

Cystic Fibrosis Research News

Title:

Multicentre Standardisation of Chest MRI as Radiation-Free Outcome Measure of Lung Disease in Young Children with Cystic Fibrosis

Authors:

Mark O. Wielpütz^{1,2,3}, Oyunbileg von Stackelberg^{1,2,3}, Mirjam Stahl^{2,4,5}, Bertram J. Jobst^{1,2,3}, Monika Eichinger^{1,2,3}, Michael U. Puderbach^{1,2,3}, Lutz Nährlich^{6,7}, Sandra Barth^{6,7}, Christian Schneider⁷, Matthias V. Kopp^{8,9}, Isabell Ricklefs^{8,9}, Michael Buchholz^{9,10}, Burkhard Tümmler^{11,12}, Christian Dopfer^{11,12}, Jens Vogel-Claussen^{12,13}, Hans-Ulrich Kauczor^{1,2,3}, Marcus A. Mall^{2,4,5,14,15}

Affiliations:

¹Department of Diagnostic and Interventional Radiology, University Hospital of Heidelberg, Im Neuenheimer Feld 110, 69120 Heidelberg, Germany

²Translational Lung Research Center (TLRC), German Center for Lung Research (DZL), University of Heidelberg, Im Neuenheimer Feld 156, 69120 Heidelberg, Germany

³Department of Diagnostic and Interventional Radiology with Nuclear Medicine, Thoraxklinik at University of Heidelberg, Röntgenstrasse 1, 69126 Heidelberg, Germany

⁴Division of Pediatric Pulmonology & Allergy and Cystic Fibrosis Center, Department of Pediatrics, University of Heidelberg, Im Neuenheimer Feld 430, 69120 Heidelberg, Germany

⁵Department of Translational Pulmonology, University of Heidelberg, Im Neuenheimer Feld 156, 69120 Heidelberg, Germany

⁶Department of Pediatrics, Justus-Liebig-University Giessen, Feulgenstrasse 1012, 35392 Giessen, Germany

⁷Universities Gießen and Marburg Lung Center (UGMLC), German Center for Lung Research (DZL), University of Gießen, Aulweg 130, 35392 Gießen, Germany

⁸Department of Pediatric Allergology and Pneumology, Medical University of Lübeck, Ratzeburger Allee 160, 23538 Lübeck, Germany

⁹Airway Research Center North (ACRN), German Center for Lung Research (DZL), University of Lübeck, Ratzeburger Allee 160, 23538 Lübeck, Germany

¹⁰Clinic for Radiology and Nuclear Medicine, University Hospital Schleswig-Holstein, Campus Lübeck, Ratzeburger Allee 160, 23538 Lübeck, Germany

¹¹Clinic for Paediatric Pneumology, Allergology and Neonatology, Hannover Medical School, Carl-Neuberg-Strasse 1, 30625 Hannover, Germany

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¹²Biomedical Research in Endstage and Obstructive Lung Disease (BREATH), German Center for Lung Research (DZL), University of Hannover, Carl-Neuberg-Strasse 1, 30625 Hannover, Germany

¹³Diagnostic and Interventional Radiology, Hannover Medical School, Carl-Neuberg-Strasse 1, 30625 Hannover, Germany

¹⁴Department of Pediatric Pulmonology, Immunology and Intensive Care Medicine, Charité-Universitätsmedizin Berlin, Augustenburger Platz 1, 13353 Berlin, Germany

¹⁵Berlin Institute of Health (BIH), Anna-Louisa-Karsch-Str. 2, 10178 Berlin, Germany

What was your research question?

Can different specialised CF centres produce similar image quality on different magnetic resonance imaging (MRI) scanners of young preschool children with cystic fibrosis (CF)?

Why is this important?

New therapies in CF aim to delay lung damage, and therefore need to start early after diagnosis. Lung function testing, an important tool to measure lung disease severity, presents an issue for young patients who do not show lung function decline on these types of tests. Radiation-free MRI is a new technique for imaging of lung disease in patients with CF. In studies performed at our centre, we demonstrated that MRI detects early abnormalities in lung structure and perfusion in young children. With the present study we transferred the MRI protocol to other centres and compared the image quality among these.

What did you do?

We implemented a standardised MRI protocol and harmonised study conditions across three paediatric CF centres of the German Centre for Lung Research. This MRI protocol was used to examine a group of 42 clinically stable young children with CF 0 to 6 years old. Together with the MRI, a chest x-ray was taken for comparison. All MRI images were systematically assessed by an experienced radiologist for image quality and CF disease severity. Scoring systems were used specifically for the grading of the severity of changes of the lungs on MRI and x-ray of CF patients.

What did you find?

MRIs were successfully performed with diagnostic quality in all patients (100%). One MRI examination is made up of several different sequences of the chest. In 6% of such MRI sequences some parts of the lung were not completely depicted. Also in 6% of the sequences other image disturbances (artefacts) were found. Altogether, such minor impairments of



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image quality were compensated for by remaining MRI sequences of the complete examinations in all patients. The range of CF disease severity was similar across the three centres. Disease severity determined by MRI showed some relation (correlation) with severity seen on x-ray.

What does this mean and reasons for caution?

We show that standardisation of chest MRI is feasible and delivers comparable MRI quality at specialised CF centres. This supports the use of MRI as radiation-free method to measure the severity of CF lung disease in young children for routine patient care and especially for participation in drug trials in this age-group. As a drawback, contrast material needs to be applied for this MRI protocol, and young children need sedation in order to cooperate for the MRI scan which takes approx. 25 min.

What's next?

The MRI including the systematic grading of disease severity by the MRI score is being used as a main measure of therapy effects in the PRESIS study (Clinicaltrials.gov identifier NCT01619657), and in further drug trials planned. We hope to reduce the exposure to radiation of patients with CF.

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