that code for the missing enzyme (SN: 4/7/90, p.213).

NIH researchers R. Michael Blaese and W. French Anderson note that their proposal must first win the approval of another NIH review panel and the Food and Drug Administration.

Chemistry

Slicing new sulfur chemical from onion

Extracts of blended onion contain a brew of over 100 sulfur-containing compounds, which chemists have been identifying for about the same number of years.

In the May 23 JOURNAL OF THE AMERICAN CHEMICAL SOCIETY, Eric Block and Thomas Bayer of the State University of New York at Albany report their discovery of a previously unknown onion chemical that should help flesh out more of the intricate onion chemistry puzzle. It also shows a moderate test-tube ability to prevent the biochemical cascade that leads to asthma and inflammatory reactions.

In Block's assessment, "Onions contain the most bizarre and exotic sulfur compounds that have ever been made synthetically or found in nature." In the late 1970s, he identified (Z)-propanethial S-oxide, the onion chemical that makes people tear up in the kitchen and his lab.

The compound forms when the vegetable gets damaged or sliced, thus enabling the enzyme allinase to convert precursors into the tear-jerking chemical. It then undergoes a series of spontaneous reactions to automatically produce the rest of the onion's sulfurous chemical brew.

Until now, propanethial S-oxide was the only known naturally occurring chemical containing an atomic arrangement called a sulfine group. The four-atom group consists of a sulfur atom bonded on one side to an oxygen atom and on the other side to a carbon atom, in turn double-bonded to another carbon. The newly identified compound, called (Z,Z)-d,l-2,3-dimethyl-1,4-butanedithial S,S′-dioxide, has a double dose of this unusual structure, Block notes. Knowing this compound's structure should help the researchers figure out which of the other onion chemicals emerge from it.

Making polymers for surgical implants

Making artificial materials that the biologically complex human body can safely assimilate keeps a community of medically minded polymer chemists working.

Since the mid-1980s, chemical engineer Robert Langer of the Massachusetts Institute of Technology in Cambridge and his colleagues have been developing a family of degradable polymers called polyanhydrides. Sixteen medical centers now use one of these to treat certain brain cancer patients. When injected, powerful cancer-fighting drugs can kill healthy cells along with malignant ones. To minimize this systemic toxicity, doctors implant drug-laced polyanhydride capsules directly into the cancerous region of the brain without exposing other body parts to the drug. As the implant degrades "like a bar of soap," it slowly releases the drug, Langer explains.

Now, he and his co-workers aim for a new family of degradable polymers strong enough to use as temporary bone screws, plates and other load-bearing implants. The new polymers contain two types of building blocks. The researchers make the strength-giving component by reacting trimellitic anhydride with an amino acid such as glycine. This yields a product containing a tough imide bond — similar to the rigid linkage that makes the polymer Kevlar strong enough to serve in bulletproof vests. The other component contains a long, flexible carbohydrate chain and forms the easily degradable anhydride bond when it links to the imide-containing component. By varying the proportions of the two components as well as their constituent amino acids and carbohydrate chains, Langer expects to design polymers with specific degradation rates and strengths. The researchers outline the chemical procedures for making the materials in the May 23 JOURNAL OF THE AMERICAN CHEMICAL SOCIETY.

"This should open up a whole new series of medical applications where one would want both degradability and strength," he told SCIENCE NEWS.