

Interventional Psychiatry - An Emerging Subspecialty

Dr. Ramkrishna Makani^{1*} and Dr. Tapan Parikh²

¹Fellow Physician, Division of Child and Adolescent Psychiatry, Children's Hospital of Philadelphia (CHOP), Philadelphia, PA, USA

²Resident Physician, Department of Psychiatry, Cooper Medical School of Rowan University, Camden, NJ, New Jersey, USA

***Corresponding Author:** Dr. Ramkrishna Makani, Division of Child and Adolescent Psychiatry, Children's Hospital of Philadelphia (CHOP), Philadelphia, PA, USA.

Received: November 30, 2017; **Published:** December 05, 2017

Abstract

Interventional Psychiatry is considered the most infant in the field of psychiatry. It is getting acknowledged due to the current research and explanation in brain circuitry. Non-Invasive approach of Neuromodulation has the most robust evidence in the treatment of treatment resistant depression and now receiving growing evidence in the treatment of other psychiatric disorders mentioned here. It is also rising as a sub-specialty fellowship training for the trainees. This mini review guides us in this very interesting and rapidly expanding field.

Keywords: Neuromodulation; Brain Circuitry; Interventional Psychiatry

Introduction

Interventional Psychiatry is one of the fastest growing subspecialty in the field of Psychiatry. In the past two decades, there is improved understanding of various brain circuitry. There have been disease specific models of possible explanation to the dysfunctions in the brain circuitry. An example could be major depressive disorder. Since there is a high rate of treatment resistant depression clinically, option in such resistant and difficult to treat cases often include modalities that target brain circuitry in various parts of brain. The long-known treatment Electro Convulsive Therapy (ECT) and comparatively newer modality Transcranial Magnetic Stimulation (TMS), both target areas of brain involved with depression. The ECT and the TMS are considered interventions and their use in Psychiatry is viewed as examples of interventional psychiatry.

The interventional psychiatry, in simplest words, utilize techniques that modulate dysfunctional brain circuitry by various mechanisms such as stimulating or suppressing those brain regions. For this reason, such techniques are also called "neuromodulation" techniques as they "modulate" brain areas, or in other words, "neurons" or "neuronal circuits".

In this mini-article, we would like to explore the current evidence based neuromodulation techniques in the field of psychiatry and possible educational opportunities for the trainees.

Classification of neuromodulation techniques

The neuromodulation techniques can be broadly classified into two categories: (1) "Invasive": The techniques that have invasive component to the modality, for example, Vagal Nerve Stimulation (VNS) and Deep Brain Stimulation (DBS); (2) "Non-Invasive": The techniques that do not involve invasion of brain areas and there is no penetration at the level of skin or beyond, for example, ECT, Magnetic Seizure Therapy (MST), and (TMS).

History and Timeline of FDA approval

Historically, electricity from electric fish was used for thousands of years to treat pain and since the concept of storage of electricity

Citation: Dr. Ramkrishna Makani and Dr. Tapan Parikh. "Interventional Psychiatry - An Emerging Subspecialty". EC Neurology SI.01 (2017): 37-39.

evolved in mid 18th century, initial use of electricity included numbing the pain during dental operations. In 1934, 'Convulsive Therapy' was introduced by Hungarian Neuropsychiatrist Ladislav Meduna, who is considered as the father of convulsive therapy, with camphor and Metrazol. In 1938, Ugo Cerletti and Lucio Bini developed the idea to use electricity instead of Metrazol to induce seizure and thus ECT was developed. It was classified as category III (high risk) by FDA in 1976. DBS was developed in 1960s to treat intractable pain. In 1965, concept of magnetic stimulation and modulation in brain circuit was first tested in laboratory and in 1985, the first TMS machine was made with principle of using electrophysiological current and magnetic fields in the therapeutic setting. Modern era began in 1960's with deep brain stimulation followed by spinal cord stimulation in 1967 to treat intractable pain. In 1994, Vagal Nerve Stimulation (VNS) was approved in the European Union for epilepsy and in USA, it was approved in 1997. In 2005, it was approved by FDA for its use in treatment resistant depression. In 1998, Magnetic Seizure Therapy (MST) was developed and the first patient was treated in 2001 and it is still under investigational phase [1,2].

| | ECT (1938) | TMS (1985) | MST (1998) | VNS (1994) | DBS |
|------------------------|--|--|---|--|---|
| Mechanism of action | Exact – unknown Proposed -Induction of seizure and postictal suppression | Exact – unknown Proposed –Neuronal excitability | Exact – unknown Proposed – Seizure induction is localized to superficial cortex with generalization to broader brain regions | Modulation of monoaminergic neurotransmitters leading to metabolic changes in prefrontal cortex and limbic structures in mood regulation | Modulation of complex neural network as many brain areas are targeted |
| Electrical Stimulation | Generalized | Focal | Generalized | Generalized | Focal |
| Classification | Noninvasive | Noninvasive | Noninvasive | Invasive | Invasive |
| FDA approval | Yes | Yes | No | Yes | Yes |
| Acute Efficacy | Level 1 evidence | Level 1 evidence | Level 3 evidence | Level 2 evidence | Level 3 evidence |
| Long term efficacy | Level 1 evidence | Level 3 evidence | Level 3 evidence | Level 2 evidence | Level 3 evidence |
| Maintenance | Yes | Under investigation | Optional | No | No |
| Safety | Level 2 evidence | Level 1 evidence | Level 3 evidence | Level 2 evidence | Level 3 evidence |
| Indication | FDA approved for treatment resistant depression, psychosis, mania, catatonia | FDA approved for treatment resistant depression in 2008. | Not yet FDA approved for any psychiatric disorders | FDA approved for epilepsy in 1997, treatment resistant depression in 2005 | Essential tremors and PD in 1997, Dystonia in 2003, OCD in 2009; not yet approved for MDD and PTSD. |

Table 1: Various neuromodulation techniques in interventional Psychiatry.

Limitations

The therapeutic indications for many of the neuromodulation techniques are still under investigational phase (e.g: TMS for the treatment of PTSD, addiction, adolescent treatment resistant depression, etc.; DBS for depression and PTSD). For the modalities that have some approved indications, the literature has evidence of other non-approved indications, however those indications remain investigational until they go through the regulatory process of approval.

Conclusion

Interventional Psychiatry is a rapidly evolving as psychiatry sub-specialty with an ample growth potential. There is an abundant evidence for ECT however other relatively newer modalities such as TMS and DBS are having robust evidences in the treatment of numerous psychiatry disorders. The formal training in interventional psychiatry has also become available, but at a very few places at this time. There is a tremendous growth potential for the field of interventional psychiatry and structured curriculum, such as fellowships may enhance the growth of this field.

Bibliography

1. Williams NR, *et al.* "Interventional psychiatry: why now?" *The Journal of Clinical Psychiatry* 75.8 (2014): 895-897.
2. Williams NR, *et al.* "Interventional psychiatry: How should psychiatric educators incorporate neuromodulation into training?" *Academic Psychiatry* 38.2 (2014): 168-176.

© All rights reserved by Dr. Ramkrishna Makani and Dr. Tapan Parikh.