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**Title:** Residual lung volume is associated with increased left ventricular mass

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**Body:** Increased left ventricular (LV) mass and chronic obstructive pulmonary disease (COPD) predict cardiovascular (CV) events, but their relationship is poorly understood. We hypothesized that residual volume would be associated with increased LV mass. We recruited participants ages 50–79 years with  $\geq 10$  pack-year smoking history that were free of clinically apparent CV disease. LV mass was estimated by cardiac magnetic resonance. Body plethysmography and pre- and post-bronchodilator spirometry were performed according to ATS/ERS guidelines. Percent emphysema-like lung was estimated on full-lung CT. Anthropometry, medication use, blood pressure (BP), fasting glucose and lipid levels were measured in a standardized fashion. COPD was defined according to GOLD criteria. Multiple linear regression was used to adjust for age, sex, race-ethnicity, height, weight, body surface area term, smoking status, pack-years, systolic BP, BP meds, fasting glucose, diabetes meds, low density lipoprotein, lipid lowering meds, and percent emphysema. Of 119 participants completing all study components, 65% had COPD (24% mild, 29% moderate, and 12% severe/very severe). Mean LV mass was  $122 \pm 34$  grams. Residual lung volume was independently associated with increased LV mass in the fully adjusted model ( $p < 0.001$ ). The magnitude of

association for residual volume was similar on a SD basis to that of systolic BP (8.7 gm 95%CI 4.5-13 gm per 714 ml increase in residual volume versus 6.9 gm 95%CI 3.5-10 gm per 16 mmHg increase in systolic BP, respectively). Residual volume is associated with increased LV mass. Further understanding of this relationship may improve cardiovascular risk assessment and represent a novel therapeutic target.