

Symposia (detailed program)

Campus Biotech, Geneva, Switzerland · 4–7 October 2026

Tuesday, October 6th

Afternoon Symposia · Three Parallel Tracks · 15:00 – 17:00

Parallel sessions in three rooms · coffee break 16:00 – 16:15 in H8 Hall · Talk summaries are condensed from the submitted symposium abstracts.

Track A · Mechanisms, predictors & causal inference · Auditorium H8
Improving the causal mapping of human brain function with neurofeedback (ID80)

 Chair: **Aurelio Cortese** (Sungkyunkwan Univ. / IBS, Suwon)

Because brain function is highly interconnected and mapping methods have important limitations, demonstrating robust brain–behavior causality is non-trivial. This symposium presents neurofeedback as a non-invasive platform for strengthening causal inference between brain activity and complex human behavior.

Guilherme Wood (Univ. Graz) — *The challenge of brain-behavior causality in humans*

An overview of the most popular techniques for mapping brain–behavior causality in humans — natural lesion studies and non-invasive brain stimulation — and the confounders that must be ruled out before causal relations can be inferred. Despite seminal evidence from these approaches, further methodological improvements are needed for robust and informative causal inference.

Michal Ramot (Weizmann Institute) — *Neurofeedback as a causal probe of brain network states*

Neurofeedback enables targeted, endogenous modulation of neural signals while measuring effects on cognition, behavior or symptoms — a powerful test of whether neural patterns are functional or merely downstream correlates. Two contrasting examples are discussed: covert connectivity-based neurofeedback targeting default–executive network coupling in creative thinking, and ongoing intracranial work in epilepsy identifying candidate neural states for future modulation.

Theo Marins (Univ. Graz) — *Enhancing the causal mapping of human brain function with the Causal-NF Framework*

The Causal-NF framework offers a conceptual and methodological structure for studying brain–behavior causality through multilevel assessment of brain function, metabolism and structure. Neurofeedback research addressing adapted Bradford–Hill causal criteria can provide robust, high-granularity and non-invasive causal evidence, improving target identification for neuromodulation and the development of assistive technologies.

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Track B · Multivariate decoding, AI & next-gen feedback signals · Room H8-01-D

Toward more effective and transferable neurofeedback: From scalable brain decoding to real-world self-regulation (ID22)

Chair: **Miroslava Hofmanová** (CIMH Mannheim / Heidelberg Univ.)

Moving beyond demonstrating that neurofeedback can modulate neural signals, this symposium asks how it can become more precise, engaging, scalable and transferable to everyday life — through better neural signals, feedback timing, user-centred design and immersive training environments.

Saampras Ganesan (Laureate Institute, Tulsa) — *EEG-to-fMRI translation using foundation models: Towards scalable, high-precision real-time neurofeedback*

EEG-to-fMRI-Translate is a deep-learning framework trained on one of the largest simultaneous EEG-fMRI datasets assembled (~400 subjects), aligning the latent spaces of two neuroimaging foundation models (REVE for EEG, NeuroSTORM for fMRI) through a lightweight Transformer bridge. Preliminary cross-subject predictions of BOLD activity across 1,054 brain regions are encouraging (best-10% ROIs $r \approx 0.65$), supporting the prospect of circuit-specific, EEG-derived fMRI neurofeedback without the cost and constraints of MRI.

Miroslava Hofmanová (CIMH Mannheim) — *Mind the timing: Comparing continuous and intermittent neurofeedback during presentation of affective stimuli*

Healthy participants (N=187) completed four sessions of amygdala-electrical-fingerprint (amy-EFP) downregulation training with continuous feedback, intermittent feedback, or no feedback, plus a follow-up transfer session. Results suggest an advantage of the intermittent protocol during training, with less clear differences in transfer — informing a key design parameter for affective neurofeedback studies.

Adrian Naas (Univ. Fribourg / BFH Bern) — *User centred design in neurofeedback training: An evaluation of categorical feedback events*

Drawing on human-computer interaction and conditioning theories, a sham-neurofeedback study (N=59) systematically manipulated categorical feedback events and the illusion of success across two training sessions. Feedback design, motivational disposition and perceived success showed significant main and interaction effects on affect, user experience and behavioral perseverance, highlighting feedback design as an underexplored factor in neurofeedback effectiveness.

Talma Hendler & Gal Raz (Tel Aviv Univ.) — *From simulation to real-world transfer: Encouraging spontaneous adaptive behavior through gamified virtual-reality neurofeedback (gVR-NF)*

Two VR-neurofeedback strategies leverage “hyper-realism” — memorable sensory experiences that the brain can spontaneously invoke in real life — to translate trained neural modulation into spontaneous behavior. An implicit design conditions paretic-limb use in motor rehabilitation via an AI-driven EEG decoder, while an explicit design trains stress-coping through EFP-contingent rewards in a gamified threat scenario, bridging clinical training and real-world transfer.

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Track C · Acquisition, signal quality, real-time tooling & BCI · Room H8-01-F
Translational applications for fNIRS neurofeedback training (ID130)

 Chair: **David Mehler** (Uniklinik RWTH Aachen)

By combining portable neuroimaging with closed-loop training, fNIRS neurofeedback offers unique opportunities for clinical rehabilitation and mental health. Recent advances, methodological challenges and future directions for its clinical implementation.

Michael Lühns (Maastricht Univ.) — *From lab to life: A decade of progress in real-world fNIRS neurofeedback and BCI*

A decade of fNIRS neurofeedback and BCI development is traced from laboratory proof-of-concept to practical, real-world applications, including sparse optode setups, individualized feature selection, augmented-reality feedback and multisensory paradigms. People can learn to influence fNIRS-derived brain signals, but effects vary with design choices, signal quality and physiological noise correction — the next step is establishing when, for whom, and under which conditions real-time fNIRS produces meaningful clinical benefit.

David Mehler (Uniklinik RWTH Aachen) — *From monitoring to modulation: Translational applications of fNIRS-guided neurotechnology for post-stroke motor rehabilitation*

Three complementary studies move fNIRS from monitoring post-stroke neuroplasticity toward adaptive intervention: a systematic review of 52 studies, a randomized proof-of-concept fNIRS-BCI trial in which contingent feedback enhanced voluntary upregulation of ipsilesional sensorimotor activity, and an fNIRS-guided TMS interface delivering stimulation only at individualized brain-state thresholds. Brain-state-dependent stimulation increased corticospinal excitability in healthy participants but not in chronic stroke, offering a novel framework for probing disrupted motor-network connectivity.

Murat C. Mutlu (Uniklinik RWTH Aachen) — *Improving fMRI-informed fNIRS decoding: Do more channels or better models matter?*

Using simultaneous fNIRS-fMRI recordings during motor and emotion-processing tasks, this ongoing work systematically compares the effect of adding task-relevant fNIRS channels versus selecting better regression models for predicting cortical and subcortical fMRI activity. The results will clarify whether decoding improvements are driven primarily by hardware or by analytical methodology, guiding the design of practical, portable neurofeedback systems.