

Antibody-based Senolytics for Targeted Treatment of Lung Cancer and Respiratory Diseases

Project Code: ICS-CEB-LF

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Department/Institute: Chemical Engineering and Biotechnology

Website: <https://www.fruk-lab.com>

Industrial Partner: AstraZeneca

Research area: Therapeutics Development

BBSRC DTP main strategic theme: Bioscience for an integrated understanding of health

BBSRC DTP secondary strategic theme: Transformative technologies

Project outline:

Senescence is a natural cellular response in place to deal with the biological stresses. It is characterised by arrested growth and the release of a molecular cocktail that can help recruit immune system. However, under prolonged stress, senescence has a detrimental effect and has been implicated in development and progression of cancer and number of other diseases. It has also been shown that there is a large accumulation of senescent cells in tissues treated with chemotherapy, which can lead to recurrence of cancer.

Recently, significant developments have been made in understanding the biology of senescence, which in turn, led to the development of the first generation of Senolytics, drugs that can remove senescent cells and results in regeneration of tissue, ultimately improving the health and increasing the lifespan.

Fruk and Munoz-Espin labs have developed first in vivo contrast agent for screening of the senescent cell burden and are actively working on identification of surface biomarkers of cancer-associated senescent cells. Proposed project aims to exploit one of the identified biomarkers to develop antibody-drug conjugates employing Senolytics used in the lab. The conjugates will be made using linker cleavable within senescent cells, additionally improving targeting and specificity of the developed conjugate.

We are particularly interested in improving the treatment of lung cancer and respiratory diseases, which are becoming a significant problem considering the level of air pollutants and emerging pathogens.

Our labs have developed several cell and 3D models to study respiratory diseases, and we have chemistry experts in place in Fruk lab to help in design of linker systems for antibody modification. The project will be conducted in collaboration with Astra Zeneca team allowing student to access the facilities and benefit from the know-how of the industrial partner.