



EMDR AND THE MILITARY IN ACTION E-NEWSLETTER

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This is a monthly E-newsletter created primarily for our colleagues trained in Eye Movement Desensitization and Desensitization (EMDR) who work with military, veterans, and their families. The purpose of *EMDR and the Military in Action* is to promote continued dialogue regarding the efficacy and current developments with EMDR and its use with these special populations.

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Citations - EMDR therapy and Neurobiology

EMDR therapy and multi-channel near-infrared spectroscopy with PTSD patients

Amano, T., & Toichi, M. (2016). Possible neural mechanisms of psychotherapy for trauma-related symptoms: Cerebral responses to the neuropsychological treatment of post-traumatic stress disorder model individuals. *Scientific Reports*, 6, 34610. doi:10.1038/srep34610.

Psychotherapy is often effective for treating psychogenic disorders, but the changes that occur in the brain during such treatments remain unknown. To investigate this, we monitored cerebral activity throughout an entire session using a psychotherapeutic technique in healthy subjects. Since post-traumatic stress disorder (PTSD) is a



typical psychogenic psychiatric disorder, we used PTSD-model volunteers who had experienced a moderately traumatic event. The technique used as psychotherapy was eye movement desensitization and reprocessing (EMDR), a standard method for treating PTSD. The oxygenated hemoglobin concentration ([oxy-Hb]), a sensitive index of brain activation, measured using multi-channel near-infrared spectroscopy, revealed changes in [oxy-Hb] in the superior temporal sulcus (STS) and orbitofrontal cortex (OFC). During a vital therapeutic stage, a significant reduction in the activation by forced eye movements was observed in the right STS, and a trend toward a reduction in the left OFC. The hyperactivation of the right STS on the recall of unpleasant memories, and its normalization by eye movements, seem to reflect an important neural mechanism of the psychotherapy. These findings suggest that psychotherapy for traumatic symptoms involves brain regions related to memory representation and emotion, and possibly those that link memory and emotion, such as the amygdala.

EMDR therapy and Resource Development using a multi-channel near-infrared spectroscopy

Amano, T., & Toichi, M. (2016). The role of alternating bilateral stimulation in establishing positive cognition in EMDR therapy: A multi-channel near-infrared spectroscopy study. *PLoS ONE*, 11(10), e0162735. doi:10.1371/journal.pone.0162735.

Eye movement desensitization and reprocessing (EMDR) is a standard method for treating post-traumatic stress disorder. EMDR treatment consists of desensitization and resource development and installation (RDI) stages. Both protocols provide a positive alternating bilateral stimulation (BLS). The effect of desensitization with BLS has been elucidated. However, a role for BLS in RDI remains unknown. Therefore, it is important to measure feelings as subjective data and physiological indicators as objective data to clarify the role of BLS in RDI. RDI was administered to 15 healthy volunteer subjects who experienced pleasant memories. Their oxygenated hemoglobin concentration ([oxy-Hb]), a sensitive index of brain activity, was measured from the prefrontal cortex (PFC) to the temporal cortex using multi-channel near-infrared spectroscopy during recall of a pleasant memory with or without BLS. The BLS used was alternating bilateral tactile stimulation with a vibration machine. The psychological evaluation suggested that RDI was successful. The results showed that, compared with non-BLS conditions, accessibility was increased and subjects were more relaxed under BLS conditions. A significant increase in [oxy-Hb] was detected in the right superior temporal sulcus (STS), and a decrease in the wide bilateral areas of the PFC was observed in response to BLS. The significant BLS-induced activation observed in the right STS, which is closely related to memory representation, suggests that BLS may help the recall of more representative pleasant memories. Furthermore, the significant reduction in the PFC, which is related to emotion regulation, suggests that BLS induces relaxation and comfortable feelings. These results indicate an important neural mechanism of RDI that emotional processing occurred rather than higher cognitive processing during this stage. Considering the neuroscientific evidence to date, BLS in RDI may enhance comfortable feelings about pleasant memories. Based on the current findings, the use of BLS in RDI may be warranted in some clinical situations.

V., Vatti, G., Marino, D., Fernandez, I, Rossi, A., &Fagiolini, A. (2017). [Morphovolumetric changes after EMDR treatment in drug-sensitive PTSD patients]. *Rivista di Psichiatria*, 52(1), 24-31. Italian,



Introduction: Few studies have investigated the effects of efficacious psychotherapy on structural alterations of discrete brain regions associated with posttraumatic stress

disorder (PTSD). We therefore proposed to evaluate the neurobiological effects of eye movement desensitization and reprocessing (EMDR) on 19 patients with drug-naïve PTSD without comorbidity, matched with 19 untreated healthy controls.

Methods: We administered the Clinician Administered PTSD Scale (CAPS) and conducted brain MRI measurements (with Optimized Voxel-Based Morphometry). Patients received 12 EMDR sessions over three months. Then patients and controls were reassessed.

Results: At baseline, grey matter volume (GMV) differed significantly between patients and controls ($F_{1,35} = 3.674$; $p = .008$; $\eta^2 = .298$). Analyses of 3-month scans showed no changes for controls, while significant changes were highlighted for patients post-EMDR, with a significant increase in GMV in left parahippocampal gyrus, and a significant decrease in GMV in the left thalamus region. The diagnosis of PTSD was effectively eliminated in 16 of 19 patients, reflected in a significant improvement on the CAPS ($t(35) = 2.132$, $p < .004$).

Discussion and Conclusions: Results indicated post-EMDR changes for patients in brain morphology. We discuss whether EMDR's mechanism of action may work at the level of the thalamus, an area implicated in PTSD pathology.

EMDR Therapy and qEEG Studies

Harper, M.L, Rasolkhani-Kalhorn, T., Drozd, J.F. (2009). On the neural basis of EMDR therapy: Insights from qEEG studies. *Traumatology* 15(2), 81-85.

Eye movement desensitization and reprocessing (EMDR) therapy has been shown by empirical studies to be effective in relief from psychological traumas including posttraumatic stress disorder (PTSD). Several logical concepts regarding the origin of the EMDR effect have been presented, but no detailed neural explanation is available. This lack of a widely accepted scientific explanation for the EMDR effect has led to skepticism about the therapy by many therapists and potential clients. The authors present evidence based primarily on quantitative electroencephalogram studies that the neural basis for the EMDR effect is depotentiation of fear memory synapses in the amygdala during an evoked brain state similar to that of slow wave sleep. These studies suggest that brain stimulation during EMDR significantly increases the power of a naturally occurring low-frequency rhythm in memory areas of the brain, binding these areas together and causing receptors on the synapses of fear memory traces to be disabled. This mechanical change in the memory trace enables it to be incorporated into the normal memory system without the extreme emotions previously associated with it. EMDR is a medical procedure because it changes the physical structure of the brain to modify problematically stored memories.



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