Better Forget It

To the Editor:

The FEV$_1$/forced expiratory volume in 6 s (FEV$_6$) ratio has been proposed for diagnosis of airflow obstruction (AO). A recent metaanalysis concluded that FEV$_1$/FEV$_6$ ratio is a valid alternative to the FEV$_1$/FVC ratio. This conclusion is questionable. In 5 of the 11 studies included in the metaanalysis, the standard for the diagnosis of AO was an FEV$_1$/FVC ratio of $< 70\%$. This fixed value decreases the sensitivity of the FEV$_1$/FVC ratio.

Since FEV$_6$ cannot be greater than FVC, one can anticipate that the number of false-positive values for the FEV$_1$/FEV$_6$ ratio should be zero. In one study included in the metaanalysis (reference 28), this value reached 30% of total sample.

Reduced end-expiratory flows and prolonged expiratory times, which commonly exceed 6 s, occur in the initial stage of AO. The FEV$_1$/FEV$_6$ ratio can therefore lose sensitivity in early diagnoses, especially in aging patients, in whom the time required to complete the FVC maneuver increases. In two studies (references 22 and 25) included in the study by Hansen et al, it was possible to calculate the sensitivity of the FEV$_1$/FEV$_6$ ratio in patients with mild AO. The values decreased to 73% and 82% respectively. In a recent study, we compared the sensitivity of FEV$_1$/FVC ratio and FEV$_1$/FEV$_6$ ratio in patients with mild AO. The sensitivity for the FEV$_1$/FEV$_6$ ratio was only 75%. The exclusion of unpublished studies can introduce bias. In one such study (reference 10 in Soares et al), 1,926 spirometry tests were evaluated. The sensitivity was for the FEV$_1$/FEV$_6$ ratio was 85.6%, but this value decreased to 74% among patients with mild obstruction.

In conclusion, substituting FEV$_6$ for FVC to determine AO reduces the sensitivity of spirometry findings, especially in older individuals and in those persons with mild AO.

Carlos A. C. Pereira, PhD
São Paulo, Brazil

Response

To the Editor:

In his letter regarding our article, Dr. Pereira stated that substituting forced expiratory volume in 6 s (FEV$_6$) for FVC to determine airflow obstruction would reduce the sensitivity of spirometry findings, especially in elderly patients with mild airflow obstruction. This has also been noticed by other investigators.

One key point to Dr. Pereira’s comments is the use of a cutoff value for FEV$_6$ to determine airflow obstruction, which is also one cause of the heterogeneity of our study. For example, since FEV$_6$ cannot be greater than FVC, one can anticipate that the false-positive values for the FEV$_1$/FEV$_6$ ratio should be zero. Why did it reach 30% in the study by Gleeson et al? The reason for that is the lower limit of the reference values for FEV$_6$ and FVC, both of which were obtained from the study by Hankinson et al. Studies from Soares et al and others have shown a low sensitivity in patients with mild airflow obstruction, because they have also used a fixed ratio for the cutoff values of FVC or FEV$_6$.

Because the process of aging affects lung volumes, the use of this fixed ratio may result in the overdiagnosis of airflow obstruction in elderly persons, especially in those with mild disease. Therefore, the current Global Initiative for Chronic Obstructive Lung Disease guidelines advise that using a lower limit of normal values for FEV$_1$/FVC ratio, which is based on a normal distribution and classifies the bottom 5% of the healthy population as abnormal, is one way to minimize the potential misclassification. If a lower limit is used for FEV$_6$, it should be applied to FVC too. We think that no remarkable difference would be seen in the results while evaluating the FEV$_1$/FVC ratio. Also, the simplicity of using FEV$_6$ in place of FVC would be sacrificed if a lower limit for FEV$_6$ is utilized. However, reference equations using post-bronchodilator therapy FEV$_1$ and longitudinal studies to validate the use of the lower limit of normal are urgently needed. The only such equations currently available are those from the National Health and Nutrition Examination Study III study.

The primary significance of using the FEV$_1$/FEV$_6$ ratio to reduce the misclassification rates in the multitude of settings where a volume-time plateau is rarely obtained. Many people operating spirometers have misinterpreted the traditional spirometry guidelines, which allow them to quit coaching patients after 6 s (even when the patient could have exhaled much more air), and this practice frequently causes the reported FEV$_1$/FVC ratio to be higher than the true value. The use of the reference values for FEV$_1$/FEV$_6$ ratio is more appropriate in these settings.

Affiliations: Dr. Pereira is affiliated with the Paulista School of Medicine.
Financial/nonfinancial disclosures: The author has reported to the ACCP that no significant conflicts of interest exist with any companies/organizations whose products or services may be discussed in this article.
Correspondence to: Carlos A. C. Pereira, Paulista School of Medicine, Av Iraí, 393, conj 34, São Paulo 04082-001, Brazil; e-mail: pereirac@uol.com.br

© 2009 American College of Chest Physicians. Reproduction of this article is prohibited without written permission from the American College of Chest Physicians (www.chestjournal.org/site/misc/reprints.xhtml).
DOI: 10.1378/chest.09-1232

REFERENCES
3 Soares AL, Rodrigues SC, Pereira CA. Airflow limitation in Brazilian Caucasians: FEV$_1$/FEV$_6$ vs. FEV$_1$/FVC. J Bras Pneumol 2008; 34:468–472

www.chestjournal.org
CHEST / 136 / 6 / DECEMBER, 2009
1701