

Outbreak of West Nile Virus Infection in Greece, 2010

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During 2010, an outbreak of West Nile virus infection occurred in Greece. A total of 197 patients with neuroinvasive disease were reported, of whom 33 (17%) died. Advanced age and a history of heart disease were independently associated with death, emphasizing the need for prevention of this infection in persons with these risk factors.

An outbreak of West Nile virus (WNV) infection occurred in Central Macedonia in northern Greece in the summer of 2010. The first cases were diagnosed and reported to the Hellenic Centre for Disease Control and Prevention (HCDCP) on August 5, 2010 (1). WNV lineage 2 sequences were later obtained from 3 pools of *Culex pipiens* mosquitoes trapped at 2 sites where cases of West Nile neuroinvasive disease (WNND) had occurred (2).

Human cases of WNV disease had not been previously reported in Greece. Serosurveys in the early 1960s, 1980s, and 2007 identified WNV antibodies in $\approx 1\%$ of the population, suggesting that WNV, or a related flavivirus, was circulating in Greece (3–5). In contrast, during 2005–2007, a total of 9,590 blood donors were tested by WNV nucleic acid amplification assay and results were negative (6).

The Study

After the outbreak alert was issued in early August 2010, physicians in Greece were asked to report all cases of WNV infection to HCDCP, according to the current European Union case definition (1). Only deaths that occurred during hospitalization were attributed to WNV infection. Statistical methods are described in the online Technical Appendix (www.cdc.gov/EID/content/17/10/11-0525-Techapp.pdf).

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Serum and cerebrospinal fluid specimens were tested for immunoglobulin (Ig) M and IgG against WNV by using an ELISA (WNV IgM capture DxSelect and WNV IgG DxSelect; Focus Diagnostics Inc., Cypress, CA, USA). Titers >640 were obtained by microneutralization assay against WNV in 14/14 patients who were positive for WNV. Although tick-borne encephalitis virus (TBEV) and dengue virus (DENV) are not prevalent in Greece, specimens were also tested for TBEV and DENV by ELISA (TBE/FSME IgM and TBE/FSME IgG; IBL International GmbH, Hamburg, Germany) and Dengue Virus IgM Capture Dx Select and IgG Dx Select (Focus Diagnostics Inc.). All specimens were negative for TBEV, and cross-reactivity was seen with DENV, mainly for IgM (7).

Overall, 262 patients with WNV infection were reported to HCDCP. Of these patients, 197 (75%) had neuroinvasive disease (encephalitis, meningitis, or acute flaccid paralysis), and 65 (25%) had WNV fever. This study focused on patients with WNND, who were identified and reported more consistently because of disease severity.

Patient disease onset occurred within a 14-week interval during July 6–October 5, and the outbreak peaked in mid August (Figure 1). Most (94%) patients with WNND were reported from the 7 districts of Central Macedonia (Figure 2), and the epicenter of the outbreak was in Pella and Imathia Districts.

Characteristics of patients with WNND are shown in Table 1. Median age of patients with neuroinvasive disease was 72 years (range 12–88 years). The attack rate for WNND increased significantly ($p = 0.006$) with age (Table 1). The incidence of WNND in older persons (≥ 80 years of age) was $\approx 50\times$ higher than that among the youngest age

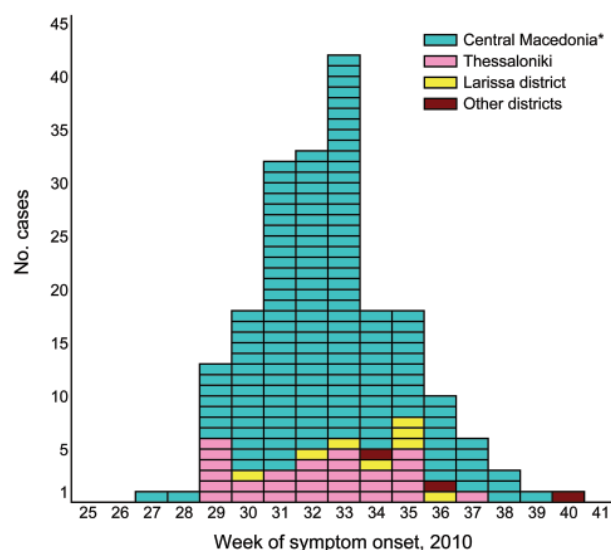


Figure 1. Reported cases ($n = 197$) of West Nile neuroinvasive disease, by week of symptom onset, Greece, July 6–October 5, 2010. *Excluding Thessaloniki.