Characteristics of the Rash Associated with West Nile Virus Fever

Dayna D. Ferguson,[1,a] Ken Gershman,[2] Adrienne LeBailly,[3] and Lyle R. Petersen[4]

[1]Epidemic Intelligence Service, Epidemiology Program Office, Centers for Disease Control and Prevention, Atlanta, Georgia; [2]Colorado Department of Public Health and Environment, Denver, [3]Larimer County Department of Health and Environment, and [4]Division of Vector-Borne Infectious Diseases, National Center for Infectious Diseases, Centers for Disease Control and Prevention, Fort Collins, Colorado

We characterized rash in 15 patients with West Nile virus (WNV) fever. Generalized, maculopapular rash typically occurred on days 5–12 of illness. Dysesthesia was reported by 27% of patients, and pruritus by 33% of patients. Because the rash was nonspecific and serologic test results were often negative for WNV at presentation, convalescent-phase testing was frequently required to diagnose WNV fever.

The frequency of rash in patients who are infected with West Nile virus (WNV) varies considerably in published reports. Rash was described in approximately half the patients with WNV-related illnesses during 2 outbreaks in Israel in the mid-20th century [1, 2]. Rash was less frequent (occurring in 14%–28% of patients) in most recent reports of outbreaks of WNV disease in Israel [3], the United States [4–7], and Canada [8]. However, in one recent case series, 57% of 98 patients with WNV fever reported rash [9]. Additionally, surveillance data from Colorado in 2003 shows that ~60% of 2947 patients with laboratory-confirmed WNV-related illness reported rash, which suggests that rash is a common symptom of WNV-related illness (unpublished data, Colorado Department of Public Health and Environment [CDPHE]).

Thus far, rash associated with WNV-related illnesses has not been well described, and published photographs are limited. In this report, we describe rash characteristics of 15 patients who contracted WNV fever during an outbreak in Larimer County, Colorado, in 2003. During this outbreak, there were 546 patients with laboratory-confirmed WNV disease in Larimer County; 483 had WNV fever and 63 had meningitis or encephalitis [10].

Methods. A convenience sample of patients with WNV fever and rash were identified through the Larimer County Department of Health and Environment, the Division of Vector-Borne Infectious Diseases, Centers for Disease Control and Prevention (CDC), and family practice clinics in Fort Collins, Colorado, from 27 July to 11 September 2003. Fifteen adults (aged ⩾18 years) met the inclusion criteria (new rash associated with fever, headache, or myalgias; diagnosis of WNV fever without meningitis or encephalitis; and positive anti-WNV IgM antibody test results). One patient's serum sample was tested at a commercial clinical laboratory with a WNV IgM antibody capture (MAC) ELISA; the rest of the serum samples were tested or had test results confirmed at the CDPHE Laboratory Services Division or the CDC using MAC-ELISA [11]. Rectal swab specimens were collected from 4 patients and tested at the CDC for enterovirus by PCR and viral culture [12]. Family physicians or internists characterized the rash by physical examination in 13 patients. For 2 patients, photographs were taken by a public health nurse, and the rash was later characterized by a physician on the basis of these photographs. Clinical histories were obtained prospectively by patient interview (for 13 patients) and retrospectively by chart review (for 2 patients). Patients were subsequently contacted by phone or e-mail to obtain complete histories and to determine rash and illness duration. No skin biopsies were performed.

Results. The median patient age was 43 years (range, 24–65 years); 9 patients (60%) were female. Other than rash, the most common symptoms were myalgias, in 12 (92%) of 13 patients; headache, in 10 (67%) of 15 patients; and fever, in 8 (67%) of 12 patients for whom these symptom data were reported. Rash onset occurred at a median of 5 days (range, 0–7 days) after illness onset and lasted a median of 7 days (range, 3–28 days). The median illness duration was 14 days (range, 7–123 days).

Rash was most commonly described as maculopapular in 12 patients (80%) (figure 1), and macular in 3 (20%). For the 14 patients for whom the rash onset history was known, rash began on the trunk alone in 6 patients (43%), on the head or neck in 3 (21%), on the upper extremities in 2 (14%), on the lower

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[a] Assigned to the Colorado Department of Public Health and Environment, Denver, Colorado.

Reprints or correspondence: Dr. Ken Gershman, Communicable Disease Epidemiology, Colorado Department of Public Health and Environment, 4300 Cherry Creek Dr. South, Denver CO 80246 (ken.gershman@state.co.us).

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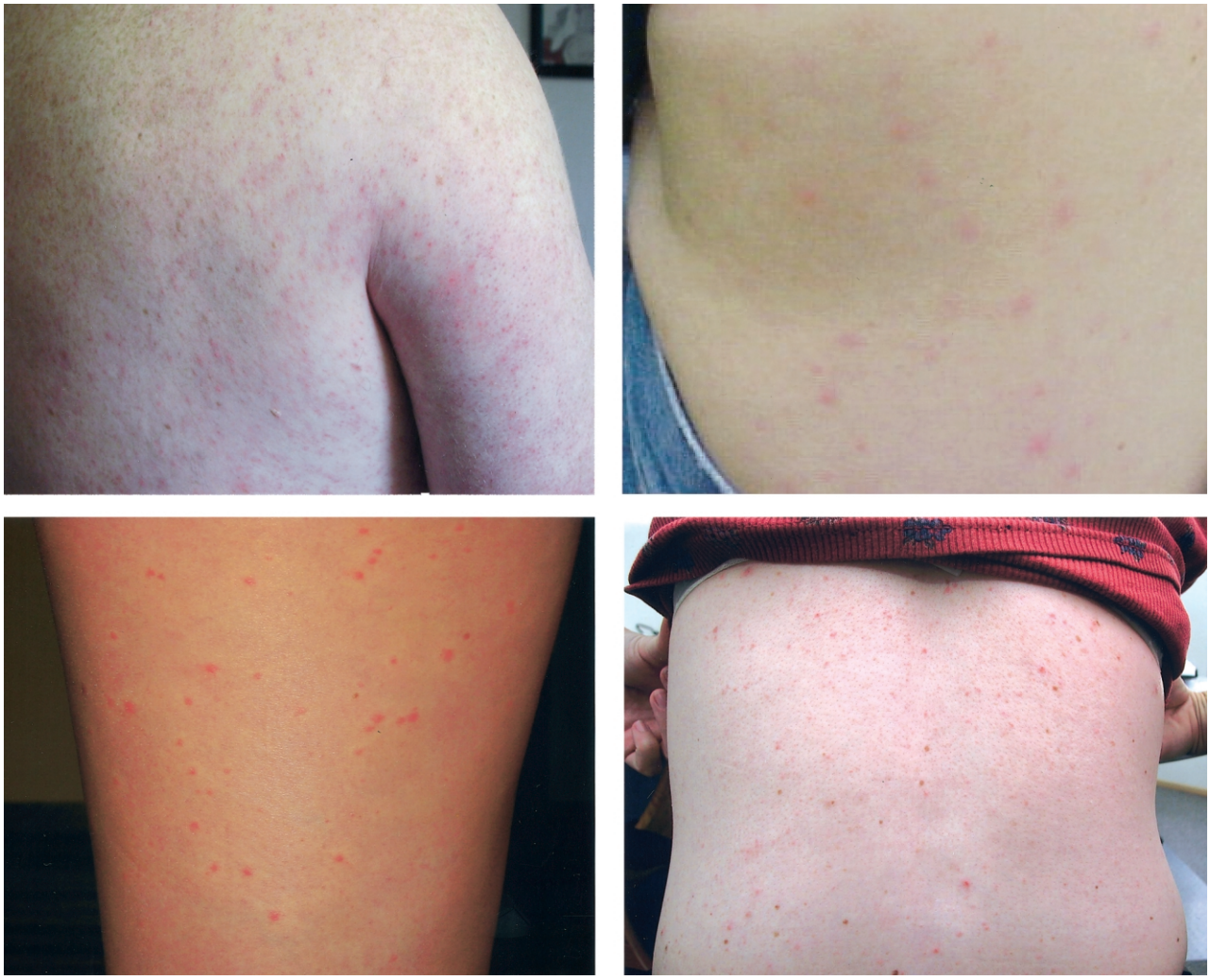

Figure 1. Four patients with West Nile virus fever and erythematous, maculopapular rashes on the back *(top left),* flank *(top right),* posterior thigh *(bottom left),* and back *(bottom right).*

extremities in 1 (7%), and on a combination of sites in 2 (14%). At some point in the illness, rash was noted on the trunk in 14 (93%) of 15 patients, the upper extremities in 14 (93%), the lower extremities in 12 (80%), and the head or neck in 8 (53%).

For 2 patients with generalized maculopapular rash, 1 reported oral and palmar lesions and 1 reported palmar lesions. One patient with generalized macular rash also reported popliteal bruising that he noticed ~2 days after rash onset. The oral and palmar lesions and the popliteal bruising developed after the initial onset of the rash; these lesions were reported in the patients' histories and not confirmed by an examining physician.

Four patients (27%) described dysesthesias (generalized tingling or burning) associated with rash. Three of these patients reported hyperesthesia precipitated by touch; 1 described severe pain. Five patients (33%) reported pruritus associated with rash.

All patients in this series tested positive for anti-WNV IgM by MAC-ELISA, with a median interval of 6 days (range, 2–16 days) between illness onset and initial specimen collection. However, initial MAC-ELISA results were positive for only 5 patients (33%), with a median interval of 8 days (range, 5–16 days) between illness onset and specimen collection in this group. For 10 patients (67%), the results of the initial WNV test were negative, and the results of a convalescent-phase test were positive by MAC-ELISA, with a median interval of 5.5 days (range, 2–8 days) between illness onset and the initial test, and a median interval of 23.5 days (range, 9–42 days) between onset and the convalescent-phase test. All of these 10 patients had a rash at the time of the initial test that yielded negative results. Rectal swab specimens collected from 4 of these patients were tested for enterovirus, with negative results.

Discussion. Consistent with previous reports, we found that ~80% of patients in our series had maculopapular rash associated with WNV disease [8, 13]. Although clinicians were

not specifically asked to assess blanching, none described petechial rash. Rash typically occurred 5 days after illness onset and lasted 7 days. WNV fever generally started before and persisted after the rash.

Approximately 27% of patients in this report reported dysesthesias associated with rash, and 33% reported pruritus. To our knowledge, dysesthesias have not previously been reported with WNV-associated rash, and pruritic rash has only been described once [13].

A recent report described 3 patients with WNV-associated rash and noted that rash was concentrated on the extremities [13]. In contrast, in the current investigation, rash was reported to occur as commonly on the trunk (in 93% of patients) as on the upper extremities (in 93% of patients), and more frequently than on the lower extremities (in 80% of patients). However, clinicians were not asked to quantify lesion numbers. It is possible that lesions occurred in greater density on the extremities.

Case patients in this series did not have rash with a characteristic appearance or pattern of onset and spread that distinguished WNV-associated rash from rash due to other causes, such as viral exanthems, drug eruptions, and nonspecific hypersensitivity reactions. Enteroviruses, for example, have a seasonal pattern similar to that of WNV and can cause similar rash [14]. Serologic testing remains necessary if confirmation of WNV infection is required.

At least 3 patients in this series had atypical rash findings, including 1 with maculopapular rash and palmar lesions, 1 with maculopapular rash and palmar and oral lesions, and 1 with macular rash and popliteal bruising. Enterovirus was considered a possible alternate cause of these rashes, particularly for patients with palmar lesions. In Colorado in 2003, there were more reported cases of aseptic meningitis (694) than there had been in the previous 5 years (range, 117–372 cases per year), and several enteroviruses in circulation were identified, including enterovirus 71, coxsackievirus A9, echovirus 9, and echovirus 30 (unpublished data, CDPHE). Enterovirus test results were negative for 4 patients in this series, including 1 patient with palmar lesions. Other than enterovirus, we did not test for other potential infectious causes of rash.

Nevertheless, WNV infection most likely caused rash in the 3 patients with atypical rash; all 3 initially tested negative for anti-WNV IgM, but the results of a convalescent-phase test were positive, which documented recent infection. Because descriptions of these atypical rashes were based on patient history and not confirmed by a physician, further study is needed to determine whether WNV might cause atypical rash in some patients.

Although WNV disease was confirmed by anti-WNV IgM in all 15 patients in this study, acute-phase serum specimens tested negative in nearly 67% of patients. This was not surprising because serum samples were collected soon after illness onset in this group (at a median of 5.5 days). Data from Romania indicate that approximately half of patients with neuroinvasive disease might not have demonstrable serum IgM antibody (as determined by MAC-ELISA) within 5 days after illness onset [15].

This investigation was subject to at least 4 limitations. First, the sample size was small. Second, this was a convenience sample. Patients with more-severe rash, dysesthesias, or pruritus might have been more likely to seek medical care and to be enrolled in this study. This might limit the generalizability of these findings. Third, a dermatologist did not confirm the descriptions of rash, and some of the less common findings were not confirmed by a physician. Fourth, all patients in this investigation had light skin. Photographs and descriptions of rash associated with WNV fever are still needed for patients with darker skin.

WNV infection should be suspected in patients with fever and generalized, erythematous, maculopapular rash during the late spring through the fall months in areas where WNV is endemic and epidemic. Dysesthesias and pruritus can occur with the rash. The rash commonly affects the head or neck, trunk, and upper and lower extremities, but it lacks a specific appearance or pattern of onset and spread that is diagnostic for WNV disease. Initial serologic test results for WNV might be negative for patients with WNV fever and rash; convalescent-phase serum should be tested if clinically indicated.

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References

1. Marberg K, Goldblum N, Sterk VV, Jasinska-Klingberg W, Klingberg MA. The natural history of West Nile fever: I. clinical observations during an epidemic in Israel. Am J Hyg **1956**; 64:259–69.
2. Spigland I, Jasinska-Klingberg W, Hofshi E, Goldblum N. Clinical and laboratory observations in an outbreak of West Nile fever in Israel in 1957. Harefuah **1958**; 54:275–81.
3. Chowers MY, Lang R, Nassar F, et al. Clinical characteristics of the West Nile fever outbreak, Israel, 2000. Emerg Infect Dis **2001**; 7:675–8.
4. Nash D, Mostashari F, Fine A, et al. The outbreak of West Nile virus infection in the New York City area in 1999. N Engl J Med **2001**; 344: 1807–14.
5. Jeha LE, Sila CA, Lederman RJ, Prayson RA, Isada CM, Gordon SM. West Nile virus infection: a new acute paralytic illness. Neurology **2003**; 61:55–9.
6. Emig M, Apple DJ. Severe West Nile virus disease in healthy adults. Clin Infect Dis **2004**; 38:289–92.
7. Brilla R, Block M, Geremia G, Wichter M. Clinical and neuroradiologic features of 39 consecutive cases of West Nile virus meningoencephalitis. J Neurol Sci **2004**; 220:37–40.
8. Pepperell C, Rau N, Krajden S, et al. West Nile virus infection in 2002:

morbidity and mortality among patients admitted to hospital in south-central Ontario. CMAJ **2003**; 168:1399–405.
9. Watson JT, Pertel PE, Jones RC, et al. Clinical characteristics and functional outcomes of West Nile fever. Ann Intern Med **2004**; 141:360–5.
10. Colorado Department of Public Health and Environment. Human West Nile virus infections: Colorado, 2003. Available at: http://www.cdphe.state.co.us/dc/zoonosis/wnv/human_wnv_03.html. Accessed 18 May 2005.
11. Martin DA, Muth DA, Brown T, Johnson AJ, Karabatsos N, Roehrig JT. Standardization of immunoglobulin M capture enzyme-linked immunosorbent assays for routine diagnosis of arboviral infections. J Clin Microbiol **2000**; 38:1823–6.
12. Nix WA, Berger MM, Oberste MS, et al. Failure to detect enterovirus in the spinal cord of ALS patients using a sensitive RT-PCR method. Neurology **2004**; 62:1372–7.
13. Anderson RC, Horn KB, Hoang MP, Gottlieb E, Bennin B. Punctate exanthem of West Nile virus infection: report of 3 cases. J Am Acad Dermatol **2004**; 51:820–3.
14. Abzug MJ, Simoes EAF. Enteroviruses. In: Pediatric infectious diseases. Philadelphia: Churchill Livingstone, **1999**. Mandell GL, Wilfert CM, eds. Atlas of infectious diseases, vol 11:6.7.
15. Tardei G, Ruta S, Chitu V, Rossi C, Tsai TF, Cernescu C. Evaluation of immunoglobulin M (IgM) and IgG enzyme immunoassays in serologic diagnosis of West Nile virus infection. J Clin Microbiol **2000**; 38:2232–9.