Conference Agenda

Session

T701: THEMATIC SESSION: Biological foundations of cognitive and socio-emotional development

Time: **Wednesday, 27/Aug/2025: 10:30am - 12:00pm**   *Location:* **GAMMA**
Session Chair: **Vera Mateus**

Presentations

Association between brain activation and behaviour during joint attention interactions in 10-month-old infants using high-density fNIRS

Vera Mateus[1], **Mónica Sobral**[1,2], **Ana Ganho Ávila**[1], **Sara Cruz**[3], **Ana Osório**[2]

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Joint attention typically emerges around 9 months of age and refers to the infant's ability to coordinate attention with a social partner towards an event/object (e.g., a toy). Neuroimaging studies with adults suggest the involvement of several brain networks, such as the dorsal and medial prefrontal cortex and temporal-parietal junction to process joint attention interactions. Studies with infants are still scarce and have some shortcomings, as they have mostly measured the electrical activity of the brain, have studied infants when the ability is already more established in their behavioural repertoire, or did not collect simultaneous behavioural data of infant's joint attention. This study aims to examine the association between brain activation and behavioural manifestation of joint attention at 10-months, when the ability is emerging. Participants are 10-month-old typically developing infants (data collection ongoing). We expect a sample size of 25 infants with complete data assessed by the time of the presentation. A high-density fNIRS device is used to measure bilateral brain activation in the prefrontal cortex, superior temporal sulcus, and temporoparietal junction while the infant interacts with a female researcher. The infant-researcher interaction includes three conditions: Joint Attention (the researcher shows a picture book to the infant while making eye contact, using gestures, smiling, and labelling the pictures); Dyadic Interaction (the researcher sings nursery songs and performs hand actions/games while making eye contact and smiling to the infant); and No Interaction (the researcher stays in silence while holding a toy in front of the infant (no eye contact with the infant). Responding to joint attention and initiating joint attention behaviours are assessed through the Early Social Communication Scales (ESCS). This study will support the identification of typical neural signatures of joint attention which may, in turn, assist early screening for neurodevelopmental disorders.

Developmental Changes in Oscillatory Measures and Language Skills: An infant EEG study

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This study examines resting-state EEG (rs-EEG) oscillatory power and functional connectivity (coherence) within the first year of life and their links to later language development. Rs-EEG power and coherence offer insights into the neural mechanisms of cognition and language, with different frequencies supporting specific cognitive functions and brain network communication. Previous cross-sectional work suggests a relationship between infant rs-EEG power and later language development and has highlighted some of the factors that might influence this relationship (e.g., SES and home language environment). However, little is known about how rs-EEG measures evolve over development, and whether individual early brain maturational changes relate to later language skills. Thus, this study asks two key questions: (i) Do rs-EEG power and coherence change in the first year (between 6, 9, 12 months of age) and do they correlate with later language abilities in the second year? (ii) Do we observe individual trajectories and are these modulated by environmental factors?

Three-minute each session rs-EEG recordings were recorded from Dutch monolingual infants in a longitudinal design, alongside family-background data and language measures at 12, 18 and 24 months of age. We predict to observe increases in theta and alpha power and greater coherence over time, and to find relationships to language skills/growth in the second year.

Preliminary results from a subset of the sample (88 participants across the three early timepoints) revealed increases in medial-frontal theta and central-posterior alpha over time, consistent with previous research, but no changes in coherence. Analyses also indicated correlations between the alpha effect and turn-taking at 12 months, highlighting early brain influences on communicative skills. The current study will expand on these findings by analysing a bigger sample (129 participants) and look at correlations to language across the second year of life, i.e., up and including the 24 months measure.

ASSOCIATION BETWEEN PRETERM BREASTMILK MELATONIN CONCENTRATION AND PSYCHOSOCIAL FACTORS AT BIRTH (ProMote)

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Background and aims: Melatonin in human milk is important for infant neurodevelopment. Preterm birth leads to sudden interruption of transplacental transfer of melatonin that normally takes place during the last part of pregnancy. Breastmilk is the only source of melatonin for the preterm neonate during the first months of life. Contradictory evidence on the way breastmilk melatonin concentration is associated with psychosocial factors shows a general trend for stress, fatigue, and negative mood to be associated with higher melatonin in morning milk samples although laughter increased the levels of breastmilk melatonin in healthy mothers. The aim of this study is to explore the psychosocial factors that may be associated with preterm breastmilk melatonin concentration immediately after birth.

Methods: The study included 64 mothers, and their preterm neonates (<37 weeks) (NICU, University General Hospital of Heraklion) (Mean [SD] gestational age: 33.7 [2.0] weeks). Mothers collected 5-10 ml of nighttime breast milk using an electric pump at three time points: 3rd-5th day (colostrum), 10th-14th day (transitional milk), and 20th-28th day (mature milk). Melatonin levels were measured using an ELISA kit. Within the first 3 days postpartum, maternal psychosocial factors were assessed, including depressive symptoms (*EPDS*), anxiety (STAI), and family functioning (FACES-*IV*).

Results: A total of 64 mothers provided breast milk at three time points: 3rd-5th day (n=55, Mean [SD]=19.7 [14.7]), 10th-14th day (n=47, Mean [SD]=24.3 [22.7]), and 20th-28th day (n=42, Mean [SD]=21.5 [19.4]). Preliminary findings show a trend for a positive association

between postnatal anxiety/depression and melatonin levels in colostrum breastmilk (r=0.193 and r=0.153). Higher maternal postnatal depression/anxiety correlates with increased melatonin concentration.

Conclusions: Despite sample size limitations, higher maternal anxiety and depression have been correlated with increased melatonin concentration in colostrum breastmilk. Further research is needed to confirm this trend and explore its potential impact on neonatal development.