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**Title:** Pulmonary volumetric analyses based on three-dimensional computed tomography (3D-CT), compared with pulmonary function test

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**Body:** BACKGROUND Three-dimensional computed tomography (3D-CT) potentiates the application to the daily clinical practice. METHODS Forty four patients (30 COPD, 12 lung cancer, 2 miscellaneous) were enrolled in this study. Lung volumes (LV), as well as the low attenuation volume (LAV), were measured based on 3D-CT both at the end inspiratory volume (EIV) and at the end expiratory volume (EEV) and compared with the physiological data of ordinary pulmonary function tests. RESULTS & DISCUSSION Lung volumes determined using reconstituted 3D-CT images at end inspiratory volume (LVins), those at end expiratory volume (LVexp), and their difference (LVins – LVexp), were significantly associated with TLC ( $p<0.0001$ ), RV ( $p<0.0001$ ), VC ( $p=0.0028$ ), respectively. Furthermore, the percentage of the LAV to LV at EIV (LAV%ins) was associated with the changes in the various results of pulmonary function tests, including FEV1, %FEV1, RV/TLC, VC. Both FEV1 and %FEV1 were associated with LAVexp and LVexp, in participants whose LAV were larger than 10mL. These results suggested that 3D-CT, taken at both EIV and EEV, provides the data not only on lung volumes in the static state, but also dynamic information. Furthermore, there is a significant association between the FEV1 and the difference between the normal attenuation volumes (NAV) of the 3D-CT at EIV and those at EEV ( $p<.001$ ). This suggested that not only LAV but also NAV contributed to the airflow limitation, represented by FEV1 reduction. CONCLUSION 3D-CT reveals not only the physiologic properties, but also provides some insights into the mechanism of respiration.