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VRIJE UNIVERSITEIT BRUSSEL

PhD in Medical Sciences
2023-2024

INVITATION to the Public defence of

Odrade GONDRY

To obtain the academic degree of

'DOCTOR OF MEDICAL SCIENCES'

Single domain antibodies for PET/CT imaging in oncology. The early-phase clinical evaluation of ^{68}Ga-labeled sdAbs targeting HER2 and CD206

The public defence will take place on

Thursday, **26 October 2023 at 6 p.m.**

In Auditorium Piet Brouwer
Faculty of Medicine and Pharmacy, Laarbeeklaan 103, 1090 Brussel

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

https://gf.vub.ac.be/redirects/PhD_defense_Odrade_Gondry.php

Summary of the dissertation

In recent decades, there has been a notable transformation in the management of cancer patients. However, these novel therapeutic approaches often entail substantial expenses, potential adverse effects, and uncertainty regarding their efficacy for individual patients. It is crucial to avoid subjecting patients to potential side effects when the treatment may not benefit them. Consequently, researchers are actively seeking methods to predict treatment responses more accurately.

Current approaches typically involve the examination of tissue samples, necessitating invasive procedures such as biopsies or surgical interventions to procure these specimens. Furthermore, these methodologies solely yield insights into the specific lesion and do not encompass metastatic lesions.

In molecular imaging, the here evaluated methodology, single-domain antibodies, commonly referred to as nanobodies, are employed. These proteins possess the unique capability to selectively bind to their designated targets. When labelled with Gallium-68, a radioactive isotope, the distribution of the tracer within the body can be detected using a PET/CT scanner.

In this PhD thesis, a first tracer targeting the HER2 receptor was used in a phase 2 clinical trial in 20 breast cancer patients. The HER2-imaging procedure showed high repeatability, and the tracer was able to visualize breast cancer lesions, even if the level of HER2 expression was low. In part of the investigated patients, the imaging potential appeared higher than that of routinely used FDG-PET/CT. These results now serve as a foundation for future clinical trials.

The second tracer, investigated in this PhD thesis, binds to a subset of macrophages expressing CD206 on their cell surface, that can be found in cancer lesions. This tracer underwent its first-in-human testing in a phase 1 clinical trial, confirming its safety. PET/CT imaging revealed the anticipated distribution pattern throughout the body, and radiation exposure levels were consistent with those of routinely used PET tracers. These promising outcomes have led to the initiation of subsequent phase 2 clinical trials.

In summary, the use of radiolabeled nanobodies offers a non-invasive and comprehensive way to characterize tumor lesions throughout the body, providing valuable information for the development of targeted and personalized cancer therapies.

Curriculum Vitae

Odrade Gondry, born on December 22, 1994, in Antwerp, completed her Master's degree in Medicine at the Vrije Universiteit Brussel (Brussels, Belgium) in June 2018. Throughout her academic journey, she engaged in a diverse range of clinical internships across various hospitals in Belgium, as well as an internship in nuclear medicine in Toulouse.

In September 2018, she started with a year of internal medicine as a part for the training to become a nuclear medicine specialist.

In October 2019 she started her PhD at the nuclear medicine department with a scholarship “Emmanuel Van der Schueren” from Kom Op Tegen Kanker. Subsequently, she was funded by the “Immune-Image” project, a European Horizon 2020 project.

Odrade's research has been centred on the application of single-domain antibodies for molecular imaging in humans. Her work has been disseminated through both oral and poster presentations at national and international conferences, with one of her posters earning the 'best poster' award at EMIM 2020.

At the time of writing, she is preparing to defend her doctorate while working at the Nuclear Medicine department, with the intent of becoming a nuclear medicine physician by the autumn of 2025.