Contribution ID: **4** Type: **Talk**

Cardio-audio regularity encoding during human wakefulness, sleep and coma

Friday, July 22, 2022 2:50 PM (20 minutes)

The human brain can encode temporal regularities based on synchronizing sound onsets to the ongoing heartbeat. Here we investigated whether cardio-audio regularity processing can occur in the absence of perceptual awareness by administering auditory sequences while recording continuous electrocardiography and electroencephalography in a cohort of comatose patients (N=65) i.e. in a deep unconscious state, and in a group of healthy individuals during sleep (N=26). We investigated the neural and cardiac correlates of violated auditory prediction by administering a series of sounds which were unexpectedly interrupted by random omissions. Sounds could occur in synchrony with the ongoing heartbeat or at a fixed pace (isochronous) or at variable interstimulus intervals and in asynchrony with the ongoing heartbeat (asynchronous). In coma survivors, unexpected omissions elicited a neural surprise response only in the synchronous condition at -99-114 ms and 225-391ms following omission onset. Patients with poor outcome did not exhibit evidence of preserved omission responses. In healthy individuals during N2 sleep, we observed a modulation of the neural response to unexpected omissions within the synchronous auditory sequences at -99-117 ms and 322-500 ms and within the isochronous sequence at 83-226ms after omission onset. In healthy individuals, cardio-audio regularity encoding was further demonstrated by a heartbeat deceleration upon omissions in the synchronous condition only across all vigilance states. Cardio-audio regularity encoding can occur in the absence of consciousness and is largely preserved across all vigilance states. The degree of preservation of cardiac and auditory integration represents a potential biomarker for coma outcome prognostication.

Primary authors: Dr PELENTRITOU, Andria (Lausanne University Switzerland); Dr PFEIFFER, Christian (University of Zurich, Switzerland); Dr ITEN, Manuela (Inselspital, Bern, Switzerland); Dr ZUBLER, Frédéric (Inselspital, Bern, Switzerland); Prof. SCHWARTZ, Sophie (University of Geneva, Switzerland); DE LUCIA, Marzia (Lausanne University Switzerland)

Presenter: DE LUCIA, Marzia (Lausanne University Switzerland)

Session Classification: Final Session

Track Classification: Predictive Processes and Statistical Learning