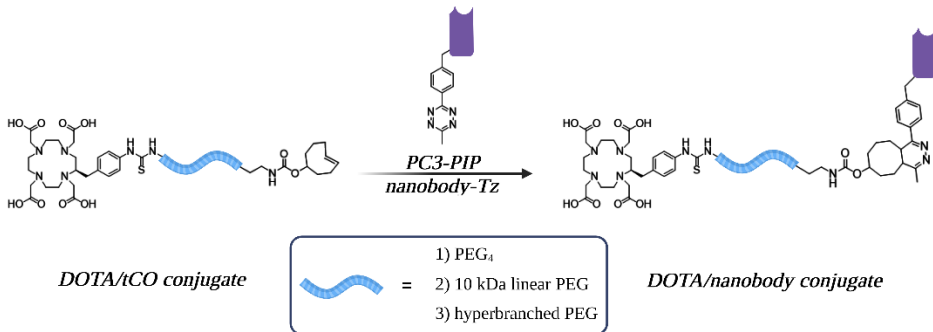


2023 Winter Research Project Description

Project title:	Polymer nanocarriers for personalised medicines
Project duration, hours of engagement & delivery mode	Duration of the project, 4 weeks during Winter Vacation. Hours of engagement must be between 20-36hrs per week
Description:	<p>Production and testing of fast clearing $^{177}\text{Lu}[\text{DOTA}]$ polymer/protein conjugates</p>  <p><i>DOTA/tCO conjugate</i> + <i>PC3-PIP nanobody-Tz</i> → <i>DOTA/nanobody conjugate</i></p> <p>Legend: 1) PEG₄ 2) 10 kDa linear PEG 3) hyperbranched PEG</p> <p>This research project involves the development of polymer/protein conjugate materials for potential use as radiotherapeutics. We aim to develop systems that use known chelators for Lutetium-177 (i.e., DOTA) and known bioorthogonal chemistries (i.e., <i>t</i>CO/tetrazine IEDDA) for rapid coupling to probe the conditions for effective targeting yet fast-clearing radiotherapeutic probes from biological systems. A series of polymer/protein conjugates with varying poly(ethylene glycol) linker lengths will be produced to test the clearance rates from blood circulation. These nanocarriers would then be capable of tumour cell receptor targeting using nanobodies incorporating tetrazine unnatural amino acids that are produced in-house, thereby producing radiotherapeutic nanomedicines that can effectively target tumorous areas as well as carry out therapeutics at sufficiently high concentrations to treat those areas, while effectively clearing from circulation to avoid any off-target issues.</p>
Expected outcomes and deliverables:	Applicants will gain experience in the latest polymer synthetic techniques and strategies, polymer/protein hybrid material development, as well as experience in post-polymerisation chemistries and imaging experiments. There is the potential to generate publications from this research, and the student will be asked to present an oral presentation to the Thurecht group at the end of their project.
Suitable for:	This project is open to applications from 2 nd year and later undergraduate students with a background in chemistry and biotechnology.
Primary Supervisor:	Dr Craig Bell
Further info:	For further information, potential candidates can contact Dr Bell (c.bell1@uq.edu.au) or Prof Thurecht (k.thurecht@uq.edu.au). Interested students must get in contact for discussions about the project and research dates prior to submitting an application.