

EXHALED BREATH CONDENSATE ANALYSIS: EVALUATION OF A METHODOLOGICAL SETTING FOR AN OCCUPATIONAL FIELD STUDY

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Introduction: Production of exhaled breath condensate (EBC) is a non-invasive method to determine airway inflammation. There is accumulating evidence that pH, nitrogen oxides, and leukotrienes (LTs) are suitable markers of inflammatory airway diseases. When occupational effects are under investigation a local assessment at the working place is necessary and often a cross-shift design is used. The aim of the pilot study was to evaluate accordingly a protocol for field work.

Methods: Eighteen non-smoking adults (aged 26-63 years) with normal spirometry and no episode of airway infection in the 6 weeks prior to the study were evaluated. EBC samples were obtained with the commercially device ECoScreen/ECoVent (VIASYS Healthcare, Höchberg, Germany) on four days over two weeks and analyzed for volume, pH, nitrate/nitrite (Griess reaction), and LTB₄ (immunoassay). Methodical influences of sample collection, sample handling, and circadian rhythm on EBC volume and mediator concentrations were determined. The study was approved by the local Ethical Committee.

Results: With 10 min of tidal breathing a higher EBC volume (median 1550 µL; 25th quantile 1250 - 75th quantile 1975 µL) was collected than with a pre-defined volume of 100 L air (900 µL; 625-1290µL). Wearing a nose-clip had no significant influence on volume or indicated mediators. Within day variability causes minor variations in EBC volume. Storage at 6°C for 16 h (simulating transport conditions in field work) had no significant impact on nitrate/nitrite and LTB₄ concentrations. Mediator concentrations were stable in EBC samples stored at -70°C up to 3 months under argon gas protection.

Discussion: Convenience must be considered when repeated measurements are planned in occupational studies. Our results do not show differences in the outcome variables by nose-clip use. Sampling over 10 min resulted in a higher volume of EBC than a predefined respiratory volume enabling more analyses. Since the evaluated mediators showed sufficient stability, analyses could be done off-field in a common laboratory setting.