Evaluation of H2O2 and pH in exhaled breath condensate samples: methodical and physiological aspects.

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This veterinary study is aimed at further standardization of H(2)O(2) 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 H(2)O(2), concentrations of H(2)O(2) in EBC, blood and ambient air were determined with the biosensor system 'ECoCheck'. In EBC, the concentration of H(2)O(2) was found to be dependent on food intake and increased significantly in the course of the day. Physiologically, lowest H(2)O(2) 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 H(2)O(2) concentrations in EBC and blood, and EBC-H(2)O(2) was not influenced by variables of spontaneous breathing. Further results confirmed that standardization of H(2)O(2) 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 H(2)O(2). 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<or=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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