INTERPRETATION OF PFTs

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Week 16

Educational Objectives:

1. Understand the physiologic basis of the measurements obtained during PFT testing
2. Develop strategies to interpret PFTs for obstructive and restrictive diseases
3. Interpret mixed obstructive/restrictive findings on PFTs

Note:

The lung volumes and % predicted values may not be accurate in comparison to the true published matched patient age/sex values. The values should merely be used for the problem solving exercise.

CASE ONE:

A 39-year-old woman with no significant PMH now presents to your office with a three-month history of cough and episodic shortness of breath at night. She is a lifetime non-smoker and has been very active, running three days a week. Her exam is significant for a normal cardiac exam with no murmurs or gallops and lungs that are clear to auscultation bilaterally. She appears comfortable with a RR 12 and O2sat of 99% RA.

Questions:

1. **What is on your differential diagnosis for her presentation and symptoms? Ultimately, what do you think is her most likely diagnosis?**

CASE ONE CONTINUED:

She is sent for PFTs, and her values are as follows:

	Pre-bronchodilator	% Predicted	Post-bronchodilator	% change
FVC	2.4	85	2.7	12
FEV1	1.5	63	2.0	34
FEV1/FVC	58%		75%	29
DLCO		99		

2. **Qualitatively describe the FVC (forced vital capacity), FEV1 (forced expiratory volume in 1sec), FEV1/FVC ratio, TV (tidal volume), RV (residual volume), and TLC (total lung capacity). What do each of these terms mean?**

3. **What is her diagnosis? Based upon what?**

CASE TWO:

A 59-year-old woman with SLE and a history of tobacco use (10 pack-years) presents with SOB of two months duration with no associated cough, no orthopnea or paroxysmal nocturnal dyspea (PND), and no lower extremity swelling. Her exam is significant for dry crackles bilaterally. She is sent for PFTs, and her values are as follows:

	Actual	**% Predicted**
FVC	**2.0**	**62**
FEV1	**1.7**	**71**
FEV1/FVC	**85%**	
RV	**1.0**	**42**
TLC	**2.9**	**57**
DLCO		**65**

4. **What type of lung physiology does this patient have? Upon what do you base this interpretation?**

CASE THREE:

A 65-year-old man with a history of tobacco use (50 pack-years) presents with worsening SOB of three to four months duration. He has an associated cough that is worse in the mornings, no orthopnea or PND, and no lower extremity swelling. He used to work in construction. His exam is significant for a benign cardiac exam and bilateral dry crackles with scattered expiratory wheezes. He smells of cigarettes. He is sent for PFTs, and his values are as follows:

	Actual	% Predicted
FVC	**2.3**	**65**
FEV1	**1.4**	**70**
FEV1/FVC	**61%**	
RV	**1.6**	
TLC	**2.9**	**62**
DLCO		**58**

5. **What type of lung physiology does this patient have?**

CASE FOUR:

A 38-year-old man with no PMH presents with recurrent episodes of SOB over the past one to two months. He is a lifetime smoker since age 15 and has smoked between one and three packs per day. His exam is significant for a benign cardiac exam and diffuse wheezes bilaterally. You have access to PFTs in the office, and you send him straight for evaluation. His results are:

	Actual	% Predicted
FVC	**2.7**	**74**
FEV1	**2.1**	**80**
FEV1/FVC	**78%**	
TLC	**4.7**	**101**
DLCO		**85**

6. **What is his lung physiology?**

Primary References:

1. Figure 2 from Pellegrino R et al. *European Respiratory Journal*. 2005.
2. Evans SE and Scanlon PD. Current Practice in Pulmonary Function Testing. *Mayo Clinic Proc*. 2003; 78: 758-763.

Additional References:

1. Ganong WF. Review of Medical Physiology, 22nd Ed.
2. Pellegrino R et al. Interpretive strategies for lung function tests. ATS/ERS Task Force: Standardization of Lung Function Testing. *European Respiratory Journal.* 2005; 26: 948-968.

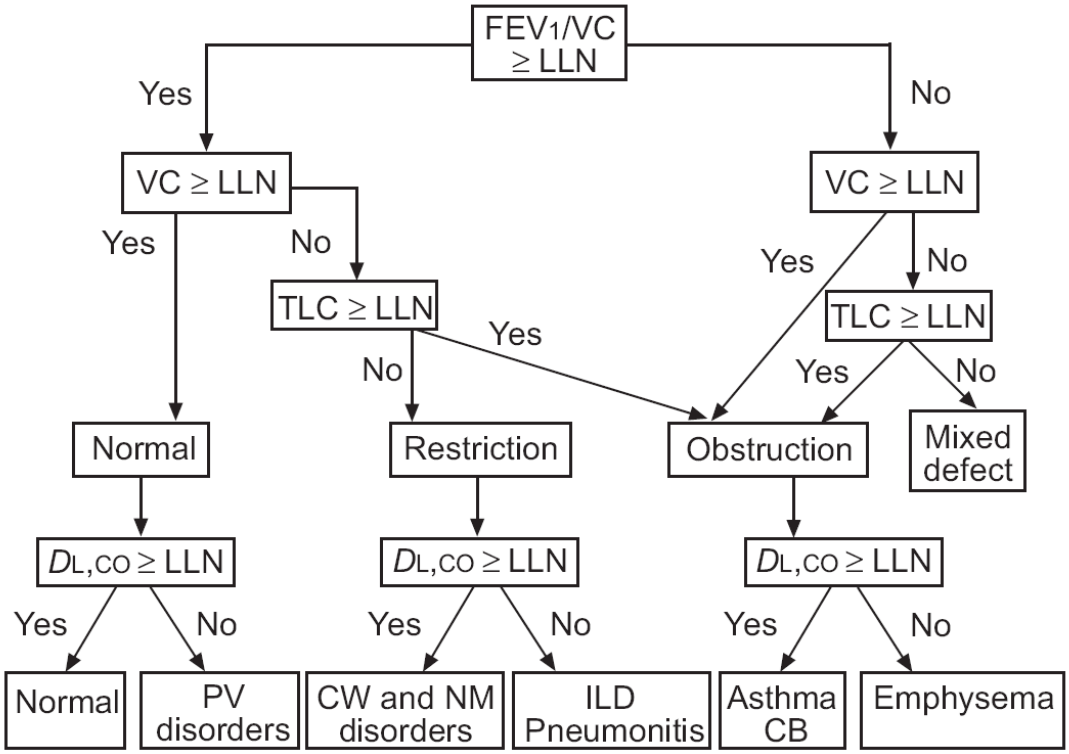

FIGURE 2. A simplified algorithm that may be used to assess lung function in clinical practice. It presents classic patterns for various pulmonary disorders. As in any such diagram, patients may or may not present with the classic patterns, depending on their illnesses, severity and lung function prior to the disease onset (*e.g.* did they start with a vital capacity (VC) close to the upper or lower limits of normal (LLN)). The decisions about how far to follow this diagram are clinical, and will vary depending on the questions being asked and the clinical information available at the time of testing. The forced expiratory volume in one second (FEV_1)/VC ratio and VC should be considered first. Total lung capacity (TLC) is necessary to confirm or exclude the presence of a restrictive defect when VC is below the LLN. The algorithm also includes diffusing capacity for carbon monoxide ($D_{L,CO}$) measurement with the predicted value adjusted for haemoglobin. In the mixed defect group, the $D_{L,CO}$ patterns are the same as those for restriction and obstruction. This flow chart is not suitable for assessing the severity of upper airway obstruction. PV: pulmonary vascular; CW: chest wall; NM: neuromuscular; ILD: interstitial lung diseases; CB: chronic bronchitis.

Pellegrino R et al. Eur Respir J 2005