ReWIRE Newsletter

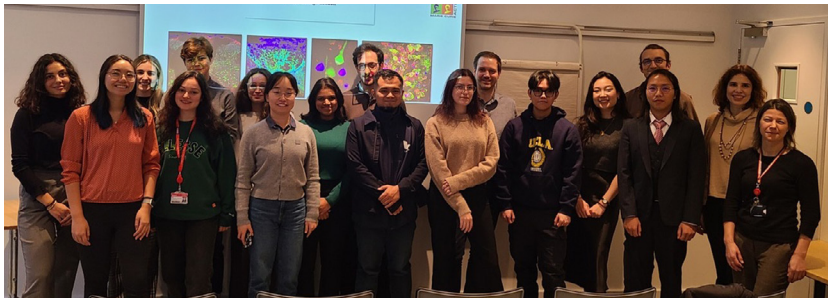
Welcome to the second edition of the ReWIRE Newsletter!

We have been hard at work and are excited to share the events attended and progress made by our next gen of scientists!

The 1st Workshop, organized by Prof. Elizabeth Bradbury's team at the Sensory, Pain and Regeneration Centre, King's College, London, took place from the 20th-21st of November and involved a wide range of lectures, interactive discussions, practical lab tours, and dedicated networking sessions. External speakers (Prof James Fawcett, Prof. Peter Timmerman, Dr. Fred de Winter, Prof. Laura De Laporte) and internal speakers (Prof. Elizabeth Bradbury, Prof. Robin Ali, Dr. Richard Eva, Dr. Aminul Ahmed), discussed "Drug Delivery Systems" from different perspectives - experimental, therapeutic, and clinical. Topics spanned regeneration research, spinal cord neurobiology, advanced therapeutics, biomaterials, peptides, gene therapy, and clinical research. Interactive talks and workshops initiated great discussion, with multidisciplinary viewpoints. The workshop received excellent feedback.

The 1st ReWIRE Network Meeting on the 22nd of November was hosted by the group of Prof. Simone Di Giovanni, at the Department of Brain Science, Imperial College London. The 15 DCs introduced themselves and their projects to the Consortium in short presentations and had fruitful discussions with colleagues and supervisors. The students were introduced to the ReWIRE organizational structure by Drs. Veronica Estrada (Network Manager) and Jose Gerardo (DC Manager) from coordinating institution, DWI Aachen. The inspiring event was rounded off by an Evening Lecture of 2022 Von Hippel Award Winner Prof. Samuel Stupp (Northwestern University).

The 2nd Workshop "Understanding the Biology of SCI" on the 23rd of November was the final UK event, organized by Prof. Di Giovanni's team. Lectures from Prof. Di Giovanni and Drs. Luming Zhou, Guiping Kong, and Ines Maldonado gave the DCs deeper insight into the topics of Nervous System Injury and Repair, Immunity and Nervous System Injury, and Molecular Biotechnologies for SCI. The DCs enjoyed a campus tour and visited the Di Giovanni lab facilities, where they were introduced to some primary data by the researchers.



Let's find out how the individual projects are progressing!

Scott Erickson began work at EPFL under the supervision of Stéphanie Lacour, with a focus on designing, fabricating, and testing a microelectrode array (MEA). The first batch made in the clean room seems to have come out well--the features resolved nicely and he is measuring decent impedance values. He is working on integrating the MEA into a fluidic platform for eventual cell culture experiments, which involves soldering, testing connections, and taking mock recordings from mounted MEAs. **Miklovana Tuci** has been delving into data-driven approaches for identifying historical controls in SCI cases through the analysis of longitudinal assessments based on the International Standards for Neurological Classification of SCI (ISNCSCI), and examining the significance of matching the timepoints in these comparisons. She is simultaneously conducting a comprehensive review of Machine Learning-based recovery prediction in SCI papers to get familiar with the current state of the field. **Maria Justino**'s focus, within the Brain-Computer Interface (BCI) field, revolves around the challenge of variability of neural patterns over time and its impact on decoding models' performance. Research involves attempting to compensate such variability improving BCI decoding robustness, which aims to contribute to the goal of enhancing autonomy for individuals with SCIs, empowering them to effectively operate BCI systems independently. **Yayue Song**'s primary research involves exploring molecular mechanisms underlying regeneration and repair following SCIs. Specifically, investigating metabolic pathways that facilitate axonal regeneration after SCI. This aims to identify innovative therapeutic strategies for treating SCIs. She plans to integrate the metabolic modulator discovered with biomaterials to enhance the repair potential following SCIs. **Navami Prabhakar Koyande** has conducted an in-depth literature review to enhance her comprehension of SCI. She has been dedicated to refining the list of potential integrin-binding target peptides for research. She has also received training in CLIPS™ reactions and is presently optimizing protocols for developing bibridged™ peptides using CLIPS™. **Simay Geniscan** has been assisting lab members on related projects and doing FLAS scoring to assess forelimb motor function recovery after chABC treatment. She is also doing some histology analysis on CST traced spinal tissues to see the impact of long term chABC treatment on neurons, and trying to explore London! **Alessandro Ippoliti** has been establishing the necessary protocols for the two-photon polymerization (2PP) of hydrogels, from hydrogel production to the final development process. After reviewing literature, he experimented with the commonly used PEGDA 700 hydrogel to serve as a benchmark for future tests. This has been successfully applied in a number of fields due to its high mechanical stability. Though not biodegradable, with this hydrogel, he has succeeded in creating a 1mmx1mm proof-of-concept device, which features two simple hexagonal grids separated by an empty chamber. Alessandro is now looking to increase the size of the device and add internal structure such as microchannels.

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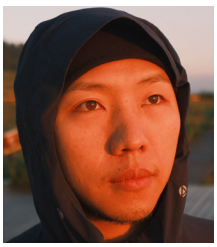
We also have some new PhD students to introduce!

Catarina Tavares is from Portugal and obtained her MSc degree in Nanotechnology Engineering at the NOVA Faculty of Science and Technology. She is undertaking a PhD under the supervision of Prof. Dr.-Ing. Laura De Laporte at DWI (RWTH Aachen University) with a focus on microfluidic production of microgel capsules as drug delivery systems and the sustained release of growth factors to promote spinal cord regeneration after injury. Since starting in September, she has been conducting a literature review on sustained or stimuli triggered drug delivery systems based on microgels and the effects of local release of growth factors for neural regeneration.

Ina Bianca Yu is from the United States and recently completed her Master's degree in Bioengineering from Stanford University, where she focused on electromechanical engineering, robotics, and clinical technology. She is joining the NeuroRestore laboratory at Lausanne University Hospital (CHUV / Centre hospitalier universitaire vaudois) in Switzerland to begin her PhD in Neuroscience. Her research will involve optimizing brain-controlled epidural electrical stimulation to restore movement and neurological function in patients with upper-limb paralysis due to cervical spinal cord injury.

Paula Holban was born in Moldova, and studied Chemistry of Complex Systems in Strasbourg, France. During her master she contributed to several research projects ranging from biochemistry to photochemistry. In October, she started her PhD journey in Biomedical Engineering at the University of Technology in Eindhoven (TU/e), under the guidance of Prof. Patricia Dankers. She will focus on developing injectable supramolecular biomaterials in order to promote the axonal growth following spinal cord injury.

Firman Isma Serdana is a Biomedical Engineer with a passion for neuro engineering on the application of Bio-Signal Processing and Machine Learning for System Control. His research focus is on the utilization of hand and arm's electromyography signal for robotics control and rehabilitation. Recent project used high-density EMG to reproduce discreet finger control (Serdana, et al 2022 & 2023) under supervision of Prof. Dario Farina and Dr. Silvia Muceli. He graduated from Airlangga University's Biomedical Engineering B.Eng. and also received a MSc in Human and Biological Robotics at the Imperial College London.



Rui Chen was born in China, and obtained his MSc degree from Tsinghua University in Mechanical Engineering, and another MSc degree form RWTH-Aachen University in Product System Engineering. He began working as a PhD student at Wearable Robotics in Italy under the supervision of Professor Antonio Frisoli. His work will focus on the development of a robotic soft exoskeleton for gross manipulation restoration after spinal cord injury.

Elif Önsöz is from Turkey and received a Bachelor degree in Molecular Biology and Genetics. She obtained a MSc in Neurobiology at Unito and Stem Cell and Regenerative Medicine at Mersin Uni. She will start at DWI in De Leporte lab under the supervision of Dr. Veronica Estrada. Her PhD project will focus on the in vivo application of the Advanced Mechanical Microconnector System (mMS+) to improve the outcome of acute and chronic spinal cord injury.

Jace Vu graduated with a BSc in Chemical Engineering at Miami University, USA, and an MSc in Bioengineering at the University of California, Los Angeles, USA. He will start his doctoral research at the Advanced Materials for Biomedicine research group led by Dr.-Ing. Laura De Laporte at the DWI Leibniz Institute for Interactive Materials. He will be working on developing and evaluating injectable magneto-responsive, macroporous guiding scaffolds as therapy after acute SCI.

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After the first exciting ReWIRE events, we are already looking forward to the DC presentations and to further updates and discussions at the next Network Meeting! **We are happy to announce the next ReWIRE events (3rd Workshop, and 2nd Network and Supervisory Meetings) in February 2024,** which will be hosted by the team of Prof. Hoc Khiem Trieu at Hamburg University of Technology. The students will elect their first DC President, and they will have the chance to get some insight into the management structure of a European Research Project by attending the Supervisory Board Meeting. **Stay tuned!**

ReWIRE is a project within the Marie Skłodowska-Curie Doctoral Networks.
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