

Rat-Borne Virus May Take Secret Toll

It starts with fever and a flushed face. Within a week, symptoms intensify to include leakage of blood plasma from the circulatory system, severe nausea, bleeding, and kidney failure accompanied by large-scale loss of proteins through the urine. Ultimately, chemical imbalances in body fluids can lead to high blood pressure, shock and death.

Korean hemorrhagic fever is all but unknown in the United States, although many U.S. soldiers fell to the disease during the Korean War. However, researchers have known for a few years that the Hantaan virus causing it is common in U.S. rats, and that residents of rat-infested neighborhoods frequently have Hantaan antibodies, indicating exposure to the virus through rat urine. Now researchers find evidence that a low-grade infection with the Hantaan virus — while not causing such dramatic symptoms as the acute form — may be taking a toll on U.S. urban poor.

James W. Le Duc of the U.S. Army Medical Research Institute of Infectious Diseases in Frederick, Md., Gregory Gurri Glass of Johns Hopkins School of Hygiene and Public Health in Baltimore and their colleagues studied 1,148 local hospital patients with high levels of protein in their urine. Although none had acute hemorrhagic disease, 15 had antibodies to the strain of Hantaan virus common in Baltimore rats — a strain closely resembling that seen in rats in Seoul, Korea. Compared with 75 antibody-negative control patients who had similarly high levels of urine protein, the group with Hantaan antibodies had a significantly higher prevalence of chronic renal disease, high blood pressure and stroke. Racial differences were not a factor.

The preliminary results have some “startling implications,” Le Duc said at a conference on emerging viruses last week in Washington, D.C. He suggests non-obvious infections of Hantaan virus may account for a significant portion of the chronic renal disease and hypertension so common among inner-city populations.

“The general [U.S.] view . . . seems to be that infectious agents transmitted by rodents really are not of particular relevance as far as public health goes,” Glass says. “It may well be that there is a certain amount of disease caused by these agents, which is simply not recognized because people are not looking for the symptoms and don’t have the means of diagnosing the diseases.” Few U.S. labs perform the complex antibody tests needed to confirm Hantaan infection.

“Hantaan virus in the United States and

in the United Kingdom and some parts of Europe has been underplayed,” asserts Graham Lloyd, a public health virologist at the Center for Applied Microbiology and Research in Salisbury, England. Lloyd says he and others are seeing similar associations between non-obvious Hantaan infections and chronic renal disease in the United Kingdom. They also find high levels of Hantaan in cats, which may aid viral transmission between rats and humans.

Hantaan is one of several so-called hantaviruses causing a spectrum of acute hemorrhagic fevers in Asia and parts of Europe. Doctors worldwide diagnose hundreds of thousands of acute infections each year but have yet to determine the clinical relevance of chronic infection. “In the animal population you get perpetual, persistent infection,” Lloyd says. “And there’s no reason to believe that persistent infection in man would not also occur. It’s a type of virus that would lodge itself . . . within various target organs,” and so might easily remain unnoticed by clinicians.

If confirmed, the findings would have their greatest significance in China and Korea, where hantavirus infections are most common, Glass says. But in the United States, the association could prove “a significant problem” for the growing urban populations living near rats.

Lloyd notes two further populations at risk within developed countries: researchers working with laboratory rats imported from Asia, and patients receiving biological products made in part from rat cells. “We make monoclonal antibodies for human use now from rats,” Lloyd says. “It’s possible, if you don’t treat those antibodies properly, that they could cause infection, especially if the individual is immunocompromised. That’s our major concern.”

Glass says U.S. scientists so far have kept their laboratories free from the virus. One drug, ribavirin, can lessen hantavirus symptoms if given early enough, but its usefulness in chronic infections remains unknown. No Hantaan vaccine exists.

— R. Weiss

Magellan: A fortuitous start to Venus

If Magellan, the first U.S. interplanetary spacecraft sent from Earth since 1978, orbits Venus next year as successfully as it took off on May 4, a stroke of scientific luck may emerge from the six-day delay in launching the space shuttle Atlantis.

The relative motions of Venus and Earth meant that as late as May 5 the radar mapper’s approach to Venus would be slower for each day the launch was postponed, reducing the amount of hydrazine propellant needed to slow the craft enough to settle into its correct orbit. The “launch window” opened April 28, and mission officials had planned to launch that day, because unforeseen delays lasting more than a month would have forced Magellan to wait nearly two years for another try. May 5 would have proved best from a fuel-economy point of view, says Elliott Cutting, head of the Magellan Mission Planning Team at the Jet Propulsion Laboratory in Pasadena, Calif., but May 4 was “awfully close.”

That launch date probably saved about 5 of Magellan’s 132 kilograms of hydrazine, Cutting says. If everything else about the craft behaves as planned, this could provide a substantial fuel reservoir for extending the basic 243-day mission. Each additional 243-day cycle — the time needed for Magellan to

map its way once around the planet — should use about 2 kilograms of hydrazine. The excess could thus be enough to hold the craft steady for 2½ more cycles.

What scientists want most from an extended mission is to map any areas Magellan misses the first time. Such gaps may be created when the sun blocks the craft’s radio beam to Earth.

Scientists also hope the craft will have time (and hydrazine) to map Venus’ south polar region, not seen at all by the Soviet Venera 15 and 16 orbiters, the most recent craft to go there. In addition, the mission team is studying the possibilities of remapping some of the surface with the radar beam aimed at a different angle and polarized differently — two ways to extract more information from a global Venus database that may be the last for years.

A particularly exciting possibility calls for Magellan to make its radar maps in stereo, by electronically adjusting its antenna to add what amounts to a “left-eyed” view of areas where it gathered “right-eyed” data during a previous orbit. Another use for some of the hydrazine would be to lower the orbit’s lowest point at some time from 250 to 200 kilometers, enabling the craft to produce maps with better contrast and more detail.

— J. Eberhart