Press Release

Easier diagnosis for fungal infection of the lungs

New clinical imaging method may enable doctors to tackle one of the main killers of immunocompromised patients – sooner and more effectively

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They are tiny. They are everywhere in the air. And we breathe them in every day – the spores of the fungus *Aspergillus fumigatus*. It's not usually a problem for healthy people – their immune system kills the spores before they can grow and infect the body. But in patients with an immune system weakened by leukaemia or AIDS, or for those receiving bone marrow transplants – the fungus faces little resistance as it settles into the lungs and can lead to an often fatal disease known as pulmonary invasive aspergillosis.

This infectious disease is one of the most common causes of death in immunocompromised patients. Early, targeted treatment is key in tackling the disease effectively but has been difficult until now because of the lack of fast and reliable methods for diagnosis.

Researchers from Tübingen University and University Hospitals, working amongst others with colleagues from the University Hospital Essen (Professor Matthias Gunzer), University of Exeter startup ISCA Diagnostics (Professor Christopher Thornton) and Paul Scherrer Institute (Professor Roger Schibli) have now developed a promising new diagnostic process and tested it in a disease model. The researchers are working within the EU consortium MATHIAS (New Molecular-Functional Imaging Technologies and Therapeutic Strategies for Theranostic of Invasive Aspergillosis), which is coordinated by Professor Bernd Pichler, head of the Werner Siemens Imaging Center, Department of Preclinical Imaging and Radiopharmacy, University of Tübingen. Their latest findings are published in the current *Proceedings of the National Academy of Sciences of the United States of America.*

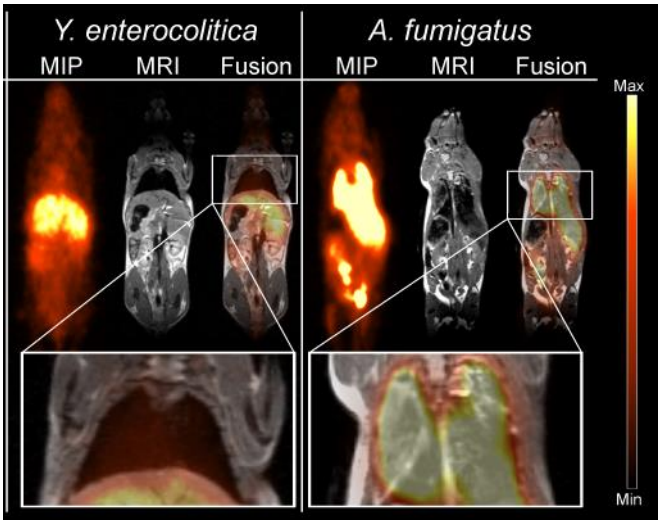
In the new process, radioactively labeled antibodies attach to the infecting structures formed by the growing fungus, making it visible to doctors. The first authors Anna-Maria Rolle (Werner Siemens Imaging Center, Department of Preclinical Imaging and Radiopharmacy, University Tübingen) and Dr. Mike Hasenberg (Institute for Experimental

Immunology and Imaging, University Hospital Essen) used a combination of PET and MRI imaging techniques, allowing them to rule out lung infections caused by other pathogens such as bacteria or viruses.

Until now, doctors seeking to diagnose invasive aspergillosis had to take samples of tissue or fluid from the lungs of immunocompromised patients who displayed abnormal symptoms. “If the process we have developed can be adapted for humans, patients could be spared these unpleasant and sometimes dangerous procedures in the future, and doctors would gain valuable time for successful treatment,” says Dr. Stefan Wiehr (Werner Siemens Imaging Center, Department of Preclinical Imaging and Radiopharmacy, University of Tübingen). “Along with a faster diagnosis, the new method would be far more reliable and specific,” adds Professor Gunzer head of the Institute for Experimental Immunology and Imaging, University Hospital Essen. This work shows the interdisciplinary cooperation of European research teams, which opens up the way for the novel diagnostic marker for application in humans.

The MATHIAS consortium was established to develop novel state-of-the-art techniques with which to diagnose and treat invasive aspergillosis. The European Union is providing €6m in sponsorship for the consortium, which includes researchers from Germany, France, Denmark, Switzerland and the UK.

Publication:
Anna-Maria Rolle, Mike Hasenberg, Christopher R. Thornton, Djamschid Solouk-Saran, Linda Männ, JulianeWeski, Andreas Maurer, Eliane Fischer, Philipp R. Spycher, Roger Schibli, Frederic Boschetti, Sabine Stegemann-Koniszewski, Dunja Bruder, Gregory W. Severin, Stella E. Autenrieth, Sven Krappmann, Genna Davies, Bernd J. Pichler, Matthias Gunzer & Stefan Wiehr: ImmunoPET/MR imaging allows specific detection of *Aspergillus fumigatus* lung infection *in vivo. PNAS,* 10.1073/pnas.1518836113



An *A. fumigatus* fungal infection in a mouse lung is shown by radioactively-labeled light-colored areas in the image on the right. By contrast, the lung on the left is infected with the bacterium Y*ersinia enterocolitica* and therefore does not show any concentration of radioactive marker.
Graphic: Werner Siemens Imaging Center

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