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Prof. Dr. Ellen Goossens, promotor

Biology of the Testis
Vrije Universiteit Brussel, Belgium

PhD in Medical Sciences
2015-2016

INVITATION to the Public defence of

Yoni BAERT

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

In vitro systems to restore male fertility following testicular tissue banking.**Monday 23 May 2016**

Auditorium **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>



Vrije Universiteit Brussel

Summary of the dissertation

Given the rapid progress in experimental fertility preservation and restoration techniques for boys facing spermatogonial stem cell loss, the prospect of a fully operational clinical program is real. Accordingly, testicular tissue (TT) banking is already being offered in several hospitals worldwide with controlled slow freezing (CSF) as the most frequently used cryopreservation method. However, this method is time-consuming and requires expensive biofreezers. In addition, fertility restoration techniques following cryopreservation are currently only fully validated in animal models, thus, more translational research is required.

In the first part of this dissertation, we assessed whether uncontrolled slow freezing (USF) and vitrification, being simple and cost-effective cryopreservation methods, are capable of cryopreserving TT. USF preserved the functionality of mouse TT and maintained the structural integrity of human TT. Importantly, as it is a crucial aspect for successful fertility restoration, in the next part of the study we tested whether human germ cells were still functional after USF by an *in vitro* propagation system. Our results indicated that human TT can be stored by USF without altering the outcome of human germ cell propagation cultures.

The final part of the thesis covers the isolation and characterization of natural human testicular matrix, and how it can be applied as a 3D culture system for the maturation of human germ cells. We found that testicular niche cells and germ cells self-assemble into testicular organoids with biomimetic activity after inoculation and cultivation on testis scaffold discs. Testicular organoids thereby represent a promising tool for future studies aiming at achieving human *in vitro* spermatogenesis.

Curriculum Vitae

Yoni Baert was born on the 9th of November 1987 in Ghent, Belgium. He followed his secondary education at the Sint-Jozefsinstituut, Ternat and graduated in 2005. The same year he started studying Biomedical Sciences at the Vrije Universiteit Brussel and fulfilled his education in 2010, magna cum laude. Subsequently, he started his PhD in the research group Biology of the Testis to specialize in male fertility preservation, supported by the Agency for Innovation by Science and Technology (IWT) and under guidance of Prof. Dr. Ellen Goossens. During his PhD, he became board member of the International Network for Young Researchers in Male Fertility and moved temporarily to Stockholm, Sweden to perform research at the Karolinska Institute. Yoni authored 5 research papers (4 published; 1 submitted) and contributed to 2 research and 1 review paper. He presented his research at several (inter)national conferences and was recently awarded for best selected oral presentation at the VFS meeting 2015. After his PhD, Yoni would like to become a postdoctoral fellow and explore tissue engineering approaches as a treatment for male infertility.