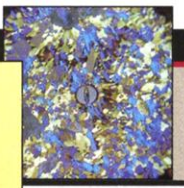
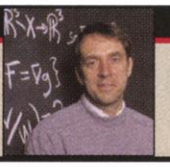
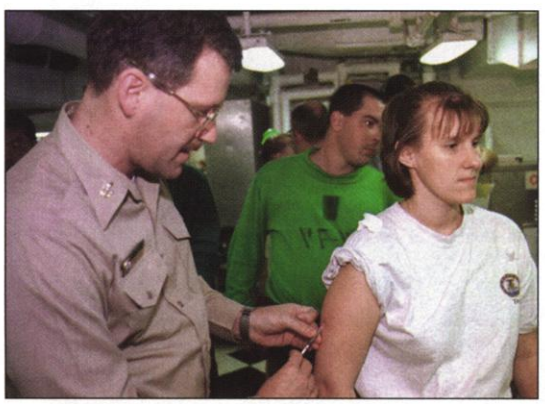




ANTHRAX

'Borrowed Immunity' May Save Future Victims

Government investigators want to have something more than antibiotics on hand should anthrax terrorists strike again. Of the 11 bioterrorism victims who came down with inhalation anthrax last fall, five died despite the powerful antibiotics they were given. Now investigators at the Centers for Disease Control and Prevention (CDC) and other federal agencies are seeking permission to treat future severe cases with an experimental therapy designed to confer instant immunity against the bacterium's deadly toxin: blood plasma from military personnel vaccinated against anthrax.



Arms supply. Plasma from vaccinated volunteers may provide an experimental anthrax treatment.

The proposal has passed CDC's internal ethics board and could be sent for approval as early as this week to the Food and Drug Administration (FDA), says Bradley Perkins, chief of CDC's Meningitis and Special Pathogens Branch. One question to be explored is whether the plasma batch CDC proposes to use complies with FDA regulations. Meanwhile, CDC, the National Institutes of Health (NIH), and the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) also plan to conduct a series of animal experiments to determine whether the therapy will work and how much plasma would be needed.

Antibiotics can fail, researchers say, because *Bacillus anthracis* churns out a toxin that continues to wreak havoc even after the bacteria have been killed. Scientists hope that the variety of antibodies in the injected plasma from vaccinated people will be able to eliminate the toxin. But in the long run, CDC plans to use antibodies, or immunoglobulin, that have been purified from the plasma.

The approach, called passive immunotherapy, has a long history: Plasma from vaccinated horses was the only available anthrax treatment in the preantibiotic era, and it's still used in Russia and China. Unfortunately, says USAMRIID anthrax researcher Arthur Friedlander, none of the reports about its efficacy in humans meets modern scientific standards. In animal studies, the strategy has been shown to work only when antibodies were given prior to anthrax exposure. Given this paucity of data, the proposed treatment would be given only as an adjunct to antibiotics, says Perkins, and only to failing patients who didn't improve on antibiotics alone.

The current plasma supply, which was collected from military personnel before the attacks, is far from ideal. Only 135 plasma units of about 600 milliliters each are available; part of that will be used for animal tests, and the remainder would suffice for a few dozen patients at most, says Perkins. And because the plasma was collected with scientific experiments in mind, not for use in humans, collection and storage procedures may raise eyebrows at the FDA. Some of the vaccinees were also enrolled in vaccine trials using live agents such as Venezuelan equine encephalitis virus and tularemia, making them less desirable donors. But a draft of the treatment protocol argues that this poses only a small risk, because the pathogens were attenuated and the trials took place at least 2 months before plasma was collected.

The investigators also want to collect a second, larger batch of plasma from vaccinated volunteers for use in both treatment and animal studies. But it would still be a fairly modest amount—perhaps three times what's available now. "Most [investigators] are not willing to stockpile this material in any serious quantity without much better data about its efficacy in animals," says Perkins. Even if the product is shown to work in animals and becomes an accepted treatment, he adds, "it would be an interim solution at best."

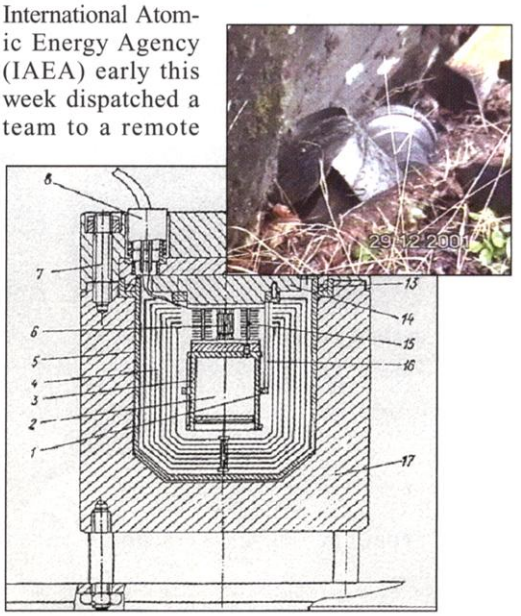
Researchers would prefer a treatment that does not rely on volunteers. That's why many anthrax researchers are following the work of a team led by Brent Iverson and George Georgiou of the University of Texas, Austin, who claim to have created so-called monoclonal antibodies that cling to the anthrax toxin much better than those produced by the human body. Georgiou and Iverson refuse to discuss the findings, which were presented at a meeting last summer, before publication. But Stephen Leppla, an anthrax researcher at NIH familiar with the results, says the antibodies have a 40-fold improved affinity, and they kept alive rats injected with the toxin. The next logical step, he says, would be to see whether the product can also save animals with a real anthrax infection.

The results should demonstrate whether one type of antibody, even if it's very good, can work as well as the broad mix produced by the immune system, says Friedlander. But, he says, the production of improved antibodies "is a good idea that certainly deserves to be evaluated." –MARTIN ENSERINK

NUCLEAR WASTE

'Hot' Legacy Raises Alarm in the Caucasus

VIENNA—Can a crack international team secure two tremendously radioactive objects in the mountains of a strife-torn former Soviet republic before they fall into the hands of nuclear terrorists? The question may sound like a trailer for a James Bond movie, but it's for real. *Science* has learned that the International Atomic Energy Agency (IAEA) early this week dispatched a team to a remote



Too hot to handle. A Soviet schematic shows that the Georgian radioactive canisters (*inset*) were at the heart of an unusual thermogenerator.

CREDITS: (TOP TO BOTTOM) MIKE LARSON/U.S. NAVY/AP PHOTO; IAEA