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Title: An electronic nose in the discrimination of patients with lung cancer and controls

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Body: Background Lung cancer is a leading cause of death in men suffering from oncological diseases. Exhaled breath contains hundreds of volatile organic compounds (VOCs) that could serve as biomarkers of lung disease. Electronic nose can distinguish VOC mixtures by pattern recognition. Objective We hypothesized that an electronic nose can discriminate exhaled air of patients with lung cancer from healthy controls. Methods 25 patients with clinicaly and histologicaly verified lung cancer and 45 controls were included in a study with sampling of exhaled breath. Subjects inspired VOC-filtered air by tidal breathing for 5 minutes, and a single expiratory vital capacity was collected into polyethylene terephthalate bag that was sampled by electronic nose (Cyranose 320) within 5 minutes. Smellprints were analyzed by multifactorial logistic regression analysis (MLRA). Optimal detector parameter combination for diagnosis of laung cancer was calculated by MLRA backward stepwise method. Sensitivity, specificty, PPV and NPV of the method were calculated. Results Optimal detector parameters for discrimination of lung cancer were maximum of detectors number 6, 13. and 23. and area under curve of detectors 2, 6, 24 and 29. 22 out of 25 or 88.0% of lung cancer cases were predicted correctly by MLRA. Sensitivity of the method was 88.0%, specificity 91.1%, PPV 84.6% and NPV 93.2%. Conclusions The electronic nose appears to be able to discriminate exhaled breath from subjects with lung cancer and healthy controls. Analysis of exhaled breath coud be used as the lung cancer screening method in the future. Ackowledgements Study was sponsored by ERAF activity Nb. 2.1.1.1.0. Project Nb. 2010/0303/2DP/2.1.1.1.0/10/APIA/VIAA/043.