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Iron supply in pregnancy – a model to establish research exchange, high level education and cooperation with India

DAAD

CMC Vellore

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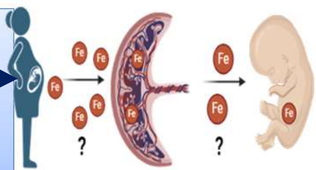
HEIDELBERG UNIVERSITY HOSPITAL

1. What did we set out to do?

Iron homeostasis in pregnancy – many unanswered questions

Research questions

Inflammation
Anemia
Iron deficiency
Vit D deficiency
Gestational diabetes mellitus (GDM)



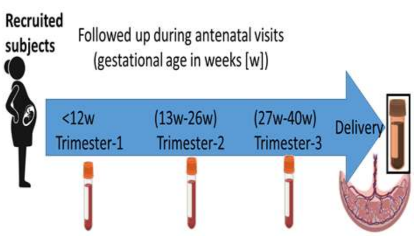
What maternal factors determine iron transfer from the mother to the fetus, in normal pregnancies?

Systemic inflammation
Iron overload

Pregnant mice (wild-type and hepcidin knock-out)

How are such determinants affected in pathological states?

2. How did we do it?



Cohort study of pregnant women, followed up from first trimester till delivery

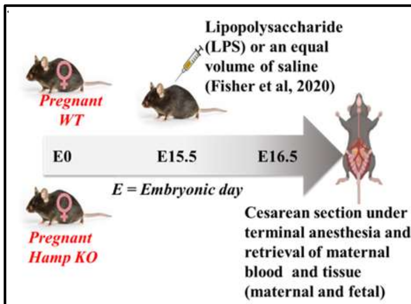
Blood samples in each trimester, cord blood and placental tissue - used to study various parameters linked to iron homeostasis

Major findings:

Maternal iron deficiency significantly affected placental proteins involved in iron uptake and transfer and resulted in lower iron status in cord blood.

Decreased expression of placental transferrin receptor was significantly associated with cord blood anemia.

Mild maternal systemic inflammation did not affect fetal iron status



Major findings:

Maternal inflammation did not affect gene expression of placental iron-related proteins.

High levels of body iron in the mother appear to be detrimental to placental and fetal outcomes as observed in Hamp KO mice.

3. Visits of medical students from Germany

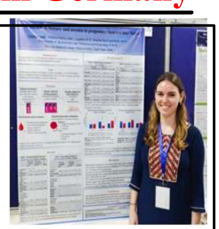
Two medical students (**Caroline Galk** and **Jannik Langbein**) from Heidelberg – underwent hands-on laboratory training x 6 months each

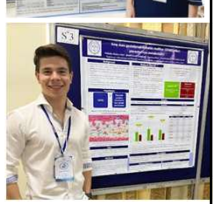
Worked on stored blood and placental samples from the cohort of pregnant women

The results of their work will form master's theses that they are in the process of writing up.

Major findings:

Women with gestational diabetes mellitus and vitamin D deficiency showed alterations in several placental proteins involved in iron trafficking and transfer to the fetus.





4. Visit of PhD trainee from India

Nikhitha John - trained x 5 months at the Center for Translational Biomedical Iron Research, University of Heidelberg.

Studied transgenic pregnant mice, with a Mutation in ferroportin (WT/C326S)

Major findings:

Hamp/Fpn axis seems to be intact and operational in fetal liver in utero, with ferroportin protein levels in fetal liver significantly higher in mutant embryos. No significant differences were found in iron-related placental parameters.

5. The symposium

A symposium was held in Vellore in Nov 2023. It showcased 12 international speakers in the field of iron homeostasis in pregnancy and linked areas, who shared valuable and important insights on the subject. This event was a culmination of the joint efforts of the team from Heidelberg and India over the past 5 years.

6. Outcomes of the collaboration

Establishment of robust collaborative links between CMC, Vellore, India and Heidelberg University, Germany, thus achieving a key goal of the "A New Passage to India" program

Work done in an area (iron homeostasis in pregnancy) that is relevant to both countries, which holds tremendous potential for future translational work.

Results from the work done have been presented at scientific meetings, both in India and abroad.

Manuscripts are in preparation for publication.

Challenges encountered

The pandemic caused major disruptions to planned visits of academics in both directions and recruitment and follow-up of pregnant women in the study.