



Brain Stimulation Therapies

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What is the role of brain stimulation therapies?

The treatment for mental disorders usually start with medication and psychotherapies. In cases that certain mental disorders do not respond to these treatments, the use of brain stimulation therapies may show promise in treating such conditions.

How do they work?

- Activating or inhibiting the brain with electricity
- Electricity given directly by electrodes implanted (invasive), or on scalp (noninvasive)
- Electricity induced by magnetic fields applied to the head

Different methods:

- Electroconvulsive therapy
- Vagus nerve stimulation
- Repetitive transcranial magnetic stimulation
- Magnetic seizure therapy
- Deep brain stimulation

Electroconvulsive Therapy (ECT)

- The best studied brain stimulation therapy
- Longest history of use
- For treatment-resistant depression, bipolar disorder or schizophrenia
- For use in life-threatening circumstances when the individual is unable to move (catatonia), is suicidal or malnourished from severe depression
- Can be effective in reducing chance of relapse when patients undergo follow-up treatments
- Begins to work quicker and older individuals respond quickly (advantage over medications)

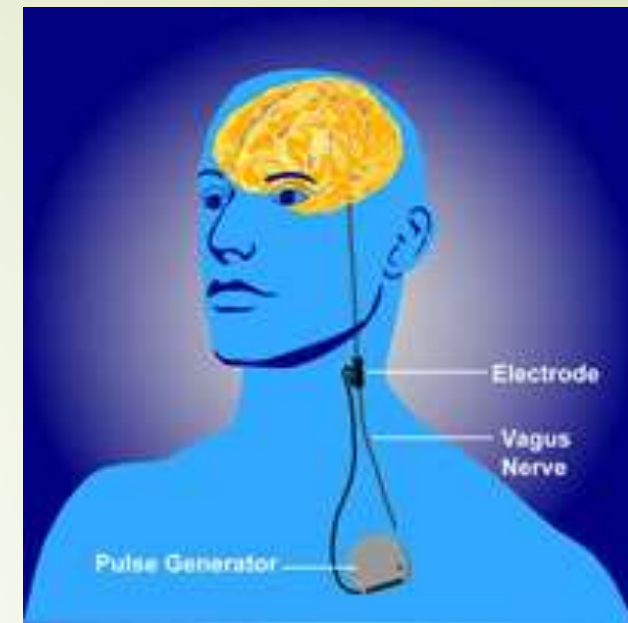
Common side effects:

- Headache
- Upset stomach
- Muscle aches
- Memory loss



Vagus Nerve Stimulation (VNS)

- A device implanted under skin sends electrical pulses through left vagus nerve, which carry messages to areas of brain that control mood and sleep
- Originally developed as a treatment for epilepsy
- Produces favorable effects on mood, especially depressive symptoms
- FDA approved in 2005 in treating treatment-resistant depression, infrequently used due to mixed effectiveness for major depression



Side effects:

- Infection from implant
- Voice changes
- Breathing problems especially during exercise
- Difficulty swallowing

Repetitive Transcranial Magnetic Stimulation (rTMS)

- Uses a magnet to activate brain
- Has been studied as a treatment for depression, psychosis, and anxiety
- Can be targeted to specific site in brain
- FDA approved in 2008 to treat major depression
- FDA also granted breakthrough device designation for NeuroStar Advanced Therapy TMS system for treating bipolar depression in 2020

Side effects:

- Discomfort at magnetic site
- Muscles may contract or tingle
- Headaches
- Lightheadedness
- Seizure (uncommon)



Magnetic Seizure Therapy (MST)

- Uses magnetic pulses (higher frequency than rTMS) to stimulate target in brain
- Aims to induce a seizure like ECT
- Must be anesthetized and given a muscle relaxant
- Goal is to retain effectiveness of ECT with reduced side effects
- Promising results in early stages, triggered remission from major depression or bipolar disorder in 30-40% of individuals

Side effects compared to ECT:

- Fewer cognitive side effects
- Shorter seizures
- Shorter recovery time

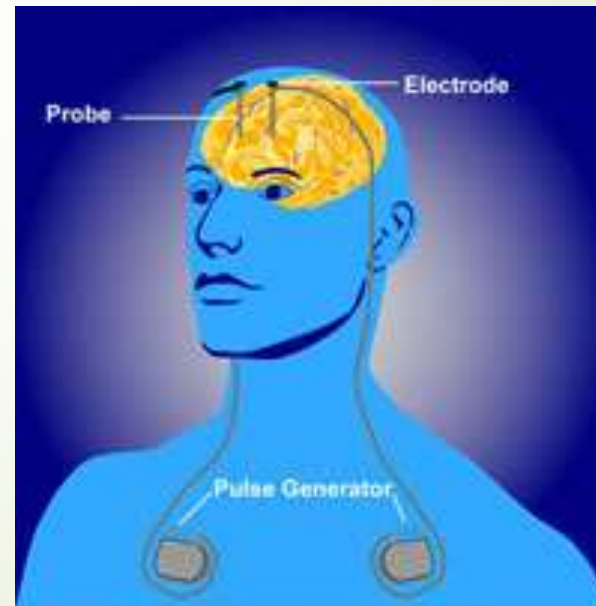


Deep Brain Stimulation (DBS)

- Been studied as a treatment for depression or obsessive compulsive disorder
- Studies found 40-50% of people show greater than 50% improvement in depression
- Requires brain surgery
- Electrodes implanted in the brain controlled by a generator
- Believed to reset the malfunctioning area of the brain

Side effects:

- Bleeding in the brain
- Confusion
- Trouble sleeping
- Movement disorders



References

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