

6 month Master Thesis stay in Cambridge, UK

Active cytochrome c nanocarriers for cancer and senescence therapy

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I am grateful to have had the opportunity to conduct my Master's Thesis in the Fruk Lab at the University of Cambridge, a highly interdisciplinary molecular and nanoengineering lab dedicated to advancing green chemistry and biomedical applications.

For my thesis, I worked closely with a PhD candidate and a PostDoc, who have developed a novel method to synthesise protein nanocarriers via ultrasound homogenisation. My project specifically focused on developing and characterising cytochrome c nanocarriers (CytC NCs) synthesised by this method. We were interested in investigating the potential of these NCs, solely based on CytC, an endogenous mediator of cell death, to eliminate cancer as well as senescent cells, known to mediate pro-tumorigenic effects.

After successfully synthesising the CytC NCs, I employed various characterisation methods, such as Dynamic Light Scattering, Transmission Electron Microscopy, and UV-Vis measurements, and developed assays to confirm the retained biofunctional activity and favourable physico-chemical properties of the CytC NCs. We then investigated the potential of the CytC NCs to induce cell death in cancerous as well as senescent cells using different cell assays and confocal microscopy. Although the particles did not induce cell death, even after implementing multiple modification strategies to enhance their endosomal escape, we gained valuable scientific insights into these novel class of protein NCs. Furthermore, from a personal standpoint, this project allowed me to acquire a variety of new techniques. It taught me a great deal about organisational and interpersonal skills and underscored the importance of resilience in the field of science.

During my time in Cambridge, I got to be a part of a highly supportive and motivational work environment which allowed me to develop close friendships with people from all over the world and extend my scientific network further. Getting to know the spirit and being a part of such a renowned and highly ambitious science hub as Cambridge was eye-opening and interesting and provided me clarity in a lot of aspects regarding my future academic and research goals. Besides spending a lot of time in the lab, I got the chance to explore various destinations in England, such as Bath, Oxford, the Lake District, Brighton, London, and Stonehenge, as well as attend a scientific conference at the Royal Society of Chemistry in London. I spend many evenings out in Cambridge, getting to know proper British pub culture, enjoying chips, beer, pub quiz nights, and football games with friends.

In sum, my time in Cambridge was truly amazing. I learned a tremendous amount of personal and scientific skills, expanding my scientific network while having a great time and finding friends for life.

