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Title: Individual decline of FEV1 show diversity in COPD

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Body: Our objective is to develop methods to gain better understanding of individual development of lung functions in COPD sub-phenotypes. The patients (N=600) have been recruited from two Finnish University Hospitals. Their medical records have been carefully evaluated including spirometry results. A mixed effects-model was used to obtain predictors for the individual development of FEV1. To manage the within-patient variation of consecutive measures, simulation methods were used to determine which patients were presenting significantly declining development. Logistic regression analysis was conducted to determine the characteristics of decliners. The COPD patients represent all stages of the disease. Mean follow-up time was 5.9 years (range 2-12) and with mean 9.4 spirometries (range 3-36) per patient. Twelve percent of patients were identified as constant decliners. The decliners had a mean rate of decline of -101 (95% CI, -58 to -171) ml/year, whereas residual patients had mean rate of -35 (95% CI, 25 to -88) ml/year. When numerous co-morbidities and clinical characteristics were tested, only mental disorders (OR=1.75) were shown to associate with poor development of FEV1. Patients who had been able to stop smoking and patients whose diagnosis had been done at early stages (better FEV1 baseline level) of the disease, showed protective effect (OR=0.52 and OR=0.98/% of FEV1 predicted, respectively). Our preliminary results suggest that COPD patients show diversity in their risk of future FEV1 decline. Development of robust screening protocols at early stages of COPD might be of value in revealing the rapid decliners.