The Si-BRe study protocol: 'Assessing the diagnostic value of 'BReathomics' in the occupational health setting for the early detection of interstitial lung diseases, such as Silicosis.'

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Introduction

Silicosis is a pneumoconiosis resulting from the inhalation of respirable crystalline silica (RCS). It is widely acknowledged that occupational exposure to RCS occurs in various industries. In occupational health practice, silicosis is mainly detected when the disease is already advanced. Early detection of RCS-exposure is necessary to assess the exposure risk and prevent possible lung damage. This observational study aims to validate a simple, non-invasive diagnostic breath test for the early detection of silicosis in an at-risk population by correlating breath analysis with inflammatory blood markers.

Methods

MethodsAfter informed consent voluntary participation of patients with diagnosed silicosis (n=±25) includes questionnaire assessment, breath and blood sampling and spirometry. To optimize the validity, this test set will be compared with a population with COPD (n=±25), asbestosis (n=±25), healthy unexposed (n=±25) and asymptomatic RCS-exposed (n=±75) controls. Ion mobility spectrometry will be used to identify volatile organic compounds (VOC). Multivariate analysis will be performed. ROC curves will be calibrated.

Results

If the presence of RCS alters physiological processes in the body through chronic inflammation, it is expected that these changes in the metabolic status can be reflected through changes in the breath profile and thus can be used as a screening tool for silicosis.

Discussion

Inconsistent analytical methodology in previous research precludes decision-making on findings that breath analysis results in a VOC-signature for pneumoconiosis. Therefore, large-scale studies including simultaneous assessment of blood and exhaled breath markers are needed. ConclusionBy mapping specific biomarkers present in silica-associated pulmonary disease, risk assessment in occupational health setting could be improved.