

Bioactive paper will revolutionize point-of-care diagnostics

24 July 2013, by Kim Wright

A pair of University researchers have received a \$600,000 CIHR award to develop a bioactive paper that aims to provide an inexpensive, point-of-care diagnostic tool to measure bronchitis in patients with airway diseases, such as asthma, COPD and chronic cough.

Dr. Parameswaran Nair, associate professor, Medicine, holds the CIHR Canada Research Chair in Airway Inflammometry. Dr. John Brennan is a Canada Research Chair in Bioanalytical Chemistry, and director of McMaster's new BioInterfaces Institute. The research is supported by AllerGen NCE, a national network for asthma and [allergic diseases](#) research, headquartered at McMaster.

The paper strip will measure the quantity of eosinophil peroxidase (EPX), a protein that can be detected in sputum.

"We are developing a point-of-care diagnostic test using a bioactive, paper-based detection of EPX," says Nair. "This test has the potential of a global application in both resource-poor and resource-rich countries in doctor's offices, outpatient clinics, and by patients themselves for self-management."

Approximately 50 per cent of [asthma exacerbations](#) and about a third of COPD exacerbations are caused by eosinophilic bronchitis—a bronchitis that is typically associated with allergies. Current management strategies do not measure bronchitis, but focus on symptoms and airflow, which are often inaccurate.

Treatment strategies for asthma and COPD that are based on EPX cell counts provide significantly better outcomes than strategies guided by conventional clinical assessments. However, quantitative EPX cell counts are not widely available and the results are not accessible in real time.

As a first step in finding a solution to this problem, Nair—along with the late Professor Freddy Hargreave, and Ann Efthimiadis—developed a sputum filtration device (Accufilter) that is protected by an international patent. In collaboration with Dr. Jamie Lee at the Mayo Clinic, Nair developed and validated a tool to accurately measure EPX in sputum.

Now, Nair and his team hope to transform this technology into a simple, paper-based strip by using novel "bio-inks." The bioactive paper would offer a low-cost diagnostic that may revolutionize the management of airway diseases globally.

"Our goal is to pave the way for a frugal treatment strategy whereby patients will be able to self-adjust the dose of their corticosteroids based on their sputum eosinophil levels as detected by the EPX assay," says Nair. "We can see applications of this technology worldwide."

NSERC and CIHR have provided \$600,000 over a period of three years through the Collaborative Health Research Program to support development of the biosensor.

Provided by McMaster University

APA citation: Bioactive paper will revolutionize point-of-care diagnostics (2013, July 24) retrieved 10 October 2022 from <https://medicalxpress.com/news/2013-07-bioactive-paper-revolutionize-point-of-care-diagnostics.html>

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