

39th ECNP Congress, Munich: Press Release

Intensive breathing alters consciousness by changing brain communication

- *Breathwork also reduces brain blood flow by up to 45%*
- *Some effects parallel psychedelic drug use*

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Type of research: peer-reviewed/experimental study/people

Munich, Germany— Intensive breathing exercises can reduce blood flow to the brain by up to 45% and alter communication between brain networks, according to a new brain-imaging study. Participants reported experiences resembling some effects of psychedelic drugs, including altered perception, vivid mental imagery, a sense of unity and changes in self-experience. The researchers, presenting the work at the ECNP Congress in Munich (following recent publication), say changes in brain communication, rather than reduced blood flow alone, appear to be key to the altered state.

The study involved 30 healthy, experienced breathwork practitioners who performed high-ventilation breathwork during MRI scanning. Participants reported strong altered states of consciousness, describing a predominantly oceanic state – in other words, a deep feeling of connection to the universe - resembling that of a moderate to high dose of LSD or psilocybin, albeit with less pronounced visual effects. Brain imaging showed that global grey-matter cerebral blood flow fell by around 45% during the session, on average from 16.24 to 9.81 ml/100g/min*. Those who reported stronger altered states also showed greater changes in the brain's default mode network, which is involved in self-reflection and self-related thinking.

The researchers suggest that the intensity of the experience is not simply explained by reduced blood flow. Instead, the experience might track more closely with changes in communication within the default mode network, a brain system linked to self-reflection and self-related thought.

Lead researcher Dr Christian Schmitz, Central Institute of Mental Health, Mannheim in Germany, said:

“Many people who practice intensive breathwork report profound changes in perception and self-experience, yet the underlying brain mechanisms remain poorly understood. Our study suggests that these experiences are linked not only to marked changes in cerebral blood flow, but also to alterations in how key brain networks communicate”.

'Co-Coordinator, Hana Adolphi said, *“Breathwork is a legal, inexpensive and non-pharmacological intervention that may provide a valuable tool for studying altered states of consciousness. Understanding these mechanisms could also help inform future research into novel approaches for mental health treatment.*

Nevertheless, this was a relatively small study, and the findings should be considered preliminary. Larger studies will be needed to determine whether these brain changes have clinical relevance.”

Commenting, Dr Guy Fincham (Brighton and Sussex Medical School, UK) said:

“This study is intriguing as it is starting to extend findings from recent breathwork research that intensive breathing practices may yield altered states of consciousness which individuals describe in ways analogous to psychedelic compounds, and under brain-imaging conditions. These findings are important because such altered subjective experiences may be harnessed for the improvement of mental health, and an accessible non-pharmacological route such a breathwork could prove invaluable for many. We should note that the study was uncontrolled and the sample was made up of experienced practitioners, so replication of this in breathwork-naïve participants using a randomised-controlled design will help determine whether these findings can translate more widely and produce therapeutic benefit”.

Dr Fincham was not involved in this study; this is an independent comment.

Professor David Nutt (of Imperial College, London) said:

“Breathwork is a non-pharmacological bridge to our research into psychedelics, so research which helps us understand how it functions is welcome”.

Professor Nutt was not involved in this study; this is an independent comment.

Note: * Cerebral blood flow: 9.81 ± 7.58 vs. 16.24 ± 4.35 ml/100g/min; $t(29) = -10.69$, $p < .001$.

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Notes for Editors

This work is presented at the 39th ECNP (European College of Neuropsychopharmacology) Congress, taking place in Munich and online 10th-13th October 2026, see <https://www.ecnp.eu/congress2026/> The ECNP Congress is Europe's leading platform for the science and treatment of brain disorders.

The study, “Breathwork-induced changes in cerebral blood flow, functional connectivity and altered states of consciousness: similarities and differences with psychedelic research,” will be presented at the ECNP Conference in Munich. It is based on the peer-reviewed article by Adolphi and colleagues, published as Schmitz et al. (2026) in *Progress in Neuropsychopharmacology & Biological Psychiatry*, 49, 111873. <https://doi.org/10.1016/j.pnpbp.2026.111873>

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Breathwork-induced changes in cerebral blood flow, functional connectivity and altered states of consciousness: similarities and differences with psychedelic research

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Background: The phenomenological overlap between high ventilation breathwork (HVB)-induced states and those induced by classical psychedelics, such as non-ordinary states of consciousness (NOSC) [1], raises the question of whether comparable modulations in brain function and physiology exist. Given that acute subjective experiences in psychedelic research are linked to therapeutic outcomes [2], this study is among the first to examine (i) changes in brain function pre-, during-, and post- in-scanner breathwork session, and (ii) the role of acute NOSC.

Method: Thirty healthy, experienced breathwork practitioners performed self-guided in-scanner HVB (3T Siemens MRI), instructed to breathe abdominally, minimizing chest expansion and head movement. pcASL sequences were acquired immediately before (pre), during (acute), and after (post) the HVB session, while BOLD-fMRI data were acquired immediately following the pre- and post-pcASL sequences. NOSC intensity was assessed after each 12-minute pcASL run using acute subjective intensity (ASI) ratings (Likert scale: 0 = absent to 4 = strong), relative to each participant's prior maximal HVB-induced experience, and via the 5D-ASC within one hour after the HVB session. Simple t-tests assessed the differences in pre-to-post functional connectivity (FC) or pre-to-acute cerebral blood flow (CBF, pcASL run corresponding to the first maximum ASI rating).

Results: HVB induced alterations in both acute ASI ratings of NOSC ($M=3.47 \pm 0.63$; median = 4; $n = 30$) and mean 5D-ASC (29.04 ± 14.83 (range = 2.67–55.9)), with most 5D-ASC subscales being positively correlated with the ASI ratings. Results indicate significant reductions in acute global grey matter cerebral blood flow (CBF; 9.81 ± 7.58 vs. 16.24 ± 4.35 ml/100g/min; $t(29) = -10.69$, $p < .001$), accompanied by expected increases in heart rate and respiration rate. No significant pre-to-post differences were determined for FC regions corresponding to the default mode network (DMN) derived from the Schaefer (2018) 100 parcel atlas and DMN-FC difference scores showed no significant association with acute CBF changes. However, regression analyses showed that greater decreases in DMN-FC (pre-to-post) were predictive of higher 5D-ASC ratings ($\beta = -4.88$, $t(27) = -2.07$, pre-to-post $p = .04$) if global signal regression was applied. Spearman correlation revealed no significant relationship between acute reductions in CBF and NOSC as determined by both 5D-ASC and ASI ratings.

Discussion: This study demonstrates that HVB reliably induces NOSC in experienced practitioners and marked reductions in global CBF likely driven by hypocapnia-induced cerebral vasoconstriction. Despite differing mechanistically from serotonin 2A receptor-mediated psychedelic action, the observed effects have parallels with psychedelic research [3]. Yet, the absence of a CBF-NOSC relationship suggests vasoconstriction alone does not drive NOSC, with relevant perfusion changes potentially being regionally specific rather than global [4]. Pre-to-post DMN-FC remained stable, though post-session scanning proximity may have limited detection of lasting network changes. Notably, greater post-HVB reductions in DMN-FC were associated with more intense NOSC. This finding, while tentative given its GSR-dependence, is directionally consistent with psychedelic research linking acute DMN disruption to experiential depth [5]. The results have implications for understanding the neurobiology of non-pharmacological NOSC and for the potential development of breathwork-based therapeutic interventions