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Prof. Dr. Kris Thielemans, Co-promotor

Laboratory for Molecular and Cellular Therapy
Medical School of the Vrije Universiteit Brussel



PhD in Medical Sciences
2016-2017

INVITATION to the Public defence of

Kevin VAN DER JEUGHT

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

ASPIRE: Adjuvant-driven induction of cancer Specific Immune Responses.

Thursday 20 October 2016

Auditorium **Vanden Driessche**, 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

Our immune system can detect and destroy cancer cells. Nonetheless, some people still develop cancer, because growing cancer cells camouflage themselves as well as possible, blocking the attack of the immune system, or worse, they hijack certain cells of the immune system and turn them into cancer promoting cells. In an attempt to stop this process, scientists want to boost the immune system. This can be done through cancer immunization a.k.a. vaccination. The rationale is to provide the immune system with; *(i)* the identification card of cancer cells, tumor antigens as well as *(ii)* adjuvants, which serve as a wake-up call to alarm the immune system of the invading enemy, the cancer cells. Several cancer vaccination strategies have been developed, among which the use of cells engineered in the laboratory. Although promising so-called *ex vivo* engineered cell-based vaccines are patient-specific and therefore time and money consuming. To generate a widely applicable cancer vaccine, it is important to immediately activate the immune cells in the patient's body. In this regard, mRNA the chemical blueprint for protein production has shown great promise. Therefore, in this PhD project we evaluated two strategies to exploit mRNA for cancer immunization. We showed that mRNA can be delivered to cells in the tumor, and that mRNA encoding a potent adjuvant can boost the immune system, while incapacitating tumor-promoting cells. Moreover we evaluated lipid-based nanoparticles to deliver mRNA to cells systemically, showing activation of the immune system in part due to the inherent adjuvant-activity of the mRNA. As such we have set the first steps on a path to a widely applicable vaccination strategy.

Curriculum Vitae

Kevin Van der Jeught was born on April 26th, 1989 in Etterbeek, Belgium. He attended secondary school at the Sint-Pieters college, Jette where he majored in Science-Mathematics. In 2007, he started studying Biomedical Sciences at the Vrije Universiteit Brussel, Belgium. His master thesis, entitled « characterization of cancer stem cells in a syngeneic mouse model » was carried out in the Laboratory of Molecular and Cellular Therapy (LMCT) under supervision of Prof. Dr. Joeri Aerts. He obtained his master degree in 2012 with great distinction. He started a PhD in Medical Sciences on the topic « use of mRNA-based adjuvants to stimulate cancer-specific immune responses » at the LMCT under the guidance of Prof. Dr. Karine Breckpot and Prof. Dr. Kris Thielemans. Part of his work was carried out at the Centre de Biophysique Moléculaire of the Centre National de la Recherche Scientifique in Orléans, France under the guidance of Prof. Patrick Midoux. His PhD has been supported by grants from the IWT, the fund Germaine Eisendrath Dubois and the Doctoral Schools of Life Sciences and Medicine. The results of his PhD project have been published in seven peer-reviewed papers (four as first author), were presented at several occasions both at national and international conferences and was awarded several times, among others by the Belgian Association of Cancer Research.