

PhD Project Description

School/Department:	Department of Obstetrics and Gynaecology, Erasmus MC
Supervisor information:	<p>Dr. M. Rousian (m.rousian@erasmusmc.nl) Prof. Dr. R.P.M. Steegers-Theunissen (r.steegers@erasmusmc.nl),</p> <p>Selected publications:</p> <ol style="list-style-type: none"> 1. Steegers-Theunissen RP, Verheijden-Paulissen JJ, van Uitert EM, et al. Cohort profile: the Rotterdam periconceptional cohort (Predict Study). <i>Int J Epidemiol</i> 2016;45:374-381. 2. Rousian M, Koster MPH, Mulders AGMGJ, Koning AHJ, Steegers-Theunissen RPM, Steegers EAP. Virtual reality imaging techniques in the study of embryonic and early placental health. <i>Placenta</i> 2018;64:Suppl 1:S29-S35. 3. Steegers-Theunissen RPM, Twigt J, Pestinger V, Sinclair KD. The periconceptional period, reproduction and long-term health of offspring: the importance of one-carbon metabolism. <i>Hum Reprod Update</i> 2013;19:640-655. 4. Rousian M, Koning AHJ, Van der Spek PJ, Steegers EAP, Exalto N. Virtual reality for embryonic measurements requiring depth perception. <i>Fertil Steril</i> 2011;95:773-774.
Project Title:	<i>Preimplantation embryo quality: Periconception conditions and the development of the inner and outer cell mass of the preimplantation embryo.</i>
Abstract:	<p>Over more than three decades, extensive translational research identified strong associations between fetal growth and development and fetal programming of health and diseases in later life (Developmental Origins of Health and Disease). More recently, the focus of this research shifted to the periconception period, defined as the time window of 14 weeks before up to 10 weeks after conception, thereby covering the vulnerable processes of gametogenesis, embryogenesis and initiation of placentation. During this period, numerous molecular and biological processes are involved, such as epigenetic modification (e.g. genome wide methylation), but also unique transcriptional and translational activities. Therefore, the periconceptional period is a critical time window for exposures potentially resulting in large health effects on the lifelong postnatal phenotype. The fact that most birth cohorts start enrolment and data collection in the second half of pregnancy or at birth, thereby ignoring the periconceptional window, has also resulted in the initiation of our unique Rotterdam Periconceptional Cohort (Predict study). In this cohort we have available unique, serial ultrasound measurements from the early first trimester onwards. Morphologic parameters as well as early placentation is being studied using innovative virtual reality imaging techniques. The Predict study is designed as a tertiary hospital-based, prospective open birth cohort study, with a focus on three research areas: i. Determinants of maternal and paternal periconceptional health; ii. Reproductive performance, pregnancy course and outcome iii. Underlying molecular biological mechanisms, such as 1C-metabolism and epigenetics, but also cardiovascular and inflammatory mechanisms. The <u>aim</u> of the current project is to investigate the development of the pre-implantation embryo and the associations with markers of prenatal fetal growth and development. We will use the Embryoscope and virtual reality techniques as state-of-the-art imaging modalities to assess the development of the inner en outer cell mass of day 5 pre-implantation embryos. These measurements will be used in advanced analysis (deep learning and machine learning) to study associations with pregnancy chance and outcome.</p>
Requirements of candidate:	<ul style="list-style-type: none"> • We are looking for a highly motivated and talented student to join and enrich our international team. • Furthermore: a master degree or MD, a fair scholarship that covers subsistence allowance and international air plane ticket, good communication skills • The student should be fluent in English (English speaking countries & Netherlands: no requirement; Other countries: IELTS 7.0 (min 6.0 for all subs), TOEFL 100 (min 20 for all subs).

Application requirements & Deadlines:

<https://www.eur.nl/en/about-eur/erasmus-university-china-centre/csc-scholarship>

Erasmus MC, ranked world

* No.32 for *Clinical Medicine US News 2020*:

<https://www.usnews.com/education/best-global-universities/clinical-medicine?page=3>

* No. 30 *Nature Index for Biomedical Sciences 2019*:

<https://www.natureindex.com/supplements/nature-index-2019-biomedical-sciences/tables/healthcare>