Exercise increases the hydrogen peroxide release in exhaled breath condensate

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Body: Background: Exhaled breath condensate (EBC) contains numerous mediators of oxidative stress (NO, H₂O₂). Exercise is characterised by an increase of reactive oxygen species (ROS), which can also be found in EBC. Building of hydrogen peroxide (H₂O₂) can be induced by ROS. In order to get inside into the correlation of H₂O₂ release in EBC and exercise, we investigated H₂O₂ release at rest and at different levels of exercise. Methods: 20 healthy subjects, (23.3±1.5 years), were investigated, during resting conditions as well as at 60%, 75%, and 90% of maximal work capacity (p_max) (each lasting 5 minutes) on a cycle ergometer. 100 L exhaled air along with capillary blood samples were collected under stationary load conditions. EBC was obtained by cooling the exhaled air volume to -20 °C. H₂O₂ was analyzed using the EcoCheck device (EcoCheck, FILT). H₂O₂ was analyzed using the EcoCheck device (EcoCheck, FILT). In further analysis the release per minute and the release for the total amount of water from 100 L exhaled breath were calculated. Results: At rest H₂O₂ concentration in EBC was 216±52 nmol/L, H₂O₂ release in the collected EBC was 115±45 pmol/min. At 60%, 75% and 90% of p_max, H₂O₂ concentration in EBC increased to 288±80, 322±71, 334±95 nmol/L (p<0.01). Taking the theoretical water volumes of 4.4 ml EBC derived from 100 L exhaled air into account, H₂O₂ release increased to 160±75, 250±88 and 357±162 pmol/min (p<0.001). The correlation of H₂O₂ release and ventilation can be described by r=0.8. Conclusions: In healthy subjects, a nearly 3-fold increased of H₂O₂ release in EBC was found during exhausting exercise. The elevated levels of H₂O₂ may be interpreted as an increase of ROS during exhausting exercise.