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

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Body: Background Lung cancer and COPD are diseases associated with cigarette smoking and coexist in many patients. Objective We hypothesized that electronic nose can discriminate exhaled air of patients with lung cancer from patients with COPD and healthy controls. Methods Exhaled breath of morphologically verified lung cancer patients (cancer group), lung cancer patients with COPD (cancer COPD group), COPD patients without verified lung cancer (COPD group) and healthy volunteers (control group) was examined. Subjects inspired VOC-filtered air by tidal breathing for 5 minutes, and a single expiratory vital capacity was collected that was sampled by electronic nose (Cyranose 320). Optimal detector parameter combination and mathematical model for discrimination of lung cancer were calculated by MLRA backward stepwise method. Age, smoking history (pack years) and ambient temperature °C were included as continuous predictors of the diagnosis. Percentage of correct prediction cases was calculated. Results 93 patients with lung cancer, 128 with lung cancer and COPD, 27 patients with COPD and 88 volunteers were included in the study.

Classification of cases (n)

	Total	Cancer	Cancer and COPD	COPD	Control	Correct%
Cancer	93	58	29	0	6	62.4
Cancer and COPD	128	19	105	2	2	82.0
COPD	27	0	2	25	0	92.6
Control	88	2	5	1	80	90.9

The main classification error occurred between cancer and cancer COPD group. Conclusions Exhaled breath analysis with electronic nose demonstrate good discrimination pattern between lung cancer, COPD patients and control, even in patients with combined disease.