search and research facilities projects will grow."

"The problem is the longer it goes on and the more instances of it there are, the harder it is for institutions to hold out," says Rosenzweig. "Nobody wants to be the last in line." The real issue, he says, is documented in a White House panel report released last week, which looks at the health of university research (see p. 328). "Until that problem is addressed," he says, "these kinds of pressures are going to pop up all over the place, and in responding to them, serious damage can be done to the whole enterprise."

The Senate committee proposals have yet to be acted upon by the entire Senate. The House version of the appropriations bill includes funds only for projects at Northeastern University in Boston and at the Rochester (N.Y.) Institute of Technology. Even if the House and Senate agree to fund all the university projects, DOD can still return the money to Congress unspent. But the strength of congressional support so far in favor of this funding may make that unlikely.

In an earlier debate, Sen. Ted Stevens (R-Alaska), who chairs the defense appropriations subcommittee, said there is nothing new about Congress earmarking funds for certain colleges and universities. He and others argue that it's an acceptable way to help universities wanting to improve their research programs.

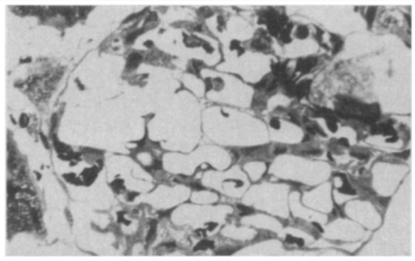
— I. Peterson

Putting human tissue under glass

Human organs cannot survive long-term freezing — the ice crystals that inevitably form fatally impair their function. But Gregory M. Fahy, a researcher at the American Red Cross's Transplantation Laboratory in Bethesda, Md., thinks he has an alternative. Instead of turning the water within organs into ice, he supercools it into glass. He and a former coworker have already "vitrified" mouse embryos; at the Red Cross's recent Annual Scientific Symposium in Washington, D.C., Fahy described modifications to the procedure that may allow it to be used on entire organs.

With cooling, kidneys can be banked for two to three days, and hearts and livers for six to eight hours. Transplantation experts estimate that as many as 20 percent of the organs donated and available for transplantation have to be discarded because a matched recipient can't be found before the organs spoil.

Fahy and William F. Rall, now at Rio Vista Laboratories in San Antonio, Tex., have succeeded in vitrifying mouse embryos, a process they initially described in the Feb. 14, 1985 NATURE. Since then, Rall has reimplanted the embryos, which then continued their development and grew into normal mice. Their offspring were normal as well, Rall says.



CRYOBIOLOGY/Fahy

Capillaries within the kidney show the disruption of freezing: Walls between the vessels in the upper left quadrant have broken down. Vitrification, Fahy says, will prevent this.

The vitrification process relies on the addition of several chemicals that prevent the crystallization of water within and outside the cells. With cooling, the molecules essentially are fixed in place, becoming what Fahy calls "a solid liquid." This is unlike conventional freezing, in which the water molecules crystallize into an orderly structure.

Organs present what Rall terms "huge technical problems." Among them are determining a way to use high enough levels of chemicals to induce vitrification without poisoning the cells, and getting the tissue to warm properly. Fahy reported at the symposium that doing the procedure at 1,000 atmospheres of pressure limits the concentration of chemicals needed.

The largest organ he has so far been able to vitrify has been a rabbit kidney. The result, which is stored at −125°C, looks something like a gruesome paperweight. The vitrified tissue itself appears normal from the outside, with no visible traces of ice. Fahy has not yet done microscopic studies of the tissue, but he says that because vitrified cell preparations retain their normal architecture and viability, and because the process of vitrification doesn't involve any sudden changes as does freezing, he expects that further investigation will show that the organ tissue is preserved.

While he can vitrify organs, the key is going to be in reversing the process. Thawing, Fahy says, is "the last barrier." The problem is balancing the speed of heating, making it fast enough to prevent ice crystals from forming as the specimen "warms" from −125°C, but slow enough to avoid stress fractures of the sort that can crack a glass into which boiling water has been poured.

"We have a new direction, new possibilities and a lot of data," says Fahy. "But we don't have proof it's going to work in [an intact] organ."

— J. Silberner

Self-promoting AIDS gene

While the AIDS virus's genetic sequence was reported last year, the book has remained open on the number and functions of the proteins it produces. Now, William Haseltine of Harvard University and his co-workers report in the May 22 NATURE the discovery of a protein that promotes viral production of other AIDS proteins. The gene that makes the protein is the second such self-stimulating AIDS gene to be identified; the first was also found by the Harvard group. □

More details on Chernobyl

As cleanup crews at the Chernobyl nuclear power station continue efforts to encase its devastated reactor in concrete, Soviet leaders have begun offering the most detailed account thus far of what they think caused the April 26 accident. In a televised statement last week that was later translated and distributed by the Soviet press agency Tass, Communist Party Chief Mikhail Gorbachev said the reactor's "capacity suddenly increased" during a scheduled shutdown of the #4 reactor.

The Soviet reactor design incorporates what is called a "positive void coefficient," explains Frank Graham, vice-president of the Atomic Industrial Forum, Inc., in Bethesda, Md., a nuclear-industry association. That means any loss of water or overheating of water in the pressure tubes through which fuel-cooling water passes could prompt "a surge in the fission action," causing a rapid increase in reactor power, he says. This is in contrast to most commercial U.S. reactors, Graham says, which begin losing power when their fuel's coolant overheats. Theoretically, Graham told SCIENCE NEWS, the power surge that Gorbachev seemed to be referring to could, if unchecked, have caused "the fuel to come apart" — and, in a reactor of the Chernobyl type, started a graphite fire.

Conceding this scenario is only an "educated guess," Graham says it might explain the origin of the graphite fire and hydrogen explosion that the Soviets now believe blew the roof off the plant. As the heat generated in a graphite fire melted the pressure tubes — liberating water, steam and oxygen — the zirconium that cladded the fuel would have begun oxidizing, producing copious amounts of heat and hydrogen.

Meanwhile, bone marrow transplant specialist Robert Gale, of the University of California at Los Angeles, has returned from Moscow after assisting in a reported 19 transplants. As many as 100,000 Soviets may eventually suffer radiation-induced health problems, he estimates.

— J. Raloff