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PhD in Medical Sciences
2016-2017

INVITATION to the Public defence of

Laetitia PETRUSSA

To obtain the academic degree of '**DOCTOR IN MEDICAL SCIENCES**'

**DNA methylation reprogramming in human
preimplantation development.**

Tuesday 23 May 2017

Auditorium **P. Brouwer**, 17:00

Faculty of Medicine and Pharmacy, Laarbeeklaan 103, 1090 Brussel

How to reach the campus Jette:

<http://www.vub.ac.be/english/infoabout/campuses>

Summary of the dissertation

Epigenetic marks such as DNA methylation allow for gene expression regulation independent of the underlying DNA sequence. During the first days of embryonic development, there is genome-wide epigenetic reprogramming that is essential for further development. Studies on human and various animal models indicate that this epigenetic reprogramming might be hampered by external and environmental factors such as those present during assisted reproductive technologies (ART).

Since most of our knowledge on reprogramming in embryos came from animal studies and species-specific differences in DNA (de)methylation kinetics had been suggested in literature, there was a need to investigate DNA methylation reprogramming during human preimplantation development. We therefore studied global DNA (de)methylation patterns together with their regulators, the DNA methyltransferases (DNMTs), in human oocytes, zygotes and embryos up to day 7 of in vitro preimplantation development.

The data obtained from human good quality fresh embryos served as reference data in studies of poor quality embryos and in safety studies investigating the impact of oocyte or embryo cryopreservation on DNA methylation reprogramming.

Appropriate DNA (hydroxy)methylation reprogramming was linked with good embryo quality up to the blastocyst stage. Global methylation patterns as well as DNMT expression patterns were disturbed in thawed embryos. The data that emerged from our experiments differed compared to the current model for DNA methylation reprogramming, largely based on mouse data, calling for an amendment of the model.

Curriculum Vitae

Laetitia Petrusa was born in Anderlecht on June 4, 1986. She obtained the degree of Master of Biomedical Sciences in 2009 at the Vrije Universiteit Brussel (VUB) with a thesis titled 'Analyse van DNA methyltransferases in menselijke eicellen en preimplantatie-embryos' promoted by Prof. Dr. Martine De Rycke of the Centre for Medical Genetics and Prof. Dr. Hilde Van de Velde of the Centre for Reproductive Medicine. She continued to work on this project and started her PhD research in October 2009. Her research focussed on the assessment of the epigenetic stability and safety of assisted reproductive technologies. The project included research on human oocytes and embryos included in this thesis, and research on epigenetic changes in placenta and cord blood of children born after assisted reproduction. Since the start of this PhD, Laetitia Petrusa has presented her work at various national and international conferences and has published the articles of her PhD dissertation in international peer-reviewed scientific journals.