Analysis of gut microbiota in patients with schizophrenia: Focus on cognitive performance and psychopathology

Presidential Symposium

From Mother to Child: Importance of the Perinatal Period

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Mother’s environment and physiology during the perinatal period are critical for influencing both maternal and child outcomes over time at various levels of analysis, from molecular to behavioral. Previous studies emphasize the importance of maternal characteristics, such as stress, mental health, and BMI, to influence maternal and child physiology, health and behavior. Additional factors, such as sex, early life stress, and postnatal environment may further moderate these associations. In this Presidential Symposium, researchers present findings from perinatal cohorts in UK, USA and Turkey to highlight the mechanisms by which maternal perinatal environment programs the long-term well-being and health of the mother and the child.

The symposium will start with Catherine Monk (Columbia University, USA) presenting evidence on the impact of maternal prepregnancy BMI on maternal physiology, epigenetics and mental health as well as fetal heart rate measures. Elif Aysimi Duman (Bogazici University, Turkey) will continue discussing how maternal early life stress together with maternal perinatal mental health may contribute to similar changes in maternal physiology and infant outcomes. Following these presentations of the detrimental effects, Elysia Poggi Davis (University of Denver, USA) will provide evidence on how these effects may be improved at both the physiological and behavioral levels through a psychotherapy intervention designed for pregnant women. ISPNE President Carmine Pariante (King’s College London, UK) will conclude the symposium by presenting findings from a longitudinal UK cohort on the long-term impact of maternal perinatal mental illness on mother-infant attachment, as well as on child development and mental health.

https://doi.org/10.1016/j.psyneuen.2023.106123

Abstracts

Impact of Maternal Mental Illness on the Mothers and the Children: A 7-9 Years Follow-Up Study

Carmine Pariante

The Psychiatry Research and Motherhood (PRAM) study is a cohort of 300 pregnant women (and their babies), half of whom had a mental disorder (major depression or bipolar disorder) in their personal history or during pregnancy. Mothers were assessed in pregnancy, and both mothers and babies were assessed in the first year postpartum; additional data is currently been collected as follow-up of these mothers and their children again, now that children are aged between 7 and 9. Our published findings show that women who suffer from a mental disorder, even if preceding pregnancy, have difficulties in the interaction with their infant in the first year of life, which then continues to be present 7-9 years later. In fact, in analysing the data at age 7-9 that we have so far, we have found that when compared with children in the control group, children born from mothers who were depressed in pregnancy showed higher levels of non-secure attachment, indicating difficulties in their relationship with the mothers. 23% of these children were also referred to child and adolescent mental health services compared to only 8% of children in the control group. Cortisol secreted in saliva during a stressor task was more pronounced in the children born from depressed mothers; furthermore, female children within this group demonstrated reduced performance at cognitive tests of memory and attention. The data we’ve collected indicates that mental health problems measurable in children at around the age of 7-8 can be predicted by maternal depression during pregnancy, or a difficult mother-infant interaction in the first year of life.

https://doi.org/10.1016/j.psyneuen.2023.106124

The Epigenetic Link of Perinatal BMI to Maternal Phenotype and Fetal Heart Rate

Catherine Monk, Sameera Abuaish, Seonjo Lee, Tianshu Feng

Background: Obesity is a metabolic stressor associated with a suboptimal physiological milieu including an inflammatory state and a dysregulated stress axis. Perinatal maternal BMI impacts pregnancy and birth outcomes along with child metabolic and neurodevelopmental health that are believed to be mediated by epigenetic mechanisms.
Methods: Our research examines the impacts of pre-pregnancy BMI in a cohort of healthy pregnancies (n = 187); first, by characterizing maternal phenotype throughout pregnancy, including her stress physiology (diurnal salivary cortisol), inflammatory status (blood cytokine levels), perinatal depression (EPDS scores), and the underlying epigenetic signature (DNA methylation) in blood that could mediate these effects. Second, we examine the effects of pre-pregnancy BMI on fetal heart rate measurements as an early marker of programming effects of altered autonomic nervous system and the associated placental DNA methylation with a focus on sex-dimorphic effects. Finally, we explore the impact of increasing the allostatic load of high BMI with stress, which was phenotyped in women early in pregnancy driven by data with 27 variables assessing psychological and physical health, on differential placental DNA methylation.

Results: To date: regional analysis revealed about 4500 differentially methylated regions (DMR) overall in response to high BMI. Gene ontology enrichment analysis revealed that DM genes annotated to these DMRs were enriched for biological processes involving inflammation in males and RNA silencing in females.

Conclusion: This work highlights that the metabolic stress associated with BMI could leave a molecular fingerprint that mediates other maternal physiological and psychological outcomes, which in turn program the fetal neurodevelopmental outcomes.

Testing the Benefits of Reducing Prenatal Maternal Depression for Maternal and Infant outcomes: A randomized controlled trial
Elysea Poggi Davis, Catherine H. Demers, Ella P. Hennessey, Robert J. Gallop, Nancy K. Grote, Sarah ED Perzow, Mary Curran, M. Camille Hoffman, Benjamin L. Hankin

Background: Depression is one of the most common prenatal complications affecting 13 to 40 percent of pregnant individuals. Prenatal depression has far-reaching implications for both the mother and for the next generation, including premature birth, dysregulation of stress physiology, developmental delays, and vulnerability to psychopathology. Despite this clear need, there is a dearth of available and efficacious prenatal interventions. Further, few studies have evaluated physiological pathways by which reducing maternal depression may benefit the fetus. The Care Project uses a randomized controlled trial design (RCT) to test a culturally sensitive psychotherapy intervention (brief interpersonal therapy) designed for pregnant individuals (MomCare). Effects of the intervention on both psychological well-being and neurobiological processes will be assessed.

Methods: This RCT included 234 pregnant participants [119 enhanced usual care (EUC) and 115 active treatment (MomCare)]. Depression symptoms were assessed at baseline and throughout gestation; Symptom Checklist-20. Prenatal maternal cortisol and placental corticotropin releasing hormone and infant brain and behavioral markers also were assessed.

Results: Analyses were conducted using an intent to treat design by a biostatistician blind to condition. Employing hierarchical linear modeling, analyses revealed a significantly faster rate of decrease in depression symptoms over pregnancy between the MomCare (8.9 pts) and EUC (3.1 pts) groups, t(229) = 3.77, p = 0.0002, medium effect size (D = 0.50, 95%CI 0.16-0.84).

Conclusions: The prenatal intervention, MomCare, resulted in a meaningful reduction in prenatal maternal depression symptoms. Next steps include testing the hypothesis that reducing maternal prenatal depression will influence both prenatal biological pathways and infant neurodevelopment assessed through age 4.

https://doi.org/10.1016/j.psyneuen.2023.106125

The Role of Maternal Early and Perinatal Stress on Maternal and Infant Outcomes in BABIP birth cohort
Elif Aysimi Duman

Background: Early life stress is associated with health outcomes across the lifespan, with potential intergenerational effects on the child, partly through altered maternal physiology and mood during the pregnancy. BABIP prospective birth cohort from Turkey investigates how maternal early life and perinatal stress are associated with maternal stress physiology and infant outcomes. In this talk, the interaction between maternal early and perinatal stressors on maternal cortisol and inflammation levels during pregnancy, as well as on infant birth and developmental outcomes will be presented.

Methods: Participants were 193 women recruited during the second trimester of pregnancy (Mage = 32.49, SDage = 4.02) and their infants. Sixty-two percent of women were recruited during the COVID-19 pandemic. Maternal early life stress, perinatal mood, stress physiology (salivary diurnal cortisol, plasma CRP) and infant birth and development outcomes were assessed across the perinatal period.

Results: Maternal early adversity was significantly associated with all perinatal mood measures, while being pregnant during the pandemic influenced perinatal mood mainly in the 3rd, but not 2nd trimester. Maternal early adversity was also associated with maternal prenatal cortisol and CRP measures and infant outcomes, some of which were moderated by perinatal mood and timing during pregnancy.

Conclusion: The results support literature on long-term impact of early life stress that may be reflected across generations and moderated by perinatal stress.

https://doi.org/10.1016/j.psyneuen.2023.106127

Oral Presentation

Analysis of gut microbiota in patients with schizophrenia: Focus on cognitive performance and psychopathology
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Background: Recent studies suggest the involvement of aberrant gut microbiota composition in the pathophysiology of schizophrenia. Some studies have also shown the association of gut microbiota alterations with psychopathological manifestation of schizophrenia.