

Breath of fresh air for asthmatics

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Research aims for better results and fewer side effects in new puffers. Credit: Thinkstock

People in good health don't usually think about breathing. But for the one in 10 Australians who have asthma and other respiratory diseases, research into inhalable medications to help them breathe more easily could change their lives.

Pharmaceutical scientist Dr Mehra Haghi hopes to develop a platform that will allow a range of drugs to be delivered by inhalation. They include antibiotics used to treat tuberculosis and anti-inflammatory drugs for asthma and chronic [obstructive pulmonary disease](#) (COPD).

Many respiratory treatments are injected or taken as pills because we have not been able to formulate them as suitable inhalable products, says Dr Haghi, a lecturer in the Graduate School of Health at the University of Technology Sydney (UTS).

"Formulating treatment for inhalation is more challenging because the formulated micro-particles need to be the right size to travel all the way down to the lung without causing sensitivity," she says.

Dr Haghi has just embarked on a prestigious Humboldt Research Fellowship in Germany where she will spend four months exploring a unique testing model.

Typically, new drugs are tested on commercially produced cell lines but Dr Haghi has arranged to isolate cells from respiratory patients. "It's unique because we can test on cells that have the pathological characteristics of the patient," she says.

"No research has been done previously that studies at cellular level what happens to respiratory formulations after inhalation by the patient."

Dr Haghi isolates several types of lung cells from patients, culturing them separately, then combining them, in the same order and ratio they grow in the lung, to create a 3D model. "It's the closest thing we can get in the laboratory to replicating the condition we are treating," she says.

Her work could potentially lead to new and more effective treatment for [chronic obstructive pulmonary disease](#) (COPD) and asthma.

"The main treatment for asthma is inhaled steroids, and that hasn't really changed for the past 50 years or so," says Associate Professor Greg King, a respiratory physician at Royal North Shore Hospital and clinician researcher at the Woolcock Institute of Medical Research.

In collaboration with the Woolcock Institute, Dr Haghi has developed an inhalable version of the asthma drug theophylline which is now taken orally but it can have problematic side effects.

Dr King says that while modern asthma treatments are safe and effective for most patients, it is remarkably common for them to be ineffective in people with severe asthma.

He estimates that 15 to 20 per cent of asthmatics experience steroid insensitivity, making treatment difficult. "In respiratory disease treatment, the preference is always to give an inhaler because that bypasses all the systemic side effects," he says.

"But there are a lot of challenges to get a preparation you can successfully put it into a puffer. You have to be able to prove it's safe to inhale, as concentrating a formula straight onto lung tissue could irritate or damage the tissue."

In another project, Dr Haghi has developed a stable, high-performance aerosol version of the drug tranexamic acid, which is used to reduce bleeding in surgery and after birth, and as an oral treatment for heavy menstrual bleeding.

"Coughing blood is a significant symptom that needs to be investigated but once you find a cause, the management is relatively limited," says Dr King. "An inhalable form of tranexamic acid to stop bleeding in the lung would make a real difference to patients."

Provided by University of Technology, Sydney

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