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## Metabolic signatures of lung cancer in sputum and exhaled breath condensate detected by <sup>1</sup>H magnetic resonance spectroscopy

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**Background & Aim:** Lung cancer is one of the most lethal cancers. Currently, there are no biomarkers for early detection, monitoring treatment response, and detecting recurrent lung cancer. We undertook this study to determine if <sup>1</sup>H magnetic resonance spectroscopy (MRS) of sputum and exhaled breath condensate (EBC), as a non-invasive tool, can identify metabolic biomarkers of lung cancer.

**Materials & Methods:** Sputum and EBC samples were collected from 20 patients, comprising patients with pathologically confirmed non-small cell lung cancer (n=10) and patients with benign respiratory conditions (n=10). Both sputum and EBC samples were collected from 18 patients; 2 patients provided EBC samples only. <sup>1</sup>H MR spectrum was obtained on a Bruker Avance 400 MHz nuclear magnetic resonance (NMR) spectrometer. Sputum samples were further confirmed cytologically to distinguish between true sputum and saliva.

**Results:** In the EBC samples, median concentrations of propionate, ethanol, acetate and acetone were higher in lung cancer patients compared to the patients with benign conditions. Median concentration of methanol was lower in lung cancer patients (0.028 mM) than in patients with benign conditions (0.067 mM; P=0.028). In the combined sputum and saliva and the cytologically confirmed sputum samples, median concentrations of N-acetyl sugars, glycoprotein, propionate, lysine, acetate and formate were lower in the lung cancer patients than in patients with benign conditions. Glucose was found to be consistently absent in the combined sputum and saliva samples (88%) as well as in the cytologically confirmed sputum samples (86%) of lung cancer patients.

**Conclusion:** Absence of glucose in sputum and lower concentrations of methanol in EBC of lung cancer patients discerned by <sup>1</sup>H MRS may serve as metabolic biomarkers of lung cancer for early detection, monitoring treatment response and detecting recurrence.

### Biography

Naseer Ahmed is a Senior Thoracic Radiation Oncologist at Cancer Care Manitoba, Winnipeg, Canada and is an Associate Professor at University of Manitoba, Canada. He was a Member of the Board of Directors of Canadian Association of Radiation Oncology (CARO) and Member of the Research Institute of Hematology and Oncology, University of Manitoba. His primary focus of research is metabolomics in cancer using magnetic resonance spectroscopy and mass spectroscopy.

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