NON-INVASIVE TECHNOLOGIES FOR COPING WITH TBI

TBIs are projected to be the most common neurological condition affecting Canadians by 2031. Luckily, studies have investigated methods to help treat them

NEUROFEEDBACK

Neurofeedback is a method of regulating brain waves with the use of EEG's. EEG measures the potential on a part of the brain and the neurofeedback responds to that potential with an auditory response.

Example: if beta and gamma signals are picked up by the EEG, the auditory response could be seagulls calling each other, which would increase the prevalence of alpha waves.

MICROCURRENT NEUROFEEDBACK (MCN)

Microcurrent Neurofeedback (MCN) applies low intensity pulses with the use of transcranial electrical stimulation (LIP-tES) accompanied by EEG surveillance. LIP-tES is used to offset the dominant brain wave which is assumed to be the one in an abnormal state. MEG is accompanied with MCN as the optimal imaging technique that is more sensitive to abnormal slow wave signals and is optimal for this treatment. MCN does not require the patient to be active or conscious in order to manifest the benefits and this treatment.

IASIS MCN

Short sessions

Patients need 10-20 sessions which last 30 minutes long

Few electrodes

5 electrodes are used and placed on different areas of the neck and head

Directly targets TBI

Patients with mTBI and abnormally slow waves had a 53% reduction of slow waves by the end of the sessions

Assists with PCS

Patients experienced a 53% reduction in PCS after treatment

Uses advanced methods

LIP-tES is used to offset dominant brainwaves and MEG is used to capture images

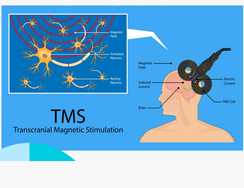
TMS benefits for TBI patients

1. Relieves headeaches
2. Regulates sleep and mental focus

TRANSCRANIAL MAGNETIC STIMULATION (TMS)

TMS is a method that alters brain activity with the use of electromagnetic induction. Insulated coil that surrounds the skull targets areas of the brain related to mood. Similar to MRI's, the coil generates a pulse in quick successions (repetitive TMS or tRMS) which result in brain activity to be altered. The magnetic field produces a current which targets nerve cell activity in the cortex.

HOW TMS WORKS

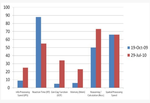


HYPERBARIC OXYGEN THERAPY (HBOT)

Hyperbaric oxygen therapy (HBOT) involves a pressurized chamber that a patient lies inside of and wears an oxygen mask. As there is high pressure in the chamber, oxygen is forced into the blood plasma where it travels to the brain and other parts of the body. This assists the body to repair tissue and restore regular bodily functions. HBOT is traditionally used to promote angiogenesis and neurogenesis while also suppressing inflammation and prevent apoptosis.

Case Study

An NFL player who suffered from concussions & TBIs throughout his career received 40 sessions of HBOT at 1.5 for 40-60 minutes. Brain scans were taken before and after the treatment to show major improvements as shown on the graph below.



HBOT benefits for TBI patients

1. Increased cerebral blood flow and volume
2. Improves results of the Glasgow Coma Scale
3. Decreases brain apoptosis
4. Improvements in processing speeds, motor skill indices, and visual spatial processing

CONCLUSION

Neurofeedback, TMS, HBOT, and MCN are all non-invasive methods that have shown to effectively assist people suffering from TBI. Future directions in TBI recovery include educating people on the various available treatments as well as conducting more clinical trials with different control factors.

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