would require more security at civil plants.

■ As civil nuclear plants take steps to improve security, their costs will rise. These costs should be reflected in electricity rates paid by customers.

■ All research reactors should be converted from high-enriched to low-enriched uranium fuel. A program to make this change has already begun in the United States.

■ The nuclear power industry should undertake a broad reevaluation of the economics of plutonium fuel. In light of the expected increases in security costs, the industry should consider dropping plans to reprocess spent fuel to recover plutonium. The "once-through" system, using exclusively uranium fuel, may be economically more attractive.

■ The report proposes many adminsitrative steps to increase security at fuel production centers and power plants. For example, it suggests that guards be allowed to use "deadly force" to stop intruders and that intelligence agents intensify their screening of job applicants.

■ A new international standard should be adopted forbidding "significant nuclear transfers" to any nation in a "zone of war" or to any nation that "supports or sponsors international terrorism."

The report closes with a standard appeal—not enthusiastically supported by all the task force members, Agnew said—for more vigorous efforts to control the nuclear arms race and for cooperation between the United States and the Soviet Union. ■

ELIOT MARSHALL

New Blood Test Raises Thorny Issues

Blood donations will soon be tested for non-A,non-B hepatitis, but the test is far from perfect

WITHIN the next few months, the nation's blood banks will start testing blood for non-A,non-B hepatitis—a newly recognized health threat. Blood should be safer as a consequence. But the cost is great and the test is far from ideal. Because the infectious agent that causes the disease has not been identified, the test is nonspecific. It will rule out many perfectly healthy donors but will detect only about a third of the non-A,non-B hepatitis carriers.

The test will clearly pose difficult problems for blood banks, and the decision to implement it was not an easy one. Moreover, the decision was complicated by the fact that the overall benefits from testing are uncertain because it is not clear just how serious a health problem non-A,non-B hepatitis is. In practice, however, blood banks may have had little choice, for the non-A,non-B story illustrates that it is very difficult not to do a medical test when there is even a slight chance that it may be beneficial.

"We don't think we can hold back" on non-A,non-B testing, says S. Gerald Sandler, associate vice president for medical operations at the Red Cross national headquarters in Washington, D.C. Yet, says Joseph Bove of Yale University School of Medicine, who is chairman of the American Association of Blood Banks' committee on transfusion-transmitted disease, the test "clearly will affect the blood supply. We estimate that 3 to 5% of donors will have positive tests, and many will be asked not to donate again."

In addition, notes Paul Schmidt, director of the Southwest Florida Blood Bank in Tampa, even if the test turns out not to be useful, it may become a permanent fixture. "Once you start doing a test, it is legally very difficult to stop." Schmidt gives the example of syphilis testing. For the past 20 years, all blood in the United States has been tested for syphilis. Yet, Schmidt says, "the test is not useful. It is practically impossible to transmit syphilis by transfusion." Of course, a better non-A,non-B test could be developed and that is the blood bankers' fervent wish. "Everybody's going into it hoping we can get out when something better comes along," Schmidt says.

The test will clearly pose difficult problems for blood banks.

Non-A,non-B hepatitis was discovered by accident in the 1960's when Harvey Alter and his colleagues at the National Heart, Lung, and Blood Institute initiated a prospective study of NIH open heart surgery patients. The idea was to follow the patients for 6 months in order to determine the incidence of post-transfusion hepatitis. Although the NIH investigators expected that 1 to 5% of the heart surgery patients would get hepatitis, they were stunned when they detected the disease in fully one-third of the patients.

Alter notes that there are three reasons for this high incidence of hepatitis. First, the patients received a lot of blood—about 17 units each. Second, at that time, the NIH was using blood from paid donors, which tends to be less safe than blood from volunteers. Third and "most important," Alter says, "we were looking for hepatitis." Most of those who developed hepatitis were actually not very sick. They were not jaundiced and had few symptoms other than fatigue. These were not patients that ordinarily would be picked out. The NIH reseachers detected them because they were looking specifically for signs of liver inflammation by testing for serum transaminase, which is elevated when the liver is inflamed.

The incidence of post-transfusion hepatitis had declined precipitously by 1970. An antigen test to eliminate donors with hepatitis B had been developed, and the NIH had switched to an all-volunteer blood donor system. Only 10% of open heart surgery patients were getting hepatitis.

But the investigators still could not account for the disease. They could show that it was not hepatitis B. And, in 1975, they were able to rule out hepatitis A as well with a test developed by three NIH researchers, Stephen Feinstone, Albert Kapikian, and Robert Purcell. (Hepatitis A is not transmitted through blood in any case.) Hepatitis A and B were the only known types of hepatitis. "At that point, we 'cleverly' called it non-A,non-B hepatitis," Alter remarks. "It was the beginning of our realization that most post-transfusion hepatitis is due to a new agent."

By the late 1970's the NIH researchers and several other groups showed that the newly discovered hepatitis is caused by an infectious agent. They could transmit the disease to chimpanzees with serum from patients. And a prospective clinical trial funded by NIH, the Transfusion-Transmitted Virus Study, essentially confirmed the

findings on the incidence of the disease. In this study 5 to 10% of transfusion recipients developed hepatitis and more than 90% of the hepatitis was non-A,non-B.

On the basis of all the U.S. data on the disease, Alter estimates that those who receive more than 3 units of blood run a 5 to 6% risk of developing non-A,non-B hepatitis. Although there is clearly something in the serum that transmits this disease, no one has been able to isolate a virus or other infectious agent. Yet, says Harvey G. Klein, director of the NIH blood bank, "this has been a high research priority for years. It's not as though no one has tried."

"What has made this more significant, in my eyes at least, is that when we continue to watch the patients, more than half have persistant transaminase elevations. Their transaminase levels go up and down, but they are abnormal all the time," Alter says. "It looks like chronic hepatitis." Moreover, when the researchers biopsy the livers of those with elevated serum transaminase, the livers look like livers from patients with viral hepatitis.

Finally, 10 to 20% of those with chronically elevated transaminase levels go on to develop cirrhosis of the liver, with significant scarring. "That's what we are concerned about," says Alter. It seems to be different from alcoholic cirrhosis, which follows a rapid downhill course, leading to death from liver failure. "In this disease, the cirrhosis is more indolent," Alter says. "It goes on for a long time and the patients are relatively well." But about 5% have died of liver failure after about 10 years of follow-up. "My gut feeling is that the cirrhosis may take a long time," Alter remarks. He cites Japanese data showing that the average interval between transfusion and cirrhosis was 23 years.

There is no specific test for the non-A,non-B virus and no way to treat the disease once it occurs. The patients generally feel fairly well. Fatigue is the most common complaint. "Most just don't quite get their strength back, but some patients are severely fatigued. A few patients are incapacitated by fatigue and are unable to work," says Alter. "But most patients lead a relatively normal lifestyle."

No one takes these findings lightly. "It's scary to me, certainly," says Klein. Yet the only way to reduce the incidence of the disease seems to be with two very nonspecific tests.

One test looks for elevated serum transaminase in donor blood. Those with non-A,non-B hepatitis have, on average, abnormally high levels of this enzyme, but since the enzyme levels fluctuate, they may not always be picked up by the test. In addition, donors may have elevated transaminase levels although they have no disease. The list of persons who might have high concentrations of the enzyme, according to Klein, include those who are obese and so have fatty livers, marathon runners, persons taking certain medications, and those who had a few drinks the night before.

A second test looks for antibodies to a core protein from hepatitis B. It is not clear why these antibodies would correlate with a likelihood of transmitting non-A,non-B hepatitis, but several groups find that they do. One possible explanation is that those who have been exposed to hepatitis B are more likely to have been exposed to non-A,non-B hepatitis. Another possibility is that the two diseases are caused by related viruses. In any event, investigators find that the core protein test is independent of the transaminase test; for maximum efficiency in detecting non-A,non-B carriers, it is best to use both tests, and the blood banks intend to do so.

As many as 60 to 70% of those who test positive with one of these two tests will not have non-A,non-B hepatitis. And the test is expected to detect only about 30% to 40% of those donors who may transmit nonA, nonB hepatitis. Moreover, Alter emphasizes, "these are *predictions*. No one has done a controlled study of the incidence of non-A,non-B hepatitis when you directly compare tested with untested blood." It would take 2 to 3 years to complete such studies, according to Alter. The blood bank organizations decided that the problem was serious enough to go ahead without them.

With such a high rate of false positives, the blood banks will have to find a way of notifying donors that their blood cannot be used without unduly alarming them. One possibility is simply to discard blood that tests positive the first time a donor comes in. If the same donor's blood is positive a second time, the blood banks would notify the donor that he may have non-A,non-B hepatitis and ask him to refrain from donating blood.

The non-A,non-B tests will make blood more expensive—Bove of Yale estimates that they will add about $5 to the price of a unit of blood. And they will exacerbate the sporadic shortages of blood that the country now experiences. "I think we are entering an era where it will be very difficult to keep the blood supply adequate nationally," Bove says. ■ GINA KOLATA

Will Growth Hormone Swell Milk Surplus?

A debate is raging over whether commercial introduction of bovine growth hormone will exacerbate the financial problems of small dairy farmers

FIFTY years ago, scientists discovered that injections of a crude extract of bovine pituitary gland could boost a cow's milk output. Ever since, many have searched unsuccessfully for a way to mass-produce the key substance, bovine growth hormone. Now, with the aid of biotechnology, four American companies can churn out the hormone by using genetically engineered bacteria, and they are racing to win marketing approval from the federal government. But even though the hormone is not yet for sale, it is the subject of growing controversy because some experts say its use will profoundly change the American dairy industry.

The main concern centers on whether widespread use of bovine growth hormone will drive small and medium-sized dairy farms out of business. At a time when milk in America is already in massive surplus and the U.S. Department of Agriculture is buying and slaughtering excess dairy cows, critics question the need for the hormone. "There are those of us who believe in the family farm, and we're concerned about dislocations," said Representative James Jeffords (R–VT) during a recent hearing by the House livestock, dairy, and poultry subcommittee. Hormone manufacturers—American Cyanamid, Elanco (a subsidiary of Eli Lilly and Company), Monsanto Company, and Upjohn Company—say that the use of the hormone will help the dairy farmer by