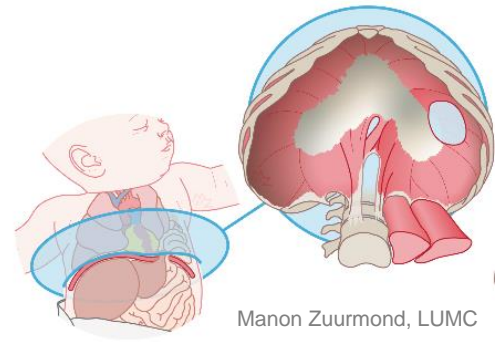


Research internship in the field of skeletal muscle regeneration (6 months minimum, MSc student):

Development of a functional muscle tissue-generating patch for congenital diaphragmatic hernia closure

The diaphragm is a muscular plate that separates the thoracic cavity from the abdominal cavity. It is the primary muscle involved in respiration. The problem that is addressed in this research is congenital diaphragmatic hernia (CDH), which is a severe and life-threatening birth defect characterized by a defect in the diaphragm. Through this defect, protrusion of abdominal organs into the thoracic cavity is possible. Therefore, it is important to close this defect after birth. Current patches do not result in the formation of functional skeletal muscle. Therefore, our goal is to develop a functional skeletal muscle generating patch for diaphragmatic hernia closure by combining natural and synthetic polymers in a hybrid patch, mimic the structure of the diaphragm and coat this patch with components that enhance skeletal muscle proliferation and differentiation.



In this student project, hybrid patches out of collagen and synthetic polymers will be constructed with radial pores mimicking the radial orientation of skeletal muscle fibers in the diaphragm by applying a specific freezing regime. The response of skeletal muscle cells on the material will be investigated. Additionally, the patch will be supplemented with a coating of components that enhance skeletal muscle proliferation and differentiation. The patches will be coated with a.o. basement membrane components laminin and entactin. The effect of these components on the proliferation and differentiation of muscle precursor cells (myoblasts) into mature muscle cells (myotubes) will be investigated. This will first be tested on 2D cell culture and later in 3D in biomaterials.

Techniques that are applied in the project include:

- biomaterial production and characterization
- chemical crosslinking
- cell culture
- scanning electron microscopy (SEM)
- SDS-PAGE & Western blotting
- immunohistochemistry
- qPCR analysis

The internship will be hosted in the Matrix Biochemistry group of dr.ir. Willeke Daamen at the department of Medical BioSciences. Daily supervision will be provided by PhD candidate Lieke van Dommelen. The internship will be from September/October 2023. Experience with cell culture is seen as an advantage.

In case of interest, please send your CV and motivation to Lieke van Dommelen (Lieke.vanDommelen@radboudumc.nl).