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Novel Biomarkers for Valley Fever

Valley Fever (VF) or coccidioidomycosis is a systemic fungal infection that is endemic to the Southwestern United States although it can occur in other parts of the world. Roughly 40% of VF patients experience vague or flu-like symptoms and approximately 5-10% of patients, progress to a disseminated form of the disease with potentially fatal consequences. The incidence of VF has risen significantly and is a substantial burden on the healthcare system.

Because VF's clinical presentation resembles community acquired pneumonia or other infectious diseases, accurate diagnoses are often delayed. Many tests detect host-produced antibodies; however, it may take months to develop such an antibody response with some patients never developing detectable antibodies. A test that directly detects Coccidioidal proteins would allow for an earlier and more definitive diagnosis.

Researchers at Arizona State University and their colleague at Mayo Clinic in Arizona have identified circulating Coccidioidal antigens that are specific for Coccidioides spp. Using laser capture microdissection (LCM) coupled with mass spectrometry, biomarkers of Coccidioides from infected lung tissue were identified. The 27 Coccidioidal proteins identified do not share significant sequence orthology with human proteins. Further, three of those 27 do not share sequence homology to any other pathogenic fungus or microbe, making them ideal Coccidioides spp biomarkers. These antigens can be detected in urine, serum or plasma to provide a definitive and early diagnosis of coccidioidomycosis.

Detecting antigens in a body fluid allows for an earlier and more definitive laboratory diagnosis of VF, leading to accurate treatment, better patient outcomes and possibly reduced healthcare costs.

Potential Applications

- Early Valley Fever diagnoses
  - Humans
  - Canines, felines and other mammals
- The biomarkers could be potential vaccine candidates or therapeutic targets

Benefits and Advantages

- Detects Coccidioidal antigens rather than host immune response
- These antigens do not share significant sequence orthology with human proteins and three do not share sequence homology to any other pathogenic fungus or microbe
- These antigens were derived from spherules that grew in a human lung
- All 27 biomarker candidates are produced by the fungus when grown in vitro in a media- and growth-phase dependent manner
- Early diagnosis of VF can reduce unneeded testing and treatment, and decrease the incidence of serious complications

For more information about the inventor(s) and their research, please see

Dr. Lake's departmental webpage

Dr. Grys' Mayo Clinic webpage