

The dynamics of brain-behaviour processes related to memory in paediatrics

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A few studies have suggested a contribution of offline pre- or post-learning functional brain connectivity (FC) processes (i.e. intrinsic resting-state or sleep-dependent FC processes) in the acquisition of new memories in children. Still, despite its relevance for cognitive development, no study has characterized the associated dynamics of memory-related FC processes in children. In this presentation, I will introduce the research that we are conducting in the lab to fill this gap by investigating, using magnetoencephalography (MEG), the sequence of brain-behaviour processes associated with the construction

of new declarative (i.e. facts and events) or procedural (i.e. sensori-motor and/ or sequential skills) memories in typically and atypically developing school-age children. I will present original MEG results suggesting that declarative memory formation in children critically rely on a dynamic modulation of theta-band (4-8 Hz) FC processes during cued recall, with sleep having a specific impact on the reorganization of associated mechanisms. Finally, I will show how such findings open up novel avenues to investigate the pathophysiological brain processes underlying memory deficits in children with neurodevelopmental or brain disorders (such as in childhood epilepsies or learning disorders), linking atypical FC processes, cognitive disturbances and impaired plasticity processes throughout development.