

Official PFT Guides

Official Guides
ATS Rapid Interpretation Guide
2010 GOLD Spirometry Guide
2022 ERS/ATS Interpretive Strategies for PFTs

Interpretation Position

Why I use GOLD Criteria

At UMMC, PFTs do report LLN and reference value (pop mean?) but not percentiles or z scores.

One can back-calculate the SD using $\sigma = \frac{\text{LLN} - \text{ref}}{-1.65}$ (this assumed LLN on our reports corresponds to 5th percentile).

Once σ is known for the each value (e.g., $\sigma_{\text{FVC}} \neq \sigma_{\text{FEV1}} \neq \sigma_{\text{RV}}$), you could then use $z = \frac{\text{PT}_{\text{value}} - \text{ref}}{\sigma}$ and refer to the tables below to grade severity.

Given the complexity of this, using ERS/ATS for diagnosing and grading abnormalities is not possible.

Therefore, I use GOLD criteria.

Step-by-Step to Interpreting PFTs

Assess Flow-Volume Loops

1. Are the loops similar between attempts?
 1. YES: Skip to next
 2. NO: See first page's comment if ATS reproducibility criteria was met
2. Roughly speaking, do the loops appear obstructive or restrictive?

Assess Spirometry

Spirometric Severity

ATS Criteria

[Source](#)

Grade	FEV1 z score	Severity
NA	-1.65 to -2.5	Mild
NA	-2.51 to -4.0	Moderate
NA	<-4.1	Severe

GOLD Criteria

Source

Grade	FEV1 Percent Predicted	Severity
1	≥80%	Mild
2	50% – 79%	Moderate
3	30% – 49%	Severe
4	<30% or <50% with CHRF	Very Severe

Bronchodilator Response

ERS/ATS Definition

- Required:
 - BDR >10%
- Calculation
 - $$\text{\$ BDR} = \frac{\text{FEV1}_{\text{postBD}} - \text{FEV1}_{\text{preBD}}}{\text{FEV1}_{\text{predicted}}}$$

Important NOTE:

- Calculation is not
 - $$\text{\$ BDR} = \frac{\text{FEV1}_{\text{postBD}} - \text{FEV1}_{\text{preBD}}}{\text{FEV1}_{\text{preBD}}}$$
- Does NOT require
 - $$\text{\$ } \Delta \text{FEV1}_{\text{volume}} > 200 \text{ mL}$$

GOLD Definition

- Required:
 - $$\text{\$ BDR} > 12\%$$
 - $$\text{\$ } \Delta \text{FEV1}_{\text{volume}} \geq 200 \text{ mL}$$
- Calculation
 - $$\text{\$ BDR} = \frac{\text{FEV1}_{\text{postBD}} - \text{FEV1}_{\text{preBD}}}{\text{FEV1}_{\text{preBD}}}$$
 - NOTE: this differs from ERS/ATS calculation**

Methacholine Challenge

Source, ERS 2017

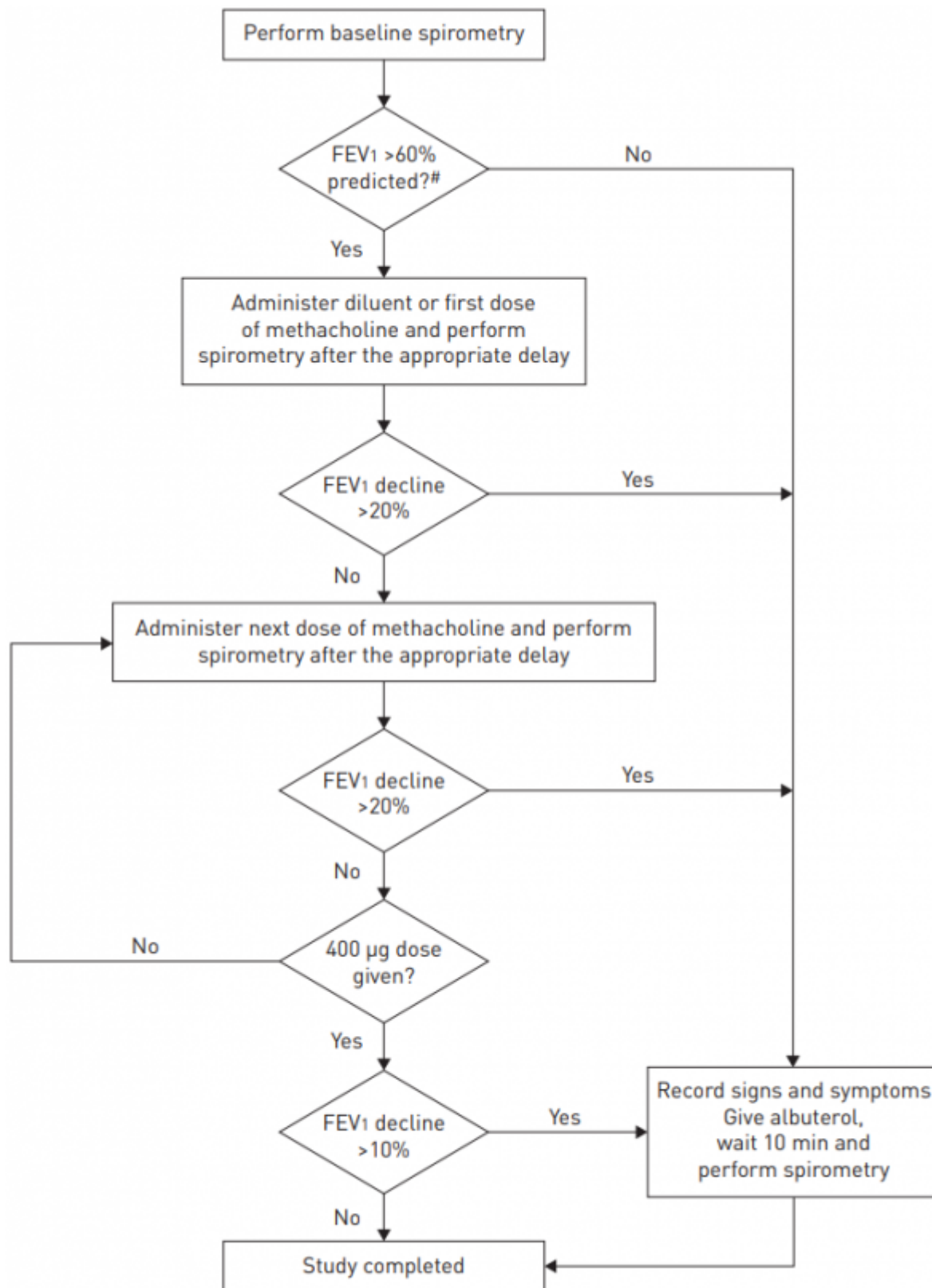
Response Categorization

TABLE 6 Categorisation of airway response to methacholine

PD ₂₀ μmol (μg)	PC ₂₀ $\text{mg}\cdot\text{mL}^{-1}$	Interpretation
>2 (>400)	>16	Normal
0.5–2.0 (100–400)	4–16	Borderline AHR
0.13–0.5 (25–100)	1–4	Mild AHR
0.03–0.13 (6–25)	0.25–1	Moderate AHR
<0.03 (<6)	<0.25	Marked AHR

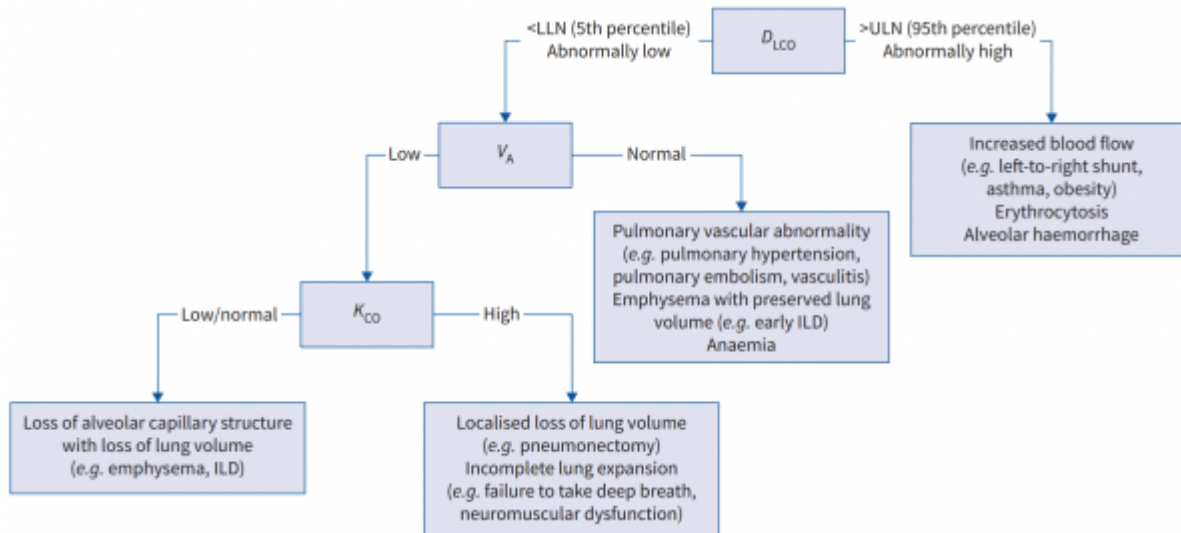
PD₂₀: provocative dose causing a 20% fall in forced expiratory volume in 1 s (FEV₁); PC₂₀: provocative concentration causing a 20% fall in FEV₁; AHR: airway hyperresponsiveness. Information from [3].

Testing Protocol



DLCO Severity

ERS / ATS Definition



Source

Grade	FEV1 z score	Severity
NA	-1.65 to -2.5	Mild
NA	-2.51 to -4.0	Moderate
NA	<-4.1	Severe

Gold Definition

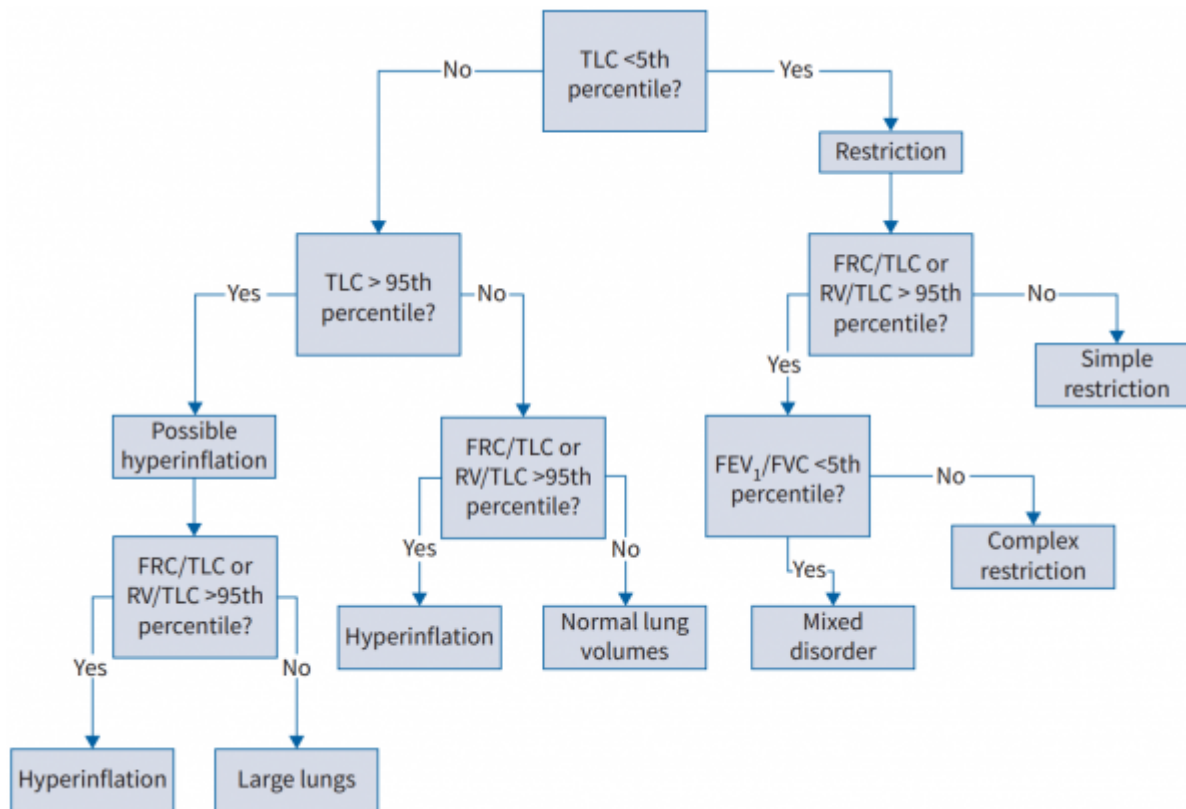
DLCO Percent Predicted	Severity
>140%	Abnormally High
76%-140%	Normal
61-75%	Mild
41-60%	Moderate
<40%	Severe

Assessing Restriction

ATS Criteria

Source, pg 17

1. Check spiro
 1. Is $FVC \cdot z_{\text{score}} \leq -1.65$ (e.g. < 5th percentile)?
 1. Yes: get lung volumes
 2. No: no restriction
2. Check lung volumes
 1. Is $TLC \cdot z_{\text{score}} \leq -1.65$ (e.g. < 5th percentile)?



Source

Grade	FEV1 z score	Severity
NA	-1.65 to -2.5	Mild
NA	-2.51 to -4.0	Moderate
NA	<-4.1	

GOLD Definition

- 1. Required:
 - 1. FVC <80% predicted

TLC Percent Predicted	Severity
>70%	Mild
50%-69%	Moderate
<50%	Severe

Other Lung Volumes

VC: ↓ in restriction, ↓ in air trapping
 RV & FRC: ↑ with air trapping
 RV & FRC: ↓ with restriction
 ERV: ↓ in obesity

Lung Volume

FRC is the primary thing calculated in lung volume calculations.

Other

Plethysmography

Boyle's Law

- $P_1V_1 = P_2V_2$
- $\implies V_{tg} = V_1 \frac{\Delta V}{\Delta P}$

$$FRC = ERV + RV$$

$$TLC = VC + RV$$

Helium

- Helium is used because He doesn't cross the alveolar-capillary membrane
 - $C_1V_1 = C_2(V_1+V_2)$
 - $\implies V_2 = V_1 \left(\frac{C_1}{C_2} - 1 \right)$
 - **limitations** since inhalation done only for a few minutes, would get into poorly ventilated lungs, so will underestimate FRC

Nitrogen

Method for calculation is similar to [Helium](#) method.

From:

<https://ewrobbins.com/> - **ewrobbins.com**

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Last update: **2024/03/08 18:32**

