

## School of Pharmacy PhD Project 2017 / 2018

Multifunctional Nanomedicines for the Targeted Treatment of Bone Metastases

Dr Helen McCarthy and Professor Colin McCoy

Bisphosphonates (BP) are routinely used to abrogate skeletal related events for those with bone metastases. We have previously published that when delivered intracellularly, the inorganic BP has a potent anti-cancer effect when packaged as a nanoparticle using the RALA delivery peptide. This can completely change the pharmacological landscape for BPs. However, side effects such as osteonecrosis of the jaw are extremely dose limiting. In this proposal the student will take a series of BPs and using click chemistry remove the bone affinity component. The student will also conjugate chemotherapy drugs, and eventually an antagomir to knockdown miR34a, to the BP via a group labile only inside the diseased cell. Given the dual mechanism of action of these compounds, the anti-cancer effects will be unprecedented. The student will formulate these drugs into a single nanoparticle using the newly patented RALA-c-P system which consists of a 30 amino acid peptide, a tumour specific cleavable sequence and Polyethylene Glycol. We have previously shown high accumulation in tumours utilizing this system and it should be extremely effective for the BP-conjugates.

This project brings together expertise in nanotechnology, biopharmaceutics and molecular engineering through synthetic chemistry. With state of the art facilities the student will benefit from training in, hyperspectral microscopy, thermal analysis, spectroscopic techniques, NMR, HPLC, molecular biology, lyophilisation in addition to in vitro and in vivo technologies. The successful applicant must be dedicated and motivated to producing publication-quality research from the outset.

### General Email Enquiries

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### Project Email Enquiries

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### How to Apply

Postgraduate applications should be made using Queen's University [Direct Applications Portal](#). Please note that there are two application processes: one for admission to the university and another for postgraduate awards.

### Further Information

Additional information for prospective postgraduate students can be found on the [School of Pharmacy website](#) and the [Queen's Postgraduate website](#).