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VRIJE UNIVERSITEIT BRUSSEL

PhD in Medical Sciences
2020-2021

INVITATION to the Public defence of

## Jessica BRIDOUX

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

# Radiolabeling Strategies of Nanobodies: Development of an Immuno-PET Tracer for PD-L1 Imaging.

The defence will take place on Monday, 28 June 2021 at 5 p.m.

and will be organised online

via Zoom meeting, accessible through the following link:

https://qf.vub.ac.be/redirects/PhD_defense_Jessica_Bridoux.php

and in Auditorium Vanden Driessche

**ADMITTANCE** to the auditorium will only be granted upon presentation of the personal invitation from the PhD candidate.

## Summary of the dissertation

Cancer cells are able to escape from the immune system and further proliferate by expressing a protein called "PD-L1". Treatments exist to block PD-L1 but they only show positive responses for approximately 20% of the patients. Despite the positive responses, these treatments remain expensive and potentially have undesirable side-effects on the patients. Therefore, there is a need for new tools to visualize if the host's cancer cells are expressing PD-L1, to help doctors select patients who could benefit from the treatments. Our aim is to develop a tracer that would allow whole body PD-L1 visualization by positron emission tomography (PET) imaging. This technique consists of injecting a tracer composed of a targeting molecule that accumulates at the tumor site, and composed of a radionuclide which allows detection by the scanner. In this study, the targeting molecule of interest is a Nanobody. Nanobodies are small antibody fragments found in Camelidae (e.g. Lamas, alpacas) and a Nanobody specifically recognizing PD-L1 has been selected. In this particular project we aim to couple the PD-L1 Nanobody with a radionuclide (Gallium-68 or Fluorine-18) for PET imaging and validate the tracer preclinically. Three different strategies proved efficient to couple the Nanobody with Gallium-68. When tested in preclinical models, we demonstrated that the Nanobody-tracer had excellent properties and could allow imaging of PD-L1 tumors within 80 minutes post injection. We also investigated three different Fluorine-18 labeling techniques which could also be applied to other Nanobodies in general. In view of the clinical demand and in view of its ideal properties, the Gallium-68 labeled PD-L1 Nanobody has the potential to become our next Nanobody in clinical trials.

## Curriculum Vitae

Jessica Bridoux was born on the 5th of January 1994 in Lille, France. In 2016 she obtained her Engineering diploma in chemistry from the Ecole Nationale Supérieur des Ingénieurs de Caen (ENSICAEN), in Caen, France, and a master's degree in organic chemistry at the Université de Caen Basse-Normandie (UNICAEN), France. In October 2016, Jessica started her PhD project funded by the Horizon 2020 Marie Curie Actions (PET3D) in the In Vivo Cellular and Molecular Imaging (ICMI) laboratory, under the supervision of Prof. Dr. Catarina Xavier, Prof. Dr. Vicky Caveliers and Prof. Dr. Marleen Keyaerts working on the development of a site-specifically radiolabeled Nanobody against the human PD-L1 receptor for PET immune-imaging. In the frame of this project, she spent two months at the Karolinska Institute, Stockholm, Sweden, in collaboration with AstraZeneca Goteborg, Sweden, under the supervision of Dr. Magnus Schou and Dr. Chad Elmore, where she focused on click-chemistry mediated radiofluorination.

Jessica Bridoux is author of five peer reviewed publications, of which two as first author. One last-author manuscript has been accepted. She presented her work at various international scientific conferences.