

Frequency of Bronchodilator Response in those with Normal Baseline Spirometry

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Introduction, Aim and Methods

Introduction

Spirometry, when combined with bronchodilator (BD) responsiveness testing, can identify whether airflow obstruction is reversible by identifying a significant improvement in spirometry after the administration of BD.

Few previous studies have identified how often a BD response is identified in those with normal baseline spirometry.

Aim

To describe the frequency of a BD response in those with normal baseline spirometry at a single Australian respiratory function laboratory.

Methods

Retrospective analysis of spirometry results from September 2014 to September 2019 from the Respiratory Function Laboratory at Northern Health. Only spirometry meeting the acceptability and repeatability criteria was included (n= 8370).

Normal Baseline Spirometry
(as defined by the Global Lung Initiative (GLI) predicted values)
n= 4827

Administer bronchodilator (SABA). Repeat spirometry after 10 minutes

BD response in Spirometry
(as defined as a $\geq 12\%$ & ≥ 200 mL increase in FEV1 or FVC or both – see Figure 1)
n= 210 (or 4.2%)

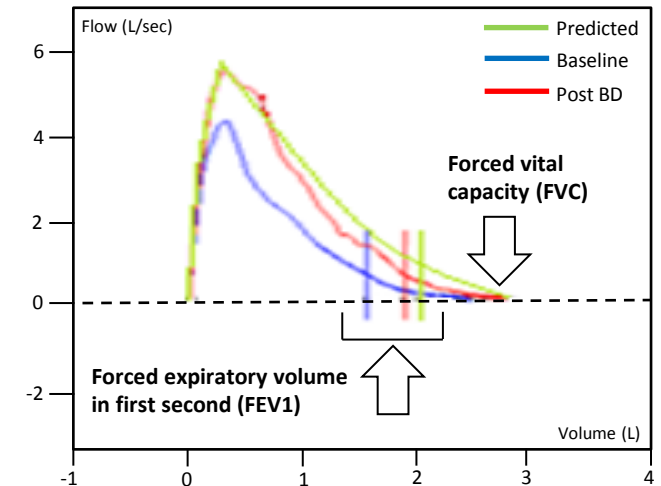


Figure 1. Spirometry curves with a BD response
Note: Predicted, baseline and post BD curves with FEV1 and FVC points highlighted.

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Analysis

Analysis

Those with a BD response were older (Figure 2) and more likely to be current smokers or ex-smokers (Figure 3).

Figure 2. Age - BD response more likely in those over the median age (IQR: 44.5-71.0, $p < 0.001$)

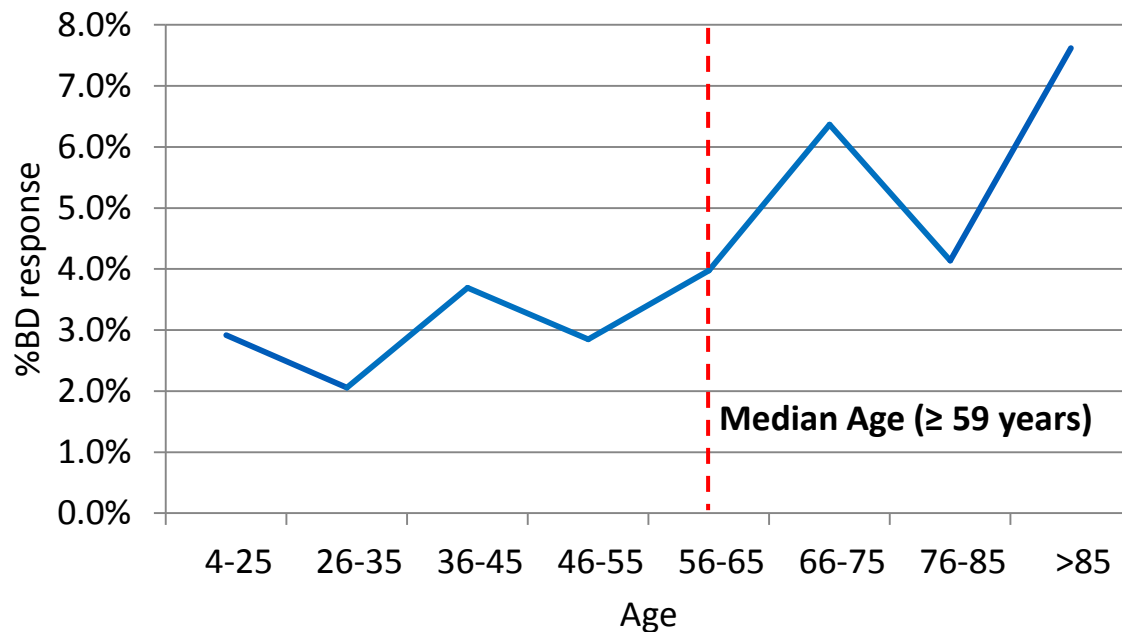


Figure 3. Smoking history - BD response most likely in current or ex-smokers (OR 1.90, $p < 0.001$)

Smoking status	Total (n=4827)	No BD response	With a BD response	Responder (% of overall)
Never Smoked	2215	2142	73	3.3%
Ex-Smoker	1776	1695	81	4.6%
Current Smoker	809	764	45	5.6%
Unknown	27	25	2	7.4%

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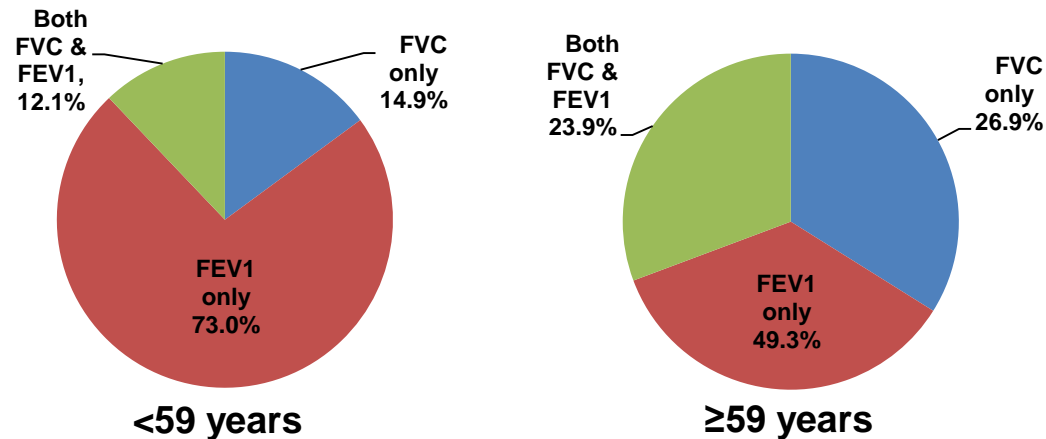
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Analysis and conclusion

Analysis

With increasing age the BD response was seen more frequently as a change in FVC rather than FEV1 (Figure 4).

Figure 4. BD response criteria - Differed above the Median age of ≥ 59 years ($p < 0.001$)



When baseline FEV1 % predicted was $\geq 91.7\%$ the likelihood of a BD response reduced significantly to 1.5% with good specificity (81%).

Conclusion

BD response was seen in over 4% of those with normal baseline spirometry. This was more likely to occur in those over 59 years and in those who with a smoking history.

With increasing age, the pattern of BD response changed, with FVC increases observed more often. When baseline FEV1 was $\geq 91.7\%$ predicted, a BD response was unlikely to be observed.

Further studies are required to clarify the clinical significance of these BD responses.