Project Summary

June 2022

NWCAM

North West Centre for Advanced Manufacturing

Clyde Biosciences

Company overview

Clyde Biosciences is a spin-out company based at Biocity Glasgow. Founded in 2012, the company designs and delivers cardiac safety studies for pharmaceutical companies. Clyde developed a novel FDA-approved technology platform (CellOPTIQ®) that uses fluorescent probes optical techniques applied to induced pluripotent stem cells derived cardiomyocytes cells (iPSC-CMs) for evaluating cardiac toxicity of drugs and accelerating drug discovery. Using this platform, Clyde provides a critical testing service for pharmaceutical companies across Europe and North America to ensure drug safety prior to gaining regulatory approval. Clyde's customers range from some of the world's largest pharmaceutical companies to medium-sized pharma through to small biotech start-ups.

The project

- Quantitative force measurements for cardiovascular drug testing

Industry focus

The contractile behaviour of cardiomyocytes (heart cells) is a critical assessment in the development of new drugs. Clyde's 96-well CellOPTIQ® platform provides patch-clamp quality functional data in a medium throughput format to enable fast, safe and accurate development of new drugs. While Clyde's initial focus had been on testing for cardiotoxicity risk, the CellOPTIQ® platform could be applied to a range of mechanical disease types and muscle tissue types. Clyde wished to investigate moving to an advanced platform which would use micropillar technology.

Upgrading to micropillar technology has the potential to increase the range of tissues thus increasing the success rate of drug development processes in the pharma industry. By adding micropillar technology to the CellOPTIQ® platform Clyde also hoped to broaden its current product offering.

The research project therefore focused on the manufacture, refinement and validation of the 96-well platform.

Research partnership

Clyde Biosciences was partnered with an interdisciplinary biomedical engineering research group in the James Watt School of Engineering at the University of Glasgow. The group is home to world-leading specialists in the development of industry-focused solutions in biomedical and nanoengineering. The project research team included two co-investigators and one research assistant.

Clyde Biosciences co-founder and Chief Scientific Officer, Professor Godfrey Smith, highlighted that "Professor Gadegaard and his team at the University of Glasgow are international leaders in substrate-based sensor technology. We realised we needed to extend our offering from cardiotoxicity into vascular toxicity assays. The project we are collaborating on will address this aspect by creating novel bioengineering-based designs which can be incorporated into our existing platform and increase our breadth of offering to our clients."

Project outputs

Following completion of a detailed state-of-the-art literature review on cardiomyocyte contractile measurement, the research team began prototyping new moulds for micropillars with different geometries.

Integration of these geometrically varied micropillars (from a single petri dish to 24- and 96-well plate formats) was completed, along with a study of the effect of pillar density on cardiac neonate cardiomyocyte cells. Software and hardware were optimised to enable integration into the CellOPTIQ® platform (with the aim of improving high throughput analysis).

The partnership between the University of Glasgow and Clyde Biosciences is expected to continue post-INTERREG VA funding. At the time of project close, discussions were ongoing regarding the exploration of a proof of concept.

Project benefits

- Access to academic R&D expertise, specialist equipment and software packages
- Cross-border collaboration between University of Glasgow and other NWCAM partners to deepen the understanding of substrate-based sensor technology
- Development of two-way knowledge exchange between University of Glasgow and Clyde Biosciences
- Increased competitiveness of the life and health sciences sector through innovation
- Industry-related skills development of academic researchers
- Knowledge dissemination to the wider life and health sciences sector through academic publications and conference presentations
- Upskilling of Clyde Biosciences staff with regards to substrate-based sensor technology

Project legacy

Professor Nikolaj Gadegaard at the University of Glasgow commented: “My research group has developed micro technologies to address and tackle life science and healthcare challenges. I have been very pleased to work with Clyde Biosciences, and to see our fundamental research being translated into a commercial setting. Collaborating with an industrial partner brings exciting challenges around scaling and manufacturing; issues which are not always considered from an academic perspective. I look forward to developing the research partnership with Clyde Biosciences.”