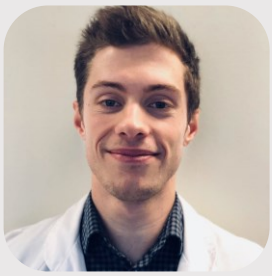

JOOST BOECKMANS

Pharmacist – Doctor in Pharmaceutical Sciences
Vrije Universiteit Brussel (VUB) – *In Vitro* Toxicology and Dermato-Cosmetology (IVTD)

PROFILE

Member of IVTD and IC-3Rs

Passion for chronic liver diseases

EDUCATION

Maastricht University
Master of Medicine - Master of Science in clinical research
2021-present

Vrije Universiteit Brussel
Post-doctoral researcher
2020-present
Funded by the VUB Chair Mireille Aerens

Vrije Universiteit Brussel
PhD in Pharmaceutical Sciences
2016-2020
Funded by the VUB Chair Mireille Aerens

Vrije Universiteit Brussel
Universitat de Barcelona **(Erasmus)**
Master of Science in Pharmaceutical Sciences
2011-2016 *Summa cum laude*

CONTACT

PHONE:
+32 477 29 21 09

LINKEDIN:
https://www.linkedin.com/in/joost-boeckmans-465547135/

EMAIL:
Joost.Boeckmans@vub.be

PHD ABSTRACT

DEVELOPMENT AND CHARACTERIZATION OF A HUMAN STEM CELL-BASED *IN VITRO* MODEL FOR ANTI-NASH DRUG TESTING

Non-alcoholic steatohepatitis (NASH) is a severe chronic liver disease that affects about 5% of the population. NASH is characterized by hepatic lipid accumulation, inflammation and fibrosis and can progress to cirrhosis and hepatocellular carcinoma. There are currently no drugs available to treat NASH.
Investigation of NASH traditionally relies on animal models, which are often not representative for the human situation. Therefore, the aim of the doctoral thesis was to develop a human-based *in vitro* model that can recapitulate the molecular and cellular mechanisms that drive NASH and can be used during anti-NASH drug development.
To this end, we created a NASH-specific hepatic environment *in vitro* by exposing human stem cell-derived hepatic cells (hSKP-HPC), primary human hepatocytes (PHH) and human hepatic cell lines (HepG2 and HepaRG) to key NASH-inducing factors. The obtained models mirrored NASH characteristics and could be used to evaluate anti-lipogenic and anti-inflammatory properties of PPAR agonists, a class of anti-NASH drugs that are under clinical evaluation. The hSKP-HPC-derived model most closely mimicked the PHH-mediated drug testing responses, highlighting its possible future position in preclinical drug development.
Furthermore, genetic predisposition of patients to develop NASH could be evaluated *in vitro* using hSKP-HPC, paving the way for the investigation of patient-specific genetic etiologies of NASH.
In conclusion, a pragmatic human- and disease-relevant stem cell-derived *in vitro* NASH model has been developed that can be implemented in drug testing and personalized medicine.

SCIENTIFIC DISTINCTIONS

- **Bi-annual PhD-thesis award** of the *Belgian Society of Pharmaceutical Sciences (BSPS) 2020-2021*
- **Best Poster prize** at the "BelTox/IC-3Rs/INVITROM Joint Symposium" 2019 [Brussels, Belgium]
- **Best poster prize** at the "Global NASH Congress" 2019 [London, United Kingdom]

ORAL PRESENTATIONS AT (INTER)NATIONAL OCASIONS

- 23 August - 2 September 2021 11th World Congress on Alternatives and Animal use in the life sciences (2 presentations) [Maastricht, **the Netherlands**]
- 21-22 November 2019: "IC-3Rs Joint symposium & workshop" [Brussels, **Belgium**]
- 15 November 2019: Presentation at the National Insitites of Health (NIH) - Laboratory of Liver Diseases [Washingthon, **United states of America**]
- 25-26 February 2019: "Global NASH Congress" [London, **United Kingdom**]
- 15-18 October 2018: "20th International Congress on *In Vitro* Toxicology" [Berlin, **Germany**]
- 22 March 2018: "Stem Cells in 3R Research" (INVITROM 2018). [Utrecht, **the Netherlands**]
- 20 March 2018: "PhD Day VUB Campus Jette" [Brussels, **Belgium**]
- 23 March 2017: "Disease models 2.0" (INVITROM 2017) [Breda, **the Netherlands**]

GRANTS

- **FWO-SB fellowship**: "Development and characterization of a human skin stem cell-derived *in vitro* liver model for anti-NASH drug screening." (2018, 2 x 2 years)
- **FWO travel grant** for participation in a conference abroad (Boston, United States of America)
- **FWO travel grant** for a short study visit abroad (Washington, United States of America)
- **Travel grant** for participation in a conference abroad of the "International Society for *In Vitro* Methods (INVITROM)" (Breda, the Netherlands)
- **Travel grant** for participation in a conference abroad of the "European Partnership for Alternative Approaches to Animal Testing (EPAA)" (Berlin, Germany)
- **Review writing grant** from the "Humane Society International": $10.000 (2018, with promotors)
- **Travel grant** of the "Doctoral Schools LSM" (Paris, France and Heidelberg, Germany)

PUBLISHED SCIENTIFIC ARTICLES

First author

- **Boeckmans J.**; Rombaut M.; Demuyser T.; Declerck B.; Piérard D.; Rogiers V.; De Kock J.; Waumans L.; Magerman K.; Cartuyvels R.; Rummens JL.; Rodrigues RM.; Vanhaecke T. Infections at the nexus of metabolic-associated fatty liver disease. *Archives of Toxicology* (2021) 24:1-19 [Q1, IF_{2020} 5.153]
- **Boeckmans J.**; Cartuyvels R.; Hilkens P.; Bruckers L.; Magerman K.; Waumans L.; Raymaekers M. Follow-up testing of borderline SARS-CoV-2 patients by rRT-PCR allows early diagnosis of COVID-19. *Diagnostic Microbiology and Infectious Disease* (2021) 100:115350 [Q2, IF_{2020} 2.803] (**1 citation**, August 2021)
- **Boeckmans, J.**; Natale, A.; Rombaut, M.; Buyl, K.; Cami, B.; De Boe, V.; Rogiers, V.; De Kock, J.; Vanhaecke, T.; Rodrigues, R.M.; Human hepatic *in vitro* models reveal distinct anti-NASH potencies of PPAR agonists. *Cell Biology and Toxicology* (2020) 37:293-311. [Q1, IF_{2019} 6.284] (**3 citations,** August 2021)
- **Boeckmans, J.**; Natale, A.; Rombaut, M.; Buyl, K.; Rogiers, V.; Vanhaecke, T.; Rodrigues, R.M.; De Kock, J. Flow cytometric quantification of neutral lipids in a human skin stem cell-derived model of NASH. *MethodsX* (2020) 19:101068. [no ranking] (**3 citations**, August 2021)
- **Boeckmans, J.**; Rodrigues, R.M; Demuyser, T.; Piérard, D.; Vanhaecke, T.; Rogiers, V. COVID-19 and drug-induced liver injury: a problem of plenty or a petty point? *Archives of Toxicology* (2020) 94;4:1367-1369. [Q1, IF_{2020} 5.153] (**70 citations**, August 2021)
- **Boeckmans, J.**; Natale, A.; Rombaut, M.; Buyl, K.; Rogiers, V.; De Kock, J.; Vanhaecke, T.; Rodrigues, R.M. Anti-NASH drug development Hitches a lift on PPAR-agonism. *Cells* (2020) 9;1: 1-20. ["Recent Advances in Liver Repair Strategies"] [Q1, IF_{2020} 6.600] (**34 citations**, August 2021)
- **Boeckmans, J.**; Buyl, K.; Natale, A.; Vandenbempt, V.; Branson, S.; De Boe, V.; Rogiers, V.; De Kock, J.; Rodrigues, R.M.; Vanhaecke, T. Elafibranor restricts lipogenic and inflammatory responses in a human skin stem cell-derived model of NASH. *Pharmacological Research* (2019) 144:377-389. [Q1, IF_{2019} 5.893] (**13 citations**, August 2021)
- **Boeckmans, J.**; Buyl, K.; Natale, A.; Vandenbempt, V.; Branson, S.; De Boe, V.; Rogiers, V.; De Kock, J.; Rodrigues, R.M.; Vanhaecke, T. Transcriptomics data of a human in *vitro* model of non-alcoholic steatohepatitis exposed to elafibranor. *Data in Brief* (2019) 3;25:104093. [no ranking] (**1 citation**, August 2021)
- **Boeckmans, J.**; Natale, A.; Buyl, K.; Rogiers, V.; De Kock, J.; Vanhaecke, T.; Rodrigues, R.M. Comment to 'Letter to the editor: Human-based systems: Mechanistic NASH modelling just around the corner?' *Pharmacological Research* (2018) 137:282-283. [Q1, IF_{2018} 5.574] (**1 citation**, August 2021)
- **Boeckmans, J.**; Natale, A.; Buyl, K.; Rogiers, V.; De Kock, J.; Vanhaecke, T.; Rodrigues, R.M. Human-based systems: Mechanistic NASH modelling just around the corner? *Pharmacological Research* (2018) 134: 257-267. [Q1, IF_{2018} 5.574] (**27 citations**, August 2021)

Co-author

- Rombaut M.; **Boeckmans J.**; Rodrigues RM.; van Grunsven LA.; Vanhaecke T.; De Kock J.; Direct reprogramming of somatic cells into induced hepatocytes: cracking the Enigma code. *Journal of Hepatology* (2021) in press. [Q1, IF_{2020} 25.083]
- Itturospe, E.; Da Silva, K.M.; Begoña, T.A.; Cuykx, M.; **Boeckmans, J.**; Vanhaecke, T.; Covaci, A.; van Nuijs, A.L.N. An exploratory approach for an oriented development of an untargeted hydrophilic interaction liquid chromatography-mass spectrometry platform for polar metabolites in biological matrices. *Journal of Chromatography A*, 1637:461807 [Q1, IF_{2020} 4.759] (**2 citations**, August 2021)
- De Kock, J.; Rodrigues RM.; Branson, S.; Verhoye, L.; Colemonts-Vroninks, H.; Rombaut, R.; **Boeckmans, J.**; Neuckermans, J.; Lequeue, S.; Buyl, K.; De Boe, V.; Lagneaux, L.; Meuleman, P.; Vanhaecke, T.; Najar; M. Inflammation alters the secretome and immunomodulatory properties of human skin-derived precursor cells. *Cells* (2020) 9 (4) 1-18. [Q1, IF_{2020} 6.600] (**4 citations**, August 2021)

- Natale, A.; Vanmol, K.; Arslan, A.; Van Vlierberghe, S.; Dubruel, P.; Van Erps, J.; Thienpont, H.; Buzgo, M.; **Boeckmans, J.**; De Kock, J.; Vanhaecke, T.; Rogiers, V.; Rodrigues, RM. Technological advancements for the development of stem cell-based models for hepatotoxicity testing. *Archives of Toxicology* (2019) 3: 1789-1805. [Q1, IF_{2019} 5.059] (**7 citations**, August 2021)
- Natale, A.; **Boeckmans, J.**; Desmae, T.; De Boe, V.; De Kock, J.; Vanhaecke, T.; Rogiers, V.; Rodrigues, RM. Hepatic cells derived from human skin progenitors show a typical phospholipidotic response upon exposure to amiodarone. *Toxicology Letters* (2018) 284: 184-194. [Q1, IF_{2018} 3.499] (**8 citations**, August 2021)
- Nofrerias, I.; Nardi, A.; Suñé-Pou, M.; **Boeckmans, J.**; Suñé-Negre, J. M.; García-Montoya, E.; Pérez-Lozano, P.; Ticó-Grau, J.R.; Miñarro-Carmona, M. Optimization of SeDeM Diagram Expert System: Improved Cohesion Index's (Icd) Methodology. *PLoS One* (2018) 13(9), [e0203846]. [Q2, IF_{2018} 2.776] (**7 citations**, August 2021)

PRESS RELEASES

- https://press.vub.ac.be/dierproefvrij-geneesmiddelen-testen-voor-leverziekte-nash#
- https://www.sciencedaily.com/releases/2018/07/180718092459.htm
- www.eurekalert.org/pub_releases/2018-07/hsi-fld071718.php
- www.medicalxpress.com/news/2018-07-fatty-liver-disease-pandemic-gold.html
- www.global-engage.com/life-science/stem-cell-based-anti-nash-drug-testing/

SUPERVISION OF MASTER/PHD THESES AND INTERNSHIPS

- PhD in Pharmaceutical Sciences: Alexandra Gatzios (2021-present)[co-promotor]
- MSc in Pharmaceutical Sciences: Lotte Vlerick (2018), Fleur Platteau (2019) and Elke Vandenberghen (2020) [co-promotor]
- Master of Medicine: Brent Cami (2020) [Master thesis, co-promotor]
- MSc in Biochemistry & Biotechnology (2018): Valerie Vandenbempt [internship, supervisor].

PEER REVIEWING ACTIVITIES

- *Clinical Microbiology and Infection* (IF_{2020} 8.067)
- *Toxicology in Vitro* (IF_{2020} 3.500)
- *International Journal of Molecular Sciences* (IF_{2020} 5.923)
- *Stem Cells International* (IF_{2002} 5.443)

PUBLISHED MEETING ABSTRACTS

- Boeckmans J. et al. Human-derived hepatic *in vitro* models identify distinct anti-NASH efficacies of PPAR-agonists. *Hepatology* (2019) 70: 1290A-1291A. (Q1, IF_{2019}: 14.971)
- **Boeckmans J.** et al. Elafibranor restores lipogenic gene expression in a human skin stem cellderived non-alcoholic fatty liver disease (NAFLD) model. *Journal of Hepatology* (2018) 68: S354-S355. (Q1, IF_{2018}: 18.946)

POSTER PRESENTATIONS (FIRST AUTHOR ONLY)

- **Boeckmans, J.,** Cartuyvels, R., Hilkens, P., Bruckers, L., Magerman, K, Waumans, L., Raymaekers, M . (2021) Follow-up testing of borderline SARS-CoV-2 patients by rRT-PCR allows early diagnosis of COVID-19. Presented at The conference of the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC). Online.
- **Boeckmans, J.**, Rombaut, M., Natale, A., Buyl, K., De Kock, J., Rogiers, V., Vanhaecke, T., & Rodrigues, RM. (2019) Human-derived hepatic *in vitro* models identify distinct anti-NASH efficacies of PPAR-agonists. Presented at "IC-3Rs joint symposium", Brussels, **Belgium**.
- **Boeckmans, J.**, Rombaut, M., Natale, A., Buyl, K., De Kock, J., Rogiers, V., Vanhaecke, T., & Rodrigues, RM. (2019) Human-derived hepatic *in vitro* models identify distinct anti-NASH efficacies of PPAR-agonists. Presented at "The Liver Meeting" Boston, **United States of America**.
- **Boeckmans, J.**, Natale, A., Buyl, K., De Kock, J., Rogiers, V., Vanhaecke, T., & Rodrigues, RM. (2019). *In vitro* investigation of the anti-NASH properties of elafibranor and lanifibranor using a human stem cell-derived disease model. Presented at "EMBL course: Genome engineering: CRISPR/Cas" Heidelberg, **Germany**.
- **Boeckmans, J.**, Natale, A., Buyl, K., De Kock, J., Rogiers, V., Vanhaecke, T., & Rodrigues, RM. (2019). *In vitro* investigation of the anti-NASH properties of elafibranor and lanifibranor using a human stem cell-derived disease model. Presented at "Global NASH Congress" London, **United Kingdom**.

- **Boeckmans, J.**, Natale, A., Buyl, K., De Kock, J., Rogiers, V., Rodrigues, RM., & Vanhaecke, T. (2018). Elafibranor reduces the expression of pannexin1 and CCL5 in a human-relevant skin stem cell-based model of non-alcoholic steatohepatitis (NASH). Presented at "International Society for *In Vitro* Methods (INVITROM), Annual meeting" Utrecht, **the Netherlands**.
- **Boeckmans, J.**, Natale, A., Buyl, K., De Kock, J., Rogiers, V., Vanhaecke, T., & Rodrigues, RM. (2018). Elafibranor restores lipogenic gene expression in a human skin stem cell-derived non-alcoholic fatty liver disease (NAFLD) model. Presented at "Global NASH Congress" London, **United Kingdom**.
- **Boeckmans, J.**, Natale, A., Buyl, K., De Kock, J., Rogiers, V., Vanhaecke, T., & Rodrigues, RM. (2018). Elafibranor reverts lipogenic and inflammatory responses in a human skin stem cell-based model of non-alcoholic steatohepatitis (NASH). Presented at "The International Liver Congress" Paris, **France**.
- **Boeckmans, J.**, Vandenbempt, V., Buyl, K., Natale, A., Rogiers, V., De Kock, J., ... Rodrigues, RM. (2018). *In vitro* evaluation of a potential drug against fatty liver disease using a disease model based on human skin-derived stem cells. Presented at "Annual Meeting of the Belgian Society for Stem Cell Research (BeSSCR)". Leuven, **Belgium**.
- **Boeckmans, J.**, Natale, A., Buyl, K., De Kock, J., Rogiers, V., Vanhaecke, T., & Rodrigues, RM. (2018). Elafibranor reduces the expression of pannexin1 and CCL5 in a human-relevant skin stem cell-based model of non-alcoholic steatohepatitis (NASH). Presented at "PhD-Day" Brussels, **Belgium**.
- **Boeckmans, J.**, Natale, A., Buyl, K., De Kock, J., Rogiers, V., Vanhaecke, T., & Rodrigues, RM. (2017). Elafibranor restores lipogenic gene expression in a human skin stem cell-derived non-alcoholic fatty liver disease (NAFLD) model. Presented at "Annual Meeting of the Belgian Society for Stem Cell Research (BeSSCR)" Luik, **Belgium**.
- **Boeckmans, J.**, Natale, A., Buyl, K., De Kock, J., Rogiers, V., Rodrigues, RM., & Vanhaecke, T. (2017). Insulin induces *de novo* lipogenesis in human skin stem cell-derived hepatic cells. Presented at PhD-Day, Brussels, **Belgium**.
- **Boeckmans, J.**, Natale, A., Buyl, K., De Kock, J., Rogiers, V., Rodrigues, RM., & Vanhaecke, T. (2017). Insulin induces *de novo* lipogenesis in human skin stem cell-derived hepatic cells. Presented at "Annual Meeting of the International Society for *In Vitro* Methods (INVITROM)" Breda, **the Netherlands**.

FUTURE DIRECTIONS

Development of an SKP-based human *in vitro* model for NASH-fibrosis drug testing (cfr. Alexandra Gatzios)