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MEDICINE

Breakthrough on Hepatitis

Almost anyone who undergoes major surgery runs a risk that can be deadlier than the disease that brought him to the operating room—the hazard of contracting serum hepatitis from contaminated blood used in transfusions. The same disease is also rampant among drug addicts who get it from dirty hypodermic needles and who often peddle their own blood to clinics. In all, serum hepatitis now strikes some 150,000 Americans annually, claiming at least 3,000 lives, and epidemiologists expect the toll to rise even further in the years to come. For this reason, a cautious report from a New York University Medical Center researcher last week was the best news that virologists had heard in years. Dr. Saul Krugman announced that he and his colleagues had successfully immunized persons against serum hepatitis, a step that could lead to a vaccine to eradicate the scourge entirely.

As is often the case in scientific discovery, Krugman's achievement is a saga of frustration, good luck and opportunities quickly exploited. Serum hepatitis is one of two virus diseases, sometimes called jaundice because their victims' skin often turns yellow, that involve inflammation of the liver and a long, debilitating illness. While serum hepatitis is usually transmitted by injection of tainted blood, the second type, infectious hepatitis, is normally spread through contaminated food and water and occurs in epidemic waves that incapacitate thousands of persons each year. It is well-known that each kind of hepatitis is caused by a different virus. But researchers have never been able to develop vaccines against either for the simple reason that they could not isolate the viruses and grow them in the laboratory.

While a good many virologists long ago despaired of conquering hepatitis and turned to other matters, Krugman doggedly remained on the trail of the elusive viruses. Since 1956, he and his colleagues, Doctors Joan Giles and Jack Hammond, have conducted studies on hepatitis infection among children at the Willowbrook State School, an institution for the mentally retarded on New York's Staten Island. Because of crowding and the unusual susceptibility of some retardates to infection, hepatitis is a common occurrence at Willowbrook, thus giving the investigators an opportunity to observe the natural course of the disease in detail. And since the disease is typically mild in youngsters, Krugman and his associates—always with parental consent—have been able to deliberately infect the children in order to study ways of treating or preventing hepatitis.

Curious: By chance, hepatitis research took a sudden, promising turn in the late 1960s that made Krugman's latest finding possible. Dr. Baruch Blumberg of the Institute for Cancer Research in Philadelphia, while performing genetic studies, found a curious new protein in the blood of an Australian aborigine. At first, Blumberg believed the protein was an inherited trait peculiar to aborigines and dubbed it the "Australia antigen." But after finding the antigen in many other blood samples, he realized that it was not related to any race but to infection with hepatitis. Shortly afterward, Dr. Alfred M. Prince of the New York Blood Center observed an unusual protein in the blood of victims of serum hepatitis. It proved to be identical to Blumberg's antigen.

Researchers now agree that the Australia antigen is either all or part of the virus that causes serum hepatitis. A susceptible person who is inoculated with blood containing the antigen invariably comes down with the disease. And when he recovers, his blood contains antibodies to the antigen, as would be expected after any virus infection. At the very least, the antigen has enabled researchers to tell whether a given blood sample is capable of causing hepatitis. A test to detect the Australia antigen in donor blood is now being used in many blood banks and hospitals to reduce the risk of serum hepatitis through transfusions.

In his own work, Krugman used a special serum containing Australia antigen to immunize children at Willowbrook against serum hepatitis. He and his colleagues boiled the serum for one minute, hoping to destroy its ability to produce the disease without eliminating its capacity to induce the production of protective antibodies. Ten youngsters were given a dose of the heated serum and exposed to infectious serum four to eight months later. Four of the children proved to be immune to the disease: no Australia antigen could be found in their blood, but antibodies to the antigen could be. And they showed no signs of hepatitis. In the other six cases, the disease was unusually mild. Four children who had been given two doses of the heated serum fared even better. Three of them developed antibodies and showed no symptoms; the fourth developed signs of liver abnormality that lasted but a single day. (Since Australia antigen is not implicated in infectious hepatitis, Krugman emphasizes, the heated serum cannot be used to prevent this form of the disease.) In addition to providing active immunization with the heated serum, Krugman also showed that the children in the Willowbrook study could be protected against infection by inoculation with a special gamma globulin prepared by Prince that contains large amounts of antibodies against serum hepatitis.

It may be some time before a vaccine against serum hepatitis is ready for routine use. Ideally, researchers would prefer not to use treated serum but rather a weakened or killed virus as is employed in the Salk and Sabin polio vaccines. And this hope rests upon the eventual isolation of the whole virus and its mass production. "Perhaps," says Krugman, "our work will get more people back into the hepatitis ball game."