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Title: HOPE-BAL: A novel tool to expand the methodological capabilities in pulmonary research

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Body: Bronchoalveolar lavage cells are essential biomaterials for both, basic research and clinical applications. Easy to acquire with comparably little risks for the patients, biomaterials even from non-malignant diseases like COPD or Asthma can be used to aid diagnostics or deliver samples from the alveolar space for basic research. However, these samples are transient materials which require timely read-out if used freshly. In case of formalin-fixed, paraffin-embedded cell blocks they are built to last but with the drawback of protein cross-linking and the severe side effects like degradation of nucleic acids. Since the rapid developments in molecular based techniques, archived samples increasingly need to meet more and more requirements for modern read-outs. Here we present a novel approach to BAL cells with all the possibilities of the omics-techniques. Human BAL cells were HOPE-fixed and paraffin-embedded to create cell blocks that are easy to store and convenient to handle. For routine diagnostic applications, standard marker molecules were targeted by means of immuno cytochemistry without antigen-retrieval. Furthermore we show that HOPE-fixed, paraffin-embedded BAL cells can be used for proteome analysis by application of 2D gel electrophoresis. In addition these BAL blocks contain enough RNA of sufficient quality for transcriptome analysis on Agilent Whole Genome arrays. Differential regulated genes show distinct expression patterns between healthy donors and patients with Asthma or COPD. In summary, HOPE-BAL is a novel powerful tool for both diagnostics and translational research. Additionally biobanks of HOPE-BAL will ensure proper accessibility for unrestrained investigations.