Portable Exhaled Breath Condensate (EBC) Analyzer for Asthma Diagnosis and Monitoring

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Technology description

Invention Summary

Asthma, an increasingly important global health problem that affects ~ 300 million people worldwide, is characterized by variable airway inflammation and air flow obstruction. Currently available non-invasive methods for diagnosing and monitoring asthma involve measurements of exhaled nitric oxide (NO). Apart from the transient nature of NO, these methods are limited by low sensitivity and an inability to identify the nature and extent of airway inflammation. Measurement of alternative biomarkers in exhaled breath condensate (EBC) that can facilitate molecular phenotyping of asthma, thus enabling targeted treatment and more effective disease management, is an important clinical need.Nitrite in EBC is a promising biomarker for the extent of inflammation and air-flow obstruction in the respiratory tract and is more stable than NO. Rutgers scientists have developed a novel portable device that employs reduced graphene oxide (rGO) as the sensing mechanism for detecting nitrite in very small volumes of EBC. The team has validated the performance of this device on clinical EBC samples. This enzyme-free and label-free method of detecting nitrite in EBC can pave the way for the development of portable breath analyzers for diagnosing and managing changes in respiratory tract inflammation and disease states.Market Applications:Point-of-Care analyzer for detecting and monitoring nitrite, an asthma-associated inflammation biomarker in EBC.

Publication:Gholizadeh A, Voiry D, Weisel C, Gow A, Laumbach R, Kipen H, Chhowalla M and Javanmard M. Toward point-of-care management of chronic respiratory conditions: Electrochemical sensing of nitrite content in exhaled breath condensate using reduced graphene oxide. (2017)Microsystems & Nanoengineering.3

Application area

Portable

Highly sensitive in the clinically relevant μM range

Easy to use, no need to pretreat EBC

More reliable than measuring exhaled NO

Institution

Rutgers University

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