

Two breath compounds could be associated with larynx cancer

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Participants exhaled into tedlar bags after fasting for more than eight hours. Credit: SINC

Researchers at the Rey Juan Carlos University and the Alcorcón Hospital (Madrid) have compared the volatile substances exhaled by eleven people with cancer of larynx, with those of another twenty healthy people. The results show that the concentrations of certain molecules, mainly ethanol and 2-butanone, are higher in individuals with carcinoma, therefore they act as potential markers of the disease.

Human breath contains thousands of [volatile organic compounds](#) (VOC) and some of them can be used as non-invasive biomarkers for various types of head and neck cancers as well as [cancer](#) of the larynx.

This was shown in the experiment carried out by scientists from the Rey Juan Carlos University (URJC) with 31 volunteers: 20 healthy subjects (half of which are smokers) and 11 with cancer of the larynx in various phases of the disease and who are being treated in the Alcorcón Hospital in Madrid.

The results, published in the journal 'Chromatographia', reveal that the air exhaled by the more seriously ill patients - in a stage called T3 - contains different concentrations of seven compounds compared with the levels of [healthy people](#) or even those with a less developed tumour (T1).

Specifically, in the graphics of individuals with advanced cancer, the peaks that represent ethanol (C₂H₆O) and 2-butanone (C₄H₈O) are particularly significant. These two compounds therefore become potential markers of laryngeal carcinoma.

"At the moment it is still a preliminary study and a wider sample has to be obtained," Rafael García, professor of Chemical Engineering at the URJC and co-author of the study told SINC, "but it is a step in the right direction, an alternative with regard to identifying biomarkers, not only for this type of cancer but for other more prevalent and serious ones such as lung cancer, where [early detection](#) is key".

As part of the experiment, the researchers asked the participants to breathe into tedlar bags after fasting for at least eight hours so there was no leftover food or drink on their breath.

The samples were then analysed with solid phase micro-extraction, gas chromatography and mass spectrometry techniques, which enable very small amounts of a substance to be separated and identified. The concentrations are around or slightly above the equipment's detection limits (40 nanograms/mL), which is equivalent to 40 ppb or parts per billion.

The ultimate aim of the research is to "create an electronic nose that can be used in hospitals and health centres for the early detection of these types of diseases," concluded Rafael García. This team, together with other Spanish and foreign research groups, is working hard to develop sensors capable

of detecting diseases through breath analysis.

Head and neck cancers represent between 5% and 10% of all malignant tumours currently diagnosed in Spain. Every year nearly half a million new cases are detected worldwide, mainly attributed to tobacco and alcohol use and approximately 90% are laryngeal cancer. The study also identified four markers in the exhaled breath that are typical of smokers, such as benzene and furfural.

More information: Rafael A. García, Victoria Morales, Sergio Martín, Estela Vilches, Adolfo Toledano. "Volatile Organic Compounds Analysis in Breath Air in Healthy Volunteers and Patients Suffering Epidermoid Laryngeal Carcinomas". *Chromatographia* 77 (5-6): 501-509, 2014.

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