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Radiographic pulmonary vessel volume, lung function and airways disease in the Framingham Heart Study

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Lower total and peripheral pulmonary blood vessel volumes on CT are associated with worse lung health in a generally healthy population. CT imaging may be useful in detecting early changes in the pulmonary vessels, even before lung disease develops. http://bit.ly/2RyDLSp

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ABSTRACT Radiographic abnormalities of the pulmonary vessels, such as vascular pruning, are common in advanced airways disease, but it is unknown if pulmonary vascular volumes are related to measures of lung health and airways disease in healthier populations.

In 2388 participants of the Framingham Heart Study computed tomography (CT) sub-study, we calculated total vessel volumes and the small vessel fraction using automated CT image analysis. We evaluated associations with measures of lung function, airflow obstruction on spirometry and emphysema on CT. We further tested if associations of vascular volumes with lung function were present among those with normal forced expiratory volume in 1 s and forced vital capacity.

In fully adjusted linear and logistic models, we found that lower total and small vessel volumes were consistently associated with worse measures of lung health, including lower spirometric volumes, lower diffusing capacity and/or higher odds of airflow obstruction. For example, each standard deviation lower small vessel fraction (indicating more severe pruning) was associated with a 37% greater odds of obstruction (OR 1.37, 95% CI 1.11–1.71, p=0.004). A similar pattern was observed in the subset of participants with normal spirometry.

Lower total and small vessel pulmonary vascular volumes were associated with poorer measures of lung health and/or greater odds of airflow obstruction in this cohort of generally healthy adults without high burdens of smoking or airways disease. Our findings suggest that quantitative CT assessment may detect subtle pulmonary vasculopathy that occurs in the setting of subclinical and early pulmonary and airways pathology.