WHITEPAPER

Meet the Marker:
Treponema Pallidum (Spirochete)

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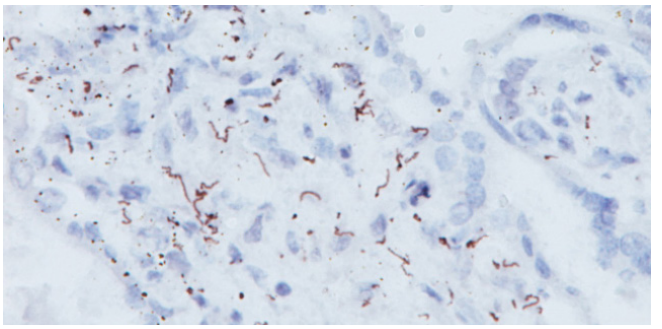
Syphilis is a multi-stage disease that has been recognized as a sexually transmitted infection for at least five centuries.[4] However, the pathogen responsible was not identified until the early 20th century when researchers were able to see the bacteria Treponema pallidum (T. pallidum) under a microscope for the first time.[4] The culprit, T. pallidum, is a spirochete, a type of helical-shaped bacteria.[4] It is an obligate human pathogen with no known environmental or zoonotic reservoir.[4] In the majority of cases, it is passed from person to person through sexual contact.[4]

Once T. pallidum gains entry, it begins to multiply and disseminate through the circulatory system.[3] The first stage of the infection is known as primary syphilis, which is characterized by the appearance of sores called chancres at the infection site.[3] These chancres are generally painless and go away on their own.[3] In fact, many patients do not seek medical treatment until they reach the secondary stage, which is characterized by a rash on the shoulders, arms, chest, or back.[3] This stage is followed by a latent period, where the infection goes silent for up to 10 to 20 years.[3] If left untreated, patients will develop tertiary syphilis, which is marked by visceral, cardiovascular, and neurological disorders, as well as severe skin lesions.[3]

T. pallidum is difficult to grow in culture, so this is not considered a viable option for clinical testing.[4] At 6 to 20 µm in length and with a diameter of 0.10–0.18 µm, the bacteria is also too small to see with conventional light microscopy, although it may be visualized via dark-field or phase contrast microscopy.[4] Serology may be used to test for the infection, but these tests can be negative in the primary stage of syphilis.[1] One of the standard methods of detection has historically been silver staining.[2] However, this technique is known to have significant background and a variable detection rate.[1,2] Furthermore, while silver staining can detect spirochetes, it is not specific to T. pallidum, and so the test may be confounded by the presence of other spirochete bacteria in the body, such as in the oral mucosa.[1]

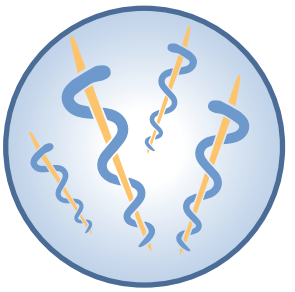
Studies have found that immunohistochemistry (IHC) shows much more sensitivity and specificity for T. pallidum than traditional silver stains.[1,2,3]

Treponema Pallidum Stain and Illustrations

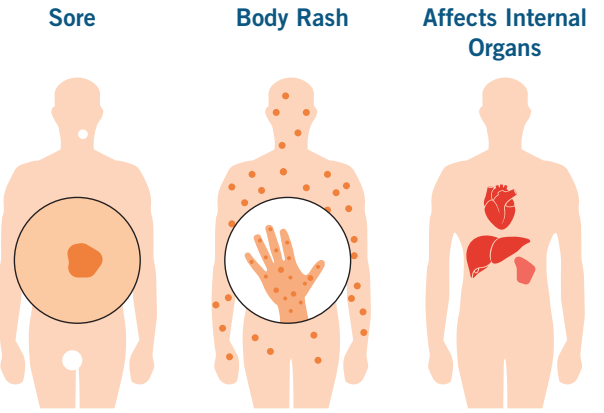


Spirochete infected tissue with treponema pallidum antibody

Treponema Pallidum



Stages of Syphilis



Stage 1
3-90 Days
After Exposure

Stage 2
4-10 Weeks After
Initial Infection

Stage 3
3-15 Years After
Initial Infection

Biocare offers an IHC stain for Treponema pallidum. To learn more about this marker, please visit biocare.net or call our Technical Support line at 1-855-504-9997, Option 3.

1. Buffet, M., Philippe A. Grange, Philippe Gerhardt, Agnès Carlotti, Vincent Calvez, Anne Bianchi, Nicolas Dupin (2007), Diagnosing Treponema pallidum in Secondary Syphilis by PCR and Immunohistochemistry. Journal of Investigative Dermatology, 127 (10), 2345-2350, https://doi.org/10.1038/sj.jid.5700888.
2. Hoang, M.P., High, W.A. and Molberg, K.H. (2004), Secondary syphilis: a histologic and immunohistochemical evaluation. Journal of Cutaneous Pathology, 31: 595-599. https://doi.org/10.1111/j.0303-6987.2004.00236.x
3. Luo Yuting, Xie Yafeng, Xiao Yongjian (2021). Laboratory Diagnostic Tools for Syphilis: Current Status and Future Prospects. Frontiers in Cellular and Infection Microbiology, 10. DOI=10.3389/fcimb.2020.574806
4. Salazar, J.C., Hazlett, K. R.O., Radolf, J.D. (2002). The immune response to infection with Treponema pallidum, the stealth pathogen, Microbes and Infection, 4(11), 1133-1140, https://