

***Bordetella pertussis* and *Bordetella parapertussis* Detection Using Real-time PCR**

Introduction

Pertussis (whooping cough) is a highly contagious, respiratory disease, caused primarily by the fastidious Gram-negative bacterium *Bordetella pertussis*.^{1,2} Infection with a closely related organism, *Bordetella parapertussis*, can produce a similar, but usually milder, syndrome.^{2,3}


Although not strictly a seasonal infection, pertussis incidence tends to peak in the early fall in temperate climates and, despite the widespread availability of an effective vaccine, episodic large-scale outbreaks still occur. In 2004, for example, almost 26,000 cases of pertussis were reported to the CDC, double the rate reported in 2003, and almost 10 times the number of cases reported in 1975.^{4,5} The pathognomonic, “whooping cough” syndrome occurs primarily in nonimmunized or incompletely immunized infants² and can usually be diagnosed on clinical presentation alone. Older children and adults with waning natural or vaccine-induced immunity, in contrast, present with a more diverse spectrum of symptoms that necessitate testing to establish a definitive diagnosis. Although disease in these populations is rarely severe,² since they can be infectious for two to three weeks they function as the primary reservoir for the organism and as a vehicle for ongoing transmission during epidemics.⁶ Prompt detection and subsequent treatment of *Bordetella pertussis* in clinically symptomatic persons is thus an important element in interrupting transmission and controlling pertussis outbreaks.²

Classically, laboratory diagnosis of pertussis was accomplished by a combination of direct fluores-

cent antibody (DFA) staining² and selective culture of suitable respiratory samples.² DFA staining, though rapid, was neither particularly sensitive nor specific,⁷ while the fastidious nature of the organism compromised the clinical relevance (three to seven days of incubation being required to recover the organism) and sensitivity of culture-based techniques.^{2,7}

The advent of polymerase chain reaction-based molecular assays for detecting *Bordetella pertussis* DNA resulted in a dramatic improvement in diagnostic efficiency,² and numerous studies documenting the superiority of PCR to either culture or DFA have been published.⁷⁻⁹ Although culture retains some epidemiologic value in certain settings, PCR is now widely accepted as the most clinically useful test for diagnosing pertussis.⁷⁻⁹

***B pertussis*/*B parapertussis* PCR Assay**

The PCR assay for *Bordetella pertussis*/*Bordetella parapertussis* is a real-time assay with fluorimetric detection, enabling simultaneous detection and differentiation of these two organisms. Optimal clinical sensitivity in diagnosing pertussis by PCR is obtained by analyzing nasopharyngeal swab or wash samples, although throat swabs are also acceptable for testing.⁸ Since detection by PCR does not require the presence of viable organisms, the stringent time, temperature, and collection device requirements necessary for culturing these organisms are not necessary (see test description below). This test should only be performed on symptomatic individuals, and the results used in conjunction with clinical findings and other diagnostic evaluations. 

References

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***Bordetella pertussis* and *Bordetella parapertussis* Real-time DNA PCR 138677**

CPT 87798(x2)

Specimen Nasopharyngeal swab, nasal aspirate, or nasopharyngeal in charcoal medium

Volume One nasopharyngeal/throat swab in universal transport medium (UTM), one nasopharyngeal/throat swab in charcoal, or 0.5 mL nasal aspirate/wash

Container UTM or charcoal medium (nasopharyngeal swab) or sterile plastic container (nasal aspirate)

Storage Instructions Maintain specimen ambient. **Stability:** Ambient or refrigerated up to seven days

Use Detect *Bordetella pertussis* (whooping cough) and *Bordetella parapertussis* (whooping cough-like syndrome) in nasopharyngeal specimens. This assay is also useful in distinguishing *Bordetella pertussis* from *Bordetella parapertussis*.

Limitations The target for the *Bordetella pertussis* PCR reaction, a region of IS481, is also found in *Bordetella holmesii*. A false-positive result for *Bordetella pertussis* DNA may occur if *Bordetella holmesii* is present in the sample tested.

Methodology Polymerase chain reaction (PCR)



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