The term neurosyphilis refers to an infection of the central nervous system (CNS) and can occur at any time after infection. Symptoms of neurosyphilis include instability, personality changes, changes in sleep habits, forgetfulness, labile mood, memory and judgment impairment, confusion, delusions, seizures, depression, delirium, mania, and psychosis.

**Serologic Testing for Syphilis:***
- **Treponemal**:
  - CSF-FTA-ABS is highly sensitive and specific for detecting recent or untreated infection.
  - CSF VDRL is not very sensitive
  - CSF TPHA can establish a diagnosis, but it cannot exclude neurosyphilis.
  - CSF-FTA-ABS is significantly more sensitive for screening despite being less specific
  - Could exclude a diagnosis with more certainty
  - Beneficial to have testing guidelines for neurosyphilis in a similar way to the testing guidelines for syphilis, as substantial treatment can be avoided in patients infected with this great imitator.

**Reference:**

**Case Presentation:**
The patient was a 72-year-old female admitted to the hospital from her assisted living facility with personality change, delusions, and hallucinations for the last month. Concerns for dementia began as early as five years ago, and she had a diagnosis of mild neurocognitive disorder secondary to vascular dementia.

### Diagnosis of Latent Syphilis:
The patient had a confirmed diagnosis of syphilis by two antibody tests. Her test of cell destruction was negative meaning she had an asymptomatic state.

**Remarkable Findings:**
- **Clinical Exam:**
  - Patient was confused and preoccupied on delusions
  - Dysarthria with right and left facial drop
  - Cranial nerve exam remarkable for hearing loss
  - Unsteady gait

**Laboratory testing:**
- **Serology:**
  - Reactive Syphilis Immunoglobulin G (IGG) antibodies with reflex enzyme immunoassay
  - Negative RPR
  - Positive TPHA

- **CSF:**
  - No pleocytosis
  - Slightly elevated protein count of 48 mg/dL

- **Negative CSF VDRL**

**Imaging:**
- Head computed tomography (CT)
  - No acute abnormalities
  - Chronic infarct involving lateral right basal ganglia, subinsular white matter, and right frontal periventricular white matter
- Volume loss with evident distal of right horn of lateral ventricles

**Chronic infarcts in right middle cerebral artery and left subinsular white matter**

**Scattered areas of hyperdensity within white matter of both cerebral hemispheres**

**Magnetic resonance imaging (MRI)**
- Diffusion weighted imaging (DWI)
  - No acute abnormalities
  - Chronic infarcts in right middle cerebral artery and left posterior cerebral artery
  - No acute distal of right lateral ventricle

**Scattered hyper-intensities suggesting mild chronic vessel disease**

**Diagnosis:**
- Neurosyphilis: previous neurosyphilis secondary to vascular dementia
- Latent cerebrospinal fluid without neurosyphilis

**Treatment:**
- No previous treatment identified
- Given 2.4 million units of intramuscular (IM) penicillin G once weekly for three weeks

**CSF VDRL:**
- False positive
- Patient exposed in the past

**CSF TPHA:**
- Reconfirms first positive antibody test
- True positive

**Why Not Neurosyphilis:**
- The patient’s presentation appeared consistent with that of someone suffering from neurosyphilis. She had gradual decline in cognition in the past five years with new onset delusions, personality change, and hallucinations in the last month. She had multiple infections that could have been caused by meningovascular neurosyphilis.

**Negative CSF VDRL**
- High specificity
- Low sensitivity

**CSF Analysis**
- No pleocytosis
- Only slightly elevated protein count

**Cerebrospinal Fluid (CSF) Testing for Neurosyphilis:**
- CSF VDRL: highly specific and generally test of choice
- CSF RPR not recommended because of low sensitivity
- CSF fluorescent treponemal antibody test (FTA-ABS) highly sensitive but nonspecific
- CSF analysis (lysosomes and lipid protein) not specific

**See image below**

**Alternative Testing**
- CSF-FTA-ABS is significantly more sensitive for screening despite being less specific
- Could exclude a diagnosis with more certainty

**References:**

**Systemic review. IMAIMA. 2014 Nov 2;11(3):1595-17.**