

An international randomised controlled trial to compare TARGeted Intraoperative radioTherapy (TARGIT) with conventional postoperative radiotherapy after breast-conserving surgery for women with early-stage breast cancer (the TARGIT-A trial)

Jayant S Vaidya,^{1,2*} Frederik Wenz,³ Max Bulsara,⁴
Jeffrey S Tobias,⁵ David J Joseph,⁶
Christobel Saunders,⁷ Chris Brew-Graves,¹
Ingrid Potyka,¹ Stephen Morris,⁸
Hrisheekesh J Vaidya,⁹ Norman R Williams¹
and Michael Baum¹

¹Division of Surgery and Interventional Science, University College London, London, UK

²Department of Surgery, Whittington Hospital, Royal Free Hospital and University College London Hospital, London, UK

³Department of Radiation Oncology, University Medical Centre Mannheim, University of Heidelberg, Heidelberg, Germany

⁴Department of Biostatistics, University of Notre Dame, Fremantle, WA, Australia

⁵Department of Clinical Oncology, University College London Hospitals, London, UK

⁶Department of Radiation Oncology, Sir Charles Gairdner Hospital, Perth, WA, Australia

⁷Department of Surgery, University of Western Australia, Perth, WA, Australia

⁸Health Economics Group, Department of Biomedical Engineering, University College London, London, UK

⁹Keble College, Oxford University, Oxford, UK

*Corresponding author

Declared competing interests of authors: Jayant S Vaidya has received a research grant from Photoelectron Corp. (1996–9) and from Carl Zeiss for supporting data management at the University of Dundee (Dundee, UK) and has subsequently received honoraria. Jayant S Vaidya also has a patent for the use of the word TARGIT for TARGeted Intraoperative radioTherapy. Frederik Wenz has received a research grant from Carl Zeiss for supporting radiobiological research. Frederik Wenz also has patents for US 8,724,775B2, US 2013/058460 A, PCT/EP2011/057518, DE/18.12.09/DEA10200905877 and DE/17.12.09/DEA10200905058581, all issues to Wenz/Zeiss. Chris Brew-Graves, Ingrid Potyka and Norman R Williams report that the Clinical Trials Group was paid an unrestricted grant from 1 November 2001 to 31 October 2010. Michael Baum was on the scientific advisory board of Carl Zeiss and was paid monthly consultancy fees until 2010. In addition, Jayant S Vaidya, Frederik Wenz, Max Bulsara, Jeffrey S Tobias, David J Joseph, Christobel Saunders and Michael Baum report that Carl Zeiss sponsors most of the travel and accommodation for meetings of the International Steering Committee and Data Monitoring Committee and, when necessary, for conferences where a presentation about targeted intraoperative radiotherapy is being made for all authors.

Published September 2016

DOI: 10.3310/hta20730

Plain English summary

The TARGIT-A trial

Health Technology Assessment 2016; Vol. 20: No. 73

DOI: 10.3310/hta20730

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

Plain English summary

About 70% of patients with breast cancer are eligible for breast-conserving surgery (a lumpectomy), after which the remaining breast is treated with radiotherapy; this avoids a full mastectomy.

Traditionally, external beam radiotherapy (EBRT) is delivered to the entire breast in small doses every day for 3–6 weeks, necessitating patients to travel to and from the radiotherapy centre every working day. This can be impractical and strenuous.

The TARGIT (TARGeted Intraoperative radioTherapy) procedure precisely delivers radiation in a single dose during the lumpectomy operation over 15–35 minutes, using a ball-shaped device that is placed in the space where the tumour was. This way, unnecessary potentially harmful radiation to healthy tissues (skin, heart, lungs, etc.) is avoided and the areas nearest to the tumour site receive the most radiation. In this way, four-fifths of patients avoid EBRT altogether.

The TARGIT-A (TARGeted Intraoperative radioTherapy Alone) trial compared TARGIT with EBRT in 3451 patients who were aged ≥ 45 years and found that, when TARGIT is given with lumpectomy, the control of breast cancer is much the same as with EBRT. The chances of being alive without return of cancer in the breast at 5 years were 93.9% with TARGIT during lumpectomy and 92.5% with EBRT. Compared with EBRT, TARGIT had fewer side effects and fewer deaths from heart attacks or other cancers. TARGIT would be less expensive than EBRT, potentially saving the NHS up to £9.1 million a year, without considering the cost savings to patients.

Targeted intraoperative radiotherapy during lumpectomy is an effective, safer and less expensive option for eligible patients.

ISSN 1366-5278 (Print)

ISSN 2046-4924 (Online)

Impact factor: 4.058

Health Technology Assessment is indexed in MEDLINE, CINAHL, EMBASE, The Cochrane Library and the ISI Science Citation Index.

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

Editorial contact: nhredit@southampton.ac.uk

The full HTA archive is freely available to view online at www.journalslibrary.nihr.ac.uk/hta. 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 *Health Technology Assessment* journal

Reports are published in *Health Technology Assessment* (HTA) if (1) they have resulted from work for the HTA programme, and (2) they are of a sufficiently high scientific quality as assessed by the reviewers and editors.

Reviews in *Health Technology Assessment* are termed 'systematic' when the account of the search appraisal and synthesis methods (to minimise biases and random errors) would, in theory, permit the replication of the review by others.

HTA programme

The HTA programme, part of the National Institute for Health Research (NIHR), was set up in 1993. It produces high-quality research information on the effectiveness, costs and broader impact of health technologies for those who use, manage and provide care in the NHS. 'Health technologies' are broadly defined as all interventions used to promote health, prevent and treat disease, and improve rehabilitation and long-term care.

The journal is indexed in NHS Evidence via its abstracts included in MEDLINE and its Technology Assessment Reports inform National Institute for Health and Care Excellence (NICE) guidance. HTA research is also an important source of evidence for National Screening Committee (NSC) policy decisions.

For more information about the HTA programme please visit the website: <http://www.nets.nihr.ac.uk/programmes/hta>

This report

The research reported in this issue of the journal was funded by the HTA programme as project number 07/60/49. The contractual start date was in September 2009. The draft report began editorial review in October 2014 and was accepted for publication in June 2016. The authors have been wholly responsible for all data collection, analysis and interpretation, and for writing up their work. The HTA editors and publisher have tried to ensure the accuracy of the authors' report and would like to thank the reviewers for their constructive comments on the draft document. However, they do not accept liability for damages or losses arising from material published in this report.

This report presents independent research funded by the National Institute for Health Research (NIHR). 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, NETSCC, the HTA programme or the Department of Health. 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 HTA programme or the Department of Health.

© Queen's Printer and Controller of HMSO 2016. This work was produced by Vaidya *et al.* under the terms of a commissioning contract issued by the Secretary of State for Health. 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).

Health Technology Assessment Editor-in-Chief

Professor Hywel Williams Director, HTA Programme, UK and Foundation Professor and Co-Director of the Centre of Evidence-Based Dermatology, University of Nottingham, UK

NIHR Journals Library Editor-in-Chief

Professor Tom Walley Director, NIHR Evaluation, Trials and Studies and Director of the EME Programme, UK

NIHR Journals Library Editors

Professor Ken Stein Chair of HTA Editorial Board and Professor of Public Health, University of Exeter Medical School, UK

Professor Andree Le May Chair of NIHR Journals Library Editorial Group (EME, HS&DR, PGfAR, PHR journals)

Dr Martin Ashton-Key Consultant in Public Health Medicine/Consultant Advisor, NETSCC, UK

Professor Matthias Beck Chair in Public Sector Management and Subject Leader (Management Group), Queen's University Management School, Queen's University Belfast, UK

Professor Aileen Clarke Professor of Public Health and Health Services Research, Warwick Medical School, University of Warwick, UK

Dr Tessa Crilly Director, Crystal Blue Consulting Ltd, UK

Dr Eugenia Cronin Senior Scientific Advisor, Wessex Institute, UK

Ms Tara Lamont Scientific Advisor, NETSCC, UK

Professor Elaine McColl Director, Newcastle Clinical Trials Unit, Institute of Health and Society, Newcastle University, UK

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

Professor Geoffrey Meads Professor of Health Sciences Research, Health and Wellbeing Research and Development Group, University of Winchester, UK

Professor John Norrie Health Services Research Unit, University of Aberdeen, UK

Professor John Powell Consultant Clinical Adviser, National Institute for Health and Care Excellence (NICE), 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 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 Jim Thornton Professor of Obstetrics and Gynaecology, Faculty of Medicine and Health Sciences, University of Nottingham, UK

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

Please visit the website for a list of members of the NIHR Journals Library Board:
www.journalslibrary.nihr.ac.uk/about/editors

Editorial contact: nihredit@southampton.ac.uk