

Epidemiology Bulletin

REPUBLIC OF CHINA

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Rabies

Introduction

Rabies is not known to occur in Taiwan. However because it is closely associated with nearby areas that have endemic rabies (Indonesia, Mainland China, Philippines, Vietnam, etc.) including some of the highest infection rates in the world, often with increasing prevalence rates, and because there is extensive legal and illicit trade between Taiwan and these infected areas, the likelihood is high and is increasing that rabies will be introduced to Taiwan. Unless health officials including clinicians and public health workers, and agricultural personnel are aware of the rabies of introduction, and are able to make rapid diagnosis, and take effective measures to contain and eliminate the disease, there is a high probability that the disease will become established in Taiwan as a new and costly problem having an adverse effect on human health, agricultural output, and tourism.

That the disease can occur with delayed recognition may be illustrated by examples in the United States and Colombia. In the U.S. one recent case (1983) of human rabies was diagnosed only after a cornea from an undiagnosed case was transplanted into a recipient who developed rabies as a result. Similar corneal transplant cases of rabies have since been reported in France and Thailand. Also in one major hospital in Cali, Colombia, a researcher, suspecting that unrecognized rabies was present, initiated a surveillance program by testing tissues from all case fatalities occurring in the hospital over a 2 year period. Results showed that 1.7% of all deaths occurring in the hospital were due to unrecognized rabies. Clearly it is possible for an introduction of rabies to go unrecognized for a long time allowing the disease to become firmly established and difficult to eliminate. It therefore seems prudent that Taiwan health and agriculture officials be aware of risks, initiate appropriate introduction, and develop contingent plans to control and eradicate the disease should it be introduced into Taiwan.

Natural history of disease

Rabies is caused by a rhabdovirus of Genus *Lyssavirus*. Although there are an increasing

number of variant strains of rabies virus being identified for practical purposes, the virus may be considered as one monotypic virus whose characteristics do not vary significantly.

Transmission of rabies is usually by the bite of an infected animal inoculating rabies infected saliva into the wound. Domestic dogs are the most important reservoir and vector of human rabies worldwide. Any warm blooded animal can be infected and some wild animals (including wolves, jackals, foxes, and bats) may be locally important but domestic dogs account for about 95% of all human cases. Other routes of transmission may rarely occur. The nosocomial transmission by tissue transplant has already been mentioned. Airborne transmission has occurred in rare instances in the laboratory and in one bat cave.

Incubation period for rabies is highly variable. Though most cases have onset within 21-60 days of exposure, there have been reported incubation periods of over 2 years and as short as 10 days.

Clinical rabies in man is somewhat variable in presentation. Onset is often characterized by some sensation of hypesthesia or paresthesia at the bite site even though the wound may be completely healed. This local neuritis may be accompanied by ascending neuritis.

Other easily symptoms including headache, altered disposition and confusion. Hypersensitive to stimuli, especially touch and sound, is common. Hydrophobia and aerophobia are diagnostic if they occur. The period of hypersensitivity and hyperreflexia is followed by increasing loss of responsiveness. Usually the patient becomes lethargic, ataxic, comatose and eventually dies, usually in respiratory arrest. Other conditions which may develop include diabetes insipidus, diabetes mellitus, and cardiac arrhythmias. Clinical illness in untreated patients usually terminates in death within 24-96 hours. With careful monitoring and supportive therapy clinical period often extended to 14-18 days. Three cases of survival from clinical rabies have been reported, two without residual, one with significant neurologic deficit.

In animals, the clinical disease is similar except that hydrophobia does not occur. Altered phonation, as an abnormally high pitched bark for dogs, is common. Survival from clinical disease is somewhat more common in animals than in man. The stage of hyperreflexia and hypersensitivity is commonly called "furious" rabies in animals and the stage of hyporeflexia and hyposensitivity is commonly called "dumb" rabies. Animals in either stage of clinical disease may be shedding virus in saliva and therefore be infectious.

Prevention of disease

Excellent antirabies vaccines are available for man and animals for pre-exposure immunization. For humans vaccine also may be administered after exposure but before onset of clinical disease. There is no effective treatment for man or animals once clinical disease has developed.

Control and elimination of rabies in a population depends upon identifying and immunizing the susceptible reservoir/vector population, usually domestic dogs. In areas where the risk of reinfection continues, it is necessary to conduct periodic dog immunization campaigns. A 70% level of immunity in a dog population is considered adequate to interrupt the disease transmission. In an

isolated (as an island) population, once this level of population immunity has been reached and disease eliminated, it may be more cost effective to prevent reintroduction by establishing a quarantine program than to continue revaccinating the population to maintain the 70% non-susceptibility level.

Current research

The most important area of current research is the development of oral vaccine baits for use in immunizing dog and wild animal populations. Such vaccine baits have been developed and used in Europe to control and eliminate rabies from much of Western Europe including all of Switzerland and most of South Germany. Recombinant virus vaccines are now being developed and field tested which may prove effective for orally immunizing dogs and other wild animals.

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EBOLA VIRUS

WHO has been informed by the Government of the United States of America of an outbreak of Ebola virus in a shipment of monkeys recently delivered from the Philippines to a biological company in Virginia, United States. The shipment of 100 *Cynomolgus* monkeys was received on 4-5 October 1989 from Manila. In total, 60 of the 100 imported monkeys died. Post-mortem serum, spleen, and liver specimens yielded multiple virus isolates confirmed to be Ebola virus.

Since the routing of these contaminated monkeys included overnight holding periods at the Amsterdam airport, and at J.F. Kennedy airport in New York, there is a slight possibility of contamination of other shipments of animals which might have shared airport holding facilities in early October. Additionally, other shipments from the Philippines might be contaminated. WHO and the Centers for Disease Control (CDC) are investigating possible contacts.

Veterinary and public health officials of the Netherlands, together with staff from WHO and the Centers for Disease Control, United States of America, formed a team to review animal shipments and monkey handling procedures at Amsterdam airport. As of 8 December, all personnel at the airport who had possibly had significant contact with the infected animals had been approached and interviewed. The 30 agents in 15 countries that had shipped or received monkeys through Amsterdam airport between 14 September and 28 November were notified by telex and requested to monitor any deaths in their animals.

Based on these preliminary results, there appear to have been no illnesses in the Netherlands attributable to the trans-shipment of these monkeys.

Ebola is an African haemorrhagic fever virus which is classified as extremely biohazardous because of its high case-fatality rate in humans (60-90%). The normal incubation period in humans is 5-7 days. Little is known about the natural history (transmission, reservoirs, etc.) of this virus, but it is related to Marburg virus, which in 1967 caused a small outbreak (25% case-fatality rate) in Europe among animal handlers and researchers working with African *Cercopithecus* monkeys (i.e. African green monkeys) imported from Uganda. Ebola virus has never before been observed outside Africa.