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A New Method to Detect Pancreatic Ductal Adenocarcinoma by Analysis of Volatile Organic Compounds (VOCs) in Alveolar Air

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Context Early diagnosis of pancreatic ductal adenocarcinoma (PDA) is still a challenge. In the last decade many studies showed that the air exhaled by subjects suffering from lung and breast tumor shows peculiar profiles of volatile organic compounds (VOCs). The possible causal factors of PDA are able to alter the concentration of some VOCs in the alveolar air which can be collected with an easy-to-use, cheap and reliable device. **Objective** To determine a VOCs profile in the alveolar air able to discriminate patients suffering from PDA. **Methods** Air samples were obtained from patients affected by PDA cyto-histologically confirmed admitted in the Surgical Unit B of Verona University Hospital (Study Group). Patients characteristics, clinical and biohumoral data, surgical procedures and histological specimen reports were prospectively collected. The same air samples were collected from healthy subjects (Control Group) and in the environmental air of the rooms where the subjects studied were staying. Air samples were analysed by an ion molecule reaction-mass spectrometry analysis (IMR-MS). Through principal components analysis and multivariate logistic regression, a predictive model was created to distinguish subjects with PDA from control subjects. **Results** The concentration of 92 compounds among VOCs and gases (CO_2 and O_2 included) was measured in 75 patients end-tidal breath and in 144 control subjects. The predictive model was built on 65 cases and 102 controls with ages between 40 and 75 years and was based on 10 VOCs significantly and independently associated with the outcome, showing sensitivity and specificity values of 98.67% and 95.10%, respectively and an area under the ROC curve of 0.9887. **Conclusion** Using a profile of some VOCs we identify an algorithm able to discriminate subjects with pancreatic adenocarcinoma from control subjects with the best sensitivity and specificity ever reported by a single test. The test is cheap, non invasive and reproducible. We believe that it could be applied extensively and it could represent a screening test in high risk population for pancreatic ductal adeno-carcinoma.