

Master student project proposal

Project title: Assessing safety of iron nanomedicines utilising an advanced dynamic cell culture platform

Project type: MSc semester project (**starting date:** August 2020)

Group details: Particles-Biology Interactions Lab headed by Dr Peter Wick

Project responsible and email: Dr Niusha Nikraves - niusha.nikraves@empa.ch

Project description:

Anaemia is one of the most common nutritional deficiency disorders observed globally and affects more than a quarter of the world's population. Intravenous iron nanomedicines are a promising therapy for the treatment of iron deficiency. Currently, several iron nanomedicines are available commercially. These nanoparticles have a complex core-shell structure (iron core surrounded by carbohydrate shell). Owing to their complex nature, any slight changes during the manufacturing process can affect particles physicochemical properties and biological responses. In our group, we have developed an advance blood vessel system using a dynamic culture condition, which can mimic the physiological shear stress and flow condition within the human body. The MSc project will be focused on the assessment of biological responses to iron nanoparticles using an advanced microfluidic system, while performing several cellular and molecular mechanisms, such as biological processes, cellular functions and cellular pathways.

This is a wonderful example of developing a novel nanotechnology approach to address an important medical problem. The accepted master student will perform as part of an ongoing project plan in collaboration with a pharmaceutical company in Switzerland. We are looking for a master student who is truly enthusiastic about working in a multidisciplinary research project focused on the assessment of biological responses to nanoparticles using microfluidic systems. If you think you are ready for a new challenge and want to build your knowledge of working in a multidisciplinary environment, please send us your cover letter and CV.

What can you learn from this project:

- Working with Microfluidic perfusion systems
- Cell culture techniques
- Iron nanomedicines
- Cell culture-based assays
- Proteomic sample preparation
- Data analysis

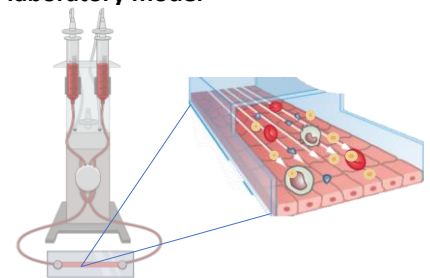
Requirement:

- Enthusiastic and team worker
- Willing to work with state-of-the-art equipment
- Background in life sciences or chemical engineering
- Basic knowledge of cell culture techniques (desirable)
- Flow cytometry (desirable)

Intravenous administration of iron nanomedicines



Nanomedicines safety evaluation using a laboratory model



Microfluidic perfusion system