# Identifying and treating high blood pressure in men under 55 years with grade 1 hypertension: the TREAT CASP study and RCT

Bryan Williams,[1,2]* Ewan McFarlane,[1] Dawid Jedrzejewski[1] and Peter S Lacy[1,2]

[1]University College London Institute of Cardiovascular Science, University College London, London, UK
[2]National Institute for Health Research University College London Hospitals Biomedical Research Centre, London, UK

*Corresponding author bryan.williams@ucl.ac.uk

**Declared competing interests of authors:** Bryan Williams has received honoraria fees from C.H. Boehringer Sohn AG & Ko. KG (Ingelheim am Rhein, Germany), Daiichi Sankyo Company, Ltd (Tokyo, Japan), Pfizer Inc. (New York, NY, USA) and Servier Laboratories (Neuilly-sur-Seine, France). All other authors declare no competing interests in relation to this study. Support was also provided by the North Thames Local Clinical Research Network. Bryan Williams is a National Institute for Health Research Senior Investigator Emeritus and is supported by the National Institute for Health Research Biomedical Research Centre at University College London Hospitals and University College London.

Published December 2019
DOI: 10.3310/eme06130

## Plain English summary

### The TREAT CASP study and RCT

Efficacy and Mechanism Evaluation 2019; Vol. 6: No. 13
DOI: 10.3310/eme06130

NIHR Journals Library www.journalslibrary.nihr.ac.uk

# Plain English summary

High blood pressure (i.e. hypertension) increases the risk of heart disease, stroke and premature death. It is uncertain whether or not younger people with mild hypertension would benefit from drug treatment to lower their blood pressure. An accurate way to check whether or not hypertension might be causing harm is to measure the thickness of the wall of the heart using magnetic resonance imaging. This study developed a way of measuring pressure close to the heart using mathematical computation of the pulse at the wrist, which was called central aortic systolic pressure (or CASP for short). It was speculated that measurement of central aortic systolic pressure would provide an accurate way of identifying patients with high pressure close to the heart, who have early evidence of strain on the heart. The study proposed that in younger people with high central aortic systolic pressure the effects of pressure on the heart could be reversed with treatment to lower their blood pressure.

Younger men (i.e. those aged < 55 years) with mild hypertension and high pressure close to the heart (central aortic systolic pressure) took part in our study. Magnetic resonance imaging of their hearts showed that men with a high central aortic systolic pressure level had thicker heart muscle than those with lower central aortic systolic pressure. This thickening is evidence that the higher pressure is causing strain and early damage to the heart. To see if this could be reversed, half of the patients were randomly selected to take a tablet to lower their blood pressure and the other half of the patients took no treatment. After 12 months' follow-up, thickening of the heart was significantly reduced in men who were treated compared with men who were not.

Central aortic systolic pressure did not prove to be superior to usual blood pressure measurements in predicting the thickness of the heart. This study provides evidence that in previously untreated younger people with mild hypertension, the pressure on the heart causes damage that is reversible with blood pressure-lowering treatment.

# Efficacy and Mechanism Evaluation

ISSN 2050-4365 (Print)

ISSN 2050-4373 (Online)

This journal is a member of and subscribes to the principles of the Committee on Publication Ethics (COPE) (www.publicationethics.org/).

Editorial contact: journals.library@nihr.ac.uk

The full EME archive is freely available to view online at www.journalslibrary.nihr.ac.uk/eme. Print-on-demand copies can be purchased from the report pages of the NIHR Journals Library website: www.journalslibrary.nihr.ac.uk

**Criteria for inclusion in the *Efficacy and Mechanism Evaluation* journal**
Reports are published in *Efficacy and Mechanism Evaluation* (EME) if (1) they have resulted from work for the EME programme, and (2) they are of a sufficiently high scientific quality as assessed by the reviewers and editors.

## EME programme

The Efficacy and Mechanism Evaluation (EME) programme funds ambitious studies evaluating interventions that have the potential to make a step-change in the promotion of health, treatment of disease and improvement of rehabilitation or long-term care. Within these studies, EME supports research to improve the understanding of the mechanisms of both diseases and treatments.

The programme support translational research into a wide range of new or repurposed interventions. These may include diagnostic or prognostic tests and decision-making tools, therapeutics or psychological treatments, medical devices, and public health initiatives delivered in the NHS.

The EME programme supports clinical trials and studies with other robust designs, which test the efficacy of interventions, and which may use clinical or well-validated surrogate outcomes. It only supports studies in man and where there is adequate proof of concept. The programme encourages hypothesis-driven mechanistic studies, integrated within the efficacy study, that explore the mechanisms of action of the intervention or the disease, the cause of differing responses, or improve the understanding of adverse effects. It funds similar mechanistic studies linked to studies funded by any NIHR programme.

The EME programme is funded by the Medical Research Council (MRC) and the National Institute for Health Research (NIHR), with contributions from the Chief Scientist Office (CSO) in Scotland and National Institute for Social Care and Health Research (NISCHR) in Wales and the Health and Social Care Research and Development (HSC R&D), Public Health Agency in Northern Ireland.

## This report

The research reported in this issue of the journal was funded by the EME programme as project number 10/90/22. The contractual start date was in June 2013. The final report began editorial review in October 2018 and was accepted for publication in May 2019. The authors have been wholly responsible for all data collection, analysis and interpretation, and for writing up their work. The EME editors and production house have tried to ensure the accuracy of the authors' report and would like to thank the reviewers for their constructive comments on the final report document. However, they do not accept liability for damages or losses arising from material published in this report.

This report presents independent research. The views and opinions expressed by authors in this publication are those of the authors and do not necessarily reflect those of the NHS, the NIHR, the MRC, NETSCC, the EME programme or the Department of Health and Social Care. If there are verbatim quotations included in this publication the views and opinions expressed by the interviewees are those of the interviewees and do not necessarily reflect those of the authors, those of the NHS, the NIHR, NETSCC, the EME programme or the Department of Health and Social Care.

**© Queen's Printer and Controller of HMSO 2019. This work was produced by Williams *et al.* under the terms of a commissioning contract issued by the Secretary of State for Health and Social Care. This issue may be freely reproduced for the purposes of private research and study and extracts (or indeed, the full report) may be included in professional journals provided that suitable acknowledgement is made and the reproduction is not associated with any form of advertising. Applications for commercial reproduction should be addressed to: NIHR Journals Library, National Institute for Health Research, Evaluation, Trials and Studies Coordinating Centre, Alpha House, University of Southampton Science Park, Southampton SO16 7NS, UK.**

Published by the NIHR Journals Library (www.journalslibrary.nihr.ac.uk), produced by Prepress Projects Ltd, Perth, Scotland (www.prepress-projects.co.uk).

## NIHR Journals Library Editor-in-Chief

**Professor Ken Stein** Professor of Public Health, University of Exeter Medical School, UK

## NIHR Journals Library Editors

**Professor John Powell** Chair of HTA and EME Editorial Board and Editor-in-Chief of HTA and EME journals. Consultant Clinical Adviser, National Institute for Health and Care Excellence (NICE), UK, and Senior Clinical Researcher, Nuffield Department of Primary Care Health Sciences, University of Oxford, UK

**Professor Andrée Le May** Chair of NIHR Journals Library Editorial Group (HS&DR, PGfAR, PHR journals) and Editor-in-Chief of HS&DR, PGfAR, PHR journals

**Professor Matthias Beck** Professor of Management, Cork University Business School, Department of Management and Marketing, University College Cork, Ireland

**Dr Tessa Crilly** Director, Crystal Blue Consulting Ltd, UK

**Dr Eugenia Cronin** Senior Scientific Advisor, Wessex Institute, UK

**Dr Peter Davidson** Consultant Advisor, Wessex Institute, University of Southampton, UK

**Ms Tara Lamont** Director, NIHR Dissemination Centre, UK

**Dr Catriona McDaid** Senior Research Fellow, York Trials Unit, Department of Health Sciences, University of York, UK

**Professor William McGuire** Professor of Child Health, Hull York Medical School, University of York, UK

**Professor Geoffrey Meads** Professor of Wellbeing Research, University of Winchester, UK

**Professor John Norrie** Chair in Medical Statistics, University of Edinburgh, UK

**Professor James Raftery** Professor of Health Technology Assessment, Wessex Institute, Faculty of Medicine, University of Southampton, UK

**Dr Rob Riemsma** Reviews Manager, Kleijnen Systematic Reviews Ltd, UK

**Professor Helen Roberts** Professor of Child Health Research, UCL Great Ormond Street Institute of Child Health, UK

**Professor Jonathan Ross** Professor of Sexual Health and HIV, University Hospital Birmingham, UK

**Professor Helen Snooks** Professor of Health Services Research, Institute of Life Science, College of Medicine, Swansea University, UK

**Professor Ken Stein** Professor of Public Health, University of Exeter Medical School, UK

**Professor Jim Thornton** Professor of Obstetrics and Gynaecology, Faculty of Medicine and Health Sciences, University of Nottingham, UK

**Professor Martin Underwood** Warwick Clinical Trials Unit, Warwick Medical School, University of Warwick, UK

Please visit the website for a list of editors: www.journalslibrary.nihr.ac.uk/about/editors

**Editorial contact:** journals.library@nihr.ac.uk