

VIEWS & REVIEWS

PERSONAL VIEW

Hyping deep brain stimulation in psychiatry could lead to its demise

Marwan I Hariz *professor of functional neurosurgery, UCL Institute of Neurology, Queen Square, London, UK*, Gun-Marie Hariz *associate professor of occupational therapy, Department of Community Medicine and Rehabilitation, Umeå University, Umeå, Sweden*

Deep brain stimulation (DBS) is 25 years old. The technique as we know it today was introduced to treat parkinsonian and essential tremor in 1987¹ (notwithstanding that a team from Southampton had already reported deep brain stimulation in the treatment of the tremor of multiple sclerosis in 1980).² The introduction of stimulation of the subthalamic nucleus in the treatment of advanced Parkinson's disease in 1995,³ and of the pallidum for dystonia in 1999,⁴ heralded an era of intense clinical and research activity leading to the establishment of the technique in the current surgical treatment of these movement disorders.

The first reports of use of the technique in neuropsychiatry also appeared in 1999: a report on stimulation of the thalamus for Gilles de la Tourette syndrome was published in February,⁵ and in the anterior internal capsule for obsessive compulsive disorder (OCD) in October.⁶ Since then the technique has been tried in at least nine different brain targets for various psychiatric conditions, including depression and OCD,⁷ leading to the recent decision by the US Food and Drug Administration to approve its use for OCD. Pioneers of deep brain stimulation for OCD have criticised the appropriateness of this decision as premature.⁸

The introduction of the technique in psychiatry has generated much debate, and in the past decade far fewer patients have been treated than articles published, and these have mostly been reviews and comment. The slowness in implementing deep brain stimulation in psychiatric illness may be a result of the legacy of old fashioned psychiatric surgery; the complexity and heterogeneity of symptoms in psychiatric illness; the multitude of brain circuitries involved in these pathologies; the tricky ethical questions related to potential manipulation of the mind; the difficulty in conducting large surgical trials in these conditions; and the inconsistent results obtained so far.

However, the lay media have been almost unanimously positive, uncritically presenting deep brain stimulation as a high tech innovation with a promising future, echoing the reports of the lay press during the heyday of lobotomy, before the turn of the tide and demise of that procedure.

After a quarter of a century of modern deep brain stimulation, riding the wave of positivity, some professionals and researchers are suggesting potential use of the technique in problems beyond disease—to enhance normal cognition and even to treat antisocial behaviour, for example. Most North American functional neurosurgeons surveyed in 2011 saw no problem in using the technique to enhance memory, provided it is efficient and safe.⁹ Others have recently stated that “subcortical structures intervene in morality” and that “deep brain stimulation might be used in . . . pathological antisocial behaviour or violence.”¹⁰

It would be a pity if short sightedness and a neglect of history led to modern deep brain stimulation meeting the same fate as the old era deep brain stimulation of the 1960s and 1970s,¹¹ when that technique was used for dubious indications,^{12 13} subsequently criticised,¹⁴ and then condemned as “unethical by yesterday's standards,”¹⁵ leading to its demise.

Deep brain stimulation is a valuable tool to treat refractory movement disorders and some other neurological conditions like chronic pain or resistant epilepsy. However, in several of these neurological conditions, such as cluster headache and epilepsy, it is not fully approved, and sometimes not even covered by insurance companies—let alone in psychiatric illness. The suggestions that the technique be used for cognitive enhancement in non-pathological conditions, and even for alleged antisocial behaviour, are reminiscent of a dark era, and constitute a bad omen for the future of this technique.

We would do well to recall what Malcolm Carpenter, renowned neuroanatomist, wrote in 1987: “I feel that stereotaxic surgery has much to offer, if properly controlled and used judiciously. Some of the wild things that are done without a scientific rational [sic] jeopardize the entire effort.”¹⁶

Competing interests: MIH has received honorariums and travel expenses from Medtronic and St Jude for speaking at meetings. MIH is supported by the Edmond J Safra Foundation, the Monument Trust, and the UK Parkinsons Appeal. G-MH is supported by the Swedish Research Council, and the Swedish Association of Persons with Neurological Disabilities (NHR).

Provenance and peer review: Not commissioned; not externally peer reviewed.

- 1 Benabid AL, Pollak P, Louveau A, Henry S, de Rougemont J. Combined (thalamotomy and stimulation) stereotactic surgery of the VIM thalamic nucleus for bilateral Parkinson disease. *Appl Neurophysiol* 1987;50:344-6.
- 2 Brice J, McLellan L. Suppression of intention tremor by contingent deep-brain stimulation. *Lancet* 1980;1:1221-2.
- 3 Limousin P, Pollak P, Benazzouz A, Hoffmann D, Le Bas JF, Broussolle E, et al. Effect of parkinsonian signs and symptoms of bilateral subthalamic nucleus stimulation. *Lancet* 1995;345:91-5.
- 4 Krauss JK, Pohle T, Weber S, Ozdoba C, Burgunder JM. Bilateral stimulation of globus pallidus internus for treatment of cervical dystonia. *Lancet* 1999;354:837-8.
- 5 Vandewalle V, van der Linden C, Groenewegen HJ, Caemaert J. Stereotactic treatment of Gilles de la Tourette syndrome by high frequency stimulation of thalamus. *Lancet* 1999;353:724.
- 6 Nuttin B, Cosyns P, Demeulemeester H, Gybels J, Meyerson B. Electrical stimulation in anterior limbs of internal capsules in patients with obsessive compulsive disorder. *Lancet* 1999;354:1526.
- 7 Krack P, Hariz MI, Baunez C, Guridi J, Obeso JA. Deep brain stimulation: from neurology to psychiatry? *Trends Neurosci* 2010;33:474-84.
- 8 Fins JJ, Mayberg HS, Nuttin B, Kubu CS, Galert T, Sturm V, et al. Misuse of the FDA's humanitarian device exemption in deep brain stimulation for obsessive-compulsive disorder. *Health Aff (Millwood)* 2011;30:302-11.
- 9 Lipsman N, Mendelsohn D, Taira T, Bernstein M. The contemporary practice of psychiatric surgery: results from a survey of North American functional neurosurgeons. *Stereotact Funct Neurosurg* 2011;89:103-10.
- 10 Fumagalli M, Priori A. Functional and clinical neuroanatomy of morality. *Brain* 2012;135:2006-21.
- 11 Hariz MI, Blomstedt P, Zrinzo L. Deep brain stimulation between 1947 and 1987: the untold story. *Neurosurg Focus* 2010;29:E1.
- 12 Delgado JMR. Physical control of the mind: towards a psychocivilized society. Harper and Row, 1969.
- 13 Moan CE, Heath RG. Septal stimulation for the initiation of heterosexual behavior in a homosexual male. *J Behav Ther & Exp Psychiat* 1972;3:23-30.
- 14 Valenstein ES. Brain control: a critical examination of brain stimulation and psychosurgery. John Wiley & Sons Inc, 1973.
- 15 Baumeister AA. The Tulane Electrical Brain Stimulation Program. A historical case study in medical ethics. *J Hist Neurosci* 2000;9:262-78.
- 16 Fodstad H, Hariz M. Electricity in the treatment of nervous system disease. *Acta Neurochir Suppl* 2007;97:11-9.

Cite this as: *BMJ* 2012;345:e5447

© BMJ Publishing Group Ltd 2012