Pollution Particle Analysis from Idiopathic Pulmonary Fibrosis Lungs and Their Effect on Macrophages

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Rationale
Idiopathic pulmonary fibrosis is characterized by destruction of the pulmonary architecture by severe fibrotic remodeling. A common feature within the areas of fibrotic remodeling is anthracosis. Since macrophages are not only responsible for removing anthracotic particles from the alveolar lumen but also involved in the fibrotic remodeling events we wanted to know first, if there were specific particles within idiopathic pulmonary fibrosis (IPF) lungs when compared to lungs with no fibrotic remodeling and second, if these particles would have an effect on macrophages that contributes to disease development. Methods We therefore collected IPF lung explants from the transplantation program of the Hannover Medical School from 2017-2019 (n=25) and isolated particles via tissue digestion and centrifugation as well as via burning and analyzed the particles in a scanning electron microscope using an EDX energy filter. As controls lungs, lung explants without fibrotic remodeling as the transplantation cause were used, mainly pulmonary hypertension. In parallel macrophages were fed with IPF specific particles preparations and analysed after defined time intervals using RNS Seq. Results We found a specific particle composition exclusively in 30% of all IPF lungs. In addition macrophages that were fed with these particles showed significant changes in their gene expression indicating a positive role of IPF particles in fibrotic disease initiation/progression. Conclusion We conclude that inhaled particles might be a key player in the development of significant numbers of IPF (∼30%) cases via deregulation of macrophages.

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