

Depression circuits vary by disorder and baseline severity across brain stimulation and lesion cohorts

Roi Sar-el^{1,3}, Garance M. Meyer^{1,3}, Nanditha Rajamani^{1,3}, Calvin Howard^{1,3}, Lauren Hart^{1,3}, Joseph Turner^{1,3}, Philip Mosley^{6,7,8,9}, Alistair Perry^{10,11}, Jan Niklas Petry-Schmelzer¹², Haidar S. Dafsari¹², Michael Barbe¹², Veerle Visser-Vandewalle¹³, Andrea A. Kühn^{2,4}, Jonathon E. Giftakis⁴⁸, Robert S. Fisher⁴⁷, Frederic L. W. V. J. Schaper^{1,14}, Mae Morton-Dutton^{1,3}, Rob P. W. Rouhl^{14,15,16}, Yasin Temel¹⁶, Paul E. Holtzheimer⁴⁵, Darin D. Dougherty^{17,18}, Tina H. Chou¹⁷, Benjamin M. Borron¹⁷, R. Mark Richardson¹⁹, G. Rees Cosgrove²⁰, Clemens Neudorfer^{1,19}, Julianna Pijar^{1,19}, Juan Carlos Baldermann^{12,21}, Jens Kuhn²¹, Stephan Chabardes^{22,23}, Mircea Polosan^{22,24}, Harith Akram^{25,26}, Himanshu Tyagi^{25,27}, Ludvic Zrinzo^{25,26}, Eileen M. Joyce^{25,27}, Cristina Nombela²⁸, Juan Pablo Castaño Montoya²⁹, Bryan Strange³⁰, Juan A. Barcia²⁹, Jürgen Germann^{31,32}, Alexandre Boutet^{31,32,33}, Andres M. Lozano^{31,32}, Martijn Figee^{34,35,36,37}, Andrew H. Smith³⁴, Ki Sueng Choi^{34,38,39}, Brian H. Kopell^{34,35,36,37,40}, Nicola Acevedo^{41,42}, Susan L. Rossell^{41,42}, Peter Bosanac^{42,43}, David J. Castle^{44,45}, Patricio Riva-Posse⁴⁷, Helen S. Mayberg^{34,35,36,37}, Shan H. Siddiqi^{1,18}, Andreas Horn^{1,49,50}, and Michael D. Fox^{1,3}

Affiliations:

¹ Center for Brain Circuit Therapeutics, Department of Neurology, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, USA

² Movement Disorders and Neuromodulation Unit, Department of Neurology, Charité – Universitätsmedizin Berlin, Berlin, Germany

³ Department of Neurology, Harvard Medical School, Boston, MA, USA

⁴ Berlin School of Mind and Brain, Humboldt-Universität zu Berlin, Berlin, Germany

⁵ Department of Biological Psychology and Cognitive Neuroscience, Freie Universität Berlin, Berlin, Germany

⁶ Systems Neuroscience Group, QIMR Berghofer Medical Research Institute, Herston, Australia

⁷ Queensland Brain Institute, University of Queensland, St. Lucia, Australia

⁸ Neurosciences Queensland, St. Andrew's War Memorial Hospital, Spring Hill, Queensland, Australia

⁹ Australian e-Health Research Centre, Commonwealth Scientific and Industrial Research Organisation Health and Biosecurity, Herston, Queensland, Australia

¹⁰ Max Planck UCL Centre for Computational Psychiatry and Ageing Research, Max Planck Institute for Human Development, Berlin, Germany

¹¹ Center for Lifespan Psychology, Max Planck Institute for Human Development, Berlin, Germany

¹² Department of Neurology, Faculty of Medicine and University Hospital Cologne, University of Cologne, Cologne, Germany

¹³ Department of Stereotactic and Functional Neurosurgery, Faculty of Medicine and University Hospital Cologne, University of Cologne, Cologne, Germany

¹⁴ Department of Neurology, Maastricht University Medical Center, Maastricht, the Netherlands

¹⁵ School for Mental Health and Neuroscience, Maastricht University, Maastricht, the Netherlands

¹⁶ Academic Center for Epileptology Kempenhaeghe/Maastricht University Medical Center, Maastricht, the Netherlands

¹⁷ Department of Psychiatry, Massachusetts General Hospital, Harvard Medical School, Boston, MA, USA

¹⁸ Department of Psychiatry, Harvard Medical School, Boston, MA, USA

¹⁹ Department of Neurosurgery, Massachusetts General Hospital, Harvard Medical School, Boston, MA, USA

²⁰ Department of Neurosurgery, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, USA

²¹ Department of Psychiatry and Psychotherapy, Faculty of Medicine and University Hospital Cologne, University of Cologne, Cologne, Germany

²² Université Grenoble Alpes, Grenoble, France

²³ Department of Neurosurgery, Centre Hospitalier Universitaire Grenoble Alpes, Grenoble, France

²⁴ Department of Psychiatry, Centre Hospitalier Universitaire Grenoble Alpes, Grenoble, France

²⁵ Unit of Functional Neurosurgery, UCL Queen Square Institute of Neurology, London, UK

²⁶ Victor Horsley Department of Neurosurgery, The National Hospital for Neurology and Neurosurgery, London, UK

²⁷ Department of Neuropsychiatry, The National Hospital for Neurology and Neurosurgery, London, UK

²⁸ Biological and Health Psychology, School of Psychology, Universidad Autónoma de Madrid, Madrid, Spain

²⁹ Department of Neurosurgery, Hospital Clínico San Carlos, Universidad Complutense de Madrid, Madrid, Spain

³⁰ Laboratory for Clinical Neuroscience, Centre for Biomedical Technology, Universidad Politécnica de Madrid, Madrid, Spain

³¹ Division of Neurosurgery, Department of Surgery, University Health Network and University of Toronto, Toronto, ON, Canada

³² Krembil Research Institute, University of Toronto, Toronto, ON, Canada

³³ Joint Department of Medical Imaging, University of Toronto, Toronto, ON, Canada

³⁴ Nash Family Center for Advanced Circuit Therapeutics, Icahn School of Medicine at Mount Sinai, New York, NY, USA

³⁵ Department of Neurosurgery, Icahn School of Medicine at Mount Sinai, New York, NY, USA

³⁶ Department of Neuroscience, Icahn School of Medicine at Mount Sinai, New York, NY, USA

³⁷ Department of Psychiatry, Icahn School of Medicine at Mount Sinai, New York, NY, USA

³⁸ Department of Radiology, Icahn School of Medicine at Mount Sinai, New York, NY, USA

³⁹ Biomedical Engineering and Imaging Institute, Icahn School of Medicine at Mount Sinai, New York, NY, USA

⁴⁰ Department of Neurology, Icahn School of Medicine at Mount Sinai, New York, NY, USA

⁴¹ Centre for Mental Health, Swinburne University, Melbourne, Victoria, Australia

⁴² St. Vincent's Hospital, Melbourne, Victoria, Australia

⁴³ Department of Psychiatry, University of Melbourne, Melbourne, Victoria, Australia

⁴⁴ University of Tasmania and Centre for Mental Health Service Innovation, Tasmania, Australia

⁴⁵ State-wide Mental Health Service, Tasmania, Australia

⁴⁶ Department of Psychiatry and Behavioral Sciences, Emory University School of Medicine, Atlanta, GA, USA

⁴⁷ Department of Neurology and Neurological Sciences (and by courtesy, Neurosurgery), Stanford University School of Medicine, Stanford, CA, USA

⁴⁸ Medtronic, Minneapolis, Minnesota, USA

⁴⁹ Stanford University School of Medicine, Stanford, CA, USA

⁵⁰ Medtronic, Minneapolis, Minnesota, USA