**Enhancing the potential of nerve regeneration using engineered biomaterial scaffolds**

The peripheral nervous system has the capacity for injured neurons to regenerate axons and rebuild functional connections. This unique PNS feature depends on Schwann cells that promote regeneration. However, growing axons across large gaps is challenging and detrimental for functional recovery even in the PNS. Toward this issue, nerve guide conduits (NGC) are used as scaffolds in regenerative medicine for small gaps (< 30 mm). Nonetheless, current treatment options lack topological, mechanical, and biological cues to promote axon growth over long distances. We developed a novel biomaterial featuring interconnected microchannels with a composition analogous to the extracellular matrix. Our goal is to assess the potential of this micro-structured biomaterial for enhancing nerve regeneration. We will assess how the biomaterial scaffold can support regeneration in a 3D human cell culture model using iPSCs and iPSC-derived Schwann cells and neuronal progenitors and evaluate their engraftment, survival, and differentiation. The development and optimization of biomaterial scaffolds in 3D culture conditions is a high-risk challenge that requires a joined knowledge of bioengineering and stem cell technologies. By combining interdisciplinary expertise, this project will generate important advances for productive clinical translation in the realm of personalized regenerative medicine.