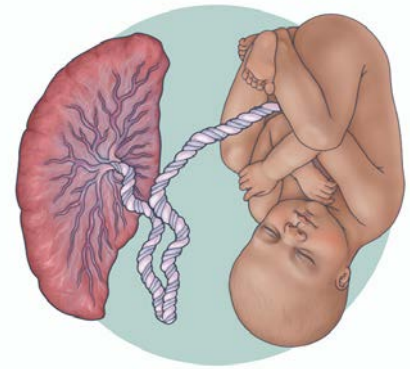


iPlacenta Newsletter

Innovation in Modelling
Placenta for Maternal
and Fetal Health



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Editorial

iPLACENTA on World Prematurity Day (17th November)

The second wave of COVID-19 and lockdowns is upon us, but the researchers have managed to achieve a balance that permits them to continue their work between the lab, the office, and their homes, staying safe and - as someone recently put it - staying sane!

Our last newsletter was produced during the height of the first lockdown and published on World Preeclampsia Day (21st May). We thought we'd bring out this one on World Prematurity Day and invite some of our early-stage researchers to explain how their work relates to dealing with prematurity. **Read their contributions on page 2.**

Featured article

Giorgione et al.: Incidence of postpartum hypertension within 2 years of a pregnancy complicated by pre-eclampsia: a systematic review and meta-analysis

Thilaganathan team, St George's, University of London | BJOG 2020 Sep 27 | <https://doi.org/10.1111/1471-0528.16545> | Online ahead of print

Women with a history of pre-eclampsia are at increased long-term risk of cardiovascular disease (CVD) and this risk is higher in women who develop preterm preeclampsia. The present systematic review found that the risk of developing chronic hypertension within 2 years of birth is six-fold higher in women who experienced pre-eclampsia compared to women with uncomplicated pregnancies. This suggests that the postpartum period is a window of opportunity to diagnose CVD and to commence targeted interventions in order to prevent major cardiovascular events later in life.

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement no. 765274

iPLACENTA early-stage researchers on prematurity

Prematurity, defined as birth before 37 weeks of pregnancy, affects 5% to 18% of pregnancies worldwide, with access to neonatal care and survival rates varying among countries (WHO: Preterm birth). It is frequently associated with adverse clinical outcomes in terms morbidity and mortality. Prematurity is a complex biological issue with a variety of possible causes. In addition to spontaneous preterm labour, a premature birth may be a necessity when the underlying condition threatens the life and health of the mother or the fetus ("iatrogenic prematurity"). Two of the major complications that accompany iatrogenic prematurity are preeclampsia and fetal growth restriction, which are the main focus of the iPLACENTA consortium.

Prematurity as a medical necessity - prematurity as a risk

Veronica Giorgione (St George's University Hospital, London): Pre-eclampsia is a multiorgan disease of the pregnancy that can be life-threatening for the mother and their babies. When pre-eclampsia affects maternal organs seriously, an early delivery ('iatrogenic prematurity') is urged in order to avoid poor maternal outcomes and maternal mortality.

The etiology of pre-eclampsia is still unknown, but a substantial involvement of maternal cardiovascular system has been demonstrated. Therefore, understanding better its impact on the maternal cardiovascular system could improve patients' care and delay the timing of delivery, for the benefit of the baby.

Gabriela Loscalzo (University Hospital La Fe, Valencia): Fetal growth restriction is the most common factor for stillborn babies, so it is important to recognise the condition so that labour may be induced when necessary. However, the low prediction rate means that labour is often induced when it needn't be, increasing the risk of medical problems associated with prematurity.

The objective of our project is the identification of markers in maternal blood of abnormal neurological development of the fetus to identify babies with fetal growth restriction, who are at increased risk of neurobehavioral problems. That would allow us to take preventive measures, for example, if a specific marker is present in maternal blood this would inform us that the fetus is suffering from lack of oxygen inside the womb, and could indicate it is time for delivery to avoid deterioration and damage to the brain.

Modelling placental disease

Agathe Lermant (University of Dundee): By mimicking biological processes happening at the start of pregnancy in the lab, my aim is to identify undiscovered molecular mechanisms that could lead to the onset of preeclampsia. Understanding those early processes could help to find treatments targeting preeclampsia at an earlier point in pregnancy and therefore improving its later outcomes.

Clara Apicella and Camino Ruano (Inserm): We are currently analyzing the molecular signatures (engraved in the DNA and RNA of the placenta) that characterize placentas coming from healthy mothers, patients with preeclampsia and fetal intrauterine growth restriction. Both of these clinical conditions can result in premature birth; therefore, a better understanding of these diseases could also shed light on the processes that contribute to premature birth.

Julia Scheel (University of Rostock): We are developing a disease map containing molecular interactions and processes within the placenta. This tool can be used in combination with experimental data, to identify new possible biomarkers and eventually, to find drug targets. This makes it a multi-purpose tool, changing its purpose with the data provided and visualized, to help scientists understand their data.

Why collaboration is essential

It is universally accepted that complex challenges cannot be solved by any one discipline in isolation. Prematurity is a complex topic and therefore studied by experts from many fields. The iPLACENTA consortium supports collaborations across research fields in the belief that, together, we can find answers faster.

SCIENCE COMMUNICATION



Image by SeppH from Pixabay

NETWORK TRAINING ACTIVITIES

Training and research online

We have successfully switched to regular online meetings and training which is organised around so-called "virtual days" arranged by institutes who are members of iPLACENTA. Fergus McCarthy and Cathal McCarthy at University College Cork (UCC) invited two fantastic speakers to talk about the patient perspective on pregnancy complications and how patient groups such as the **Irish Neonatal Health Association** (www.inha.ie) work to ensure their voices are heard for clinical research and clinical care. Following the early-stage researchers' request to learn more about placental imaging, they also invited Lisa Story (King's College) to speak on the role of **MRI in imaging the placenta** and other potential applications of this technology in obstetric research. | At Inserm / Institut Cochin, Daniel Vaiman's research team identified, among others, eight novel **imprinted genes** in the human placenta, which appear indispensable to negotiate its size, an important indicator of placental health. He delivered his talk on the subject as part of the PlacentOmics focus in iPLACENTA. | Olaf Wolkenhauer and Shailendra Gupta at the Department of Systems Biology at the University of Rostock, along with their team of trainers involved in de.NBI (German Network for Bioinformatics Infrastructure) have facilitated the ESRs' understanding of **mathematical and network modelling** and open-source tools (incl. Python, Jupyter, Galaxy, Cytoscape) for **representing data-intensive biomedical research**.

These are snapshots of early-stage researchers as they presented their results to the consortium:

What else we learned this summer

Camilla and Gwen are based at Mimetas BV in Leiden and registered as doctoral candidates at the University of Maastricht, 220 kilometres away. In that sense, the move to online study really benefits them. But of course they aren't the only ones. The opportunities to learn new skills from home have grown vastly. Clara conquered her fear of bioinformatics and learned to use R and plink to analyse her data, while experimenting with watercolours... Mirren followed interesting free seminars from the UK chapter of the Project Management Institute, while experimenting in the kitchen, finding yummy ways to replace meat with vegetables and legumes. Jana has been keeping an eye on the screen while knitting away and making some fabulous headbands!



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