

Images in Clinical Tropical Medicine New Diagnostics for Yaws

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Yaws, caused by *Treponema pallidum* subsp. *pertenue*, is an important public health problem in many tropical countries.¹ Like syphilis, the disease manifests in three stages; however, unlike syphilis, its route of transmission is non-genital skin-to-skin contact and not by sexual intercourse. Primary yaws manifests as either a papilloma or a chronic ulcer. Typically, ulcers are painless, with a raised edge and friable base (Figure 1). In secondary yaws, skin manifestations, involvement of the bones and joints including periostitis have been reported. Tertiary yaws develops in a minority of patients causing destructive lesions of the skin and soft tissues. Interest in yaws has been revived by the finding that azithromycin is a highly effective treatment of both primary and secondary yaws.² Clinical diagnosis alone of primary yaws is unreliable, but a point-of-care test has been shown to be of value.³ This test provides a result analogous to a *T. pallidum* particle agglutination assay (Figure 2, line 1) and a rapid plasma reagin (RPR) assay (Figure 2, line 2). In early infection, only the RPR may be positive. Diagnosis has been further complicated by the discovery that *Haemophilus ducreyi* may cause clinically similar ulcers.⁴ New polymerase chain reaction (PCR) assays have been developed for yaws.⁵ DNA suitable for can be extracted directly from swabs collected into dry tubes without the need for transport medium. Figure 3 demonstrates real-time PCR amplification curves of positive and negative controls and a clinical swab from a yaws lesion containing *T. pallidum pertenu* DNA. Both serological and molecular tests have a major role to play in the World Health Organization yaws eradication campaign.



FIGURE 1. Classical primary ulcer of yaws.

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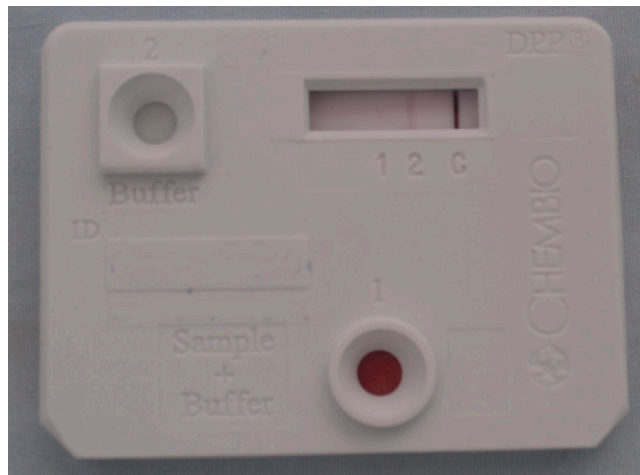


FIGURE 2. Combined treponemal and nontreponemal rapid diagnostic test for yaws.

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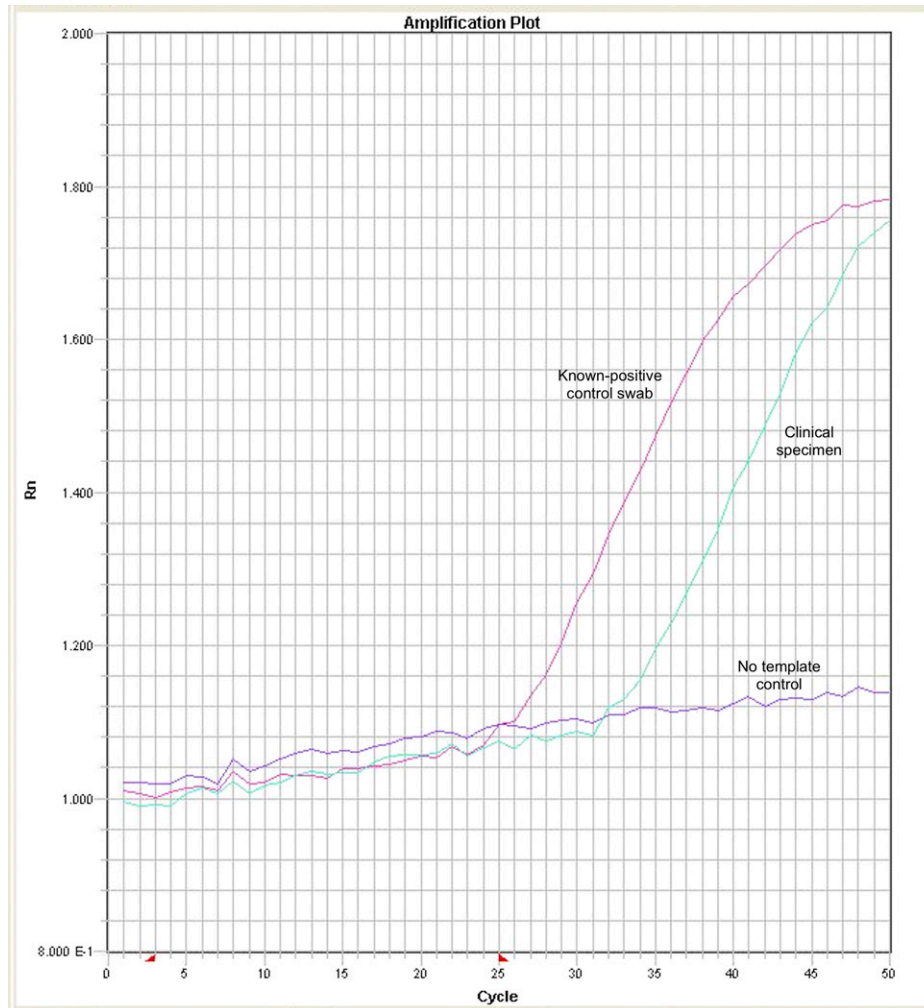


FIGURE 3. Quantitative polymerase chain reaction for yaws.

REFERENCES

1. Marks M, Solomon AW, Mabey DC, 2014. Endemic treponemal diseases. *Trans R Soc Trop Med Hyg* 108: 601–607.
2. Mitjà O, Hays R, Ipaï A, Penias M, Paru R, Fagaho D, de Lazzari E, Bassat Q, 2012. Single-dose azithromycin versus benzathine benzylpenicillin for treatment of yaws in children in Papua New Guinea: an open-label, non-inferiority, randomised trial. *Lancet* 379: 342–347.
3. Marks M, Goncalves A, Vahi V, Sokana O, Puiahi E, Zhang Z, Dalipanda T, Bottomley C, Mabey D, Solomon AW, 2014. Evaluation of a rapid diagnostic test for yaws infection in a community surveillance setting. *PLoS Negl Trop Dis* 8: e3156.
4. Marks M, Chi K-H, Vahi V, Pillay A, Sokana O, Pavluck A, Mabey DC, Chen CY, Solomon AW, 2014. *Haemophilus ducreyi* associated with skin ulcers among children, Solomon Islands. *Emerg Infect Dis* 20: 1705–1707.
5. Mitjà O, Lukehart SA, Pokowas G, Moses P, Kapa A, Godornes C, Robson J, Cherian S, Houinei W, Kazadi W, Siba P, de Lazzari E, Bassat Q, 2014. *Haemophilus ducreyi* as a cause of skin ulcers in children from a yaws-endemic area of Papua New Guinea: a prospective cohort study. *Lancet Glob Health* 2: e235–e241.