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Training in mucinous ovarian cancer organoid model generation and maintenance, Peter MacCallum Cancer Centre, University of Melbourne, Victoria, Australia
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This year I was fortunate enough to receive a Royal Society of Biology's AMRSB travel grant to help facilitate an international research visit to the Gorringe Laboratory at Peter MacCallum Cancer Centre. The purpose of this visit was to train in the generation and maintenance of mucinous ovarian cancer organoid models.

Mucinous ovarian cancer (MOC) is a rare subtype of epithelial ovarian cancer (EOC), which accounts for 90% of all ovarian cancers diagnosed. MOC cases are usually diagnosed in FIGO stage 1, however, if they are identified at later stages of disease, they present a clinical challenge to treat. This is because MOC's are inherently not susceptible to the first-line platinum-based chemotherapies used to treat all EOC cases. Thus, the treatments are often less effective and this impacts MOC patient outcomes. Clinically relevant studies utilising clinically relevant MOC models are required to improve patient diagnosis and treatment.

Organoids are patient derived cellular models that grow in 3-D. Their human origin and their growth conditions more closely mimic tumour growth in the body compared to the conditions of immortalised cell lines. Thus, organoids are a useful model to gain insight into how tumours would behave. This makes them a valuable tool for researchers to utilise in drug discovery, therapeutic development and diagnostic investigations and they have been gaining in popularity.

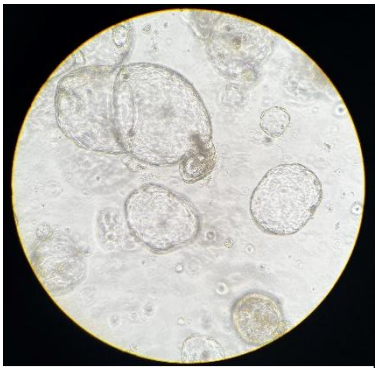
My laboratory group at the University of Birmingham primarily works in steroidal metabolism in endocrine cancers. We wanted to implement the use of MOC organoids in our studies to better reflect MOC tumours in patients.

A/Prof Kylie Gorringe's research group at the Peter MacCallum Cancer Centre, University of Melbourne, Australia is a prominent research group investigating MOC. They have developed optimised protocols for MOC organoid generation and maintenance and have successfully utilised their MOC organoids in multiple studies pending publication. Prof Gorringe kindly offered to host my visit to learn from her laboratory group how to set up and utilise these models.

During my visit, I was embedded within the team of scientists who work MOC organoids and had individualised training. My first few weeks in the lab, I was focussed on learning the organoid culturing protocols and understanding the theory behind them. This included learning organoid growth media recipes. Furthermore, I was able to shadow staff and students as they cultured and ran experiments with their own organoid lines to see the full workflow. This built my understanding of how to design and perform high-throughput experiments using MOC organoids. Alongside this, I brought up a few organoid lines from long-term frozen storage and practised culturing them and maintaining their growth. This was an invaluable experience as I was able to have a hands-on practical approach, supported by the wider team, to develop my understanding of MOC organoid culture, identifying signs of organoid death and troubleshooting. As such, this allowed me to gain confidence in my technique and to learn to identify signs of growth, signs of stress and to gauge when is right to passage the organoids.

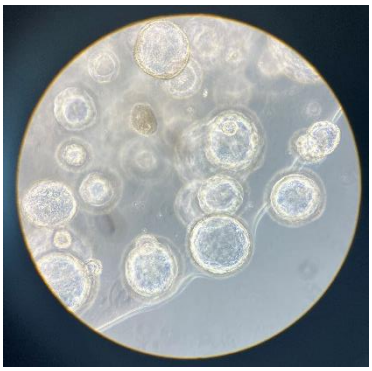
In the latter weeks of my visit, whilst continuing to culture organoid lines, I was also able to trial preliminary steroidal experiments in 3 organoid lines. This allowed me to bring everything I had been learning from the group together and seed, then treat the MOC organoids and the downstream

acquisition and analysis of the experimental data. I was lucky enough to be able to run two of these experiments and these have provided a background for my experiments at my home institution. In this time, the laboratory group had a primary sample, which allowed me to shadow the generation of an organoid line from a human tissue sample.



Large organoids forming in the plate

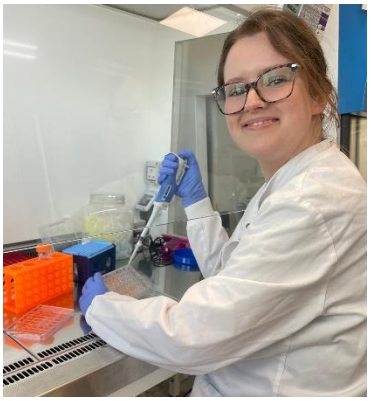
Outside of the prime reason for my visit, I took every opportunity to get involved with, and learn from, the academics and colleagues at Peter MacCallum Cancer Centre. This included attending many different talks held by the department, shadowing other experimental work and attending a variety of meetings. I heard from world experts in gynaecological cancer research about their current work in a round table discussion and I attended lectures from institute PI's about cancer's grand challenges and how their research aims are addressing these disease facets. Attending these events expanded my understanding of cancer research and women's health beyond what I would have had the opportunity to without this experience and has made me a more knowledgeable and inquisitive scientist.



Smaller but many organoids in the plate

During the last week of my visit, I attended the Emerging Technologies Organoid Research 2024 Symposium and Organoid Nexus 2024 Innovation Meeting. Both events were an opportunity for me to hear from other researchers in Victoria, Australia and how they are utilising organoids in their research and their future directions. A highlight of these events was a keynote lecture from Prof Karuna Ganesh (Memorial Sloan Kettering Cancer Center, NYC). Attending these symposiums provided me with detailed and practical uses of organoids in the field and the open discussions proved insightful for understanding the current challenges in organoid research.

Having trained in MOC organoid generation, culture, and utilised them in experiments, it is my aim to bring what I have learned and some samples from the Gorringe group back to the University of Birmingham, UK. There I will continue with my MOC organoid steroid studies, and this will become a significant part of my PhD thesis and will enhance the quality of research that I am able to produce. With the inclusion of the patient derived organoid model data, my project hopes to identify key steroidogenesis differences in MOC and to highlight new diagnostic markers and/or therapeutic targets.



Changing the media on my organoid lines in the culture hood

This research trip was an amazing academic development experience for me. It was my first experience of an international research visit, my first conferences and my first introduction to an academic environment outside of the UK. It allowed me to develop my networking skills and develop a positive collaboration between my own group and the Gorringe Laboratory.

Overall, I had a very productive and informative research visit training in MOC organoid model culture, and I am very grateful to the Royal Society of Biology and other funding bodies for their generous support of this visit.