Report Lina Bergman, research project Cape Town, South Africa

I am very grateful that I received funding from NFOG to cover parts of my expenses during my research stay in Cape Town in December 2018 for my research project PROVE – Preeclampsia Obstetric Adverse Events. My name is Lina Bergman, I'm an obstetrician and researcher in the field of preeclampsia.
My project PROVE in Cape Town aims to study the major complications of severe preeclampsia, primarily cerebral- and cardiovascular complications. These complications are associated with most of the preeclampsia related deaths. There is a deficiency in knowledge regarding the mechanism behind these complications and there are no objective tests to predict the onset of these complications. There are also no tests to predict the short- and long-term prognosis.

I am the principal investigator of this project that joins expert preeclampsia researchers from several countries. The majority of maternal deaths related to preeclampsia can be avoided by providing timely and effective care to high-risk women. Thus, optimization of health care for women during pregnancy to prevent and treat preeclampsia, both in high-and low-income countries, is a necessary step towards achievement of the WHO 5th Millennium Development Goal; to improve maternal health. The results of the project will hopefully yield a possibility to customize treatment to specific organ involvement and facilitate surveillance and treatment of women at high risk of mortality and morbidity due to preeclampsia. In the long run, the discoveries will hopefully facilitate identification of future drug targets to protect both the maternal brain and heart on short- and long-term.

A biobank for women with preeclampsia and various organ complications (PROVE) is now recruiting women at Tygerberg hospital since April 2018, a project that will be ongoing. The first 2 years, women with preeclampsia complicated by neurological dysfunction or pulmonary edema are included where also MRI brain, cerebral Doppler measurement, cognitive function scoring, MRI heart and echocardiography are added specifically for these studies.

MRI examinations
The MRI examinations will be performed within 48 hours after enrolment. The MRI of the brain is to determine the presence of cytotoxic and/or vasogenic edema, estimate tissue perfusion, detect micro- and macro intracranial bleeds and the presence of arterial spasm. The MRI of the heart is to detect tissue abnormalities and systolic and diastolic function. This will be performed for all women with eclampsia (cerebral MRI) and pulmonary edema (heart MRI).

Cerebral perfusion pressure
The cerebral perfusion pressure will be obtained through bilateral Doppler measurements of the blood flow velocity in the middle cerebral artery with concomitant blood pressure recording. This will be performed for all women in the study.

Cognitive function scoring
The cognitive function will be assessed objectively through Montreal Cognitive assessment tool (MoCa) and subjectively through the cognitive failure questionnaire. Trained nurses will perform the interviews at discharge and at 6 months follow up.

Premonitory symptoms of eclampsia
A questionnaire of premonitory symptoms for eclampsia, established through collaboration with experts in the field and based on a recent systematic review of symptoms preceding eclampsia (unpublished data, Hastie and Bergman), has been implemented. This will be performed for all women in the study.

Echocardiography
Standard views with parasternal long- and short axis, apical four, five, two and three-chamber views, subcostal views. This will be performed for women with pulmonary edema and compared to preeclampsia and healthy pregnant controls.

Biomarker analyses
Various biomarkers such as S100B, NSE, tau, NfL, soluble FMS like tyrosine kinase (sFlt-1), soluble Endoglin (sEng), placental growth factor (PlGF) and NT-pro BNP will be considered for analyses through Enzyme linked Immunsorbent Assay (ELISA) methods. This will be performed for all women in the study.

During my stay in December 2018, I supervised a medical student, Evelina Ahlm, from Lund University, in her master thesis regarding cognitive function and eclampsia and I also worked together with one of my collaborators, Teelkien van Veen from the Netherlands who is an expert in investigations of dynamic cerebral autoregulation. We achieved sufficient sample size to perform analyses of dynamic cerebral autoregulation in eclampsia vs preeclampsia vs healthy pregnancies. I also used my time to plan the biobank further ahead regarding education of research nurses, recruitment of a new research nurse and amendements to ethics protocols together with my co-

investigator Catherine Cluver. I also agreed with the department to become an associated senior researcher to Stellenbosch University, an application that will be submitted in January.

I am now looking forward to when we will complete our recruitment of women with eclampsia and their matched controls; women with preeclampsia and women with normal pregnancies – to start evaluating the results of MRI brain, cerebral biomarkers, cognitive function and prediction models. Furthermore, in the next year we will hopefully finish the recruitment of women with preeclampsia and pulmonary edema and start analysing MRI heart results and cardiac biomarkers in this group.

Again, a huge thank you to NFOG for supporting me in my work.