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Title: Analysis of exhaled breath with electronic nose and diagnosis of lung cancer by multifactorial logistic regression analysis

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Body: Background Exhaled breath of lung cancer patients contains specific pattern of volatile organic compounds (VOCs). Objective The aim of our study was to test the potential of multifactorial logistic regression (MLRA) analysis in diagnosis of lung cancer. Methods Exhaled breath of morphologically verified lung cancer patients (cancer group) and mixed group of patients with COPD, asthma, pneumonia, bronchiectasis and healthy volunteers (no cancer group) was examined. Exhaled air was collected using standardized method and sampled by electronic nose (Cyranose 320). Optimal detector parameter combination and methematical model for discrimination of lung cancer was calculated by MLRA backward stepwise method. Sensitivity, specificity, positive (PPV) and negative predictive value (NPV) of the method in the training group of smokers and nonsmokers was calculated. Results Total 475 patients, out of them 252 lung cancer patients and 223 patients with different lung diseases and healthy volunteers, and 265 current nonsmokers and 210 smokers, were recruited in the study.

Classification of cases in nonsmokers

	Lung cancer	No cancer	
Lung cancer	128	12	PPV 91.4%
No cancer	5	120	NPV 96.0%
	Sensitivity 96.2%	Specificity 90.6%	

Classification of cases in smokers

	Lung cancer	No cancer	
Lung cancer	114	7	PPV 94,2%
No cancer	5	84	NPV 94.4%
	Sensitivity 95.8%	Specificity 92.3%	