CARDIFF UNIVERSITY

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Breast Cancer Hope

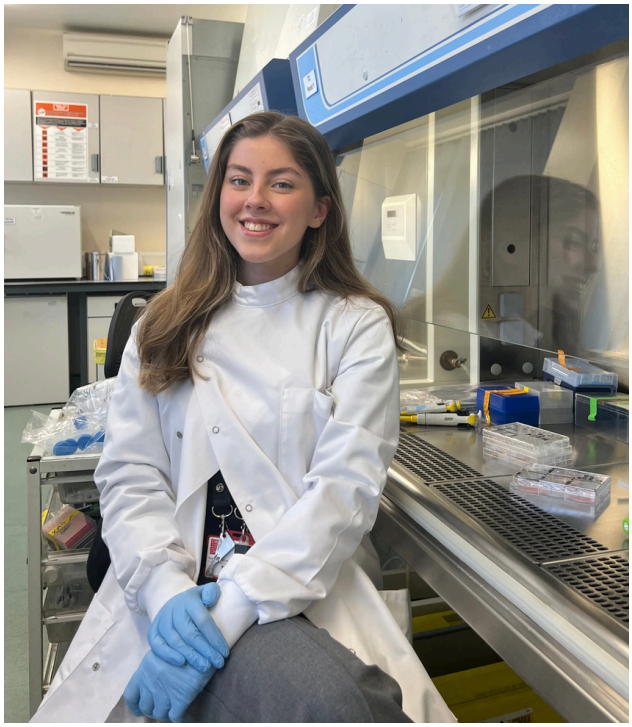
Annual Report
Summer 2025

In this report, Niamh O'Neill (BSc 2024, Medicine 2024 -) gives an update on her research progress. Thanks to the support of Breast Cancer Hope, Niamh is conducting robust research and is already collaborating with other researchers across the world. Diolch - thank you.

“My PhD project investigates a molecule called GD2, which is highly expressed on solid tumours, but has limited expression on normal tissue – making it an attractive therapeutic target. GD2-targeting drugs are currently approved for paediatric neuroblastoma and have shown strong clinical efficacy. However, because GD2 is also present on peripheral nerves, patients can experience significant neurotoxic side effects, such as nerve pain.

Interestingly, we found GD2 is expressed in approximately 30% of breast cancers, where it is associated with poor prognosis. While directly targeting GD2 shows promise, existing therapies have short half-lives and side effects due to off-target interactions. My research aims to take a novel approach by targeting GD2 biosynthesis instead, which may offer a more effective, longer lasting, and less toxic alternative for patients.

GD2 is also believed to mark breast cancer stem cells, driving aggressive tumour behaviours such as migration, invasion, and self-renewal.



“These achievements and experiences would not have been made possible without the generous support of Breast Cancer Hope.”

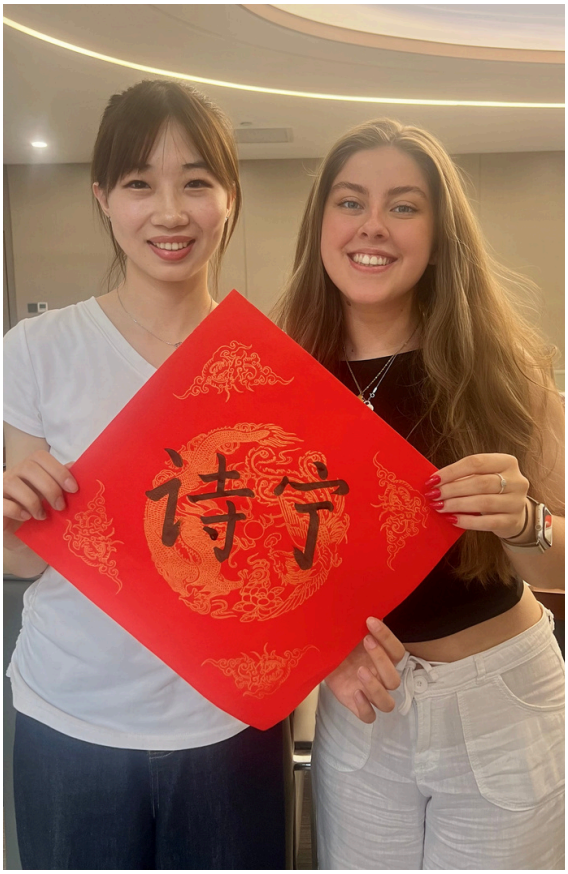
Despite its significance, the clinical role of the enzymes that produce GD2 was previously unclear. During my first year, I analysed the expression of these enzymes in patient tissue and found specific patterns of dysregulation strongly associated with poor survival. One enzyme signature in particular outperformed traditional prognostic indicators in predicting survival.

These findings were recognised by the American Association for Cancer Research (AACR), and I was honoured to receive the prestigious SABCS Basic Science Scholarship to present my work at the world’s largest conference dedicated solely to breast cancer research – the San Antonio Breast Cancer Symposium (SABCS) in Texas.

To support my attendance, I was also awarded the WM Thomas and ME Williams bursaries from the School of Medicine. A highlight of my year was a three-week long research exchange trip to China, funded by the Welsh Government’s Taith Mobility fund.


中医药创新研究院
Innovative Institute of Chinese Medicine and Pharmacy
学院简介


WELCOME THE YOUNG SCHOLARS FROM CARDIFF UNIVERSITY VISITING SDUTCM


诗宁


英青年学术沙龙
中英青年学术沙龙
China-UK Academic Symposium

“The recognition and impact this research has already received highlights its real potential to make a difference in the lives of breast cancer patients.”

I visited top research and clinical centres, including Shandong University of Traditional Chinese Medicine and the Third Bethune Hospital of Jilin University (China-Japan Union Hospital - see images). I delivered an oral presentation on my research at the Sino-British Young Scholars Academic Salon. It was a fantastic opportunity where I gained insight into how breast cancer is treated and studied globally.

The past year has been transformative both professionally and personally. I was awarded four grants and scholarships, presented at both regional and international conferences, and published my first-first author paper (O’Neill et al., 2025). I have gained confidence, resilience, and a deeper understanding of how meaningful this research can be. In the coming year, I aim to investigate the cellular impact of dysregulated GD2 biosynthesis and explore why it correlates with poor prognosis. This may provide new insights into tumour behaviour and treatment resistance in breast cancer.

I am incredibly grateful for the opportunities your funding has made available. I remain deeply motivated to make a difference in cancer care and am incredibly grateful for the opportunity to share and develop my research on such a global scale.”

Niamh O’Neill (BSc 2024, Medicine 2024 -)
Thesis title: The clinical and therapeutic impact of disialoganglioside GD2 and its synthases on breast cancer

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