New e-nose sniffs out rare progressive lung disease

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An e-nose used to detect cancer has been adapted for early detection of Pulmonary Arterial Hypertension (PAH), a rare form of high blood pressure, by Université Paris-Saclay in partnership with the Technion Israel Institute of Technology.

The artificial nose can sniff out PAH on a person's breath as the disease alters its signature.

As cases are often diagnosed late, patients suffering from PAH have just a five year life expectancy after diagnosis. It causes cells to obstruct small pulmonary arteries that pump blood from the heart to the lungs, impairing blood flow and increasing blood pressure within the lungs. Symptoms include shortness of breath, chest pain, dizziness and eventually right-sided heart failure.

But the disease can be managed with the right diagnosis. The earlier, the better.

A team at the Technion, working in nanotechnology and headed by Professor Hossam Haick, initially invented the e-nose to diagnose cancer.

Doctor Sylvia Cohen-Kaminsky from Université Paris-Saclay contacted Haick to apply his technology to PAH – which has some similar characteristics to cancer. They are setting up a device dedicated to the diagnosis of the devastating disease.

They created an international associated lab between Inserm, the Technion, and Université Paris-Sud (http://presse.inserm.fr/un-nouveau-laboratoire-international-associe-sur-la-piste-dun-nez-electronique-pour-renifler-lhyperten made and published the proof of concept of the detection of PAH using the e-nose. It's built from gold nanoparticles coupled with chemical modules.

A large clinical trial (https://clinicaltrials.gov/ct2/show/NCT02782026) sponsored by the public hospital system in Paris, Assistance Publique Hopitaux de Paris, and headed by Professor Marc Humbert from Université Paris-Sud, renowned expert in pulmonary hypertension, is now ongoing in PAH for validation.

"The gold standard for the diagnosis of PAH is right heart catheterism, which can make the right diagnosis, but it is invasive, risky and unsuitable for widespread screening," says Cohen-Kaminsky. "The e-nose is a non-invasive and safe detection method that means general screening of PAH could eventually be made available."

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For more information or a copy of the study, please contact Stephanie Mullins at BlueSky PR on

smullins@bluesky-pr.com or call +44 (0)1582 790 706.