Syphilis is caused by the infection of treponema pallidum, a spirochete bacterium. There are two types of tests used to detect syphilis, treponemal and non-treponemal:

**Treponemal** tests include: CIA, EIA, FTA, TP-PA, Trep. pallidum IgG/IgM (MIA)
- Considered confirmatory tests.
- If *reactive* = current or past infection.
- Typically stays reactive, regardless of treatment.
- If *non-reactive* = client not infected with syphilis.

**Non-treponemal antigen** tests include: RPR, USR, VDRL, STS* (*plasma center only)
- Considered screening or monitoring tests.
- May be non-reactive or reactive, if reactive, should be diluted to establish *titer*.
- A *titer* is a measure of the amount of antibody formed in response to syphilis.
- *Titers* decline after proper treatment over a period of months to years.

### Below are some titer dilutions depicting a fourfold increase and decrease:

<table>
<thead>
<tr>
<th>Titer</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:128</td>
<td>Titers should decline at least fourfold after proper treatment and can take from a few months - two years.</td>
</tr>
<tr>
<td>1:64</td>
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<tr>
<td>1:32</td>
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<tr>
<td>1:16</td>
<td></td>
</tr>
<tr>
<td>1:8</td>
<td></td>
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<tr>
<td>1:4</td>
<td></td>
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<tr>
<td>1:2</td>
<td></td>
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<tr>
<td>1:1</td>
<td></td>
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<tr>
<td>NR</td>
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</tbody>
</table>

**RPRs are typically 1-2 titer dilutions higher than a VDRL or USR (possibly 3 dilutions higher than USR) on the same sample.**

RPR 1:32 is comparable to:

- **VDRL 1:16 or 1:8**
- **USR 1:16, 1:8, or 1:4 (possible)**

It is preferable to compare the same non-treponemal tests when determining a new infection or to verify adequate response to treatment on an individual.

Syphilis testing is typically done by **reverse algorithm**.¹

This indicates that the treponemal (confirmatory) test is done initially and if **reactive** it should reflex (allow for) a non-treponemal test to be run on the sample. If the sample doesn’t reflex, a non-treponemal test should be ordered immediately.

¹*A diagram of the reverse testing algorithm that the BOL at Michigan Department of Health and Human Services is on back.
Non-Treponemal (USR)/Treponemal Test Result | Interpretation Guide
--- | ---
Nonreactive Treponemal | No serologic evidence of syphilis infection. Recommend additional testing consistent with clinical history findings*.
Reactive USR/Reactive Treponemal | Presumptive evidence of syphilis infection.
Nonreactive USR/Nonreactive Treponemal | No serologic evidence of syphilis infection. Recommend additional testing consistent with clinical history findings*.
Nonreactive USR/Reactive Treponemal | Primary or latent infection, or previously treated or untreated syphilis. Recommend additional testing consistent with clinical history findings*.
Reactive USR/Nonreactive Treponemal (For special requests or forward algorithm testing) | Syphilis infection unlikely; biological false positive likely. Recommend additional testing consistent with clinical history findings*.
Reactive MIA Total (IgG/IgM)/Nonreactive USR/Indeterminate or Atypical TP-PA (supplemental) | Presumptive evidence of syphilis infection.
Equivocal MIA Total (IgG/IgM)/Nonreactive USR/Indeterminate or Atypical TP-PA (supplemental) | Indeterminate for syphilis infection; potentially early infection or false positive. Recommend additional testing consistent with clinical history findings*.
Equivocal or Reactive MIA Total (IgG/IgM)/Nonreactive USR/Nonreactive TP-PA (supplemental) | No serologic evidence of syphilis infection. Recommend additional testing consistent with clinical history findings*.
Equivocal MIA Total (IgG/IgM)/Reactive USR/Nonreactive TP-PA (supplemental) | Indeterminate for syphilis infection; potentially early infection or false positive. Recommend additional testing consistent with clinical history findings*.

*Specimen may have been collected before the production of detectable antibody. If recent infection is suspected, submit a convalescent specimen in 2-4 weeks (or one week if patient is pregnant). The predictive value of a reactive USR test in the serologic diagnosis of syphilis is increased when combined with a reactive treponemal test. Interpretation of results must be used in conjunction with the clinical signs and symptoms, medical history and other clinical/laboratory findings.

8/2019