Isolated Reduction of the FEV$_3$/FVC Ratio as an Indicator of Mild Airflow Obstruction

To the Editor:

We read with keen interest the recent article by Morris et al$^1$ in CHEST (October 2013) in which they describe the use of the FEV$_3$/FVC ratio in diagnosis of early airflow obstruction (termed mild lung injury by the authors). However, certain important issues need to be highlighted. It is important to interpret these observations in concert with clinical and radiologic features to ascertain whether reduction in FEV$_3$/FVC ratio translates into clinically relevant patient outcomes.

Age-related changes in the respiratory function of healthy adults are important factors to be considered. With increasing age, there is a reduction in lung elastic recoil and respiratory muscle strength, which results in increased residual volume (RV). RV increases by approximately 50% between the ages of 20 and 70 years.$^2$ Total lung capacity remains relatively unchanged with increasing age.$^3$ Therefore, the ratio of RV to total lung capacity increases with age. Observations in the present study regarding the FEV$_3$/FVC ratio are similar to age-related changes in lung function. It has also been observed that the utility of FEV$_3$/FVC ratio in the diagnosis of airflow obstruction, especially in older individuals, is limited and can lead to overdiagnosis of COPD.$^4$ The mean age of patients with isolated FEV$_3$/FVC reduction in the present study was 61.2 ± 12.3 years. Therefore, calculating the sensitivity and specificity of the FEV$_3$/FVC ratio using the FEV$_3$/FVC ratio as the gold standard for airway obstruction may be inappropriate in older patients.

Whether the reduction in FEV$_3$/FVC ratio is just an age-related phenomenon that subsequently evolves into FEV$_1$/FVC ratio reduction without any clinically significant impact is a critical question. Inappropriate use of this ratio in the absence of clinical data might lead to overdiagnosis of obstructive airway disease. If the FEV$_3$/FVC ratio is eventually recognized as a clinically relevant parameter for early airflow obstruction that translates into clinically significant patient outcomes, the global burden of patients with obstructive airway disease across the globe will increase dramatically. Use of the term mild lung injury in the title is misleading. The term lung injury is conventionally used with reference to clinically significant patient outcomes, the global burden of patients with obstructive airway disease across the globe will increase dramatically. Use of the term mild lung injury in the title is misleading.

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Response

To the Editor:

Because of the concerns expressed by Dr Madan and colleagues regarding the physiologic changes that occur with aging, we analyzed the data from our article using % predicted values (residual volume, total lung capacity, residual volume/total lung capacity, diffusing capacity of lung for carbon monoxide, and so forth) rather than absolute values and calculated the predicted values using regression equations adjusted for age, as well as sex, height, and race. This eliminated the biases introduced by the small differences in age when comparing groups.$^1$

Dr Madan and colleagues bring up an important issue when referencing studies that demonstrate that the burden of COPD is overestimated using the FEV$_1$/FVC ratio. This occurs as a consequence of using a fixed cutoff in all ages to define the lower limit of normal and is well recognized as problematic.$^2$ The GOLD (Global Initiative for Chronic Obstructive Lung Disease) updates continue to promote defining a fixed lower limit of normal of 70% despite decades of research and guidelines that recommend that when interpreting pulmonary function tests one should use regression equations that adjust for age, sex, height, and race.