Whole-body plethysmography (WBP) with bronchial challenge testing to measure the (specific) airway resistance, (s)R(AW), is considered to be a more sensitive diagnostic procedure than spirometry, which can only measure the forced expiratory volume in one second (FEV1). The evidence for the added diagnostic value of WBP is not yet conclusive. In a prospective diagnostic study, we carried out WBP with bronchial challenge testing as well as a bronchodilation test in 400 patients with suspected asthma from June 2010 to October 2011. The bronchial provocation test was considered positive if the FEV1 fell by at least 20% and/or the airway resistance doubled, with an increase of the sR(AW) to at least 2.0 kPA × s and/or of the R(AW) to 0.5 kPA × s/L. Follow-up evaluation was performed one year later. The prevalence of asthma in the 302 patients who completed follow-up was 27.5%. The sensitivity of WBP with sR(AW) measurement for asthma was 95.2% (95% confidence interval [CI] 88.3%-98.1%), and its specificity was 81.7% (95% CI 76.1%-86.3%). The sensitivity of FEV1 was 44.6% (95% CI 34.4%-55.3%), and its specificity was 91.3% (95% CI 86.6%-94.4%). The negative predictive value (NPV) of WBP with sR(AW) measurement was 97.8% (95% CI 94.5%-99.1%), while that of FEV1 was 81.3% (95% CI 76.0%-85.7%). The positive predictive
value (PPV) of WBP with sR(AW) measurement was 66.4% (95% CI 57.5%-74.2%), while that of FEV1 was 66.1% (95% CI 53.0%-77.1%). With sR(AW) measurement, asthma can be ruled out with high certainty. Improving the positive predictive value of testing for asthma remains a challenge, however, as sR(AW) measurement does not yield any increase in specificity.