

Pneumocystis PCR

Background Information

Pneumocystis jirovecii is an atypical fungus that causes *Pneumocystis* pneumonia (PCP) in patients with a compromised immune system. Transplant recipients and those with poorly controlled HIV are at highest risk, but those receiving chemotherapy for malignant diseases and others with immunosuppression may also develop the disease. PCP is an important cause of morbidity and mortality in immunocompromised patients.

The diagnosis of PCP is a challenge, since the microorganism does not grow in conventional culture. However, prompt and accurate detection of PCP is critically important for patient care, since the therapeutic agent used to treat patients with this infection is different from those employed for community-acquired pneumonia. Therefore, without an accurate diagnosis, the patient may be receiving inappropriate therapy.

Although direct examination of respiratory specimens has been used for years for the detection of *Pneumocystis*, these methods lack in sensitivity or specificity. Cleveland Clinic Laboratories' Department of Molecular Pathology and others have demonstrated that nucleic acid detection using *Pneumocystis*-specific primers and the polymerase chain reaction (PCR) is superior to conventional morphologic detection with respect to both sensitivity and specificity. Therefore, we now offer this method for the detection of *Pneumocystis* in respiratory specimens from patients at risk for this disease.

Clinical Indications

PCP is an opportunistic infection that can cause a lung infection in individuals with a weakened immune system, including those taking medications that may affect the immune system. The symptoms of PCP include breathing difficulties, fever and a dry cough. Other symptoms include fatigue, night sweats, weight loss and chest tightness. Antibiotics are usually recommended for those with mild, moderate or severe PCP. The key to surviving PCP is early treatment.

DNA PCR is useful in detecting the organism, tracking the course of infection and monitoring response to treatment.¹

Methodology

Amplification and detection of specimen using real-time, qualitative PCR comparing DNA taken from bronchial samples or sputum.

Interpretation

A positive result indicates the presence of *Pneumocystis* DNA.

A negative result indicates the absence of detectable *Pneumocystis* DNA.

Limitations of the Assay

Test result should aid in the diagnosis of *pneumocystosis*. When "rare" quantities are detected, then the possibilities of early infection, resolving infection or transient colonization should be considered.

Although a negative result does not entirely rule out the presence of PCP, the negative predictive value of this test is very high.

References

1. Cushion MT: Pneumocystis. In Manual of Clinical Microbiology. 8th edition. Edited by PR Murray, EJ Baron, JH Jorgensen, *et al.* Washington, DC, ASM Press, 2003; pp 1712-1725.
2. Wakefield AE, Lindley AR, Ambrose HE, *et al.* Limited asymptomatic carriage of *Pneumocystis jiroveci* in human immunodeficiency virus-infected patients. *J Infect Dis.* 2003;187(6):901-908.
3. Takahashi T, Goto M, Endo T, *et al.* *Pneumocystis carinii* carriage in immunocompromised patients with and without human immunodeficiency virus infection. *J Med Microbiol.* July 2002;51(7):611-614.
4. Aliouat-Denis, C-M., *et al.* (2008). Pneumocystis species, co-evolution and pathogenic power. *Infection, Genetics & Evolution* 8 (5): 708–726. doi:10.1016/j.meegid.2008.05.0.001. PMID. 18565802.
5. Ponce CA, Gallo M, Bustamante R, Vargas SL (2010). Pneumocystis colonization is highly prevalent in the autopsied lungs of the general population. *Clin Infect Dis* 50 (3): 347353. doi:10.1086/649868. PMID 20047487.
6. Vargas SL, Hughes WT, Santolaya ME, *et al.* Search for primary infection by *Pneumocystis carinii* in a cohort of normal, healthy infants. *Clin Infect Dis.* March 2001;32(6):855-861.

Test Overview

Test Name	<i>Pneumocystis jiroveci</i> PCR
Ordering Mnemonic	PCPPCR
Methodology	Polymerase Chain Reaction (PCR)
Reference Range	Negative for <i>Pneumocystis jirovecii pneumoniae</i>
Specimen Requirements	Testing Volume/Size: 1 mL; Type: Bronch (BAL); Induced Sputum: Bronchial Washing; Tissue from Lung Container: Sterile container; Transport Temperature: Refrigerated.
Minimum Specimen Requirements	Volume/Size: 1 mL
Alternate Specimen Requirements	Testing Volume/Size: 1 mL; Type: Sputum; Container: Sterile container; Transport Temperature: Refrigerated
Stability	24 hours at ambient temperature, 7 days at 2-8°C or 30 days frozen (-20° or -70°C)
Billing Code	87814
CPT Codes	87798(x1)

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