

West Nile Virus-Associated Paralysis



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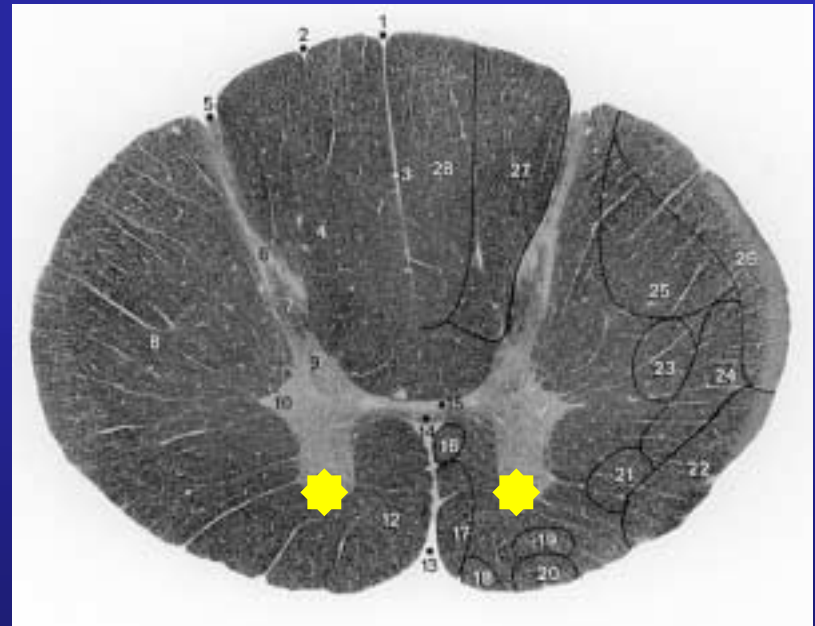
**Division of Viral and
Rickettsial Diseases**

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Infectious Diseases**

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Poliomyelitis

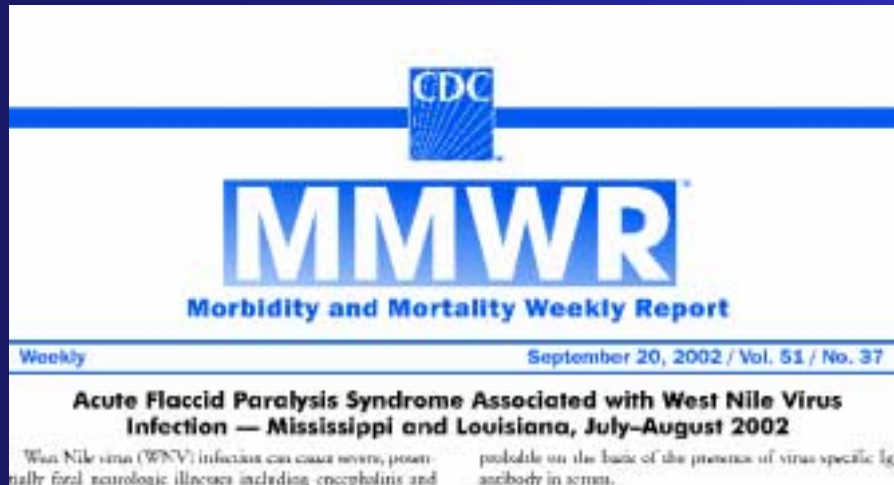
- Greek
 - πολίός (*polios*) = “gray”
 - μυελός (*myelos*) = “marrow”
- Most common etiology—poliovirus
- Common cause of acute flaccid paralysis



WNV-Associated Flaccid Paralysis

- Infrequently reported with WNV infection, other flaviviruses
- Attributed to various etiologies
 - Guillain-Barré syndrome (GBS)
 - Radiculopathy
 - Transverse myelitis
- Not reported in recent outbreaks (Romania, Russia, Israel)
- Prominent feature in some encephalitis cases in NYC

WNV Poliomyelitis—2002



Poliomyelitis Due to West Nile Virus

To the Editor: Poliomyelitis is a clinical syndrome defined by the presence of fever, meningitis, and flaccid paralysis. In the United States, this syndrome was historically associated with infection by poliovirus but is now more commonly seen with other enteroviruses. We describe a case of poliomyelitis in a patient infected with West Nile virus, a flavivirus.

A 50-year-old woman from Louisiana had a headache on the day before she traveled to Georgia for the July 4 holiday. After she arrived, her headache worsened, and she had severe myalgia. Two days after the onset of headache, weakness developed, and the patient was admitted to the hospital. She was febrile (temperature, 39.5°C) but was awake, alert, and fully cognizant. She had moderate bifacial and appendicular weakness (Medical Research Council grade 4–5), with a normal sensory examination and retained deep-tendon re-

Some scientists race to develop vaccines against the scourge while others probe the possible lingering effects of the mosquito-borne infection

BY STEPHEN S. HALL
PHOTOGRAPHS BY GREG MILLER

On the Trail of the West Nile Virus

DURING THE DRY HOT SUMMER OF 2002, a telltale silence enveloped Chicago and its suburbs like an insidious fog, too subtle to notice at first, too strange to ignore after a while. Residents in the affluent North Shore communities and the well-to-do western suburbs noticed it. Folks in the modest suburban enclaves southwest of the city noticed it. Sooner or later, in a gradual and almost dreamlike way, people all around the city realized what was missing: the sound of crows. — BENNIE CASALINA and YVONNE O'NEILL noticed it not long after they moved in June to Oak Lawn, a town of 55,000 people a few miles southwest of Chicago. Their one-story brick bungalow is set back from the tree-lined street and has a postage stamp of lawn in front and a small yard with a little flower bed out back. Bennie, a 71-year-old retired cement mason, is a sturdy big-boned man with a bushy mustache and a fine mop of white hair over somewhat mournful eyes. He and Yvonne, a petite straight-talking woman, have been married for 13 years. It was Yvonne who first noticed the silence. "In the whole neighborhood, you never saw birds," Yvonne said, recalling last summer. "The crows used to be out there cawing all the time, and then it got silent. You especially noticed the crows, because they're usually so noisy."

On August 9, a Friday, Bennie played golf with a neighbor, went home and developed a 103-degree temperature. The next day, still feverish, he began to see double. On Sunday, he woke at 11:15 before 4 a.m., got out of bed and took a few steps to ward the kitties he has before collapsing onto the floor near a framed "Home Sweet Home" sampler. He was so weak he couldn't

Small illustration of a person sitting at a desk, possibly a doctor or researcher, with a lamp and books.

Correspondence



A Poliomyelitis-like Syndrome from West Nile Virus Infection

To the Editor: Muscle weakness is a common finding and an important predictor of death in patients with West Nile virus encephalitis.^{1,2} Yet this important sign does not have a defined pathological basis. In monkeys, horses, and birds, West Nile virus causes poliomyelitis.³⁻⁵ Our clinical and electrodiagnostic findings in three consecutive patients with confirmed West Nile virus infection suggest that the virus also attacks the spinal cord in humans.

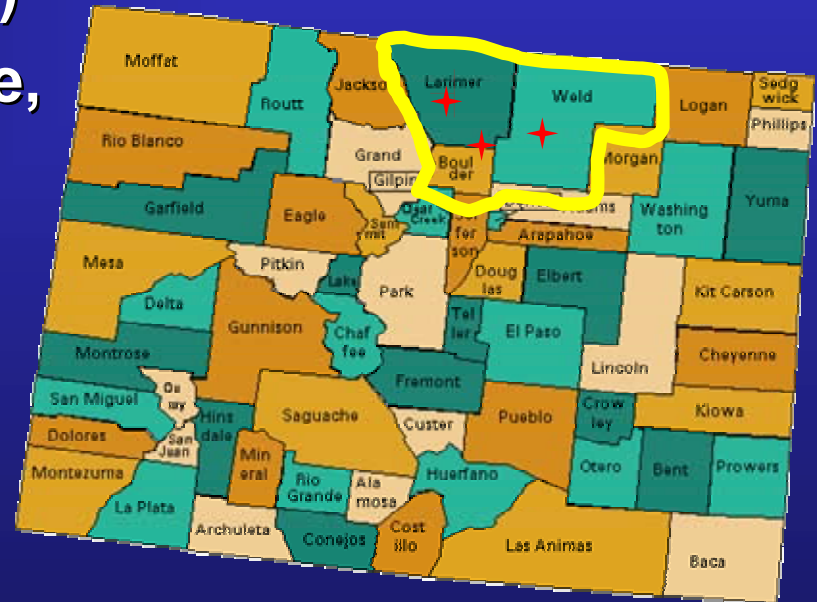
Patient 1, a 56-year-old man, presented with fever, chills, night sweats, myalgias, and confusion. Weakness gradually developed in his arms, along with flaccid paralysis in his right leg, areflexia, bladder dysfunction, and acute respiratory distress. He reported that he had no pain or paresthesias. Sensory examination was normal. Suspected diagnoses included stroke, Guillain-Barré syndrome, and inflammatory myopathy, for which he received anticoagulation therapy and intravenous immune globulin and underwent muscle biopsy. Cerebrospinal fluid showed 3 white cells per cubic millime-

WNV “Poliomyelitis”

- How frequent is this manifestation?
- Short- and long-term outcome?
- Spectrum and patterns of weakness?
- Other etiologies of weakness?

WNV-Associated Weakness: Population-Based Study

- 3 counties in northern CO (combined pop. 750,000)
- State-based surveillance, ICPs, MDs
- WNV infection; limb/respiratory weakness developing over < 48 hours
- Neurologic assessment
- 3-month follow-up



WNV-Associated Weakness

- **32 patients identified**
 - **18 (56%) male**
 - **Median age: 56 yrs (range 15–84 yrs)**
25th (43 yrs) and 75th (61 yrs) quartiles
 - **26 (81%) with no prior medical conditions**
- **Attack rate: 4.4/100,000 population—comparable to poliovirus epidemics**
- **Estimated 15% of WNV neuroinvasive disease patients had weakness**

WNV-Associated Weakness

- **Associated neurologic illness:**
 - **AFP alone:** 5 (16%)
(3 with no fever, headache)
 - **AFP + meningitis:** 11 (34%)
 - **AFP + encephalitis:** 16 (50%)

WNV-Associated Weakness

- 3 distinct clinical and pathologic presentations
 - “Poliomyelitis” 27 (84%)
 - Guillain-Barré syndrome (GBS) 4 (13%)
 - Brachial plexus dysfunction/neuritis 1 (3%)

WNV “Poliomyelitis”

- **Clinical features consistent with poliomyelitis in 27**
 - **Asymmetric weakness without sensory loss**
 - **EMG in 14—c/w anterior horn cell disease**
 - **Neuroimaging in 3—anterior spinal cord abnormalities**
- **Various weakness patterns**
 - **Asymmetric weakness in all limbs: 12 (44%)**
 - **Acute single limb weakness: 7 (26%)**
 - **Asymmetric LE weakness: 6 (22%)**
 - **Asymmetric UE weakness: 2 (7%)**

WNV—Other Weakness Etiologies

- **4 with features c/w GBS**
 - **Ascending, symmetric weakness with sensory symptoms**
 - **Confirmed by EMG in 3**
- **1 with brachial plexus involvement**
- **11 of 32 also had facial nerve palsy (all poliomyelitis)**
 - **2 unilateral**
 - **9 bilateral**

WNV—Respiratory Paralysis

- 12 with acute respiratory failure requiring emergent intubation (incl. 1 GBS)
 - 9 with diagnostic evidence of neuromuscular weakness (“iron lung”)
 - Diaphragm elevation, CO₂ retention, restrictive pattern on PFTs
 - 5 additional patients with neuromuscular respiratory weakness, but not intubated
- Dysarthria, dysphagia predictive of subsequent respiratory failure (OR 60; p<0.0001)

3-Month Follow-up

- 27 followed up at 3 months
- 2 lost to followup; 3 deaths (all respiratory)
- 3/4 with GBS with good outcome, improvement
- Brachial plexus—no improvement, but little functional difficulty
- Poliomyelitis
 - Minimal or no improvement in 7 overall
 - 15 patients with some improvement in strength
 - Range of recovery
 - 12 using ambulatory aids, orthotics
- Of 12 respiratory patients:
 - 3 deaths
 - 2 still on chronic ventilation
 - Median duration of intubation: 66 days

WNV-Associated Weakness: Conclusions

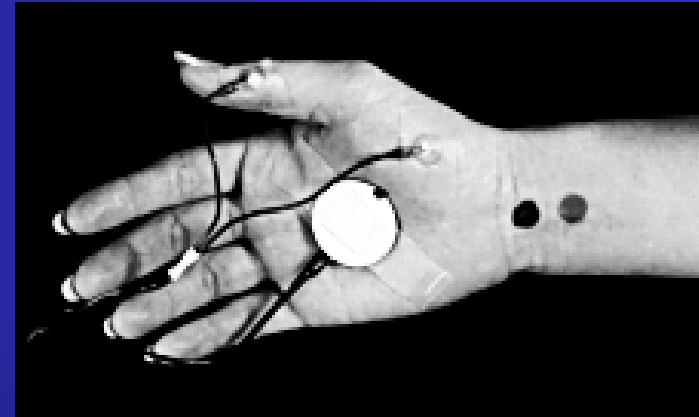
- **Wide range of outcomes, but all with continued deficits at 3 months**
- **Poliomyelitis most common etiology of weakness**
- **Common manifestation of WNV infection**
 - **Attack rates similar to poliovirus epidemics**
 - **Prolonged hospital stays, extensive rehabilitation, severe functional deficits**
 - **Public health burden could be substantial**

WNV-Associated Respiratory Failure

- Nearly 1/3 of cases with acute respiratory failure
- Viral involvement of brainstem and high cervical spinal cord
 - Importance of including these structures on MRI
- Early dysarthria, dysphagia: careful monitoring for impending respiratory failure

WNV-associated “Poliomyelitis”

- **Electrodiagnostics:**
Incomplete loss of activity in involved myotome = better prognosis?
- **Early physical and occupational therapy** important for recovery?



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