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FUNCTIONAL MAGNETIC RESONANCE IMAGING (fMRI)-BASED NEUROFEEDBACK AS A NEW TREATMENT TOOL FOR DEPRESSION

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We investigated whether depressed patients who received fMRI-based neurofeedback are able to upregulate the activity in brain areas devoted to positive emotion processing and thereby establish improvements in mood state. Eight medicated patients with major depression participated in four separate fMRI sessions, each of which consisted of an emotion localiser and three neurofeedback runs. Target areas were selected individually with a functional localiser that identified the region most responsive to positive affective images. The target areas were in uni- or bilateral prefrontal cortex, insula or amygdala. During neurofeedback runs, patients received real-time feedback about activation levels in the target area. Each patient learnt to increase target area activity over successive sessions. Depression scores on the 17-item Hamilton Depression Rating Scale improved significantly. No such improvement was seen in a non-neurofeedback control group (N=8) that was matched for symptom severity, demographics and medication and used the same cognitive/affective strategies that were employed successfully by the neurofeedback group, but outside the scanner. This group difference in treatment effects was supported by a significant interaction between the factors time (pre/post-intervention) and group (neurofeedback/controls) on the repeated measures ANOVA ($F(1,14)=10.15$, $p=.007$). The neurofeedback group showed increasing activity in the ventral striatum and regions involved in cognitive control as training progressed. Upregulation of brain areas responsive to positive affective cues through fMRI-neurofeedback is thus a promising tool in the treatment of depression. The novelty of the present approach consists in the combination of biological and cognitive factors in the same intervention.