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# Diagnosis of Syphilis Using the Reverse Algorithm

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# Syphilis

Causative agent: *Treponema pallidum*

- Spirochete bacterium
- Cannot be grown on medium
- Does not take up gram stain

Typically diagnosed indirectly by serological methods

- Both treponemal and nontreponemal tests performed to differentiate between current and past infection

# Serologic tests for syphilis

Two antibody types are detected to determine syphilis diagnosis:

- Treponemal antibodies
  - Antibodies directed against *T. pallidum*
- Non-treponemal antibodies
  - Antibodies directed against antigens such as cardiolipin, cholesterol, and lecithin
  - Released in response to *T. pallidum* active infection

(1)

# Treponemal and non-treponemal tests

**Treponemal** serologic tests

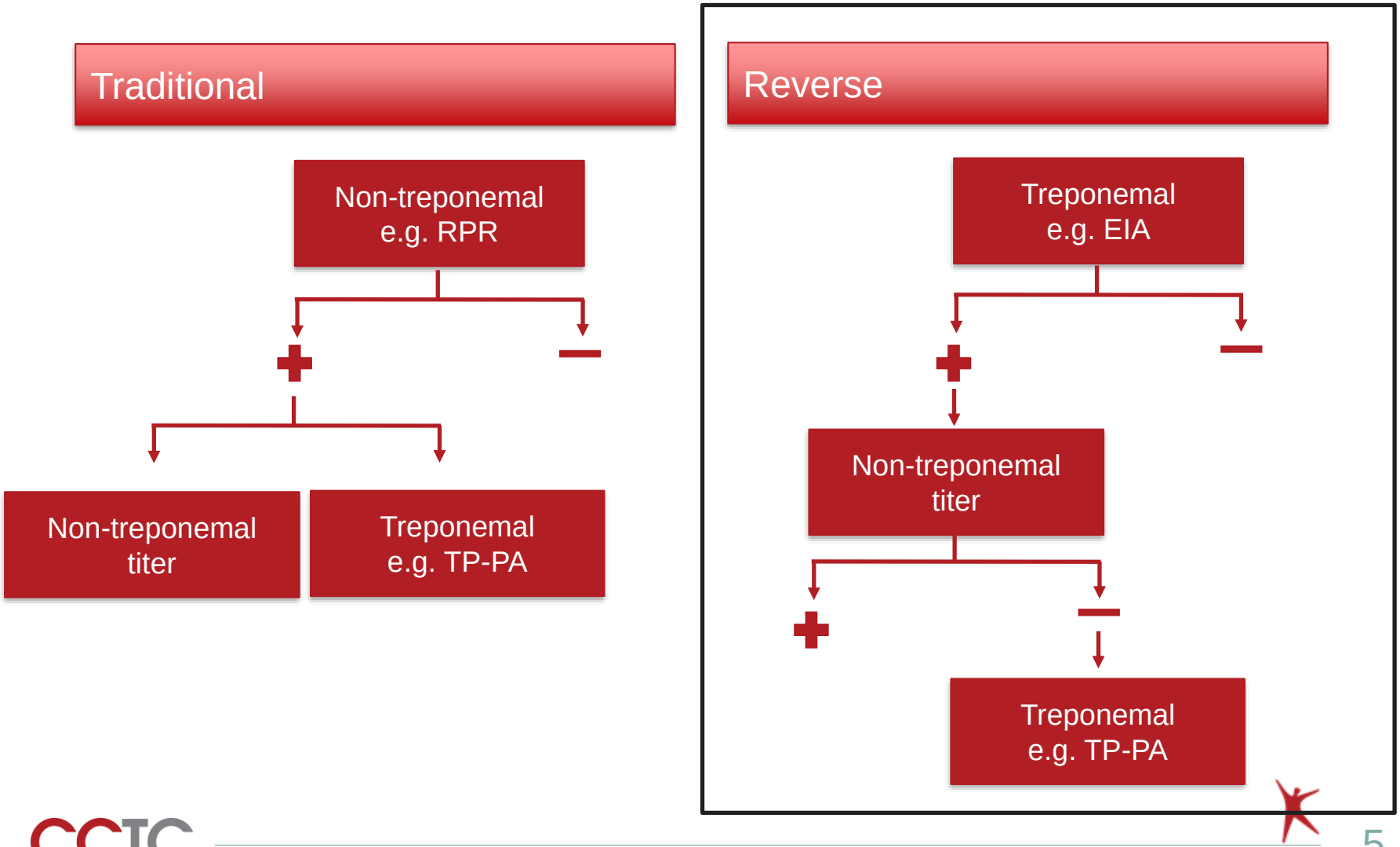
- *Treponema pallidum* particle agglutination (TP-PA)
- enzyme immunoassay (EIA)
- chemiluminescent immunoassay (CLIA)
- fluorescent treponemal antibody absorption (FTA-ABS)

**Non-treponemal** serologic tests: Quantitative tests to evaluate treatment progress

- Venereal Disease Research Laboratory (VDRL)
- rapid plasma reagin (RPR)
- unheated serum regain (USR)
- toluidine red unheated serum (TRUST)

*(1)*

# Syphilis Screening Algorithms



# Reverse Algorithm Advantages

- Treponemal IgG screening tests are highly sensitive and specific
  - fewer false negatives than non-treponemal assays (presumably due to detection of latent syphilis)
- Can be performed on automated platforms
  - Increased testing volume while reducing labor cost
- More effective for diagnosis of secondary, latent, and late syphilis
  - treponemal assays are not subject to prozone reactions, which have been reported as a rare occurrence in non-treponemal (RPR) assays

*(2)* and *(3)*

# Sensitivities and specificities of RPR test and IgG ELISA in comparison to results of FTA-Abs test for IgG

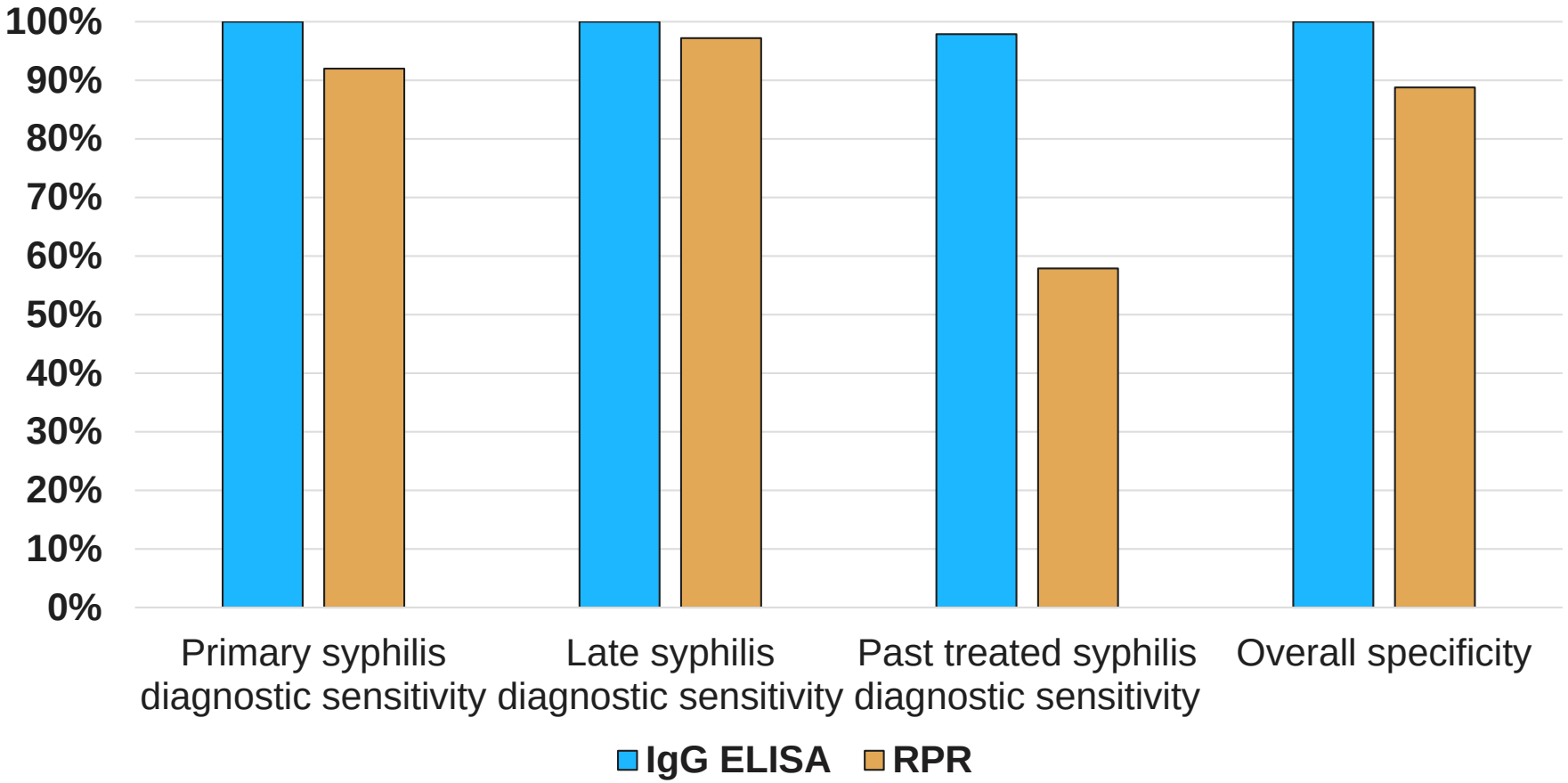



Table created from *(4).*

# Important points to consider

- Treponemal tests do not distinguish between present and past infection
- A non-treponemal test (e.g. RPR) result is required to determine whether infection is active
- In low prevalence disease populations, tests such as EIA may have higher false positive rates
    - Necessitates reflex to an additional treponemal test (e.g. TP-PA) and a non-treponemal test

*(5)* and *(6)*

# Summary

- The reverse screening algorithm enables the laboratory to automate high volume syphilis testing and produce highly sensitive and specific results
- Diagnosis of secondary, latent, and late syphilis is more sensitive using the reverse screening algorithm
- The reverse algorithm and interpretation of results must be thoroughly explained to healthcare providers in order to avoid confusion

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# Disclosures/Potential Conflicts of Interest

*Upon Pearl submission, the presenter completed the Clinical Chemistry disclosure form. Disclosures and/or potential conflicts of interest:*

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