

Use of RTMS in Depression

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Abstract: -- Depression is a medical illness that negatively effects how you feel and actually how u act. It is a psychotic disorder. According to most widely accepted Monoamine hypothesis, there is deficiency of catecholamine in brain (neuronal junction). When in excess, causes hyper manic condition, anti-depressant actually acts by inhibiting the re- uptake of serotonin, non-epinephrine and to a lesser extent dopamine so as increasing the concentration of catecholamine between the neuronal functions, but we know the side effects of anti-depressants such as nausea, increased appetite, weight gain, erectile dysfunctions, fatigue and drowsiness, insomnia, dry mouth at sometimes even not effective in major depression. So the solutions for these problems in rTMS (Reverse Trans cranial Magnetic Stimulation). TMS is generally used when other treatments fail. In this technique, an electromagnetic coil efficiently delivers magnetic pulse especially to nerve cells of our prefrontal cortex and it activates decreased activity of brain in patients of depression.

Keywords: Depression, Psychotic disorder, Mono-amine hypothesis, catecholamine deficiency, rTMS, Magnetic pulse, Pre-frontal cortex, Activated brain parts.

I. INTRODUCTION



Depression-

Depression is a medical illness that negatively affects how u feel and how u act. It is a psychotic disorder in which a patient suffers from a feeling of deep sorrow, helplessness and loss of interests in activities.

On the basis of circumstances, an individual suffers depression, may be categorized as-

- Psychotic depression – It occurs when a person is suffering from major depression plus a form of psychosis such as OCD (Obsessive Compulsive Disorder), Schizophrenia.
- Persistent depressive disorder – As the name suggests, this kind of depression lasts for longer duration of time (may be up to 2 years).
- Postpartum depression – This kind of depression is faced by the women during pregnancy or after delivery. The feeling of extreme sadness, anxiety and exhaustion that accompany postpartum depression may make it more

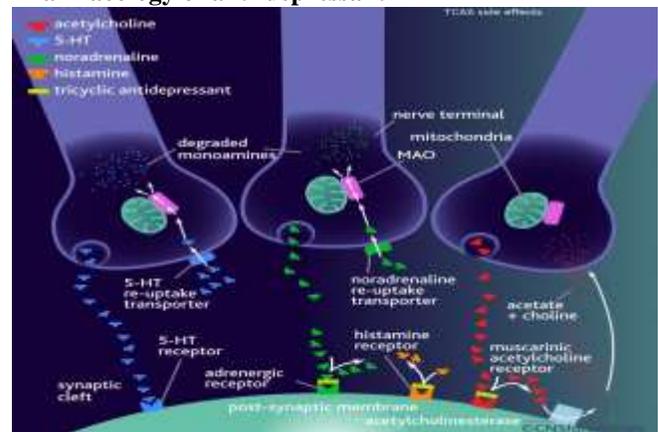
difficult for mother to take care of themselves and their newly born infant.

- Bipolar disorder – It is different from normal depression. Normally, a person suffering from bipolar experiences, major mood swings with extreme high's and low's.
- Seasonal affective disorder – It is characterized by the onset of depression during the winter months, when there is less natural light. So this kind of depression actually lifts up during the spring and summer seasons.

Depression: The case of Monoamine hypothesis-

According to widely accepted monoamine hypothesis in depression, there is deficiency of Catecholamine specially non-epinephrine and serotonin and sometimes more or less dopamine between the neuronal junction.

Pharmacology of anti-depressant-



Pharmacology of anti-depressant is still not entirely clear. It

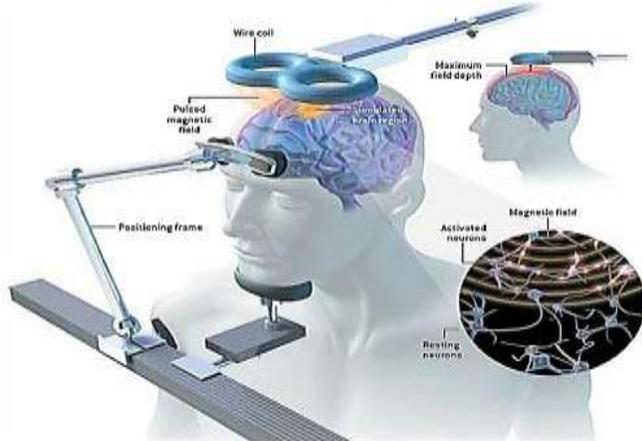
is basically understood by mono-amine hypothesis which states that when there is deficiency of catecholamine specially non-epinephrine, serotonin and dopamine (to a less extent), the anti-psychotics actually works by inhibiting the re uptake transporters, increasing the concentration of catecholamine between the neuronal junction and correcting the disorder.

Side effects of anti-psychotics-

- Nausea
- Insomnia
- Drowsiness
- Erectile dysfunction
- Fatigue
- Dry mouth

At sometimes even not so effective in major depression.

rTMS (Reverse Trans cranial Magnetic Stimulation)-



It is a non invasive procedure in which there is use of magnetic fields to stimulate nerve cells of pre frontal cortex to improve the symptoms of depression. In case of depression, the magnetic coil is placed over forehead (pre frontal cortex). When the magnetic coil is placed over forehead, it painlessly delivers magnetic pulse to activate the parts of brain which is inactive or decreased activity in people suffering from depression.

Why it's done-

Certain times, in case of major depression, the anti-psychotics are not effective. So in that case, rTMS is used when actually standard medication and psycho therapy does not work.

Benefits-

Unlike vagus nerve stimulation or deep brain stimulation, rTMS does not require any kind of implantation of electrodes in brain. Like ECT (Electro Convulsive Therapy), rTMS does not cause seizures or require sedation with anesthesia.

Common side effects-

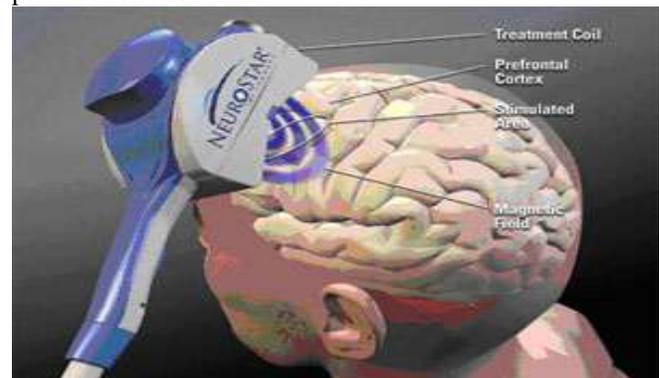
- Light headedness
- Headache
- Scalp discomfort at the site of stimulation

How rTMS works-

When magnetic coil is placed over the forehead, the magnetic pulse is generated through the coil and the pulse generated actually stimulates the pre frontal cortex of the brain or the areas of brain which are under active in depression. During the first session, the doctors identify the patient's motor threshold which is the amount of magnetic field strength that will be administered throughout the course of treatment. Generally, TMS sessions are not very long. According to recent searches, an approved device from NeuroStar can deliver the right dose in minimum 19 minutes. Therapy is generally taken place for 5 days in a week and it is continued for 4-6 weeks. At the end of the treatment, perhaps there is duration to reduce the number of treatments gradually.

Who is most likely to benefit from TMS?

TMS is actually prescribed for the patients suffering from major depression or does not respond for more than one anti-depressant. TMS is not at all right for the patients having non removable conductive metal implants or stimulator implants in or near the head of patients. For those who do not respond to medication or can't tolerate the negative side effects of anti-depressants, TMS would be a perfect choice for them.



II. CONCLUSION

Beginning in the 1980s, series of positron emission tomography (PET) studies showed that glucose metabolism is reducing in a number of areas of the prefrontal cortex, including the DLPFC. Addition research using pet demonstrated that effective antidepressant treatment was correlated with reversing the hypoactivity in the prefrontal cortex. More recent studies using functional MRI (fMRI) and electroencephalographic recording show that it is not only the DLPFC that changes its level of activation. A network of brain regions involved in cognitive control and emotion regulation, including the DLPFC, changes its activity in response to effective antidepressant treatment. The large body of convergent evidence pointing at the DLPFC as a neuroanatomical location of interest in depression built a compelling and solid rationale for early studies using rTMS to target the DLPFC in depression treatment. Pilot studies then showed that rTMS to the left DLPFC was an effective treatment for a proportion of patient with major depressive episode who had not responded to earlier antidepressant treatment. Indeed, a recent meta-analysis shows that rTMS is effective in 30% to 40% of individuals with treatment-resistant depression

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