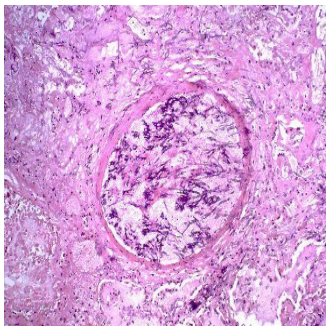
ICU
MANAGEMENT & PRACTICE

Breath Test for Diagnosing Fungal Pneumonia



Pneumonia is caused by many different microbes, and early identification of the bug culprit is important to ensure timely and appropriate treatment. A novel approach — analysing a patient's breath for key chemical compounds made by the infecting microbe — may help detect invasive aspergillosis, a fungal infection that is a leading cause of mortality in patients with compromised immune systems, according to a proof-of-concept study published in *Clinical Infectious Diseases*.

This type of fungal pneumonia is difficult to diagnose and in most cases a lung biopsy is necessary to obtain more accurate identification. However, such an invasive procedure could be difficult, and even dangerous, for debilitated patients with weakened immune systems, including organ or bone marrow transplant recipients and patients on chemotherapy.

Hence, the challenge for experts is to find a noninvasive method that can also identify the type of fungus causing pneumonia to enable timely and targeted treatment in these cases. Sophia Koo, MD, of Brigham and Women's Hospital in Boston (MA, USA), and her colleagues set out to find a unique "chemical signature" in the breath of patients being evaluated for fungal pneumonia. They prospectively collected breath samples from patients with suspected invasive fungal pneumonia from 2011 to 2013.

In their research, Dr. Koo et al. identified several compounds, or metabolites, normally produced by *Aspergillus fumigatus* and other fungi that can cause pneumonia. The next step was to analyse breath samples from 64 patients with suspected cases of invasive aspergillosis. This would allow the team to assess if it was possible to distinguish patients with this fungal pneumonia from patients who did not have this illness.

New Technique Detects Fungal Infection with High Accuracy

Based on the identification of these fungal compounds in the breath samples, the researchers were able to identify patients with the fungal infection with high accuracy: 94 percent sensitivity and 93 percent specificity. This means that the "breath test" was able to detect 94 percent of patients who actually had or probably had the disease, and misidentified as infected seven percent of patients who did not have the infection.

According to the hospital team, the breath collection procedure was implemented without any problem. It was well-tolerated, including by patients who had difficulty breathing or required supplemental oxygen.

"Identification of the underlying microbial etiology remains elusive in most patients with pneumonia, even with invasive diagnostic measures," Dr. Koo noted. "Our findings provide proof-of-concept that we can harness detection of species-specific metabolites to identify the precise microbial cause of pneumonia, which may guide appropriate treatment of these infections."

More work is needed to validate the findings and refine the approach before it can be considered for clinical use, the researchers said. If supported by future research, the new technique also may be used in other types of pneumonia. "We can likely also use this volatile metabolite profiling approach to identify other, more common causes of pneumonia," Dr. Koo pointed out.

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