

## Understanding the effect of BAS on decoding the EMDR mechanisms of action: an fMRI study

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### Abstract

**Introduction:** EMDR uses bilateral alternating stimulation (BAS) as a means of therapeutic action. We have previously shown in humans that BAS allow faster extinction of conditioned fear in a healthy population of subjects. These results have recently been confirmed in animals. The effect of these BAS on brain activity has been little studied. Neurobiological models of PTSD implicate fear processing impairments in the maintenance of the disorder. The protocols for conditioning and extinguishing fear can be used to model the fear processing impairments in PTSD. Our objective is to study the effect of BAS on brain activity during the extinction of conditioned fear to understanding the EMDR mechanisms of action during the desensitization (phase 4 of the clinical protocol).

**Methods:** We included 37 healthy subjects who had no history of neurological or psychiatric disorder. Subjects performed twice the conditioning and extinction fear protocol, once with and once without BAS in the MRI during the extinction. BAS were administered by auditory stimulation. The results are displayed for a  $p < 0.05$  in FWE for the cluster.

**Results:** Contrast with > without BAS shows greater activation in auditory areas such as the bilateral superior temporal gyrus. This contrast activates also non-auditory brain structures as the right amygdala, left insula, right precuneus and middle left frontal gyrus.

**Conclusion:** We demonstrate evidence for a putative neurobiological basis of the BAS as used in the EMDR method. For the first time, we show that BAS during the extinction of a conditioned fear do not only activate sensory cerebral areas but also cerebral structures involved in emotion (expression of fear, feeling of pain, regulation of emotions) and self-consciousness.

### Learning objective

- Review known impairments in the extinction of a conditioned fear in PTSD
- Understanding the effects of the BAS during the desensitization

### What it new, unique and innovative ?

- For the first time, we show the effect of BAS on brain activity during the extinction of conditioned fear.
- A better understanding of the mechanism of action of BAS will ultimately improve EMDR therapy.