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Hantaan Virus Infection in Singapore

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Hantaviruses are a group of viruses causing several clinically similarly human diseases collectively called haemorrhagic fever with renal syndrome (HFRS). Hantaan virus, which is the prototype hantavirus (genus *Hantavirus*), is the aetiological agent of the rural type of HFRS known as Korean haemorrhagic fever in Korea and epidemic haemorrhagic fever in China and Japan. The *Apodemus* field mouse is the main reservoir host of hantaviruses causing the rural form of HFRS in these countries. The urban form of HFRS and the laboratory-acquired disease are aetiologically associated with Seoul virus, which is transmitted to man by urban rats (*Rattus norvegicus* and *R. rattus*) and laboratory white rats, respectively.

Seroepidemiological studies in human and rat populations have shown that hantaviruses are widely distributed in the world.¹ However, the spectrum of illness caused by hantaviruses outside the traditional endemic/epidemic countries remains to be elucidated. It has been suggested that the disease in nonendemic countries may be atypical or different from that seen in Korea, China and Japan.

Beginning from 1985, seroepidemiological studies were initiated to determine the presence and prevalence of hantavirus infection in man and urban rats in Singapore. In addition, laboratory white rats bred and reared from imported stocks at the Laboratory Animals Centre of the National University of Singapore were also screened for hantavirus infection. Blood and lung tissues were obtained from laboratory

rats and urban rats trapped live in the old part of the city, along canal and river, in a public housing estate and near the harbour. Blood was obtained from patients with clinical diagnoses of acute nephritis, leptospirosis, non-A non-B hepatitis and dengue haemorrhagic fever which were not confirmed by appropriate serological and other tests. Patients with acute nephritis had a negative anti-streptolysin O antibody titre; leptospirosis patients were not confirmed by the sensitized erythrocyte lysis test for leptospiral antibody; non-A non-B hepatitis were diagnosed by exclusion, i.e., they had no IgM antibody for hepatitis A virus and no surface antigen and antibody for hepatitis B virus; and dengue haemorrhagic fever patients had no dengue antibody detectable by the haemagglutination inhibition test. Sera and lung tissues were sent under dry ice to Dr Ho Wang Lee of WHO Collaborating Laboratory for Virus Reference and Research (Haemorrhagic Fever with Renal Syndrome) in Seoul, Korea, for virus isolation or antibody testing by the indirect immunofluorescent antibody (IFA) test using the 76-118 strain of Hantaan virus grown in A546 cells. We report here the preliminary results of this study.

To date, 16 normal healthy individuals working at the Laboratory Animals Centre, 21 patients with acute nephritis and 38 laboratory white rats have been tested for hantavirus antibody and the results are shown in the Table. None of the laboratory personnel caring for laboratory white rats had evidence of hantavirus infection although 13% of the rats had IFA

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Sera	Number tested	Number with IFA antibodies ^a	% positive
Human			
Laboratory Animals	16	0	0
Centre personnel			
Acute nephritis patients	21	2 ^b	9.5
Laboratory white rats	38	5 ^c	13.2

^aSera were tested against 76-118 strain of Hantaan virus ; IFA titre of 1 : 20 was considered as positive for antibody.

^bOne patient had titre of 1 : 640.

^cThree infected rats were Wistar strains originated from Japan.

titres ranging from 1 : 20 to 1 : 80. Three of the five infected rats were Wistar strains which originated from Japan and imported via Australia. The origin of the other infected rats could not be determined. Two of the acute nephritis patients possessed IFA antibodies to Hantaan virus and one of them had a relatively high titre of 1 : 640.

It may be concluded from these preliminary findings that Hantaan or a Hantaan-related virus occurs in Singapore causing human disease and imported laboratory white rats are infected with the virus. Further virological and serological studies of human and rat populations are indicated to determine the extent of hantavirus infection in Singapore.