RABIES-RELATED VIRUSES

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ABSTRACT

Since, unlike most strains of classical rabies virus, the rabies-related viruses have been isolated from species other than carnivores, an attempt has been made to bring to the fore their virus-host relationships. Duvenhage virus, the only rabies-related virus to date found outside of Africa, now appears to be endemic among European bats, and the development of this epizootic is chronicled. Of considerable importance to public health authorities is the question of whether or not current vaccines protect against the European variants of this virus, and this topic is discussed in detail.

INTRODUCTION

Rabies in terrestrial animals has long been recognized as a terrifying disease. Pasteur, on whose classical experiments all subsequent work on rabies is founded, recognized that there were biological differences between the strains which cause the disease. By repeated passage of wild ("street") isolates intracerebrally in laboratory animals, he was able to alter their biological properties so that they became more neurotropic and the incubation periods became less variable ("fixed"). It was not until many years later, however, long after rabies had been shown to be caused by a virus, that antigenic differences between strains were recognized and their possible implications for vaccine programs were first considered. Within the past decade, the application of monoclonal antibody techniques has permitted the differentiation between viruses from different species.
and from different geographical locations. Nevertheless, such studies have led to the conclusion that, despite the variations, most of the strains in terrestrial animals can be regarded as classical (serotype 1) viruses.

Among the mammals, bat species are in number second only to the rodents, yet comparatively little is known of their natural history. It was from bats that the first truly distinctive rabies-related virus isolate (Lagos bat virus, serotype 2) was made, and this was followed by the isolation of another rabies-related virus from a man bitten by a bat (Duvenhage virus, serotype 4). Many further isolations of this virus from bats have since been reported in Europe.

Shrews are found on all major land areas, and the Crocidura species from which another rabies-related virus (Mokola, serotype 3) was isolated are common in Africa and Europe.

Two other viruses, Obodhiang and kotonkan, have been isolated from arthropods. They have been shown to be distantly related to each other and to Mokola virus.

Rabies is still one of the most important epizootic diseases of the world. The rabies-related viruses, though of less public health importance, may yet provide the information needed for a fuller understanding of the complex virus-host relationships of the disease.

THE RABIES SEROGROUP

Classical rabies, Lagos bat, Mokola, Duvenhage, Obodhiang and kotonkan viruses (Table 1) together form the genus Lyssavirus within the family Rhabdoviridae. All have a characteristic bullet shape (see Tordo and Poch, this volume). Since the relationship of the arthropod-borne members to the others is distant and only through Mokola virus, Bauer and Murphy (1) have suggested the need for further physico-chemical characterization to determine if they should be placed in a separate subgroup. However, in a recent review, Shope and Tesh (2) consider that these viruses should be included in two separate serotypes within the lyssaviruses.

Serotype 1: Rabies Virus

The prototype strain of the serotype is Challenge Virus Standard CVS-24, which was derived from Pasteur's virus. This serotype also