Faculty of Engineering
Summer Research Program 2020-2021

Project Title: Engineering new technologies for respiratory drug delivery
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Objective

The extensive surface area of the respiratory tract provides an excellent portal for the targeted delivery of aerosolized drugs and vaccines. However, the complex, convoluted geometric properties of both the lower and upper respiratory tracts provide numerous, distinct challenges for the effective delivery of drug compounds. Drug deposition in the respiratory tract primarily depends on three key parameters: i) the size and distribution of the aerosol particles/droplets, ii) the flow rate and iii) the inspired volume and patient’s breathing pattern. Hence, a personalised approach, which is capable of tuning the particle size, is required for increased effectiveness. This is currently not possible with any commercially available device.

Project Details

We patented a new inhaler and respiratory drug delivery method. The approach employs a small form-factor device that sits comfortably in the palm of the hand and fits a variety of face shapes thanks to its universal design. The device uses disposable microfluidic chips to dial the size, distribution and dose of aerosolised particles on-demand. This represents a first for targeted, personalised inhaled therapy that is tuneable for pulmonary administration of therapeutics.

As part of the project, you will work on:

- integration of this technology into a hand-held prototype suitable for use in clinical trials.
- design of sample delivery methods
- life cycle testing to establish device reliability.

Prerequisites

No prerequisites. The ideal candidate(s) should be interested in fluid mechanics, microtechnology and medical device applications. The project involves both hands-on experimental work and analytical/ computational modelling.

Additional Information

Applicants may be required to attend an interview.