

Board of examiners

Prof. dr. Isabelle Kohler

Division of BioAnalytical Chemistry,
Amsterdam Institute for Molecular and Life Sciences, VU Amsterdam

Prof. dr. Pierre Van Antwerpen

RD3-Pharmacognosy, Bioanalysis & Drug Discovery Unit & Analytical Platform of the Faculty of Pharmacy, ULB Brussel

Prof. dr. Pieter Cornu

Department of Pharmaceutical and Pharmacological Sciences,
Clinical Pharmacology and Clinical Pharmacy, UZ Brussel/Vrije Universiteit Brussel

Dr. Anneleen Mortier

Clinical Chemistry and Radio-Immunology Unit,
Department of Metabolic Disorders and Toxicology, UZ Brussel

Prof. dr. Najat Aourz

Department of Pharmaceutical and Pharmacological Sciences,
Experimental Pharmacology, Vrije Universiteit Brussel

Prof. dr. Ilse Weets, Chair

Department of Pharmaceutical and Pharmacological Sciences,
Clinical Biology, UZ Brussel/Vrije Universiteit Brussel

Prof. dr. Ann Van Eeckhaut, promoter

Department of Pharmaceutical and Pharmacological Sciences,
Experimental Pharmacology, Vrije Universiteit Brussel

Prof. dr. Yvan Vander Heyden, promoter

Department of Pharmaceutical and Pharmacological Sciences,
Analytical Chemistry, Applied Chemometrics and Molecular Modelling, Vrije Universiteit Brussel

Prof. dr. Debby Mangelings, co-promoter

Department of Pharmaceutical and Pharmacological Sciences,
Analytical Chemistry, Applied Chemometrics and Molecular Modelling, Vrije Universiteit Brussel

Prof. dr. Dimitri De Bundel, co-promoter

Department of Pharmaceutical and Pharmacological Sciences,
Experimental Pharmacology, Vrije Universiteit Brussel

Prof. dr. Ilse Smolders, co-promoter

Department of Pharmaceutical and Pharmacological Sciences,
Experimental Pharmacology, Vrije Universiteit Brussel



PhD in Pharmaceutical Sciences
2021-2022

INVITATION to the Public defence of

Karen SEGERS

To obtain the academic degree of

'DOCTOR OF PHARMACEUTICAL SCIENCES'

Method development in metabolomics and its application as diagnostic tool

The defence will take place on

Wednesday, 15 December 2021 at 5 p.m.

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

ADMITTANCE: Due to Covid restrictions, please contact the PhD candidate if you want to attend the public defence in person.

The public defence can also be followed online via Zoom meeting, accessible through the following link:

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

Summary of the dissertation

Metabolomics is the large-scale study of small molecules, commonly known as metabolites, within a biological sample. Collectively, these small molecules and their interactions within a biological system are known as the metabolome. Biomarker discovery through metabolic fingerprinting holds great potential for the identification of drug-resistant populations and rapid deployment of appropriate treatment regimens in different diseases. In this PhD project, metabolite profiling of volume-limited plasma samples is performed using two complementary separation techniques, capillary electrophoresis (CE) and liquid chromatography (LC), coupled to mass spectrometric (MS) detection. First, we evaluated the suitability of CE-MS in a simulated metabolomics study by spiking different compounds and concentrations in human plasma. Secondly, this CE-MS method was used to discover potential metabolic consequences of evoked seizures in plasma by using a 6Hz acute corneal seizure mouse model. This work clearly demonstrated the possibility of profiling metabolite consequences, related to seizure activities, in an intrinsically low volume of body fluid using CE-MS.

As a complementary technique to CE-MS, an untargeted LC-MS method is being developed and validated in the laboratory. Several obstacles are tackled and discussed in detail.

Due to the complex nature of the profile or fingerprint, multivariate data analysis is required for the unbiased selection of candidate biomarkers. We demonstrate using chemometric tools that the untargeted application of SIFT-MS spectra has potential as rapid pattern-recognition tool, useful in the diagnosis of asthma and cystic fibrosis from breath samples.

Curriculum Vitae

Karen Segers was born on the 31st of March 1993 in Turnhout, Belgium. She completed secondary school, math-sciences, in 2011 after which she started her academic career at the Vrije Universiteit Brussel (VUB). In 2016, she graduated as Pharmacist and Master in Drug Development. Afterwards, she started a PhD at the research groups of Experimental Pharmacology and Analytical Chemistry, Applied Chemometrics and Molecular Modelling at the VUB under supervision of profs. Ann Van Eeckhaut and Yvan Vander Heyden. Here, she was immersed in the broad world of untargeted metabolomics.

Karen has five peer-reviewed scientific publications as first author and is co-author of another four publications. Her work was presented at various national and international scientific conferences as both oral and poster presentations. During her PhD, Karen had also a stay abroad of six months at the Leiden Academic Centre for Drug Research (The Netherlands) under the supervision of prof. Rawi Ramautar.

She provided assistance in different educational courses, and guided five master students with their thesis work.

In 2021, Karen became mother of a beautiful son Léon and started a new adventure at the laboratories of the Federal Agency for the Safety of the Food Chain (Federaal Agentschap voor de Veiligheid van de Voedselketen - FAVV).