New method of diagnosing deadly fungal lung infection in leukemia patients discovered

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Lead author Dr. Allan Brasier, UTMB Professor of Internal Medicine, Director of the Institute of Translational Sciences and the Sealy Center for Molecular Medicine is pictured. Credit: The University of Texas Medical Branch at Galveston

A team of researchers have discovered a new way for early detection of a potentially deadly fungal infection in patients with suppressed immune systems such as those being treated for leukemia or have had an organ transplant.

A multidisciplinary research group led by Allan Brasier of The University of Texas Medical Branch at Galveston, in tandem with several collaborating research institutions and the Aspergillosis Technology Consortium, published their findings in *PLOS ONE*.

Patients receiving leukemia chemotherapy treatments, bone marrow stem cell transplants or lung transplants are some of those at risk for serious infection by the disease-causing *Aspergillus* fungus, a common mold in the environment that easily becomes airborne. When inhaled, the mold colonizes the respiratory tract. In patients with immune suppression from their chemotherapy treatment, the mold invades into the bloodstream where it spreads and infects several organs including the liver, lungs and brain. People with normal immune systems are able to destroy the inhaled mold without becoming infected.

Despite close monitoring for infection and aggressive anti-fungal therapy in vulnerable people, the fatality rates are as high as 50 to 90 percent depending on a patient's underlying disease and site of infection. While early diagnosis can improve the patient's outcome, timely detection of the infection is difficult.

Currently, the infection is diagnosed with X-rays and tests that measure levels of fungal molecules that produce an immune reaction in a patient's blood. These tests are not very accurate and often can lead to a wrong diagnosis.

The study describes how the team studied patients undergoing chemotherapy for leukemia, bone marrow transplants and lung

transplants from several of the collaborating institutions and identified, confirmed and evaluated a new method of detecting the infectious mold in patients with leukemia. Similar people with no health conditions participated in the study as a comparison group.

The test results for the mold were different for each group of patients, so future commercial diagnostic tests using this technology should be tailored for different medical conditions commonly linked with this infection.

Brasier, director of UTMB's Institute for Translational Sciences, said the breakthrough was "an example of successful collaboration that brought together experts in several different scientific fields to approach a difficult problem." The team's discovery could translate to refined diagnostics, earlier treatment and improved survival for patients affected by this infection. More studies will be needed to confirm and validate this panel as a diagnostic test in independent patients.

  More information: Allan R. Brasier et al. Improved Detection of Invasive Pulmonary Aspergillosis Arising during Leukemia Treatment Using a Panel of Host Response Proteins and Fungal Antigens, *PLOS ONE* (2015). DOI: 10.1371/journal.pone.0143165

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