T-PA as stroke treatment?

Tissue plasminogen activator (t-PA), a clot-busting enzyme that is showing value in reducing damage after heart attacks (SN: 4/13/85, p. 229), may someday prove useful in stroke patients as well. Both strokes and heart attacks can occur when a clot lodges in a blood vessel, blocking blood flow. In the Dec. 13 SCIENCE researchers from the University of California's San Diego campus and University of Massachusetts in Worcester report the enzyme effectively protects rabbits from the neurological damage that occurs when a blood clot is induced in the brain; proper dosage information and proven efficacy with larger clots will be needed before the procedure can be tried on human patients, they say.

New laser role for diabetes eyed

Using lasers on the eyes of diabetics with macular edema, a swelling of the key focusing area of the retina, can prevent a significant loss of vision in 200,000 people in the United States in the next five years, according to researchers involved in a National Eye Institute (NEI)-sponsored multicenter evaluation of the procedure.

They lased 754 eyes of people with macular edema and compared them with 1,490 nonlased eyes. After three years, only 12 percent of the treated eyes, compared with 24 percent of the untreated eyes, had suffered a significant loss of vision, they report in the December ARCHIVES OF OPHTHALMOLOGY.

Lasers are already used in diabetic retinopathy to destroy the abnormal blood vessels that grow over the retina. The new research extends the benefit of lasers to vessel growth in the macula.

In macular edema, abnormal vessels growing in the macular area leak fluid. Explains Frederick L. Ferris of the Bethesda, Md.- based NEI, "The retina absorbs the fluid like a blotter, swells up and loses its shape, so the image is distorted. It's like having wrinkled film in a camera."

Exactly how laser use stops the process isn't known, says Ferris. The suspicion is that tiny laser burns in the swollen area damage the leaky parts of the vessels, and as they heal they no longer leak. The treatment's inability to halt vision loss in about half the cases can be due to a persistence of leaking, to a loss of needed blood vessels or to other ocular diseases unassociated with the edema, Ferris says. Crucial to success is early intervention.

Not tonight, dear, I'll have a headache

Sometimes scientific discoveries are made not by white-coated scientists but by backyard tinkerers. Such was the case of a Georgia man with heart disease.

According to Emory University researchers, the man had noticed that the nitrate skin patches he was wearing on his chest to control heart pain gave him a headache, a known side effect of the drug; the headache didn't occur if he wore the patch on his leg. His curiosity aroused, the man rubbed a used patch on his penis. Within five minutes he became sexually aroused, and had sexual intercourse with his wife. "Several minutes later," the Decatur, Ga.-based researchers report in the November ANNALS OF INTERNAL MEDICINE, "she wondered why she had the worst headache she ever had in her life."

The man explained, but his wife was not impressed and strongly discouraged any more investigation in this area.

The case, the researchers say, "illustrates two previously undescribed points concerning topical nitrates: their ability to induce vasodilation and resulting erection, and their absorption through the mucous membranes of the vaginal walls." The authors expressed doubt that further research in this area will be done.

The texture of clinging proteins

The varying roughness of a protein molecule's convoluted surface may influence how different parts of the protein interact with other molecules. One way to describe the roughness of such an irregular surface is to measure and compute its fractal dimension (SN: 1/21/84, p. 42). A perfectly smooth surface has a fractal dimension of 2, while an extremely rough surface with features that fill all of space has a dimension of 3.

In the Dec. 6 SCIENCE, Mitchell Lewis of SmithKline and French Laboratories in Philadelphia and D.C. Rees of the University of California at Los Angeles report that the fractal dimension of several protein surfaces is about 2.4. This dimension, however, varies considerably from place to place along a given protein. Because the amount of surface detail detected depends on the size of the probe used, these results apply for probes in the range of 1.0 to 3.5 angstroms in radius.

For proteins like lysozyme and superoxide dismutase, regions involved in the formation of tight complexes, in which molecules are firmly bound together, appear to be more irregular than average. Regions known as active sites, which are involved in the formation of transient complexes, seem to be smoother than average.

"These considerations suggest that the calculation of fractal surfaces . . . may be a useful technique," Lewis and Rees conclude. "Recognition of these geometric factors provides a new approach to describing the interaction of macromolecules with one another."

A solid look at xenon

Normally it takes a very low temperature or a high pressure to solidify an inert gas like argon or xenon. This constraint, however, can be overcome by using a beam of inert-gas ions to irradiate an aluminum film. The resulting film contains small "bubbles" of solid xenon or argon trapped in an aluminum matrix. In this form, rare gas solids can be studied using high-resolution electron microscopy, as reported in the Dec. 13 SCIENCE.

The technique makes it possible to detect and measure lattice characteristics of individual bubbles less than 8 nanometers across, say Stephen E. Donnelly and Christopher J. Rossouw of the Commonwealth Scientific and Industrial Research Organization in Clayton, Australia. Information about crystal defects within the bubbles themselves also becomes available.

An analysis of 130 solid xenon bubbles revealed that, in general, the tiny embedded crystals are faceted but often irregular in shape. A number of images hint that the crystals look somewhat like truncated octahedra. Many bubbles show a high degree of crystalline perfection.

Digging into surface reactions

Two scientists at Rockefeller University in New York City have stumbled upon a new method for detecting chemical reactions that take place at the surface of solids. While studying a thin solid film of an organic dye, the researchers inadvertently exposed the dye to light in the presence of air. When they repeated a mass spectrometric analysis of the film, they found clear evidence that a chemical transformation had occurred.

The key step involves using an essentially nondestructive form of mass spectrometry based on the radioactive isotope californium-252. Fission fragments from the isotope's disintegration bombard the film, intensely heating the surface and causing molecules to ionize and vaporize.

The researchers, Brian T. Chait and Frank H. Field, have now shown that the technique works for a variety of surface reactions. It's also very sensitive, they report in the Nov. 13 JOURNAL OF THE AMERICAN CHEMICAL SOCIETY.