This is a repository copy of Magnetic resonance imaging of ventilation and perfusion changes in response to pulmonary endarterectomy in chronic thromboembolic pulmonary hypertension.

White Rose Research Online URL for this paper:
http://eprints.whiterose.ac.uk/119983/

Version: Accepted Version

Article:

https://doi.org/10.1164/rccm.201310-1842IM

Reuse
Unless indicated otherwise, fulltext items are protected by copyright with all rights reserved. The copyright exception in section 29 of the Copyright, Designs and Patents Act 1988 allows the making of a single copy solely for the purpose of non-commercial research or private study within the limits of fair dealing. The publisher or other rights-holder may allow further reproduction and re-use of this version - refer to the White Rose Research Online record for this item. Where records identify the publisher as the copyright holder, users can verify any specific terms of use on the publisher’s website.

Takedown
If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.
MR Imaging of ventilation and perfusion changes in response to pulmonary endarterectomy in chronic thromboembolic pulmonary hypertension

Helen Marshall\textsuperscript{1}, David G. Kiely\textsuperscript{2}, Juan Parra-Robles\textsuperscript{1}, David Capener\textsuperscript{1}, Martin H. Deppe\textsuperscript{1}, Edwin J.R. van Beek\textsuperscript{3}, Andrew J. Swift\textsuperscript{1}, Smitha Rajaram\textsuperscript{1}, Judith Hurdman\textsuperscript{2}, Robin Condliffe\textsuperscript{2}, Charles A. Elliot\textsuperscript{2} and Jim M Wild\textsuperscript{1}

\textsuperscript{1} Academic Radiology, University of Sheffield, Sheffield, UK
\textsuperscript{2} Pulmonary Vascular Disease Unit, Royal Hallamshire Hospital, Sheffield, UK
\textsuperscript{3} CRIC Edinburgh, University of Edinburgh, Edinburgh, UK

Corresponding Author: Jim M Wild
Tel: +44 114 226 8665
Fax: +44 114 271 1714
E-mail: j.m.wild@sheffield.ac.uk

Academic Radiology
C Floor, Royal Hallamshire Hospital
Glossop Road
Sheffield, S10 2JF, UK

Acknowledgements: Bayer for research grant support.

Short running head: MR Imaging of ventilation and perfusion in CTEPH

Descriptor number: 8.16 Imaging: Emerging Technologies

Total word count: 335, abstract word-count: 0
A 41-year-old woman with chronic thromboembolic pulmonary hypertension (CTEPH) underwent pulmonary endarterectomy. Mean pulmonary artery pressure fell from 53 to 28mmHg, and WHO class from III to II.

Hyperpolarized $^3$He magnetic resonance imaging (MRI) and dynamic contrast enhanced (DCE) perfusion MRI were used to quantitatively visualize lung ventilation (A, E) and perfusion (B, F) pre and post endarterectomy. The ventilated and perfused lung volume (C, G) was calculated from ventilation and perfusion images.

At baseline (A-D) large regions of the lung were ventilated but not perfused. After endarterectomy (E-H) lung ventilated volume increased by 0.2 L, perfused lung volume by 0.8 L, and the volume of the lungs both ventilated and perfused by 0.8L.

The method provides a safe and sensitive means of assessment of regional ventilation and perfusion distributions in CTEPH with excellent spatial resolution, and a safe non-invasive means of assessment of regional V/Q in response to intervention.

The institutional review board for human studies approved the protocols and written consent was obtained from the patient. These images have not been previously published.

**Figure Caption**

Coronal MR images before (upper) and after (lower) pulmonary endarterectomy. Ventilation (A, E), blood perfusion (B, F), pulmonary tissue which is both ventilated and perfused (C, G) and histograms of ventilation (blue) and perfusion (red) (D, H).