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Immunoprofiling of secondary pulmonary hypertension in chronic lung diseases

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Chronic lung diseases (CLD), such as chronic obstructive pulmonary disease (COPD) and idiopathic pulmonary fibrosis (IPF) are severe progressive diseases and are associated with a large decrease in quality of life. Both diseases consists of several highly heterogeneous phenotypes, which can be distinguished by their degree of inflammation, pathology or treatment response. Patients with CLD can additionally develop an associated form of pulmonary hypertension (PH, WHO Class III). The presence of pulmonary hypertension in these diseases is associated with a worsened prognosis. Even though COPD, IPF and PH are very different in their appearance, vascular remodelling share common features, such as neointimal formation and medial hypertrophy. So far, there is no successful treatment against vascular remodelling, and usual treatments for PH are not recommended for PH in CLD. Previous work in our lab has shown an altered immune cell profile in arteries of idiopathic pulmonary arterial hypertension compared to healthy vessels. In this project, we will determine the inflammatory profile in arteries of PH associated with CLD and investigate how certain inflammatory cell subpopulations have an impact in the remodelling of pulmonary arteries. Human COPD-PH, IPF-PH and healthy donor pulmonary arteries are currently characterized using flow cytometry analysis. Additionally we are currently analysing an in-house database of already measured COPD, IPF, IPAH and healthy pulmonary arteries. To gain further insights in structural remodelling and cell localization image analysis of various fluorescence/ light microscopic stainings will be performed. Functional cell information will be gathered using cell culture techniques, such as direct and indirect co-cultures, and single cell RNA-seq. By combining this data with clinical parameters, we will be able to get a more complete and translational understanding of the impact from immune cells in the formation of PH in CLD.