PROFILE

26 years old

Biomedical Researcher

Member of IVTD and IC-3Rs

EDUCATION

Vrije Universiteit Brussel
Biomedical Sciences -
Master of Biomedical Research
2022 *Magna cum laude*

CONTACT

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LORNA MARCHANDISE

Biomedical Researcher
VUB (IVTD) – PhD student since September 2022

PROJECT OUTLINE

Development of a human stem cell-based *in vitro* model to assess toxicity hazards induced by thyroid hormone system disruptors during the early phases of liver development.

September 2022–2026

Thyroid hormone system disruptors (THSDs) interfere with the production, distribution, metabolization and/or secretion of thyroid hormones (THs) necessary for the proper development of the foetus. THSDs can hinder the TH system in a multitude of ways, also involving the liver which plays a vital role in TH transport and metabolism. While some of the THSD-mechanisms of action have been uncovered, many are still poorly understood. Moreover, most of the research on this topic has been conducted in rats, and differences between humans and rodents have been postulated.

Therefore, a novel human stem cell-based in vitro model will be developed to assess molecular mechanisms of toxicity induced by THSDs during early liver development. Hereto, multipotent human skin-derived precursor cells (hSKPs) are differentiated towards "hepatic progenitor cells", called hSKP-HPC period to mimic embryonal liver development in vitro.

A preliminary study using existing microarray data indicated the presence of major TH signalling mediators in hSKP-HPC. Next, their response will be assessed after addition of TH in the differentiation media. Later on, the cells will be exposed to a range of non-cytotoxic concentrations of well-known THSDs, e.g. pesticides, such as Fipronil, and/or alternatives thereof. Mechanisms of action and key events of liver adversity, such as altered lipid metabolism associated to TH-imbalance, will be investigated at the gene and functional level.

The results obtained will be compared to non-exposed cells as well as to in vivo human and in vivo animal data (obtained from collaborations) in the context of next generation in vitro-based risk assessment.

RESEARCH OUTPUT

Peer-review article Ramhøj, L., Axelstad, M., Baert, Y., Cañas-Portilla, A. I., Chalmel, F., Dahmen, L., De La Vieja, A., Evrard, B., Haigis, A-C., Hamers, T., Heikamp, K., Holbech, H., Iglesias-Hernandez, P., Knapen, D., Marchandise, L., Morthorst, J. E., Nikolov, N. G., Nissen, A. C. V. E., Oelgeschlaeger, M., Renko, K. & 10 others. 17th of May 2023. *Frontiers in toxicology*, 5, 10 p., 1189303. *New approach methods to improve human health risk assessment of thyroid hormone system disruption–a PARC project*

Poster & oral presentation JRC Summer School on Non-animal Approaches in Science 2023, IT
Joint Research Center, Ispra, May 23rd – 29th 2023
Development of a human stem cell-based in vitro model to assess toxicity hazards induced by thyroid hormone system disruptors during the early phases of liver development.

ACTIVITIES

ORGANISATION OF EVENTS:

Congress (organizer): IC-3Rs Symposium 2022: More science, more care, less animals. September 21st 2022, Brussels (BE)

VUB-Leerstoel Mireille Aerens