Patients with chronic obstructive pulmonary disease (COPD) exhibit a markedly reduced exercise capacity which translates into a limitation in everyday life and activities. Impairment of the pulmonary circulation is a potential cause of this impaired exercise capacity and therefore a potential target for strategies to improve exercise capacity. In this thesis, the following questions regarding the effect of COPD on the pulmonary hemodynamics are addressed: How does airway obstruction affect the pulmonary blood flow? How do altered pulmonary mechanics lead to an impaired cardiac function? Does pulmonary hypertension contribute to exercise intolerance? And which patients might benefit from therapy targeting the pulmonary circulation?