Lung function

Spirometry or bodyplethysmography for the assessment of bronchial hyperresponsiveness? New answers to an old question

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Question: Methacholine testing is one of the standard tools for the diagnosis of mild asthma, but there is little information about optimal outcome measures.

Methods: A total of 395 college students were tested by the ATS dosimeter protocol for methacholine testing, with minor modification. Bodyplethysmography and spirometry were measured after each inhalation step. End-of-test-criteria were (i) FEV_1 decrease of ≥ 20% and (ii) doubling of specific airway resistance and increase to ≥ 2.0 kPa*s. Results were expressed by receiver operating characteristic (ROC) plots using questionnaire answers as reference. The areas under the ROC curves were calculated for a wide range of thresholds for both measures.

Results:

ROC plots showed maximal sensitivities of about 0.5 - 0.6 for FEV_1 and about 0.7 for specific airway conductance with roughly similar specificities of about 0.7 - 0.8 taking questions with known high specificity as references. Accordingly, higher maximal areas under the ROC-curve were observed for bodyplethysmography, but the differences were small. A decrease of FEV_1 of about 15 % and a decrease of sGt of about 60% showed the highest areas under the ROC curves.

Conclusions: Bodyplethysmography yielded better sensitivity than spirometry, with similar specificity. However, replacing the common spirometric criterium for a positive test (20% decrease of FEV_1 from baseline) by the optimal bodyplethysmographic criterium would result in an increase of false positive tests from about 3 to about 6 percent in healthy young adults.