**A BREATH TEST FOR DIAGNOSING MALIGNANT PLEURAL MESOTHELIOMA**

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**Aim:** Malignant Pleural Mesothelioma (MPM) is an asbestos-related disease with a dismal prognosis due to its late detection at an advanced stage (van Meerbeeck JP et al, 2011). As blood biomarkers have not shown to be clinically useful for early non-invasive diagnosis (Hollevoet K et al, 2012), breath is currently explored. Breath is easy to retrieve by physicians in a clinical environment and contains volatile organic compounds (VOCs) that arise from (patho)physiological processes (Lamote K et al, 2014; Buszewski B et al, 2012). Since asbestos causes oxidative stress and cancers are known to upregulate their metabolism, we hypothesize that VOCs and, hence, the exhaled breath of MPM patients will differ from healthy controls.

**Methods:** We compared the breath of 20 MPM patients, 10 asbestos-exposed and 10 non-exposed healthy individuals using a multicapillary column/ion mobility spectrometer (MCC/IMS, B&S Analytik, Dortmund, Germany). After subjects refrained from eating, drinking and smoking for at least 2 hours, 10 ml alveolar air was sampled via a CO₂-controlled ultrasonic sensor. Per subject a background sample was taken. Eighty-nine VOC peaks were visually selected via on-board VisualNow 3.2 software. Their intensity was compared between background and breath samples. After calculating the VOCs’ alveolar gradient, we performed a logistic LASSO regression using R (R Foundation for Statistical Computing, Vienna, Austria). We selected the optimal MPM diagnostic logistic LASSO model by 10-fold cross-validation using age, gender and the alveolar gradient of the peaks and subsequently estimated this model’s sensitivity, specificity, AUC_\text{ROC} and positive (PPV) and negative predictive value (NPV) with 95% confidence intervals.

**Results:** We were able to discriminate MPM patients from the asbestos-exposed and non-exposed controls with 85% sensitivity (64%-96%) and 90% specificity (71%-98%). The AUC_\text{ROC} was 0.92 and the PPV and NPV were resp. 90% (69%-98%) and 86% (66%-96%). It was clear that age and the VOCs P5, P3, P83, P1 and P67 were the important discriminators.

**Conclusions:** Breath analysis in a clinical setting by IMS allows to discriminate MPM patients from asbestos-exposed and non-exposed healthy controls. Identification of the underlying VOCs and a further validation in different patient cohorts is being undertaken.

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