**Aspergillus antibodies**

For antibody tests, please send serum or clotted blood in a plain tube; EDTA blood is not suitable.

*Note:* this is a new test that replaces the previous test using ELISA and Countercurrent Immunoelectrophoresis.

*Use(s):* Aspergillus serology: Diagnosis of allergic bronchopulmonary aspergillosis, aspergilloma, paranasal sinus aspergillosis, other forms of aspergillosis in immunocompetent patients.

*Description:* Determination of the presence and level of IgG antibodies to *Aspergillus fumigatus* in serum. The method used is a commercial automated Fluorescent Immuno Enzyme Assay (ImmunoCAP).

*Specimens:* Serum 500 µl minimum or 1 mL clotted blood.

*Results:* Results are returned as mg Antibody per litre (mgA/L) and range from <2.0 to >200.

*Interpretation:* As *Aspergillus fumigatus* spores are common in the environment and almost everyone is exposed to them, low levels of antibody to *A. fumigatus* are found in many patients and are not clinically significant. However, what is considered a significant level of antibody is dependant on the underlying conditions if any that are present in the patient. In people with Cystic Fibrosis (CF) there are relatively higher levels of antibody to *A. fumigatus* compared to other patient groups and for CF patients levels of antibody ≥ 90 mgA/L is considered significant. In non-CF patients levels of antibody ≥ 40 mgA/L are significant.

Go to ImmunoCAP testing for further information on interpreting Aspergillus and other antibody tests.

**Mean Turnaround Time: 3 days.**

*Note:* The antigens used in this assay are from *A. fumigatus*, however it is known there is often significant cross reactivity with antibodies to other Aspergillus spp. Please contact the laboratory to discuss the serodiagnosis of infections caused by other Aspergillus spp.

**Aspergillus Antigen**

For the following tests, please send serum or clotted blood in a plain tube; EDTA blood is not suitable.

*Use(s):* Diagnosis of invasive aspergillosis in immunocompromised patients.

*Description:* Determination of the presence of *Aspergillus galactomannan* in serum
by ELISA.

**Specimens:** Serum 700 µl minimum or 5 mL clotted blood. This test is not currently recommended for specimens other than serum.

**Results:** Negative, Positive (report includes cut-off value)

**Mean Turnaround Time 1 day (90% within 3 days).**

**Note:** Specificity of the test is improved if two or more consecutive specimens are positive. The Candida antigen test has been discontinued in this laboratory, as it is not considered to be of clinical use. Requests for the Candida antigen test should be discussed by telephone with the mycology clinical staff.

**Cryptococcal antigen**

**Use(s):** Diagnosis of cryptococcal meningitis, systemic cryptococcosis in both immunocompetent and immunocompromised patients.

**Description:** Determination of the presence of cryptococcal antigen and the titre in the specimen, by latex agglutination.

**Specimen:** Serum or CSF, 300 µl minimum or 2 mL clotted blood.

**Results:** Negative, Positive (Titre).

**Mean Turnaround Time 1 day (90% within 2 days).**

**Note:** This test may be used to monitor the response to treatment when the CSF is tested.

**Histoplasma and Coccidioides serology**

**Use(s):**
- **Histoplasma:** Diagnosis of acute, chronic pulmonary or systemic histoplasmosis
- **Coccidioides:** Diagnosis of coccidioidomycosis.

**Description:**
- **Histoplasma:** Determination of the presence of antibodies to Histoplasma capsulatum by immunodiffusion (mycelial antigen) and complement fixation test (CFT; mycelial and yeast antigens).
- **Coccidioides:** Determination of the presence of antibodies to Coccidioides immitis by immunodiffusion and CFT.

**Specimens:** Serum or CSF 500 µl minimum or 2 mL clotted blood.

**Results:**
- **Histoplasma:** Immunodiffusion: Negative, Positive (M or M+H band); CFT: Negative, Positive (Titre) to mycelial and/or yeast antigens.
- **Coccidioides:** Immunodiffusion: Negative, Positive; CFT: Negative, Positive (Titre). The CFT is only carried out once a week.
**Mean Turnaround Time**

**Histoplasma** 10 days (90% within 15 days).  
**Coccidioides** 11 days (90% within 13 days).

*Note:* Inclusion of travel history is required for confirming potential exposure to these fungi.

**Candida antibodies**

This test is for the detection of antibodies to Candida spp. but is useful in only limited clinical situations. These include Candida endocarditis, Candida osteomyelitis, Candida endophthalmitis or other forms of Candidosis in the immunocompetent patient.

**Sample Tube**

Blood  
Serum (No Gel)

**Collection Conditions**

Note: Serum gel tubes can also be used.  
Min. Vol  
2ml  
Freq.  
Ref. Range (Male)  
N/A  
Ref. Range (Female)  
N/A  
Ref. Range (Paed)  
N/A  
Sera are screened by ELISA, any sera positive by ELISA are tested for precipitins by countercurrent immunoelectrophoresis (CIE). Any sera positive by ELISA and positive at 1/8 or greater titre by CIE should be considered potentially significant.

**Ref. Range Notes**

N/A  
IP Acute TAT  
4 days  
IP Routine TAT  
4 days  
GP Acute TAT  
4 days  
GP Routine TAT  
4 days  
Department  
Mycology

**Aspergillus antigen**

This test detects the presence of the Aspergillus antigen galactomannan in serum to diagnosis invasive aspergillosis in immunocompromised patients.

**Sample Tube**

Blood  
Serum (No Gel)

**Collection Conditions**

Note: A serum gel tube can also be used.  
Min. Vol  
2ml  
Freq.  
Ref. Range (Male)  
N/A  
Ref. Range (Female)  
N/A  
Ref. Range (Paed)  
N/A  
The results of this test are reported as an index. An index of 0-
0.499 is negative, and index of 0.5 or greater is positive. Note positives are always confirmed on the same specimen and a repeat specimen is recommended.

<table>
<thead>
<tr>
<th>Units</th>
<th>N/A</th>
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<tbody>
<tr>
<td>IP Acute TAT</td>
<td>1 day</td>
</tr>
<tr>
<td>IP Routine TAT</td>
<td>1 day</td>
</tr>
<tr>
<td>GP Acute TAT</td>
<td>1 day</td>
</tr>
<tr>
<td>GP Routine TAT</td>
<td>1 day</td>
</tr>
<tr>
<td>Department</td>
<td>Mycology</td>
</tr>
</tbody>
</table>

**Aspergillus antibodies**

Detection of antibodies to Aspergillus spp. Appropriate for the diagnosis of aspergillosis in immunocompetent patients e.g. allergic bronchopulmonary aspergillosis, aspergilloma, chronic necrotising aspergillosis, aspergillus sinusitis

<table>
<thead>
<tr>
<th>Sample</th>
<th>Blood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube</td>
<td>Serum (No Gel)</td>
</tr>
</tbody>
</table>

**Collection Conditions**

Note: Serum gel tubes can also be used.

<table>
<thead>
<tr>
<th>Min. Vol</th>
<th>2ml</th>
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</thead>
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**Mycology PCR**

(http://www.mdlab.com/html/testing/mycology.asp)

*Aspergillus fumigatus by Real-Time PCR* Clinical significance: Aspergillosis is the second most common fungal infection requiring hospitalization in the United States. It is associated with infections of the eye, ear, sinuses, skin and respiratory system. It can also cause allergic reactions with worsening of pulmonary function in asthmatics and cystic fibrosis patients. There are certain predisposing factors associated with Aspergillus such as prosthetic devices, immunocompromised patients such as those undergoing chemotherapy, organ transplantation and suffering from AIDS. Traditional diagnostic methods consist of microscopic analysis, culture and special stains that cannot speciate. Molecular methods, such as PCR, offer the physician a rapid and extremely sensitive means of diagnosis. In this assay, DNA is extracted from the specimen and subjected to PCR amplification.

- **Method:** Real-Time PCR
Specimen: Whole blood yellow top tube (ACD solution A), CSF, biopsy

Transport: Whole blood stable at room temperature; refrigerate others

Turn around time: 24-48 hours

**Candida albicans by Real-Time PCR** Clinical significance: Between 70% to 90% of yeast strains isolated from the vagina belong to the species Candida albicans. C. albicans is one of the major causes of Candida Vaginitis (CV). In the United States, CV is currently the second most common cause of vaginal infection, with bacterial vaginosis the most common diagnostic entity. CV affects most females at least once during their lives at an estimated rate of 70% to 75%, of whom 40% to 50% will experience a recurrence. Studies indicate that CV is a frequent diagnosis among young women, affecting as many as 15% to 30% of symptomatic women visiting a clinician; by the age of 25, half of all college women will have experienced at least one episode of CV. C. albicans and C. glabrata represent the most common fungal causes of both complicated and uncomplicated urinary tract infections. In this assay, DNA is extracted from the specimen and subjected to Real-Time PCR amplification.

- **Method:** Real-Time PCR
- **Specimen:** Whole blood yellow top tube (ACD solution A), CSF, biopsy
- **Transport:** Whole blood stable at room temperature; refrigerate others
- **Turn around time:** 24-48 hours

**Candida dubliniensis by Real-Time PCR** Clinical significance: First described in 1995, Candida dubliniensis is reported to have been previously misidentified as Candida albicans. It is associated with oral candidiasis and has been recovered from the vaginal tract of women. Although it is closely related to C. albicans, its differences in virulence and its ability to rapidly develop resistance to traditional antifungal agents makes it clinically relevant. C. dubliniensis is an opportunistic infection that is of particular concern in immunocompromised patients. The use of molecular techniques, such as PCR, enables the clinician to differentiate C. dubliniensis from other species of Candida to facilitate diagnosis and proper treatment. In this assay, DNA is extracted from the specimen and subjected to PCR amplification.

- **Method:** Real-Time PCR
- **Specimen:** Whole blood yellow top tube (ACD solution A), CSF, biopsy
- **Transport:** Whole blood stable at room temperature; refrigerate others
- **Turn around time:** 24-48 hours

**Candida glabrata by Real-Time PCR** Clinical significance: C. glabrata has emerged as the second most common cause of invasive fungal infection and is the leading non-albicans species involved in Candida Vaginitis (CV), accounting for up to 20% of infections in immune-competent women. It is thought that the widespread use of topical antifungals, especially in short courses, may contribute to selection for non-albicans yeasts, which are less susceptible to these agents. C. glabrata has also been shown to intrinsically exhibit low level resistance but has the ability to rapidly acquire high level resistance to antifungals. C. glabrata is associated with CV and affects most females at least once during their lives at an estimated rate of 70% to 75%, of whom 40% to 50% will experience a recurrence. In the United States CV is currently the second most common cause of vaginal infections, with bacterial vaginosis the most common. Most studies indicate that CV is a frequent diagnosis among young women, affecting as many as 15% to 30% of symptomatic women visiting a clinician; by the age 25 years, half of all college women will have experienced at least one episode of CV. C. albicans and C. glabrata represent the most common fungal causes of both complicated and uncomplicated urinary tract infections. In this assay, DNA is extracted from the specimen and subjected to PCR amplification.

- **Method:** Real-Time PCR
- **Specimen:** Whole blood yellow top tube (ACD solution A), CSF, biopsy
- **Transport:** Whole blood stable at room temperature; refrigerate others
- **Turn around time:** 24-48 hours
Candida kefyr by Real-Time PCR Clinical significance: *Candida kefyr* is one of the six strains of Candida, of approximately 154 species, that is commonly associated with infections in humans. This species, previously reported in the literature by the obsolete name of *Candida pseudotropicalis*, has been reported as an emerging pathogen. Candidiasis has a wide clinical spectrum, capable of affecting almost any organ or system in the body. Infections range from localized, superficial infections to dissemination in the blood stream. Considered to be a relatively rare infection, found in approximately 1% of fungal isolates reported, *C. kefyr* infections have been documented from burn wounds, blood and vaginal infections. More recently, the frequency of *C. kefyr* infections has increased within oncohematologic patients, particularly those with neutropenic, myeloid and lymphoblastoid leukemias. In this assay, DNA is extracted from the specimen and subjected to PCR amplification.

Candida krusei by Real-Time PCR Clinical significance: *Candida krusei*, which has traditionally been implicated in urinary tract infections, has recently been associated with certain instances of fungal vaginitis, particularly recurrent fungal vaginitis. Candida Vaginitis (CV) resulting from *C. krusei* infection is often chronic due to the organism’s inherent resistance to conventional anti-fungal therapies, necessitating the need for prolonged treatment courses. The incidence of *C. krusei* fungemia within leukemic populations has been on the rise within recent years, doubling within a five year span, and is highly lethal within the neutropenic subpopulation receiving fluconazole prophylaxis. As a result, treatment needs to be initiated quickly and aggressively. The use of molecular techniques, such as Real-Time PCR, enables the clinician to differentiate *C. krusei* from other species of Candida to facilitate diagnosis and proper treatment. In this assay, DNA is extracted from the specimen and subjected to PCR amplification.

Candida lusitaniae by Real-Time PCR Clinical significance: *Candida lusitaniae* is considered a nosocomial bloodstream pathogen that is becoming increasingly associated with Candidemia. It is an opportunistic infection and therefore is associated with immunocompromised individuals. *C. lusitaniae* is known to enter the host through the urogenital and respiratory tracts or through intravascular catheters. It is also quite resistant to amphotericin B, a common antifungal treatment. In this assay, DNA is extracted from the specimen and subjected to PCR amplification.
**Candida parapsilosis by Real-Time PCR** Clinical significance: *C. parapsilosis* accounts for 1% of vaginal yeast isolates. It is thought that the widespread use of topical azole antifungals, especially in short courses, may contribute to selection for non-*albicans* yeasts, which are less susceptible to these agents than *C. albicans*. *C. parapsilosis* is associated with Candida Vaginitis (CV). CV affects most females at least once during their lives at an estimated rate of 70% to 75%, of whom 40% to 50% will experience a recurrence. In the United States CV is currently the second most common cause of vaginal infections, with bacterial vaginosis the most common diagnostic entity. Studies indicate that CV is a frequent diagnosis among young women, affecting as many as 15% to 30% of symptomatic women visiting a clinician; by the age of 25, half of all college women will have experienced at least one episode of CV. In this assay, DNA is extracted from the specimen and subjected to PCR amplification.

- **Method:** Real-Time PCR
- **Specimen:** Whole blood yellow top tube (ACD solution A), CSF, biopsy
- **Transport:** Whole blood stable at room temperature; refrigerate others
- **Turn around time:** 24-48 hours

**Candida tropicalis by Real-Time PCR** Clinical significance: *Candida tropicalis* accounts for 1% to 5% of vaginal yeast isolates and may be associated with a higher rate of recurrence after standard treatment. Although *C. tropicalis* is still very susceptible to azole antifungals, an increase in resistance has been observed in the US. It is thought that the widespread use of topical azole antifungals, especially in short courses, may contribute to selection for non-*albicans* yeasts, which are less susceptible to these agents than *C. albicans*. *C. tropicalis* is associated with Candida Vaginitis (CV). CV affects most females at least once during their lives, at an estimated rate of 70% to 75%, of whom 40% to 50% will experience a recurrence. In the United States CV is currently the second most common cause of vaginal infections, with bacterial vaginosis the most common diagnostic entity. Studies indicate that CV is a frequent diagnosis among young women, affecting as many as 15% to 30% of symptomatic women visiting a clinician; by the age of 25, half of all college women will have experienced at least one episode of CV. In this assay, DNA is extracted from the specimen and subjected to PCR amplification.

- **Method:** Real-Time PCR
- **Transport:** Whole blood stable at room temperature; refrigerate others
- **Turn around time:** 24-48 hours

**Cryptococcus neoformans by Real-Time PCR** Clinical significance: *Cryptococcus neoformans* is found in aged pigeon droppings, such as those accumulated on window ledges and rooftops. Infection is commonly seen in AIDS and transplant patients on immunosuppressive therapies and primarily manifests as a respiratory infection causing severe pneumonia. It also causes central nervous system disturbances and skin lesions that may be non-specific but are often the first sign of infection. India ink smears can be useful as supportive evidence of infection but are not definitive. A combination of culture and smears with antibody or antigen detection assays are traditionally used. Molecular methods, such as PCR, offer a rapid route of diagnosis with increased sensitivity and specificity. In this assay, DNA is extracted from the specimen and subjected to PCR amplification.

- **Method:** Real-Time PCR
- **Specimen:** Whole blood yellow top tube (ACD solution A), *UroSwab®* (males), CSF biopsy
- **Transport:** Whole blood and *UroSwab®* (males) stable at room temperature; refrigerate others
- **Turn around time:** 24-48 hours
**Pneumocystis carinii by Real-Time PCR** Clinical significance: *Pneumocystis carinii* is an opportunistic pathogen which can cause a fatal pneumonia in patients under immunosuppressed or immune deficient conditions due to AIDS, cancer, chemotherapy, or immunosuppressive therapy for organ transplantation. Traditionally, the clinical samples for diagnosis of *P. carinii* infection by microscopic analysis are mostly from samples obtained during invasive procedures such as open lung biopsy and bronchoscopic alveolar lavage. In this assay, DNA is extracted from the specimen and subjected to PCR amplification

- **Method:** Real-Time PCR
- **Specimen:** Whole blood yellow top tube (ACD solution A), biopsy (fresh), biopsy (paraffin)
- **Transport:** Whole blood stable at room temperature; refrigerate others
- **Turn around time:** 24-48 hours

http://www.pathology.leedsth.nhs.uk/pathology/ClinicalInfo/ClinicalServices/MycologyServices/tabid/213/Default.aspx