

Short report NF14013: Perinatal biology course and research collaboration, University of Texas San Antonio, USA

Fetal environment – implications for health over generations The role of placenta

We are most grateful for the grant given by NFOG that made our 1 month stay (25.04-26.05.14) in San Antonio Texas at the University of Texas Health Science Center (UTHSC) possible. During this stay we further developed the collaboration we have established with the Jansson/Powell group studying transport proteins and intracellular nutrient sensing systems in the human placenta. In addition we attended the 2014 Translational Perinatal Biology Course April27-May3 2014.

25 participants from all over the world with different backgrounds, all working in the field of perinatal medicine, attended this excellent course in translational science. We had lectures from several of the leading researchers in this field and also enjoyed their mentorship during group work. In addition the course provided hands on training in laboratory techniques. The course went through different basic science techniques used to bring insight to placenta function, fetal development and fetal programming. The course focused on the use of animal models, molecular and cellular studies in this aspect. We also learned about the design and execution of clinical studies. The course tried to illustrate how these study techniques brought together can give us new insight and ultimately therapeutic alternatives. The course provided group work where participants of diverse backgrounds came together to turn research ideas into design of mechanistic translational studies and to write succinct summaries and grant proposals to present the ideas. It was a truly inspiring course and as clinicians working with a translational research project it was an eye-opener in many ways.

The remaining 3 weeks we spent in the laboratory of the Powell/Jansson group at UTHSC analyzing the placenta samples from our cross sectional study of placental nutrient transfer (“The placenta 4 vessel sampling”).

We have collected blood samples from the ingoing and out coming vessels on the maternal and fetal side of the placenta from 130 healthy women to study placental nutrient transfer (“The placenta 4 vessel sampling”). We aim to study nutrient transport proteins and nutrient sensing systems in placental tissue obtained from about 30-50 of the same women. The tissue and blood samples obtained in the “four vessel project” gives us a unique opportunity to study the interaction between placental energy- sensing systems and transport of nutrients in the human in vivo.

The Jansson/Powell group is one of the leading groups in the world studying placental transport and the nutrient sensing systems in the placenta. We used the collected placenta samples from our project and learned how to separate the maternal-facing microvillous membrane and the fetal-facing basal membrane of the syncytiotrophoblast. We also learned how to determine and compare the levels of specific transport proteins expressed in these two membranes. We performed a pilot study including 9 patients with promising results.

In addition we started to work with different antibodies to quantify the activity of placental nutrient sensing systems using Western blot. The Jansson/Powell group has long experience with these studies and was able to help us target some important proteins in these pathways and to find good antibodies. Based on the work we did and the knowledge we gained, we will set up Western blot studies of these proteins in Oslo and hold these results together with our data on placental nutrient transfer.

The goal is to link placental transporter expression and nutrient signaling activity to measurements of placental in vivo nutrient transfer. This will form the basis for ongoing future studies and joint articles.

During our stay Ane Moe Holme also held a lecture in the Ob/Gyn Grand Rounds at UTHSC on the subject fetal growth and macrosomia, presenting previous research from our research group (lead by professor Tore Henriksen) as well as more clinical aspects on how we handle suspected fetal macrosomia in the Nordic countries. We were also fortunate to be able to visit the Ob/GYN ward at UTHSC and learn about their challenges both in terms of the health care system and their clinical challenges.

In sum we learned more than we could imagine both from the course and our work in the laboratory and we initiated the practical part of our collaboration with the Powell/Jansson group.

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