

## **Void consciousness: Investigating the neural network correlates of an exceptional meditative experience with EEG-MREG**

### **ABSTRACT:**

#### **Background**

The minimal neural correlate of the conscious state, isolated from its ever-changing contents, has still not been identified. Previous approaches mainly compared the normal waking state to unconscious states, such as deep sleep or general anesthesia. A more direct approach would be the neuroscientific investigation of conscious states that are experienced as free of any specific phenomenal content.

#### **Aims**

This proof of concept study aimed to elaborate this approach by exploring neurophysiologic changes during content-reduced states of awareness induced by meditation.

#### **Method**

Combined EEG-fMRI was applied in ten long-term meditators during content-minimizing meditation and rest. Functional connectivity was analyzed within the dorsal attention network (DAN) and the default mode network (DMN). Additionally, EEG spectral power was analyzed in the theta (4-8 Hz) and alpha (8-12 Hz) frequency bands.

#### **Results**

One extraordinarily qualified meditator reported an experience of complete content-free awareness, the neural correlates of which were characterized by sharply decreased alpha and increased theta power as well as connectivity increases in the DAN and decreases in the posterior DMN. In contrast, the merely content-reduced phase of his meditation was marked by increased DMN connectivity. The group-level analysis likewise showed a reduced amount of contents of consciousness during meditation, associated with increased connectivity in both DAN and DMN but unchanged EEG power.

#### **Conclusions**

Our findings hint to changes in DMN connectivity modulated by top-down attention as an important correlate of content-minimized states of awareness. We conclude that investigating such states could be an important approach to narrow down the minimal neural correlate of consciousness.

#### **Keywords**

Content-free awareness, Consciousness as such, Neural correlate of consciousness (NCC), Disconnected consciousness, Meditation

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