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PTR-MS breath test shows potential for detecting liver disease

Researchers at the University of Birmingham have published results that suggest a non-invasive breath test for liver disease using an IONICON PTR-MS.

Elevated levels of limonene in patients have been found to be indicative of a diseased liver.

Background

Especially in the UK liver disease has risen sharply over the past few decades and is the third biggest cause of premature mortality. Patients do not often present with symptoms until the disease is advanced. Even then diagnosis is difficult and the symptoms are often general and can be mistaken for other pathologies.

Breath gas analysis is a non-invasive method to collect information on the state of an individual by monitoring the concentration of the volatile organic compounds (VOCs) present in the exhaled breath, which are directly correlate to their concentrations in blood.

The study

Patients with a diseased liver showed very high levels of limonene, a flavour compound that is predominantly found in citrus fruits, in their breath – higher than in a healthy person, reports Raquel Fernandez del Rio, the lead author of the paper [1]. Limonene, which is metabolized by a healthy liver, is accumulated in patients with liver disease. This hypothesis is supported by further studies on a sub-group of those patients before and after liver transplantation. Once the transplanted liver starts to work, limonene is cleared from the body.

IONICON supplied the PTR-MS instrument that carried out the analysis

Lukas Märk, IONICON's CEO comments on the study: "A direct link between a compound's concentration in breath and a disease state is a promising basis for the development of a clinical test. The non-invasive character of a breath test is captivating, especially in comparison to invasive alternatives such as a biopsy. But breath analysis has even more to offer: the possibility to analyze breath in real-time delivers immediate results, with a high-throughput and no waiting for lab tests.

The analyzer employed in this study, an IONICON PTR-MS, has become the reference method for real-time breath analysis. Moreover, IONICON provides an optimized inlet system for breath analysis with PTR-MS. Safety of patients has become an increasing focus, and even devices for non-invasive breath analysis have to comply with international regulations. The IONICON BET-med system has been certified for clinical use, which allows real-time breath analysis of patients with IONICON PTR-TOFMS instruments".

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About IONICON

IONICON Analytik GmbH was founded in 1998 to commercialize the unique Proton Transfer Reaction – Mass Spectrometry (PTR-MS), recently adding the proprietary Selective Reagent Ionization – Mass Spectrometry (SRI-MS) technology.

Over 250 leading scientists, institutions and multinational corporations are among IONICON's customers. They rely on PTR-MS instruments for results in real-time at one out of a trillion parts (LoD < 1 pptv) but without time-consuming sample preparation procedures.

Learn more about IONICON here.

Resources:

[1] Fernández del Río et al. Volatile biomarkers in breath associated with liver cirrhosis – comparisons pre- and post-liver transplant breath samples.
doi: 10.1016/j.ebiom.2015.07.027

Medical PTR-MS applications: http://www.ionicon.com/applicationshowcases/medical-applications

PTR-TOFMS series instruments: http://www.ionicon.com/products/ptr-ms/ptr-tofms-series

BET-med breath sampling system: http://www.ionicon.com/product/accessories/bet

IONICON blog post: http://blog.ionicon.com/2015/08/ptr-ms-breath-test-shows-potential-for-detecting-liver-disease/

Supporting picture download link. Credit: © IONICON. Suggested capture/title: Real-Time Breath Analysis using IONICON's patented BET-med sampler coupled to a PTR-TOFMS.

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