

Evaluation of H₂O₂ and pH in exhaled breath condensate samples: methodical and physiological aspects.**Knobloch H, Becher G, Decker M, Reinhold P.**

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This veterinary study is aimed at further standardization of H₂O₂ and pH measurements in exhaled breath condensate (EBC). Data obtained in the study provide valuable information for many mammalian species including humans, and may help to avoid general pitfalls in interpretation of EBC data. EBC was sampled via the 'ECoScreen' in healthy calves (body weight 63-98 kg). Serum samples and condensates of ambient (indoor) air were collected in parallel. In the study on H₂O₂, concentrations of H₂O₂ in EBC, blood and ambient air were determined with the biosensor system 'ECoCheck'. In EBC, the concentration of H₂O₂ was found to be dependent on food intake and increased significantly in the course of the day. Physiologically, lowest H₂O₂ concentrations at 06:00 varied within the range 138-624 nmol l⁻¹ EBC or 0.10-0.94 nmol per 100 l exhaled breath and individual concentrations were significantly different indicating a remarkable intersubject variability. Highly reproducible results were seen within each subject (three different days within 4 weeks). No correlation existed between H₂O₂ concentrations in EBC and blood, and EBC-H₂O₂ was not influenced by variables of spontaneous breathing. Further results confirmed that standardization of H₂O₂ measurements in EBC requires (1) the re-calculation of the concentration exhaled per 100 l exhaled breath (because the analyzed concentration in the liquid condensate underlies multiple methodological sources of variability given by the collection process), and (2) subtracting the concentration of inspired indoor H₂O₂. In the study on pH use of the ISFET electrode (Sentron, the Netherlands) and a blood gas analyzer ABL 550 (Radiometer, Denmark) led to comparable results for EBC-pH ($r=0.89$, $R(2)=79.3\%$, $p<0.001$). Physiological pH data in non-degassed EBC samples varied between 5.3 and 6.5, and were not significantly different between subjects, but were significantly higher in the evening compared with the morning. EBC-pH was not dependent on variables of spontaneous breathing pattern or ambient conditions, and no significant correlation was found between serum and EBC for pH.

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