Mechanical force-induced oral tumor cell killing

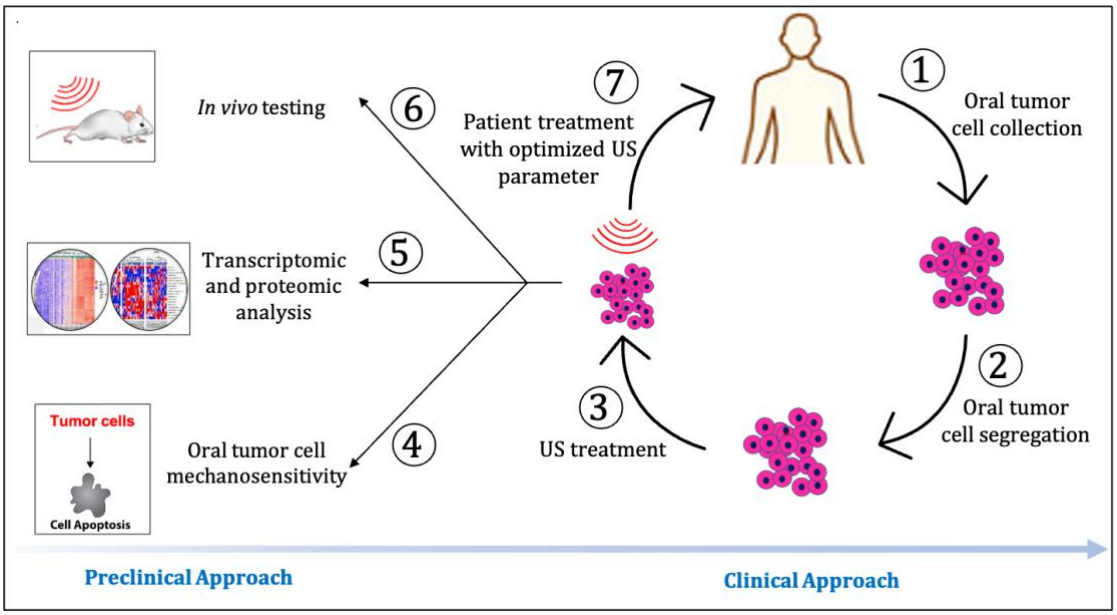
Background

According to the annual report of the Indian Cancer Statistic 2020, tobacco related-oral cancer is the second most common type of cancer, and tobacco-related cancers constituted 30% of the total cancer burden in 2020. Since oral cancer is not a significant concern in western countries, collective efforts to address the oral cancer problem through basic and clinical studies are lacking.

In India, conventional radio- and chemotherapy are widely used for oral cancer treatment. However, severe side effects associated with these therapies compromise the patient's quality of life. Therefore, a premium has been placed on strategies that minimize the side effects in recent years. Interestingly, we recently observed that ultrasound/stretch-generated mechanical forces selectively kill cancer cells without damaging normal cells, thus showing a great potential to minimize side effects. *(paper link1, paper link2)*

Approach

My immediate aim will be to assess the mechanical vulnerability of different oral cancer cell types (lip, tongue, cheek, gum) and then utilize this knowledge **to optimize ultrasound parameters to enhance oral cancer cell killing without damaging healthy tissue stroma**. Ultrasound force-induced apoptosis (programmed cell death) will be a major criterion for mapping the mechanical killing of cancer cells. Patient-derived primary cancer cells will be treated with ultrasound, and resulting apoptosis will be compared to that observed in tissue-matched normal cell lines. Given the notorious heterogeneity within patient-derived tumors, ultrasonication of patient-derived cancer cells *in vitro* will provide vital information on the levels of ultrasound required to kill primary cancer cells while preserving healthy stroma. Thus, this project has the potential for the development of **personalized ultrasound therapy**.



Schematic representing steps involved in the development of personalized mechanotherapy

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