

Long limb compared with standard limb Roux-en-Y gastric bypass for type 2 diabetes and obesity: the LONG LIMB RCT

Alexander Dimitri Miras,^{1†} Anna Kamocka,^{1†}
Tricia Tan,^{1†} Belén Pérez-Pevida,¹ Harvinder Chahal,¹
Krishna Moorthy,² Sanjay Purkayastha,² Ameet Patel,³
Anne Margot Umpleby,⁴ Gary Frost,¹
Stephen Robert Bloom,^{1*†} Ahmed Rashid Ahmed^{1†}
and Francesco Rubino^{3†}

¹Division of Diabetes, Endocrinology and Metabolism, Imperial College London, London, UK

²Department of Surgery, Imperial College London, London, UK

³Department of Surgery, King's College London, London, UK

⁴Department of Diabetes and Metabolic Medicine, University of Surrey, Guildford, UK

*Corresponding author s.bloom@imperial.ac.uk

†Equally contributing authors

Declared competing interests of authors: Anna Kamocka is funded by a research fellowship from the Royal College of Surgeons.

Published February 2021

DOI: 10.3310/eme08030

Plain English summary

The LONG LIMB RCT

Efficacy and Mechanism Evaluation 2021; Vol. 8: No. 3

DOI: 10.3310/eme08030

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

Plain English summary

Metabolic surgery produces major and sustained weight loss and is being increasingly used to treat patients with obesity and diabetes mellitus. There was initial optimism that these procedures might 'cure all diabetes mellitus'. However, the gold standard operation, standard gastric bypass, effectively results in diabetes mellitus remission in only 4 out of 10 patients.

To design a more successful procedure, an understanding of how metabolic surgery works to improve diabetes mellitus is required. Hormones from the gut are released when food is eaten. It has been discovered that the beneficial effects of surgery on glucose control are mainly due to increased release of these gut hormones. These gut hormones improve blood sugar levels by increasing the release of insulin, and also reduce appetite, leading to weight loss.

In this trial a procedure called long limb gastric bypass was tested. It was designed to be better at improving diabetes mellitus than the 'standard limb' gastric bypass, while being as safe. It was expected that this new procedure would work better than the standard limb gastric bypass by causing an even bigger increase in the release of gut hormones and, thus, of insulin.

Forty-eight people with diabetes mellitus completed the trial. It was found that the standard and long limb operations were equally effective in reducing blood sugar and reducing weight by causing the release of gut hormones. The study did not show that there was a significant difference between the standard and long limb operations.

This trial has taken the first critical step in studying the role of the gut in glucose control after gastric bypass surgery. This trial shows that a long limb gastric bypass does not result in better glucose control and more weight loss than the standard limb operation. Other changes to the surgical procedure to construct a better gastric bypass that is more effective for patients with diabetes mellitus can now be investigated.

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 supports 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 13/121/07. The contractual start date was in February 2015. The final report began editorial review in May 2019 and was accepted for publication in December 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 2021. This work was produced by Miras *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 Professor of Digital Health Care, 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 Senior Scientific Adviser (Evidence Use), Wessex Institute, University of Southampton, 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 Emeritus Professor of Wellbeing Research, University of Winchester, 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

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

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