Design and evaluation of exhaled breath condensate sampler for assessment of exhaled biomarkers of oxidative stress

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Abstract

Background: The use of exhaled breath condensate (EBC) biomarkers to evaluate exposure and disease in recent years gained attention in toxicology and occupational medicine. However, use of standard sampling apparatus is missing element in this procedure.

Methods: Initial design of sampler was selected based on the water condensation system. The effect of sampler length, sampling time and temperature were studied in the condensate collection system. Samples from both smokers and non-smokers were acquired to determine the amount of malon di aldehyde in exhaled breath condensates. Samples were analyzed by high-performance liquid chromatography (HPLC).

Results: Based on observed results, cooling at zero degree centigrade was selected for optimum sampling. However, 5°C temperature also had slightly less sample recovery in comparison with 0°C. A 25 cm length condenser also had the highest sampling efficiency in comparison with other condenser lengths (15 and 40 cm). EBC Malon di aldehyde was measured by the constructed sampler in smokers and non-smokers. Smokers had higher amount of malon di aldehyde in their EBC($P<0.05$).

Conclusions: In this study we designed, constructed and validated the simple and cost effective exhaled breath sampler for exhaled breath biomarkers study. Results indicated satisfactory repeatability and robustness. Smokers had higher level of EBC malon di aldehyde as a marker of lipid peroxidation.

Key words: Lipid Peroxidation, Exhaled Breath Sampling, Malon di aldehyde, Biomarker

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