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VRIJE UNIVERSITEIT BRUSSEL

PhD in Medical Sciences
2021-2022

INVITATION to the Public defence of

Henri Vincent BAUDHUIN

To obtain the academic degree of

'DOCTOR OF MEDICAL SCIENCES'

DEVELOPMENT OF A KIT FOR 68GA-LABELING OF SINGLE-DOMAIN ANTIBODY-BASED DIAGNOSTICS FOR MOLECULAR IMAGING

The public defence will take place on

Tuesday, **17 May 2022 at 4 p.m.**

In Auditorium Vanden Driessche
Faculty of Medicine and Pharmacy, Laarbeeklaan 103, 1090 Brussel

and can be followed online, accessible through the following link**:**

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

Please contact the PhD candidate if you want to attend the public defence.

Summary of the dissertation

The main goal of the work consisted of developing a kit for an easy and rapid radiolabeling of single-domain antibody (sdAb) based tracers with gallium-68 (^{68}Ga) for PET imaging. To this purpose, the concept of freeze-drying was applied on sdAb precursors to increase their stability, allowing storage in more convenient conditions (e.g., 2 – 8°C vs -20°C°). For this part, the work consisted of designing a lyophilization formulation to stabilize the sdAb precursor and developing a suitable lyophilization cycle, which provides a qualitative dried product with minimal residual moisture. Stability studies and *in vivo* studies were performed to assure the retention of all qualitative aspects of the sdAb precursor, such as integrity and functionality. In a second part, the radiolabeling process was optimized to provide a high purity product without requiring purification steps, greatly simplifying, and shortening the procedure. This optimization process consisted of on the one hand the optimization of the sdAb precursor itself, for which studies were performed to investigate the effect of the conjugation degree (i.e., the number of chelators per sdAb) on the pharmacokinetic effects of the tracer, to find an optimal balance between the conjugation degree and potential loss of affinity. On the other hand, this process consisted of the development of an anti-radiolytic formulation, preventing degradation of the tracer even at highest available activity today from gallium generators. The results presented in this work form the basis of a potential kit product for sdAb-based tracers.

Curriculum Vitae

In 2015 I obtained a Master of Science in Biomedical Sciences at the VUB. During my master I had the opportunity to perform two short internships in 2013. One internship was at Paraxel CRO, where I conducted an analysis of clinical trial practice in Belgium and compared this to the top 3 countries in Europe with the most clinical trials and a second internship at the Laboratory for Molecular and Cellular Therapy (LCMCT), headed by Prof. Kris Thielemans at the time, where I could follow the investigation of a new therapeutic approach for Multiple Myeloma, a type of blood cancer. In the academic year of 2014 – 2015, I got accepted to conduct an internship for my thesis at the In vivo Cellular and Molecular Imaging lab, headed by Prof. Tony Lahoutte, where we performed studies to investigate a novel imaging technique using radiolabeled sdAbs as tracer and SPECT/CT as imaging modality for the detection of atherosclerosis targeting the Macrophage Mannose Receptor. In 2016, Tony offered me the opportunity to start as a PhD student in the lab for the development of a ^{68}Ga-labeling kit for diagnostic sdAb tracers. In 2020, Abscint NV was created, which included Tony and me as co-founders, for the further development and commercialization of the kit concept, which will allow a more widespread use of these tracers to help patients around the world. As of May 2021, I am a full-time employee at Abscint, further pursuing the goal of making the sdAb-based diagnostic tracers more accessible to clinicians and therefore patients.