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Chlamydia pneumoniae DNA detection assay user information sheet - Version: 6.0. Index: S - 2050. Printed: 06-Nov-2025 17:25

Chlamydia pneumoniae

Background

First isolated in 1965, *Chlamydia pneumoniae* (formally *Chlamydophila pneumoniae* from 1999 to 2015) is a Gram-negative obligate intracellular bacterium belonging to the chlamydiaceae family. The chlamydiaceae family have a unique biphasic lifecycle consisting of two morphologically and functionally distinct forms. The elementary body, the smaller extracellular form, is the form which is infectious and enters the cell by receptor mediated endocytosis. The elementary body then matures into a larger replicating form (the reticulate body) inside the phagosome. The organism is metabolically active in this form, replicating by binary fission and relying on ATP synthesis from the cell.

Chlamydia pneumoniae is found worldwide and strains have been documented to infect a range of reptiles and amphibian hosts in addition horses and koalas (Bodetti, et al., 2002).

Clinical manifestations

Primarily, *C. pneumoniae* infects the respiratory tract causing diseases including pneumonia, bronchitis, sinusitis and pharyngitis. Mild and asymptomatic infections account for the majority of infections, which are self-limiting and therefore go unreported. However, 20% of those that are infected go on to have upper respiratory infections, with 10% resulting in pneumonia 1-4 weeks after the appearance of symptoms; *C. pneumoniae* is thought to account for 5-20% of cases of community acquired pneumonia.

Older adults appear to have, on average, a more severe clinical course than young adults do. This is also true for those with concurrent infections or co-morbidities (Kou, et al., 1995). Severe complications, such as exacerbation of asthma, encephalitis, myocarditis, whilst uncommon, have been documented. Additionally, *C. pneumoniae* has also been associated with inflammatory disease including atherosclerotic cardiovascular disease, arthritis, asthma, lung cancer and chronic obstructive pulmonary disease in addition to neurological disorders such as schizophrenia, multiple sclerosis and Alzheimer's disease (Porritt & Crother, 2016).

Epidemiology

Most individuals are thought to have been exposed to *C. pneumoniae* throughout their lifetimes as it is a commonly found pathogen. Infection of individuals under the age of five is uncommon, but seroprevalence increases dramatically from five to fourteen years, and by the age of twenty approximately 50% are seropositive. There is a continued increase in seroprevalence, albeit slower, among the older age groups despite a time-limited antibody response suggesting people are infected and reinfected throughout life (Kou, et al., 1995).

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Transmission

Transmission is via close person to person contact by respiratory droplets. Data suggests that *C. pneumoniae* can survive as an aerosol at room temperature in conditions of high relative humidity and is capable of surviving on surfaces for a number of hours. As a consequence of this, outbreaks are more common in close-contact settings (Falsey & Walsh, 1993).

Diagnosis

There are multiple approaches to the diagnosis of *C. pneumoniae* infection, and encompass serological testing, culture, immunohistochemistry as well as DNA amplification.

Serological methods:

The IgM antibody response occurs 2-3 weeks following the development of symptoms and then becomes undetectable after 2-6 months. In contrast the IgG antibody takes between 6-8 weeks after the onset of symptoms to reach a significant titre. The MIF test is the CDC recommended serological testing method. This requires paired serum samples, obtained 4-8 weeks apart. An acute infection diagnosed on the basis of a four-fold increase in IgG or an IgM titre of ≥1:16 (Dowell & al, 2001).

There are some limitations to this method:

- Samples obtained from the elderly or from those with chronic obstructive pulmonary disease can present with persistently high IgG titres despite not presenting with disease.
- Those with chronic infections are also difficult to define.
- Poor preparation can lead to false-positive IgM results due to the presence of the rheumatoid factor in the serum.
- Studies have demonstrated poor correlation with detection by culture or PCR. This is particularly true in samples obtained from children.

Culture methods:

As *Chlamydia pneumoniae* is an obligate intracellular bacterium it must be cultured using a eukaryotic host cell. Whilst being useful to establish the viability of the organism, the process is technically complex and issues of low yield can be encountered (Dowell & al, 2001).

DNA amplification:

Nucleic acid amplification techniques have successfully detected *C. pneumoniae* DNA in a wide range of clinical samples including respiratory specimens, vascular tissue, serum and peripheral blood mononuclear cells. PCR provides a rapid, specific and sensitive method which can give results in a timely manner.

Micropathology Ltd uses nested PCR, targeting the *ompA* gene, for qualitative detection of *C. pneumoniae* with end point visualisation on ethidium bromide agarose gel/melt curve.

Respiratory swabs, NPA, BAL and sputum are the UKAS accredited sample types for this assay.

Other samples may be tested but are reported with a caveat stating that the assay is not UKAS accredited for testing alternate sample types.

Turnaround times

Turnaround times are stated in the laboratory user manual with results usually available in practice much sooner than the given time frame. Where there is a delay, we are usually confirming a result and addressing clinical data given with the specimen.

References

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