Board of examiners

Prof. dr. Lorenzo Piemonti
Diabetes Research Institute, San Raffaele Scientific Institute
Università Vita-Salute, Milan, Italy

Prof. dr. Pieter Gillard
Service of Endocrinology of University Hospital Leuven
Catholic University of Leuven, Belgium

Prof. dr. Thierry VandenDriessche
Gene Therapy & Regenerative Medicine
Vrije Universiteit Brussel, Belgium

Prof. dr. Isabelle Houbracken
Cell Differentiation
Vrije Universiteit Brussel, Belgium

Prof. dr. Peter in't Veld , Chair
Experimental Pathology
Vrije Universiteit Brussel, Belgium

Prof. dr. Zhidong Ling, Promotor
Diabetes Pathology and Therapy
Vrije Universiteit Brussel, Belgium

Prof. dr. Daniel Pipeleers, Co-promotor
Diabetes Pathology and Therapy
Vrije Universiteit Brussel, Belgium

VRIJE UNIVERSITEIT BRUSSEL

PhD in Medical Sciences
2018-2019

INVITATION to the Public defence of

Thomas ROBERT

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

Assessment of Functional Beta Cell Mass in Macro-Encapsulated Stem Cell-Generated Implants.

Tuesday 28 May 2019
Auditorium Piet Brouwer, 16:00
Faculty of Medicine and Pharmacy, Laarbeeklaan 103, 1090 Brussel

How to reach the campus :
http://www.vub.ac.be/english/infoabout/campuses

Summary of the dissertation

Human stem cell-derived pancreatic endoderm (PE) represents a potential source for beta cell replacement therapy in type 1 diabetes. Device-encapsulated human PE derived from embryonic stem cells (hES-PE) or from induced pluripotent stem cells (hiPS-PE) has been shown to generate insulin-producing implants in mice. These advances have led to the start of a clinical trial with device-encapsulated hES-PE to assess their safety and examine formation of beta cells in patients. Meanwhile, the therapeutic potential of encapsulated hES-PE and hiPS-PE should be assessed, in particular their ability to form and maintain a metabolically adequate functional beta cell mass (FBM). Processes that influence FBM formation in devices should also be investigated to identify targets and methods for improvement. These objectives have been addressed by the present thesis. This implied developing and implementing a combination of in vivo, in situ and ex vivo markers of beta cell number and functional maturation. In this work, we assessed these key components of the FBM in device-encapsulated human pancreatic endoderm implants and determined characteristics required for achievement of metabolic effects. We identified modifications on the graft and implant site that positively influence graft outcome, and unveiled phenomena underlying beta cell formation as potential targets for additional improvement. Findings lay the ground for further preclinical and clinical development of stem cell-derived beta cell therapy for type 1 diabetes.

Curriculum Vitae

Thomas Robert obtained a Master's degree in Biochemistry, Molecular and Cellular Biology at Université Catholique de Louvain in 2014. He then started a FWO PhD Fellowship in the Research group "Diabetes Pathology and Therapy" of Vrije Universiteit Brussel; under supervision of Prof. Zhidong Ling and Prof. Daniel Pipeleers. His thesis focused on assessing the Functional Beta Cell Mass in stem cell-generated pancreatic endoderm implants; a translational research in the context of beta cell therapy for type 1 diabetes. Throughout his thesis, Thomas Robert contributed as first or co-author to 4 publications in international peer-reviewed journals.