PA../18
January 22 2018

Could targeted magnetic pulse treatment offer new hope in treating depression?

Researchers are to investigate whether an innovative new treatment that targets areas of the brain with magnetic pulses could offer hope to the millions of people around the world who suffer from depression.

The study, led by the University of Nottingham and funded with more than £1.8 million from an MRC and NIHR partnership, with support from the recently established Nottingham Biomedical Research Centre, will examine the use of theta-burst stimulation (TBS) to find out whether it could help those people with depression for whom other treatments have proved ineffective.

The World Health Organization (WHO) estimates that 350 million people suffer from depression worldwide. It is the second leading cause of disability, and suicide from depression is the biggest killer in people aged 15 to 49 years old.

Antidepressants and talking therapies help two-thirds of people with depression, but the remaining third have 'treatment resistant depression'. Until recently, some of these patients were offered electroconvulsive therapy (ECT), a treatment in which an electric current is sent through the brain while under a general anaesthetic to trigger an epileptic seizure to relieve the symptoms of some mental health problems. However, associated potential side effects such as memory loss deter many patients from having the treatment.

An alternative treatment called transcranial magnetic stimulation (TMS) has recently emerged which uses pulses of magnetic energy, to stimulate or dampen down areas of the brain known to contribute to psychiatric conditions, without the need for anaesthetic. TMS has been approved by NICE since 2015 as an effective and safe treatment in the UK for depression in the short term.

However, the latest study led by Professor Richard Morriss at the Institute of Mental Health, based at the University of Nottingham, is comparing this standard TMS treatment with the new theta-burst stimulation – which offers a more precise variation of TMS and potentially longer lasting improvements.

Patients with depression experience changes in some parts of the brain, particularly in the frontal area. TBS uses the latest MRI technology to scan the patient's brain and identify those areas most affected by these changes. Magnetic pulses are delivered directly to those areas, resulting in a more targeted and effective treatment with fewer unwanted side effects.

Professor Morriss said: "Treatment resistant depression is a devastating condition associated with premature death from suicide or poor physical health and an impaired ability to work. We have had a limited degree of success with talking therapies and antidepressant drugs. Now we have a safe third

option using stimulation by magnets. We have changed the way the magnets deliver their energy from constant stimulation to short burst of stimulation, and using brain imaging we have targeted the stimulus more accurately in each person. By doing this we hope this safe treatment can help more people to stay well for many months at a time from rather than a few weeks at a time."

A previous pilot study led by the Nottingham team suggested that TBS could both increase the proportion who responded to the treatment and the length of time it worked from four weeks to at least 3 months.

The latest study, which is aiming to strengthen the evidence for the treatment's effectiveness, is currently recruiting treatment-resistant patients with depression via referral by their GP or psychiatrist. Those taking part in the study will undergo a thorough clinical assessment by a researcher before undertaking some tasks designed to rate their symptoms, day to day function and memory.

Following this, they will be given a brain scan lasting around 45 minutes which researchers will use to identify the targets before starting treatment a week later.

More than 360 patients will receive five treatments a week for four weeks, half receiving TBS and half receiving the standard TMS treatment. After the treatment course is complete, they will be reassessed against information gathered at the first assessment and will have another MRI scan at 16 weeks to observe any changes.

Further follow up assessments of symptoms and cost of treatment at eight, 16 and 26 weeks will be compared to the first assessment and patients will also be asked for their views on the treatment and any side effects.

The study will be based at four centres in Nottingham, Northampton, Newcastle and London, each with an advisory group of patients who have had TMS, TBS treatment or depression. The research team will have regular meetings with this group throughout the study.

The study will benefit from an additional £196,000 from the Welsh company Magstim, which manufactures the TMS machines, and will provide valuable expertise in training staff in the delivery of the treatment.

Beacons of Excellence

This research is an example of the expertise the University has in Precision Imaging – one of six beacons of excellence chosen recently by the University to benefit from a £200 million investment in the future of its research.

This research is an example of the expertise the University has in Precision Imaging. To find out more about our research excellence in this field click here for the Beacon of Excellence web page.

To discover more visit www.nottingham.ac.uk/world

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More information is available from **Professor Richard Morriss** in the Institute of Mental Health, University of Nottingham on +44 (0)115 823 0427, richard.morriss@nottingham.ac.uk; or Emma Thorne, Media Relations Manager for the Faculty of Medicine and Health Sciences in the Communications Office at The University of Nottingham, on +44 (0)115 951 5793, emma.thorne@nottingham.ac.uk

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The study was funded by an MRC and NIHR partnership created to support the evaluation of interventions with potential to make a step-change in the promotion of health, treatment of disease and improvement of rehabilitation or long-term care.

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The NIHR Nottingham Biomedical research centre (BRC) was established in April 2017 to improve the health of millions of people by translating world-leading research intro breakthrough treatments, innovative technologies and new medicines. It is carrying out research in six areas of health:

- Hearing
- Gastrointestinal and liver diseases
- Musculoskeletal disease
- Mental health and technology
- Respiratory and
- Magnetic resonance Imaging (which supports all areas of research)

The Nottingham BRC is a partnership between Nottingham University Hospitals NHS Trust and the University of Nottingham, supported by Nottinghamshire Healthcare Foundation Trust. It is funded by the National Institute of Health Research (NIHR) – the research arm of the NHS. It is one of 20 centres set up around the country to translate research into life-saving treatments for the future.

The Institute of Mental Health was launched in 2006 in Nottingham to help transform understanding and treatment of mental illness and can now be considered as one of the leading mental health

institutes in the UK, offering world class expertise and insight. Further information on www.institutemh.org.uk

The Institute is a partnership between Nottinghamshire Healthcare NHS Foundation Trust (www.nottinghamshirehealthcare.nhs.uk) and The University of Nottingham (www.nottingham.ac.uk).