# Free Communications: Abstract 4

## Age-related differences in the dynamics of cortical excitability and cognitive inhibition during prolonged wakefulness

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**Objective**. The regulation of human wakefulness by sleep homeostasis and circadian processes changes with age. Cortical excitability, i.e. cortical neuron responsiveness to stimulations, is regulated by sleep homeostasis and the circadian clock. Here, we explored age-related change in cortical excitability dynamics and its relation to cognitive performance modulation.

**Methods**. 13 healthy young (23 mean age; 5 women) and 13 elderly participants (63 mean age; 7 women) followed a 36h sleep deprivation protocol under constant routine conditions, during which they underwent 9 EEG recordings of TMS-evoked potentials. Cortical excitability was inferred from the amplitude and slope of the first component of TMS-evoked potentials over the supplementary motor area (SMA), a frontal brain region sensible to sleep loss. Every two hours, participants performed an inhibitory Go/Nogo task. The percentage of false positive answers to Nogo trials was used to estimate motor response inhibition. Interpolated inhibitory and cortical excitability measures were then correlated.

**Results**. Cortical excitability showed a main effect of phase (p=.0001) and a significant phase*group interaction (p=.04). Nogo false positive answers showed a main effect of phase (p=.0004), a tendency for a main effect of group (p=.06) and a significant phase*group interaction (p=.002). Furthermore, cortical excitability significantly correlated with Nogo false positive answers (r=.15; p=.02, irrespective of phase and group).

**Conclusion**. Data indicate that aging affects the dynamics of cortical excitability and inhibitory cognitive processes during prolonged wakefulness. Results further show that these changes are partly correlated, suggesting a link between cognition and underlying cortical function.