During the first year of my undergraduate degree at the University of Strathclyde, the covid-19 pandemic disrupted all lab work and significantly reduced in-person lab experience. Furthermore, because all lectures and workshops were conducted online, the social interaction with academics and other students was significantly impacted. I was eager to obtain laboratory experience and see how a research laboratory operates. I began by reviewing the academic profiles of academic staff to determine their primary areas of study. In addition to the lectures in Pharmacology, I was intrigued by Dr Margaret Cunningham's research, so I contacted her to inquire about summer internship options in her lab. I was delighted that Margaret proposed a project for us to work together on and suggested I apply for the British Pharmacological Society's Vacation Studentship prize. To apply, I sent my CV, a personal statement detailing what I hoped to achieve from the internship, my academic transcript, and a description of the planned project. It was good to be involved in the project proposal development and I was ecstatic to learn that the application was accepted. This studentship provided a generous stipend that covered my living expenses for the 10 weeks I worked in Margaret's lab at Strathclyde University.

To recreate the effects of doxorubicin (DOX) on the heart, my internship research focused on the impact of doxorubicin (DOX) on a three-dimensional (3D) model of human cardiac spheroids. The study area is pharmacologically significant since cancer medications induce damage to the heart, which results in cardiac complications years after chemotherapy treatment. Connexin-43 (Cx43), gap junctions which connect cardiac muscle cells, are essential for heart-cell communication. We hypothesised that Cx43 was dysregulated, and its expression altered because dying cancer cells release extracellular vesicles as a result of chemotherapeutic drugs, such as DOX.

I learnt how to do RNA extraction and isolation, as well as how to assess the sample's purity for subsequent use in qPCR to determine the gene expression of the Cx43 gene, GJA1. I measured expression in AC16, HUVEC, and human cardiac fibroblasts that comprised the 3D cardiac cell model. Western blot analysis was used to evaluate Cx43 expression in 3D tri-cell spheroids treated with DOX or DMSO. I also isolated mitochondria from the primary cells and examined mitochondrial Cx43 expression using western blotting. Further, I had the privilege to collaborate with Dr Ralf Bauer, also situated at Strathclyde university, to help image our 3D-spheroids by employing light-sheet microscopy, using a microscope that he and his colleagues are presently developing. This was such a wonderful opportunity to see the development of cutting-edge technology and collaborate with a team from a different field to help address a scientific issue.

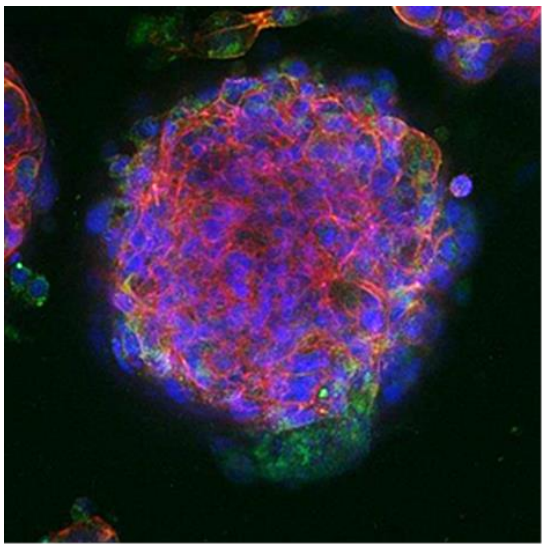

Figure 1) *Fluorescent staining microscopy of human 3D cardiac cell spheroid. Nucleus (Blue), actin (Red), and Cx43 (Green) were stained to visualise the disruption and expression of imaged proteins. This image is a control, to show the model used with no treatment.*

I am now in my final year of a BSc (Hons) in Biochemistry and Pharmacology at the University of Strathclyde, Glasgow, and will begin my lab-based research in late October, examining how the amino acid composition of cell culture medium impacts protein expression. Although my study for this year is very different from the research I conducted with Dr. Cunningham and her team over the summer, the technical skills I acquired, such as western blotting, cell culture, and cell imaging, will propel my upcoming project forward. These technical abilities are crucial, but what is more important to me is acquiring further lab experience to enhance my confidence in the lab by working on my own experiments and coming up with my own research ideas. During my summer internship, I realised that I wanted to pursue a career in research, particularly biochemical pharmacology. I want to apply for forthcoming PhD openings as well as entry-level industrial employment.