

## NEURODYNAMIC IMPACTS OF MEDITATION COMBINED WITH AYAHUASCA CONSTITUENTS DMT AND HARMINE

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**Background:** Meditation and psychedelics, such as psilocybin, LSD, or dimethyltryptamine (DMT), exert profound effects on human consciousness. Current models of biological mechanisms of both meditation and psychedelics hint toward synergistic effects on brain functioning when the two are combined. Building on a prior study exploring the effects of meditation with psilocybin, we conducted a double-blind, placebo-controlled between-subject study, investigating the combined impact of meditation and a novel ayahuasca-derived formulation containing DMT and harmine.

**Aims:** Functional brain scans (fMRI) were conducted before and after a three-day psychedelic-enhanced meditation retreat with the aim to compare neurodynamic changes in the brain at rest before and after the meditation retreat between the two groups.

**Methods:** Forty trained meditators (22 male, 18 female) participated in one of two three-day meditation retreats, receiving either DMT and harmine (120 mg each) or placebo on day two of the retreat. Resting-state fMRI scans were acquired one day before and one day after the retreat. Analyses included seed-to-voxel analyses of seven resting-state networks (RSN), between- and within-network changes, global connectivity and cortical gradient analyses. All voxel-thresholds were set to  $p < 0.001$ , cluster-thresholds were set to  $p < 0.05$ , FDR-corrected.

**Results:** Within-group analyses indicated that, following the retreat, participants in the placebo condition showed increased network segregation among several resting-state networks, whereas those in the DMT–harmine condition exhibited increased functional connectivity (FC) within the visual network (VIS) and between VIS and attention-related networks. Between-group comparisons revealed stronger FC between VIS and the salience network (SAL) in the DMT–harmine group compared with placebo after the retreat. Global correlation analyses identified three clusters with reduced connectivity in the placebo group (post vs. pre) located in the precentral gyrus, inferior frontal gyrus, and precuneus. Importantly, no sustained alterations in cortical hierarchy organization — typical of acute psychedelic effects — were detected, suggesting a reestablishment of baseline network structure shortly after the experience.

**Conclusions:** Together, these findings highlight divergent neural mechanisms of meditation and psychedelic-augmented meditation: meditation alone promoted greater network segregation, whereas DMT–harmine enhanced within- and between-network integration. By delineating how mindfulness practice and psychedelics differentially modulate large-scale brain organization, this work provides novel insights into their potential synergistic application for enhancing emotional regulation and mental well-being.

**Keywords:** DMT, psychedelics, meditation, resting-state fMRI, brain imaging

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