Impact of expiratory flow limitation on alveolar pressure–flow relationships in individuals with COPD

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Supplemental methods

Experimental sequence: recording of flow and shift volume during spontaneous breathing

Static and dynamic lung volumes, together with specific airway resistance (sR_{aw}) were measured with a constant-volume plethysmograph (MasterScreen Body Plethysmograph, Erich Jaeger GmbH, Würzburg, Germany), following the American Thoracic Society/European Respiratory Society (ATS/ERS) guidelines (1). In particular, the time-course of flow and shift volume were recorded for each of ten consecutive breaths during the plethysmographic measurement of sRaw. The sequence of the maneuvers required for this measurement is similar to that required for the plethysmographic assessment of intrathoracic gas volume (ITGV) and is described in details in (1). Briefly, after an adequate warm-up period and calibration of the plethysmograph, the levels of the mouthpiece and of the seat were adjusted so that the patient was able to seat comfortably without the need to flex or extend the neck. Thereafter, a detailed explanation of the procedure was given, the door of the plethysmograph was closed, and time allowed for temperature to stabilize. The patient, wearing a noseclip, was then instructed to attach to the mouthpiece and to breath quietly. At this point the plethysmograph started displaying automatically the time-course of volume and the shift-volume plots. When a stable breathing pattern was reached, the operator activated the shutter at end-expiration for ITGV measurement. Immediately the system automatically stores the time-course of flow, volume and shift-volume of preceding ten breaths. Upon reopening of the shutter, the patient was invited to perform a a slow exhalation to residual volume followed by a slow inflation to total lung capacity.

The tracings corresponding to the last ten breaths before the occlusion were exported as ASCII, together with the measured value of ITGV and of environmental parameters (ambient pressure, temperature and water vapor saturation).

Supplemental results

Fig. S1 shows the flow of patients through the study.

76 patients were considered for eligibility. Of these 9 were excluded because they met the exclusion criteria. Of the 67 remaining patients, 5 did not give the informed consent, in three cases because of claustrophobia. In two cases, NEP malfunctioning prevented the execution of the test. The two subjects were therefore excluded from the analysis.

References

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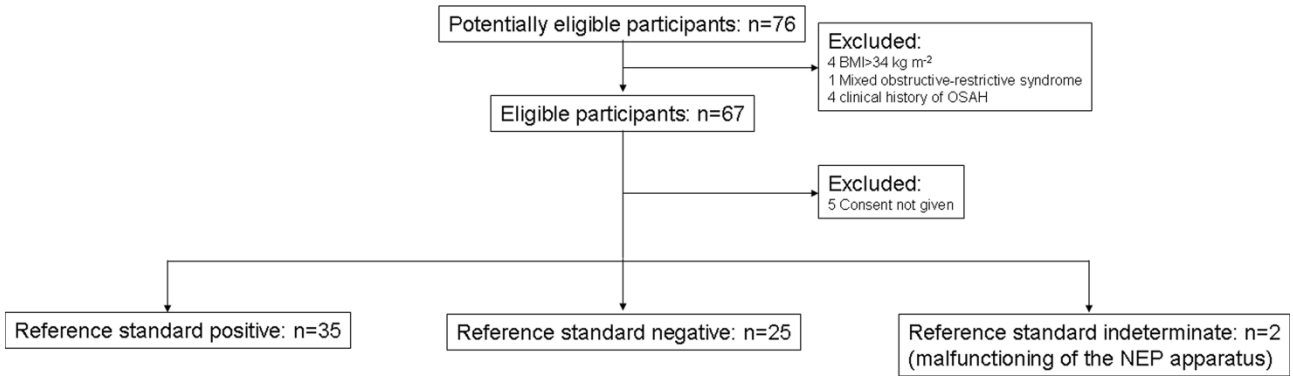

Figure S1: Flow of patients through the study.

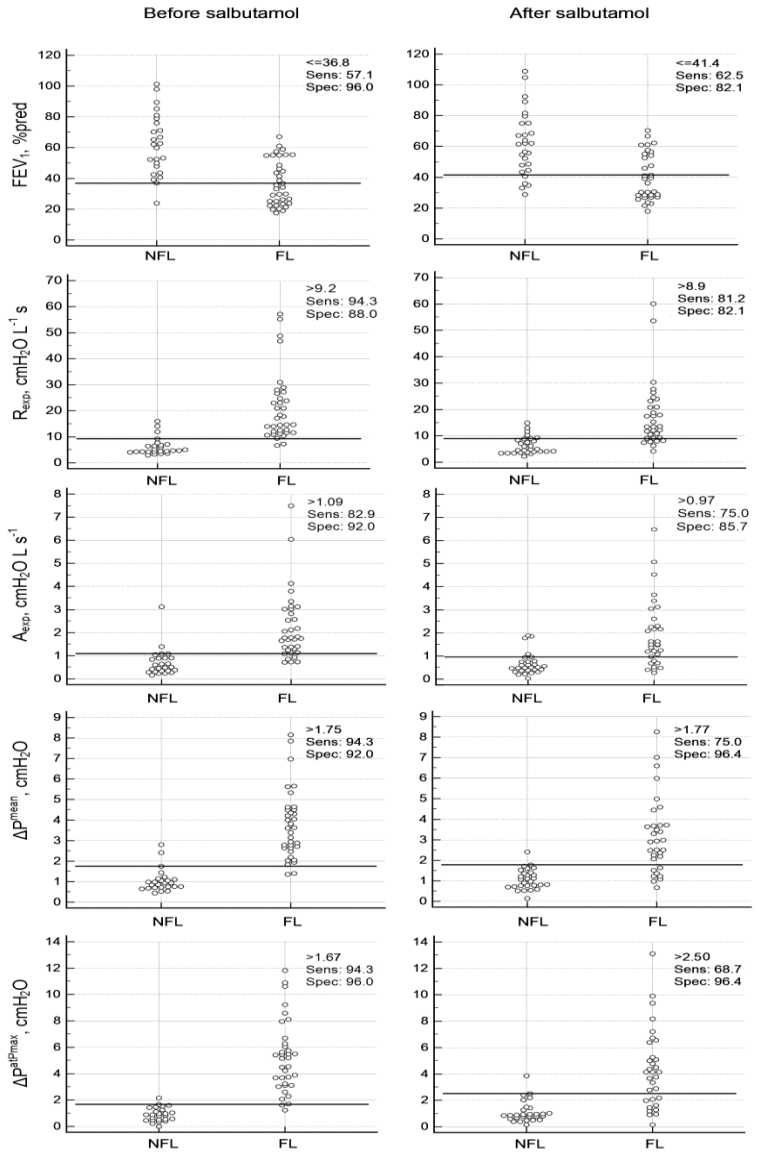

Figure S2: FEV_1, R_{exp}, A_{exp}, ΔP^{mean} and ΔP^{atPmax} in stable COPD patients who were non flow-limited (NFL) or flow-limited (FL) before and after salbutamol inhalation. The threshold which best discriminates between NFL and FL patients has been calculated according to maximum Youden index. The corresponding sensitivity (sens) and specificity (spec) are indicated.