

Positive (PBR) and negative (NBR) haemodynamic responses (relative to baseline) are arising during stimulation. Functional magnetic resonance imaging (fMRI) signals only indirectly reflect the haemodynamic signatures of neural activity fluctuations, and the relation between these fluctuations and fMRI responses remains poorly understood. Two components of gamma frequency band (oscillatory narrowband (60-80Hz)-NBG; non-oscillatory broadband (60-150Hz)-BBG) are reported, mainly from invasive animal studies. The contributions of gamma signals to PBR in activated and to NBR in deactivated brain regions are still under debate. Here, we will replicate and extend Kupers et al., 2018 which was first to obtain separable gamma signals in humans with magnetoencephalography (MEG). We seek to identify and manipulate interaction between the power of neural activity and haemodynamic responses to 3 sensory tasks: black/white checkboard on high or low contrast; high or low spatially randomised black/white gratings, and auditory detection task. Published noise-pool algorithm (Kupers et al., 2018) will be applied on MEG data, the extracted time-courses will be compared to recorded PBR and NBR in visual cortex. We expect unilateral visual field stimulation will elicit gamma event-related-synchronisation with co-varied PBR appearance in contralateral hemisphere and decrease alpha, beta power in both hemispheres. We hypothesise ipsilateral alpha, beta and gamma event-related-desynchronisation will be associated with amplitude changes of NBR. We seek to observe different sensitivity of NBG and BBG to various contrast-levels and types of visual stimuli. Findings are assumed to support the theory of different neuronal source originations and contributions of NBG and BBG to PBR and NBR.

REFERENCE

Kupers, E. R., Wang, H. X., Amano, K., Kay, K. N., Heeger, D. J., & Winawer, J. (2018). A non-invasive, quantitative study of broadband spectral responses in human visual cortex. *PloS one*, 13(3).