

SARS

SCWDS Briefs, July 2003, Vol.19, No.2

In February 2003, a new coronaviral disease known as Severe Acute Respiratory Syndrome (SARS) gained international attention as it spread to 32 countries around the world. The virus first surfaced in the human population in November 2002 in the Guangdong Province of southern China. The emergence of SARS and its impact on international travel and business has created an urgent need to understand the natural history of the disease in order to prevent future epidemics.

Coronaviruses are large RNA viruses that cause respiratory and intestinal disease in humans and many species of domestic animals. Most human coronaviruses cause mild upper respiratory disease resembling the common cold. However, coronavirus of cattle and transmissible gastroenteritis virus of swine cause severe disease in livestock. Little is known about coronavirus infection in wild animals, but feline infectious peritonitis virus has been documented as a cause of disease in large felids such as the cheetah. Coronaviruses are spread in respiratory secretions and feces, so lower density of wild animal populations could explain the lower prevalence of coronavirus infections in wildlife when compared with domestic animals. Also, coronaviruses are inactivated by heat, disinfectants, and ultraviolet light, so they do not survive long outside of their hosts. Coronaviruses typically have narrow host ranges, but they can mutate easily due to their unique method of replication and potentially could be infectious to other species. Sequencing of the genome of SARS virus demonstrated that the virus is distinct from all of the known coronaviruses for which information is available. It is proposed that the SARS virus be classified into a distinct fourth serogroup, separate from the three previously recognized coronavirus serogroups.

The natural reservoir of SARS virus and the origin of the new virus are still unknown. In May 2003, researchers from the University of Hong Kong isolated a virus very similar to SARS virus from four masked palm civets (*Paguma larvata*) and one raccoon dog (*Nyctereutes procyonoides*) in a live-animal market in Shenzhen in the Province of Guangdong. Civets are cat-like carnivores related to the mongoose. They are solitary animals that may form small family groups in the woodlands, rainforests, and savannas of Africa, southwestern Europe, India, the Arabian Peninsula, southeastern Asia, and the Philippines. In southern China, the meat of the masked palm civet is a delicacy, and live animals are sold in markets for human consumption. The raccoon dog is closely related to the gray fox and the bat-eared fox and is native to the forests of eastern Asia. It also was artificially introduced into eastern Europe to be hunted for fur. These civets and raccoon dogs may be the source of SARS virus, or they may be incidental hosts infected by another animal before they arrived at the market. Close confinement of these animals in a market creates a good environment for disease transmission.

In the market where the SARS-like coronavirus was isolated from masked palm civets, 5 out of 10 (50%) civet handlers tested positive for antibodies to SARS virus, which indicated that the handlers had overcome infection in the past. Elsewhere in the

Guangdong Province, 508 civet handlers were tested, and 66 (13%) tested positive for SARS virus antibodies. This percentage is much higher than the prevalence of SARS virus antibodies in the general population, so animal handlers in the live markets of southern China apparently come in contact with the virus more frequently.

The coronaviruses isolated from the palm civets and the raccoon dog in Guangdong were very similar to the SARS virus but had an extra stretch of genetic material not present in the human SARS virus. Since coronaviruses are known to mutate and lose sequences of genetic material during replication, researchers believe that the SARS agent may have originated in other animals before it gained the ability to infect humans. Research currently is underway to identify the natural life cycle of the SARS virus and to determine the role of animals in the origin and transmission of the SARS coronavirus and their status as reservoirs of the disease. Additional information on SARS is available from the Centers for Disease Control and Prevention website: www.cdc.gov
(Prepared by Emily Watry)