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Title: Detection of lung cancer using ion mobility spectrometry in Japan: A pilot study

Dr. Hiroshi 9434 Handa hiroshihstv@marianna-u.ac.jp MD ¹, Prof. Dr Teruomi 9435 Miyazawa miyazawat@marianna-u.ac.jp MD ¹, Dr. Kei 9436 Morikawa mokke@marianna-u.ac.jp MD ¹, Dr. Teppei 9437 Inoue t3inoue@marianna-u.ac.jp MD ¹, Dr. Naoki 9438 Furuya n2furuya@marianna-u.ac.jp MD ¹, Dr. Hirotaka 9439 Kida h2kida@marianna-u.ac.jp MD ¹, Dr. Hiroki 9441 Nishine h2nishine@marianna-u.ac.jp MD ¹, Dr. Seiichi 9442 Nobuyama nobuyama@marianna-u.ac.jp MD ¹, Dr. Takeo 9443 Inoue t2inoue@marianna-u.ac.jp MD ¹, Dr. Masamichi 9444 Mineshita m-mine@marianna-u.ac.jp MD ¹ and Prof. Dr Takehiko 9445 Hiramoto f3n28nq5@ms11.megaegg.ne.jp MD ¹. ¹ Division of Respiratory and Infectious Diseases, Department of Internal Medicine, St. Marianna University School of Medicine, Kawasaki, Kanagawa, Japan, 216-8511 .

Body: Background: National Lung Screening Trial (NSLT) reported screening with low-dose CT could reduce mortality from lung cancer. Breath analysis such as canine scent, electronic nose and ion mobility spectrometry (IMS) could detect volatile organic compounds (VOC). Objectives: To detect specific VOC peaks in lung cancer then compare lung cancer and healthy subjects. Methods: IMS coupled to a multi-capillary column (MCC/IMS) (BioScout: B&S Analytik, Dortmund, Germany) with a 95MBq β -radiation source was used to detect VOC peaks. For the Japanese market, regulations restrict ^{63}Ni β -radiation sources to under 100MBq. Exhaled breath samples were collected at quite breathing in 30 patients with lung cancer and 13 healthy volunteers. Peaks were characterized using Visual Now 2.2 software (B&S Analytik, Dortmund, Germany). Results: Patients included 17 adenocarcinoma, 3 squamous cell carcinoma, 6 small cell carcinoma and 4 unclassified carcinoma. Forty-seven VOC peaks were detected and 10 VOC peaks showed significant differences between lung cancer and healthy volunteers ($p < 0.05$). Conclusions: IMS using 95MBq β -radiation source is a feasible screening test in the detection of lung cancer. In the future, IMS may detect histological types of lung cancer and molecular mutation.