

analysis demonstrates a small area of tissue damage at the end of treatment (Day 4). In mice that were survived for additional 28-days after the final treatment, the tissue showed no signs of damage.

**Conclusion:** AMF combined with antibiotics leads to enhanced reduction of biofilm on metallic implants in vivo. This non invasive approach to eradicating biofilm could serve as a new paradigm in treating these challenging infections.

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### 336. Neurocysticercosis in a non-endemic region: A large case series from New York City

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**Session:** P-11. CNS Infection

**Background:** Neurocysticercosis (NCC) is associated with significant morbidity and a variety of clinical presentations. We describe our experience with NCC at a New York City hospital.

**Methods:** A retrospective review of consecutive patients with a confirmed diagnosis of neurocysticercosis who attended to Jacobi Medical Center in New York City was done. Demographic data, symptoms at presentation, and cysticercosis serology were retrieved from the medical records. The cases were classified according to the location of the cysts. Demographic and clinic variables were compared to assess for differences according to the cyst location.

**Results:** A total of 260 cases of NCC were included. Of these cases, 163 (62.7%) were male, and the median age was 36.7 ± 13.7 years. A total of 245 patients (94.2%) were immigrants from 22 different countries. The most common countries of origin were Mexico (28.8%) and Ecuador (24.2%). Parenchymal NCC alone was seen in 139 patients (53.5%); of these, 31 patients had viable cysts. Forty patients (15.4%) were diagnosed with subarachnoid NCC (SANCC) alone and 19 patients (7.3%) had intraventricular NCC alone. Sixty-two patients (23.8%) had parenchymal and extra-parenchymal NCC. Additionally, 24.7% of SANCC cases had concomitant spinal NCC. The median time from immigration to presentation was 9.5 years. SANCC cases had significantly longer time from immigration than parenchymal disease. The most common symptom among patients with only parenchymal NCC was seizures (68.4%). Among patients with only SANCC, 28 patients (70.0%) reported headache. Fifteen patients (37.5%) had intracranial hypertension and 12 required shunt placement. Eight patients (20.0%) of the SANCC group presented as an ischemic event. Cysticercus antigen was measured in 172 patients and was positive in 38 patients (14.6%); all but one with a positive antigen had extra-parenchymal NCC.

**Conclusion:** This is the largest series of NCC reported in the US and highlights the importance of SANCC disease, a more severe form of NCC. Our data suggests that those with SANCC present with intracranial hypertension and have longer latency than other forms. The NCC recombinant antigen was more likely to be positive in extra-parenchymal disease. This is a complex disease and ID physicians should be aware of the many presentations.

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### 338. Analysis of Etiologies of Aseptic Meningitis within a Nation-Wide Hospital Network

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**Session:** P-11. CNS Infection

**Background:** Aseptic meningitis can be caused by an array of microorganisms, both bacterial and non-bacterial, as well as non-infectious conditions. Some etiologies of aseptic meningitis require treatment with antibiotics, antiviral, antifungals, anti-parasitic agents, immunosuppressants, and or chemotherapy. There are limited diagnostic tools for diagnosing certain types of aseptic meningitis, therefore knowing the differential causes of aseptic meningitis, and their relative percentages may assist in diagnosis. Review of the literature reveals that there are no recent studies of etiologies of aseptic meningitis in the United States (US). This is an epidemiologic study to delineate etiologies of aseptic meningitis in a large database of 185 HCA hospitals across the US.

**Methods:** Data was collected from January 2016 to December 2019 on all patients diagnosed with meningitis. CSF PCR studies, and CSF antibody tests were then selected for inclusion.

**Results:** Total number of encounters were 3,149 hospitalizations. Total number of individual labs analyzed was 10,613, and of these 262 etiologies were identified. 23.6% (62) of cases were due to enterovirus, 18.7% (49) due to HSV-2, 14.5% (38) due to West Nile virus, 13.7% (36) due to Varicella zoster (VZV), 10.5% (27) due to Cryptococcus. Additionally, we analyzed the rate of positive test results by region. Nationally, 9.7% of tests ordered for enterovirus were positive. In contrast, 0.5% of tests ordered for HSV 1 were positive. The southeastern United States had the highest rate of positive tests for HSV 2 (7% of tests ordered for HSV 2 were positive). The central United States had the highest rate of positive test for West Nile virus (11% of tests ordered for West Nile were positive). The northeastern region and the highest rate of positive tests for varicella zoster (18%).

Table 1: Percentage of positive CSF tests (positive tests/tests ordered)

Organism	Number of Tests Performed	Positive Tests	Positive Rate
Enterovirus	639	62	9.7%
Varicella zoster	672	36	5.4%
Herpes simplex virus 2	989	49	5.0%
West Nile Virus	848	38	4.5%
Cryptococcus neoformans	1298	27	2.1%

Table 1: Percentage of positive CSF tests (positive tests/tests ordered)

Table 2: Lists the number of HIV patients and transplant patients that had positive CSF PCR/serologies

Organism	HIV	Transplant
Cryptococcus neoformans	8	
Epstein Barr virus	4	1
BK virus	1	
Toxoplasmosis	2	
Varicella zoster	4	1

Table 2: Lists the number of HIV patients and transplant patients that had positive CSF PCR/serologies

Figure 1: Percentage of positive CSF tests in each region

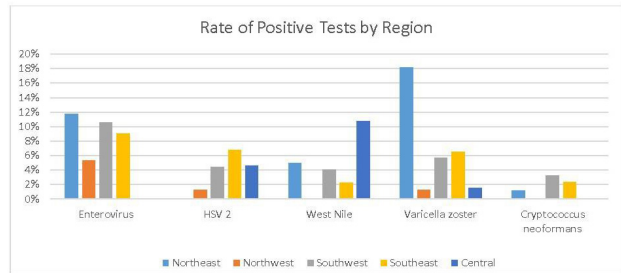


Figure 1: Percentage of positive CSF tests in each region

**Conclusion:** Approximately 40% of aseptic meningitis population had treatable etiologies. A third of the Cryptococcus meningitis population had HIV. Furthermore, enteroviruses had the majority of cases within the US, which are similar to studies done in other parts of the world.

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### 339. Assessing Utilization of the Venereal Disease Research Laboratory Test in Cerebrospinal Fluid for the Diagnosis of Neurosyphilis: A Cohort Study

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**Session:** P-11. CNS Infection

**Background:** The Venereal Disease Research Laboratory (VDRL) test performed in cerebrospinal fluid (CSF) is considered highly specific for the diagnosis of neurosyphilis, but algorithms to diagnose neurosyphilis require positive syphilis serologic testing prior to obtaining CSF-VDRL. Inappropriate use of diagnostic tests depletes healthcare resources, and contributes to rising healthcare expenditures. CSF-VDRL has historically been improperly utilized; however there is no recent evaluation of its use in clinical practice. We aimed to quantify rates of appropriate CSF-VDRL testing, determine the CSF-VDRL false-positivity rate and describe causes of false-positive CSF-VDRL reactivity.

**Methods:** In this retrospective cohort study of three Mayo Clinic sites (Rochester, MN, Jacksonville, FL, and Scottsdale, AZ), we measured the rate of appropriate CSF-VDRL test utilization in patients with negative testing from January 1, 2011 to December 31, 2017. We then identified all patients with positive CSF-VDRL testing from January 1, 1994 to February 28, 2018, characterized true- and false-positive rates and described causes of CSF-VDRL false-positivity.

**Results:** Among 8,553 persons with negative CSF-VDRL results, testing was unnecessarily ordered in 8,399 (98.2%). The word "syphilis" or "neurosyphilis" appeared in the notes of only 1,184 (13.8%) individuals with a negative CSF-VDRL result. From January 1994 through February 2018, 33,933 CSF-VDRL tests were performed on 32,626 individual patients. Among 60 positive CSF-VDRL results, 41 (68.3%) were true-positives, 2 (3.3%) were indeterminate, and 17 (28.3%) were false-positives. Every patient with true-positive CSF-VDRL had positive serologic syphilis testing prior to CSF testing. All patients with false-positive CSF-VDRL results were inappropriately tested. Neoplastic meningitis was a common cause of false-positive CSF-VDRL results.

**Conclusion:** This is the first study in decades to review CSF-VDRL utilization for the diagnosis of neurosyphilis. Inappropriate use of CSF-VDRL testing for diagnosis of neurosyphilis remains problematic in clinical practice. Following recommended testing algorithms would prevent unnecessary testing, preserve resources, and minimize false-positive results.

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