



**NEURO  
SCIENCE**

neuroConn   
Technology

## Simultaneous EEG with non-invasive brain stimulation (NIBS)

Globally unique solutions for neuroscience research

### Combining non-invasive brain stimulation with neuroimaging

Simultaneous recording of DC-EEG during non-invasive brain stimulation (NIBS), such as transcranial direct current stimulation (tDCS), transcranial alternating current stimulation (tACS, tRNS) or transcranial magnetic stimulation (TMS) is a painless method to evaluate the modulation of cortical oscillatory brain activity and cerebral plasticity. These methodologies allow neuroscientists to investigate a broad range of research topics, such as:

- establishing a causal link between brain functions and behavior
- understanding the online mechanisms of brain stimulation
- assessing how non-invasive brain stimulation locally affects neural processing by means of objective measures of cortical activity, reactivity, and connectivity
- determining in vivo the brain areas directly or indirectly affected by non-invasive brain stimulation
- improving stimulation protocols based on direct effects to brain activity

neuroCare integrates full-band DC-EEG recording with NIBS technologies offering globally unique and highly sophisticated solutions for researchers.



*neuroConn full-band-DC-EEG device NEURO PRAX® TMS/tES*

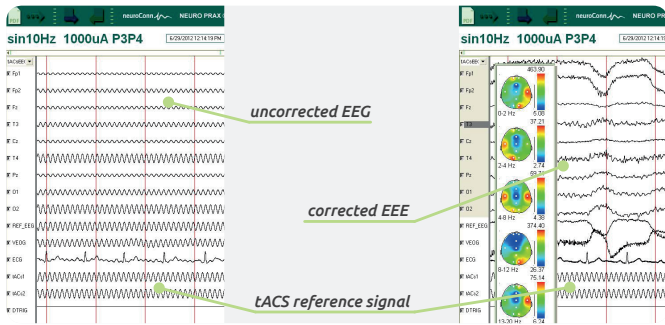
**neuroConn technology fulfills all technical requirements for the following combined applications:**

- noise free DC-EEG during **tDCS / tACS / tRNS**
- noise-free DC-EEG during (navigated) **TMS**
- noise-free DC-EEG during **fMRI**

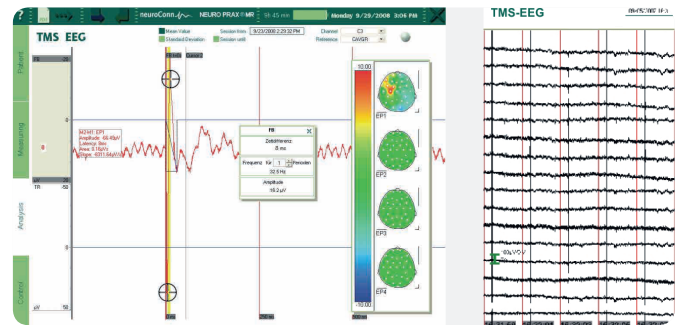
Researchers and clinical users also require further detailed understanding and expertise in the methodical aspects of these applications in order to:

- avoid amplifier saturation
- reduce induced current into electrodes and cables
- prepare the skin properly
- interpret the artefacts and their elimination

Please refer to the **neuroCademy** section (over-leaf) for more information regarding training and education.



A worldwide unique solution for neuroscientists: The DC-STIMULATOR PLUS combined with the NEURO PRAX® TMS/tES provide artifact-free EEG-tACS.



NEURO PRAX® TMS/tES: short recovery times of 3 - 5 ms after the TMS pulse allow correction of TMS-induced artefacts in realtime for all channels.

## Noise-free EEG during tES: The world-wide unique neuroCare solution

Why combine EEG with tES (tDCS, tACS, tRNS)?

- tES-EEG for functional neuroimaging in science and clinic
- detailed understanding of tES-induced effects in motor and non-motor regions
- detailed understanding of local and network effects of tES
- discover brain-behavior relationships
- guiding tES input parameters by monitoring brain states

The neuroConn DC-STIMULATOR PLUS and NEURO PRAX® TMS/tES work hand in hand to provide noise-free EEG while stimulating the brain with tDCS and even with tACS. The DC-STIMULATOR PLUS delivers a galvanically isolated reference signal of the applied stimulation, whilst NEURO PRAX® eliminates the stimulation-induced artefacts from all EEG channels in real time using an innovative correction software. The high dynamic range of 219 mV allows to record brain signals during tES without the EEG-amplifier going into saturation.

## Simultaneous EEG with TMS, even in combination with neuronavigation

Why combine EEG with TMS?

- TMS-EEG for functional neuroimaging
- better insights into cortico-cortical and interhemispheric interactions
- more direct assessment of cortical inhibitory processes
- deeper understanding of cortical plasticity
- prospects of clinical applications

Furthermore, NEURO PRAX® integrates with **Brainsight TMS Navigation** and **Brainsight NIRS** by Rogue Research for navigated EEG-TMS. This setup ensures the accuracy of coil placement and constant coil location over several sessions or in multiple sessions in TMS experiments.

## Relevant scientific references demonstrating the methods of combining EEG with NIBS:

- EEG-NIBS: Bergmann T. O. et al., NeuroImage, 2016; Thut G. et al., Clin Neurophysiol., 2017
- EEG-tACS: Schlegelmilch F. et al., Clin Neurophysiol., 2013; Helfrich R. F. et al., Curr Biol., 2014
- TMS-EEG: Rogasch, N. C. et al., Hum Brain Mapp, 2013; Herring J. D. et al., J Neuroscience, 2015; Mäki H. et al., NeuroImage, 2011

### COURSES & TRAINING

neuroCademy  
Training & Science



neuroCademy courses offer in-depth knowledge on the scientific application of neuromodulation and its combinations with neuroimaging techniques, e. g. multichannel tES, EEG-TMS, EEG-tDCS, EEG-tACS and navigated\*. Furthermore, our experts provide technical supervision for your research and support you with their methodical expertise.

\* EEG-TMS

Details and dates: [www.neurocademy.com](http://www.neurocademy.com)

neuroCare Rindermarkt 7 | 80331 Munich | Germany  
 telephone +49 89 215 471 2995  
 e-mail [sales@neurocaregroup.com](mailto:sales@neurocaregroup.com)  
 web [www.neurocaregroup.com](http://www.neurocaregroup.com)

Distributor: