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REVIEW

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West Nile Virus: An Overview of Its Spread in Europe and the Mediterranean Basin in Contrast to Its Spread in the Americas

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Abstract West Nile (WN) virus is a mosquito-transmitted flavivirus. It is widely distributed in Africa, the Middle East, Asia, and southern Europe and was recently introduced to North America. Birds are involved in the cycle of transmission as amplifying hosts. Humans and horses are considered accidental dead-end hosts. WN fever was initially considered a minor arbovirosis, usually inducing a nonsymptomatic or a mild flu-like illness in humans, but some cases of encephalitis associated with fatalities were reported in Israel in the 1950s. After two silent decades, several human and equine outbreaks of fatal encephalitis occurred from 1996 to 2000 in Romania, Morocco, Tunisia, Italy, Russia, Israel, and France. In Romania, a few cases of WN encephalitis in humans are noticed every year, and in France, recent WN infections have been detected in monitored sentinel birds in 2001 and 2002. Phylogenetic studies have shown two main lineages of WN strains. Strains from lineage I are present in Africa, India, and Australia and are responsible for the outbreaks in Europe and in the Mediterranean basin, and strains from lineage II have been reported only in sub-Saharan Africa. In 1998, a virulent WN strain from lineage I was identified in dying migrating storks and domestic geese showing clinical symptoms of encephalitis and paralysis in Israel. A nearly identical WN strain suddenly emerged in New York in 1999, killing thousands of native birds and causing fatal cases in humans. The virus is now well established in the New World, and it disseminates rapidly. New modes of transmission through blood donations, organ transplants, and the intrauterine route have been reported. In Europe, an enhanced surveillance of WN infection in humans, horses, birds, and vectors may reveal the presence of the virus in different locations. Nevertheless, outbreaks of WN virus remain unpredictable. Further coordinated studies are needed for a better understanding of the ecology and the pathogenicity of the WN virus.

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Introduction

West Nile (WN) fever is a viral disease originally identified in Africa in the West Nile district in Uganda [1]. The viral agent was isolated in 1937 from the blood of a febrile patient and was found to be antigenically related to the virus that causes Japanese Encephalitis [2]. Other isolates were later obtained from the blood of apparently healthy children in Egypt [3]. Ecological studies undertaken in 1952–1954 in the Sindbis district in Egypt established the cycle of the virus, which involves mosquitoes as vectors, birds as amplifying hosts, and humans and horses as sensitive dead-end hosts [4, 5]. The virus was recovered from mosquitoes, birds, and humans and had a widespread geographical distribution in Africa, Europe, and Asia [6].

Initially, WN fever was considered a minor arbovirosis, inducing in humans essentially a nonsymptomatic disease or a mild flu-like illness. The first epidemics of encephalitis were reported in Israel in the 1950s and then in France in 1962–1963, affecting both humans and horses [7, 8]. Three fatal cases in children were described in India [9]. More recently, WN fever has become a major public health and veterinarian concern. During the last 10 years, several human outbreaks have been reported in the Mediterranean basin and southern Europe, with fatal cases of encephalitis occurring principally among elderly people. Outbreaks have occurred in Algeria in 1994, Romania in 1996, Tunisia in 1997, Russia in 1999, and Israel in 2000 (Fig. 1) [7, 10]. Epizootics in horses have also been described in Morocco in 1996, Italy in 1998, and France and Israel in 2000 (Table 1) [11, 12, 13, 14]. In 1998, in Israel, an unusual mortality related to WN infection was observed in migrating white storks and domestic geese [15]. In all these different episodes, the period of detection of clinical cases started in July–