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Vrije Universiteit Brussel

**Prof. Dr. Martine Cools, Promoter UGent**

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**Prof. Dr. Nico De Leu, Co-promoter VUB**

Beta Cell Neogenesis (BENE)  
Vrije Universiteit Brussel



Joint PhD VUB & UGent  
2017-2018

INVITATION to the Public defence of

**Willem STAELS**

To obtain the academic degree of

**'DOCTOR IN MEDICAL SCIENCES'**

**'DOCTOR IN HEALTH SCIENCES'**

**Modulation of VEGA-A signaling by beta cells during pregnancy and islet transplantation.**

**Wednesday 30 May 2018**

Auditorium **Piet 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>

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## Summary of the dissertation

Diabetes mellitus is a metabolic disorder characterized by chronic hyperglycemia due to depletion of the functional beta cell mass. A genuine cure for diabetes will likely rely on beta cell replacement through either transplantation or regeneration. In this thesis, we focused on the crosstalk between blood vessels and beta cells. By modulating the levels of VEGF-A, a major proangiogenic factor, we aimed to contribute to both treatment strategies.

Beta cell transplantation suffers from a large islet cell loss immediately after infusion that is at least partly due to insufficient graft revascularization. To tackle this hurdle, we transfected islet cells with mRNA encoding VEGF-A immediately prior to transplantation. We provide proof-of-concept for the ability of VEGF-A mRNA-therapy to enhance the vascularization of both mouse and human beta cell grafts.

Our understanding of beta cell regeneration remains limited. Pregnancy is a unique metabolic challenge during which adult beta cell proliferation robustly occurs in the maternal pancreas. A better understanding of adult beta cell proliferation could provide us with a regenerative therapeutic strategy. Crosstalk between endothelial cells and beta cells has been implied in this adaptive process during pregnancy. To validate this, we interfered with VEGF-A signaling during the beta cell generation phase and showed that islet hypovascularization did not preclude beta cell expansion during pregnancy.

## Curriculum Vitae

Willem Staels was born in Geraardsbergen on May 19<sup>th</sup> in 1986. He attended the Sint-Aloysius College in Ninove and majored in Science and Mathematics. In 2011, he graduated from Medical School at Ghent University and was subsequently trained in pediatrics at the AZ Sint-Jan in Brugge and the University Hospital in Ghent. In 2014, he got a PhD fellowship grant from the Flemish Research Foundation (FWO) to start a Joint-PhD under the supervision of Harry Heimberg, Nico De Leu (Vrije Universiteit Brussel) and Martine Cools (Ghent University). He combines basic science at the Beta Cell Neogenesis Lab with a clinical training in pediatric endocrinology at the Ghent University Hospital. Willem is engaged to Seline van den Aemele, they have two children and live in Sint-Jans-Molenbeek.