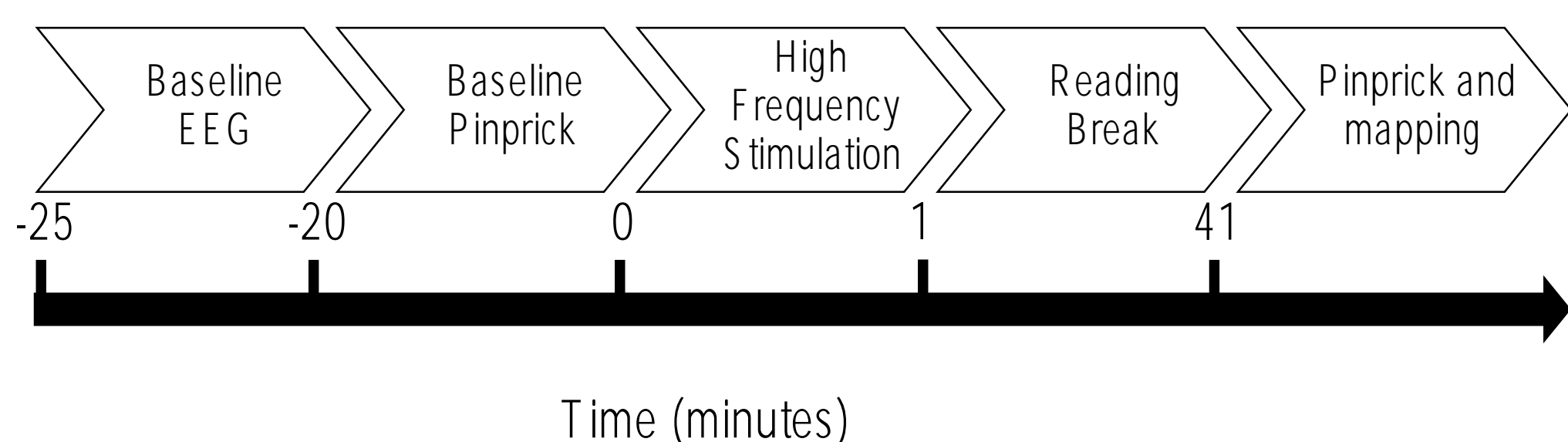


Background and aims

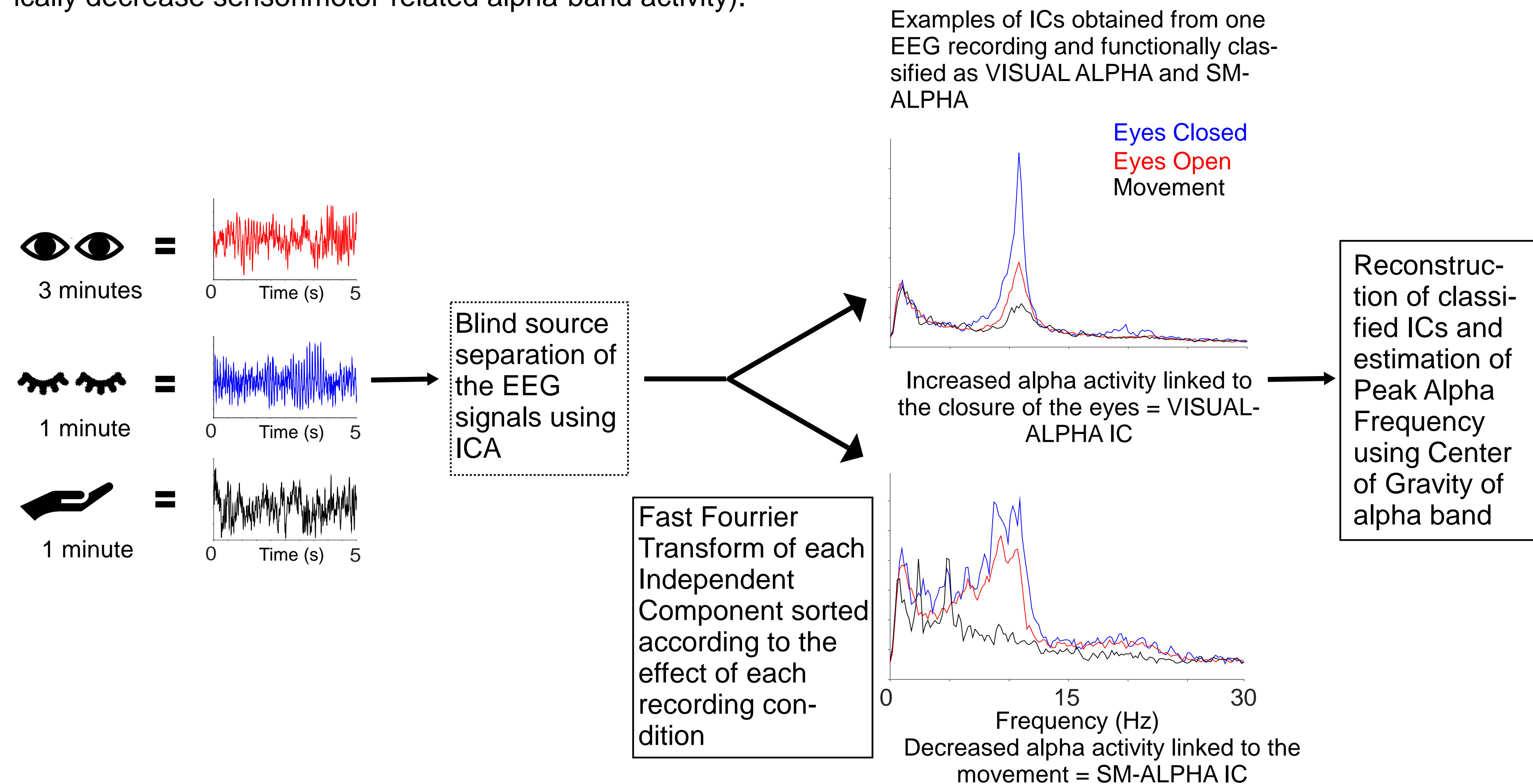
A negative relationship has been reported between Peak Alpha Frequency (PAF) recorded in pain-free healthy volunteers and subsequent intensity ratings to experimental pain (1). As changes in the state of the central nervous system may also modulate the susceptibility to develop central sensitization, the aim of the present study was to test whether PAF recorded in healthy volunteers predicts the strength of the secondary mechanical hyperalgesia induced by high-frequency electrical stimulation of the skin (HFS).

Methods

The baseline EEG (64 channels) was recorded in 32 right-handed healthy participants (16 women), aged 25 ± 4.5 years (mean ± SD).



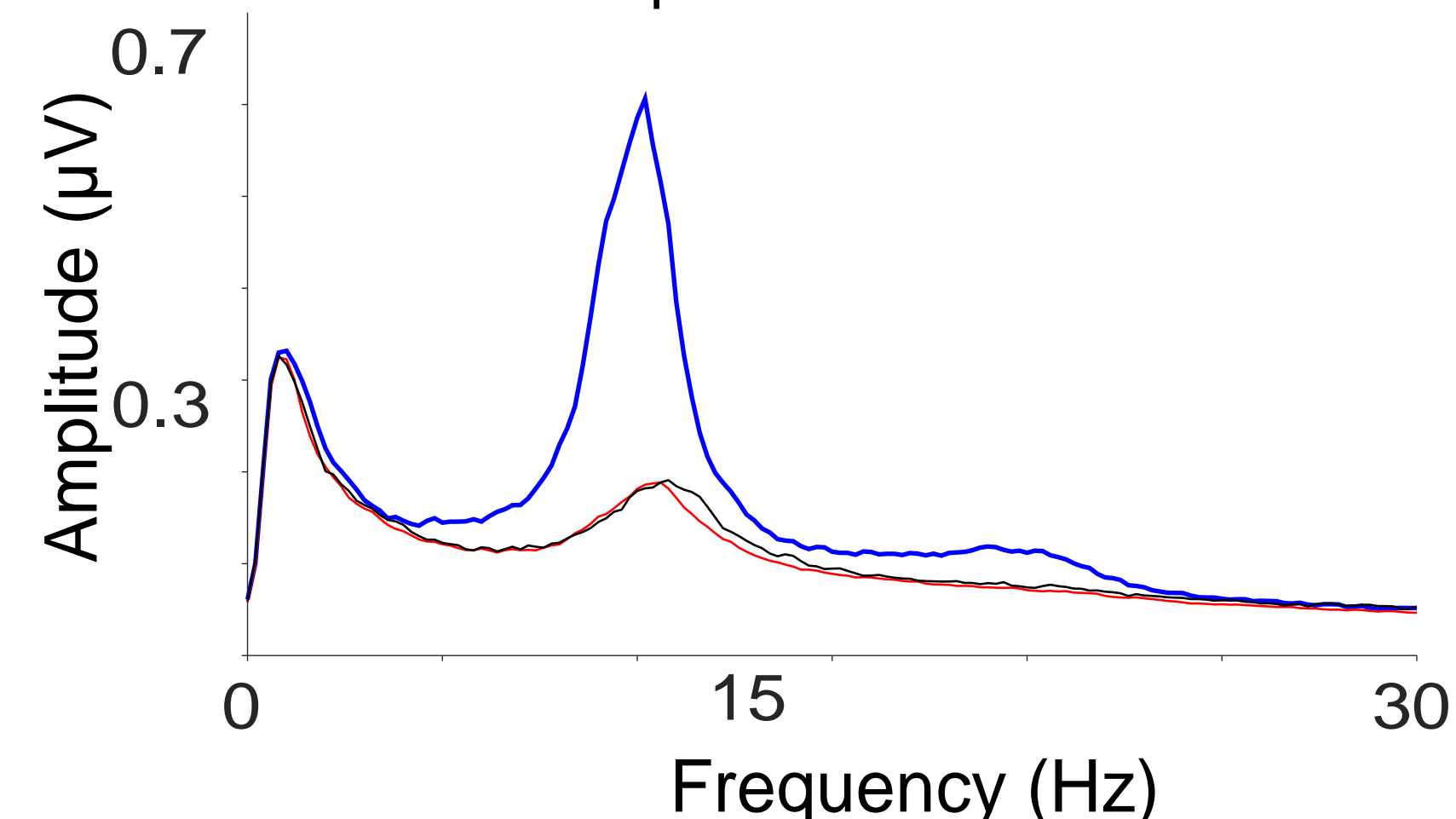
5-minutes EEG was recorded at baseline consisting of 3 minutes of Eyes Open, 1 minute of Eyes Closed (known to specifically enhance posterior vision-related alpha-band activity) and 1 minute of bilateral finger movement (to specifically decrease sensorimotor-related alpha-band activity).



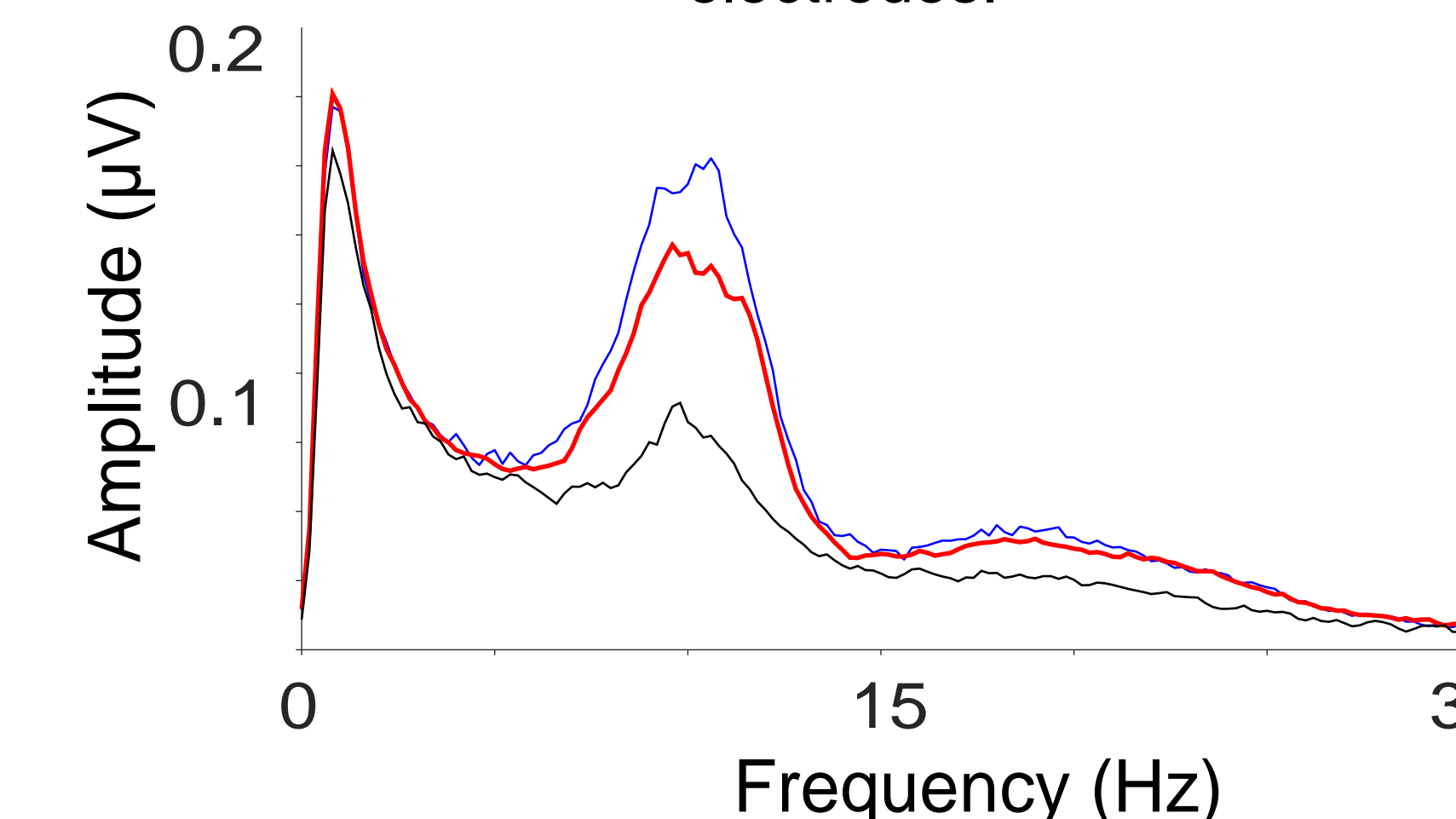
HFS was used to induce secondary hyperalgesia. It was applied on the skin 10 cm distal to the cubital fossa on right volar forearm. It consisted of 5 trains of electric pulses (100 Hz) separated by a 9-s break. The intensity of stimulation was 20 times detection threshold of single pulses (DT: 0.126 ± 0.045 mA; Mean ± SD). Mechanical pinprick sensitivity was assessed 41 minutes after HFS using a 128 mN pinprick probe before HFS and 41 minutes after HFS, at the sensitized and contralateral forearm. We evaluated change in perceived intensity to pinprick stimuli using the averaged rating of 3 stimuli (NRS) and the extend of the cutaneous area of increased pinprick sensitivity.

Results

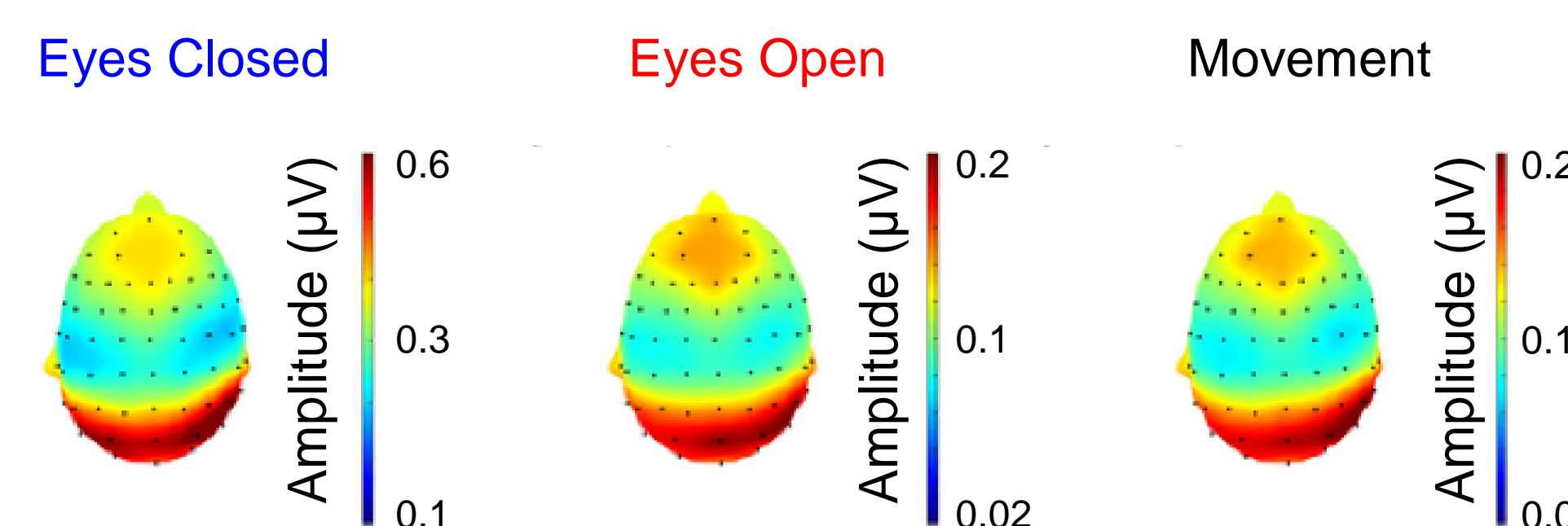
Reconstructed spectrum of VISUAL-ALPHA signals in pooled occipital electrodes.



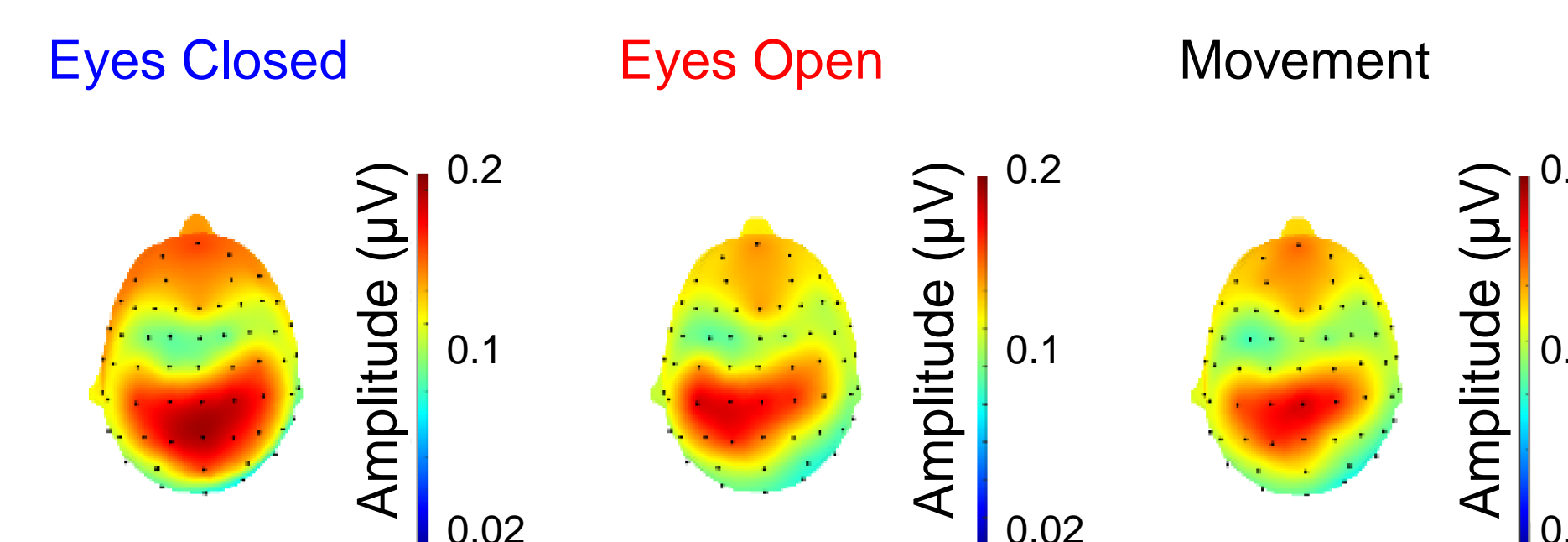
Reconstructed spectrum of SM-ALPHA signals in pooled central electrodes.



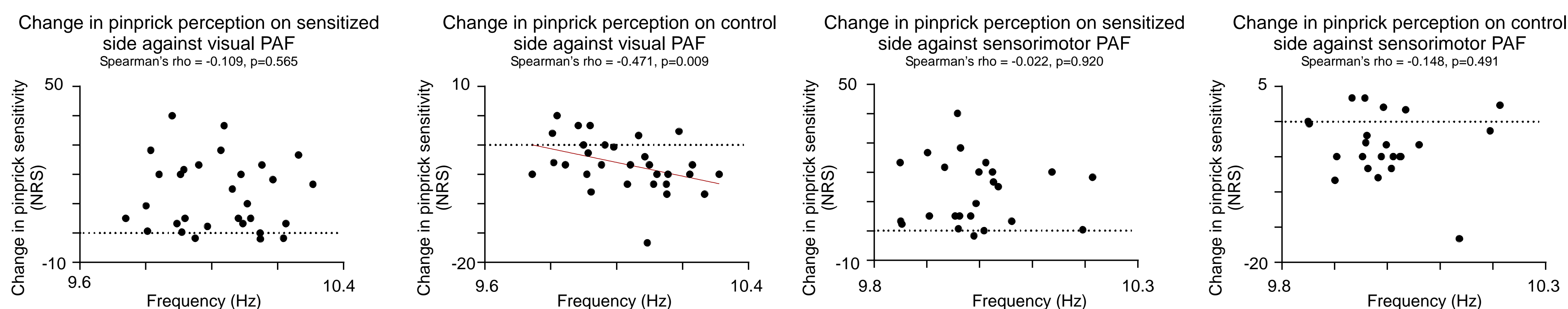
Scalp topography of VISUAL-ALPHA reconstructed signals.



Scalp topography of SM-ALPHA reconstructed signals.



We successfully managed using ICA to dissociate and evaluate separately vision-related alpha-band activity (VISUAL-ALPHA) and sensorimotor-related alpha-band activity (SM-ALPHA). This separation based on amplitude modulation during the different conditions reveals a clearly different and concordant scalp topography.



Sensorimotor PAF was not correlated with the change in pinprick sensitivity neither on sensitized arm nor on control arm. Visual PAF was only correlated with the decrease in pinprick ratings on control side (Rho = -0.471, p=0.009).

Conclusion

Our results do not provide evidence for a relationship between PAF at baseline and the susceptibility to develop central sensitization following HFS. However, our results do suggest a relationship between PAF and perceptual habituation to repeated mechanical noxious stimulation.

1. Furman et al. *Neuroimage*, 203-210 (2018).

The authors have no conflict of interest to declare.

This study was supported by a funding from the Innovative Medicines Initiative 2 Joint Undertaking under grant agreement No [777500]. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation program and EFPIA. www.imi.europa.eu; www.imi-paincare.eu. The statements and opinions presented here reflect the author's view and neither IMI nor the European Union, EFPIA, or any Associated Partners are responsible for any use that may be made of the information contained therein.