

# Enhancing syphilis diagnosis through innovative adaptation of wet mount microscopy

## Problem

The diagnosis of syphilis relies on direct tests like dark ground illumination (DGI) and indirect serological assays.<sup>1</sup> Dark ground microscopy is known for its reliability in detecting the syphilis-causing *Treponema pallidum* due to its unique morphology and motility but is inaccessible in many centres.<sup>2</sup> This poses a significant challenge for timely and accurate diagnosis of syphilis, especially in resource-limited settings. Some authors have recommended using dark-field mode in advanced light microscopes and employing plastic sheets or coins to block the light source.<sup>3</sup> However, the advantage of employing this method in identifying *Treponema* species has not been mentioned.

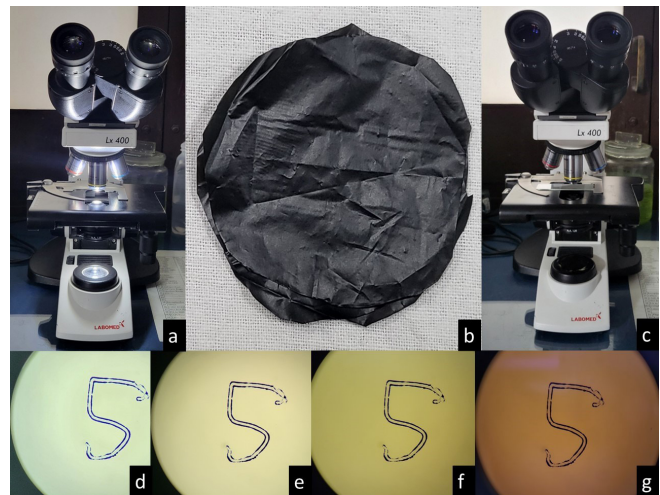
## Solution

A novel approach has been developed based on insights from three cases of primary syphilis that involved adapting

routine microscopy with specific modifications to detect *Treponema pallidum*. Serum samples from the moist lesions of syphilis are smeared on the glass slides and secured with a coverslip [Figure 1]. A modified microscope setup is then utilised, incorporating a thin, black plastic cover between the light source and the glass slide to reduce background light interference. We used three plastic covers one over the other [Figure 2]. Additionally, a dark room is created by blocking all external light sources, and the intensity of the microscope's light source is minimised to facilitate the observation of characteristic spirochete movements [Video 1]. To minimise potential disruptions from air bubble movements, ventilation systems such as fans are turned off during observation. Notably, the distinctive corkscrew movement of the spirochete aids in their identification [Figure 3 and Video 2]. Practical recommendations include emphasis on the importance of sample collection and prompt



**Figure 1:** Clinical image showing solitary ulcer over the glans.



**Figure 2:** (a-c) show the steps for converting a normal microscope into a modified dark ground microscope, (d) displays the microscopy field without a black cover, (e) with a single layer, (f) with a double layer, and (g) with a three-layer cover.

**How to cite this article:** Vendhan S, Vasudevan B, Bala K, Neema S. Enhancing syphilis diagnosis through innovative adaptation of wet mount microscopy. Indian J Dermatol Venereol Leprol. 2024;90:844-5. doi: 10.25259/IJDVL\_374\_2024

**Received:** March, 2024 **Accepted:** May, 2024 **Epub Ahead of Print:** August, 2024 **Published:** October, 2024

**DOI:** 10.25259/IJDVL\_374\_2024 **PMID:** 39152810 **Videos available on:** [https://doi.org/10.25259/IJDVL\\_374\\_2024](https://doi.org/10.25259/IJDVL_374_2024)

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**Figure 3:** Wet mount microscopy (400x) shows spiral structures (highlighted in red circles) indicative of spirochetes.

microscopic examination with a minimal light source to prevent to enhance diagnostic accuracy and sensitivity. This innovative adaptation offers a promising alternative for syphilis diagnosis in settings where traditional dark ground microscopy is not available. A limitation of this innovation is that it cannot match the contrast achieved with a dark-field microscope.

**Video 1:** Demonstration showing conversion of normal microscope into a modified microscope.

**Video 2:** Wet mount microscopy (400x) showing spirochete following corkscrew motility with to and fro movements.

**Declaration of patient consent:** The authors certify that they have obtained all appropriate patient consent.

**Financial support and sponsorship:** Nil.

**Conflicts of interest:** There are no conflicts of interest.

**Use of artificial intelligence (AI)-assisted technology for manuscript preparation:** The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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