

CLINICAL SPECIFICATIONS

PENICILLIUM

Pathogen Type:

Penicillium is a genus of fungi, which commonly grows on many foodstuffs such as cocoa beans, coffee beans, cassava flour, cereals, fish, peanuts, dried fruits, wine, poultry eggs and milk.¹ It is found in soil, water and air especially in and around water-damaged buildings. Array 12 assesses immune reactivity to *Penicillium notatum* and *Penicillium chrysogenum*.

Associated With:

Pulmonary fibrosis²
 Peritoneal dialysis³
 Endophthalmitis⁴
 Sick building syndrome⁵
 Autoimmune inner ear disease, Meniere's disease, tinnitus⁶

Known Cross-Reactions: *Aspergillus*, *Stachybotrys*;⁷ cochlin⁶

Clinical Significance:

The detection of antibodies to *Penicillium* indicates the patient has increased risk of chronic fatigue syndrome, fibromyalgia, a variety of autoimmunities including neuroautoimmunity. The most common mode of invasion is via inhalation. Due to their small size, *Penicillium* spores rest in the lower lung. These spores and their products can induce significant immunomodulatory responses in lung cells and inflammation in animal models of lung disease.⁸ Molds, through the production of enzymes such as serine chymotrypsin-like proteinase, cleaves lungs and gut barrier proteins and then finds their way into the blood. In the blood, immune system reaction against them results in the release of proinflammatory cytokines and the production of antibody against mold antigens. First, there is a significant increase in albumin, macrophages and neutrophils, which leads to the production of tumor necrosis factor- α and interleukin-6.⁹ The molds and their mycotoxins, enzymes and proinflammatory cytokines alter the blood brain barrier function and allow for the entry of autoreactive, T-helper-1 (Th1), Th7 and antibodies into the nervous system causing damage to microglia, astrocytes and neurons, which leads to the neuroautoimmunity commonly seen in patients exposed to molds.

This array tests for IgG immune reactivity associated with *Penicillium*. This is not a measurement of acute infection. Equivocal or out-of-range results indicate IgG antibody reactivity to the tested antigen. We tested 288 blood donor sera against *Penicillium* antigens at optimal dilution, 22% of these donors were IgG reactive.

References:

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5. Schwab, et al. Allergic inflammation induced by a *Penicillium chrysogenum* conidia-associated allergen extract in a murine model. Allergy, 2004; 59:758-765.
6. Pathak, et al. Innate immune recognition of molds and homology to the inner ear protein, cochlin, in patients with autoimmune inner ear disease. J Clin Immunol, 2013; 33(7): 10.1007/s10875-013-9926-x.
7. Vojdani. Cross-reactivity of *Aspergillus*, *Penicillium*, and *Stachybotrys* antigens using affinity-purified antibodies and immunoassay. Archives Environ Health, 2004; 59(5):256-265.
8. Chung, et al. Dose-dependent allergic responses to an extract of *Penicillium chrysogenum* in BALB/c mice. Toxicology, 2005; 209(1):77-89.
9. Rand, et al. Inflammatory and cytotoxic responses in mouse lungs exposed to purified toxins from building isolated *Penicillium brevicompactum* Dierckx and *P. chrysogenum* Thom. Toxicol Sci, 2005; 87(1):213-222.