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Title: Natural decline in FEV₁ and FVC: Self versus reference equations

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Body: Ideally, serial measures of lung function should be compared using data from the person when young and healthy. In practice reference equations are the best substitute. Aim: To compare the natural decline in spirometry in respiratory scientists using measured values and their reference value z-scores. Methods: Serial measures of FEV₁ and FVC from respiratory scientists were obtained. We calculated the annual decline in measured values and compared with z-scores using ECSC/ERS'93, Hankinson and GLI2012 equations. Results: 2044 data points were available for 26 scientists (13 female) starting from 20-39 years up to 31-60 years. The data time-span was 5 to 33 years. The average fall in FEV₁ was 29 mL/year and FVC 23 mL/year.

Average Annual Decline in Spirometry Values

FEV1	Change mL/year	Range mL/year	FVC	Change mL/year	Range mL/year
Females	-25	-1 to -47	Females	-14	+14 to -33
Males	-29	+10 to -65	Males	-29	+4 to -66
All subjects	-27		All subjects	-22	

Age-related FEV₁ and FVC z-scores for the equations are shown in Figure 1.

Discussion: The horizontal z-score trends using GLI2012 equations demonstrate they virtually match the rate of decline in FEV₁ and FVC in our group of respiratory scientists. ECSC/ERS'93 elevates the z-score, and Hankinson shows a decreasing trend suggesting these equations are a poorer match for our longitudinal data. Conclusion: This study suggests that the GLI2012 equations are more appropriate for monitoring lung function over time.