

Pulmonary Function Tests

DLCO

Learning Objectives

- Understand the physiologic significance of the DLCO.
- Be able to use the DLCO to further characterize both obstructive and restrictive lung disease.
- Know the conditions that can alter DLCO which are unrelated to lung disease.

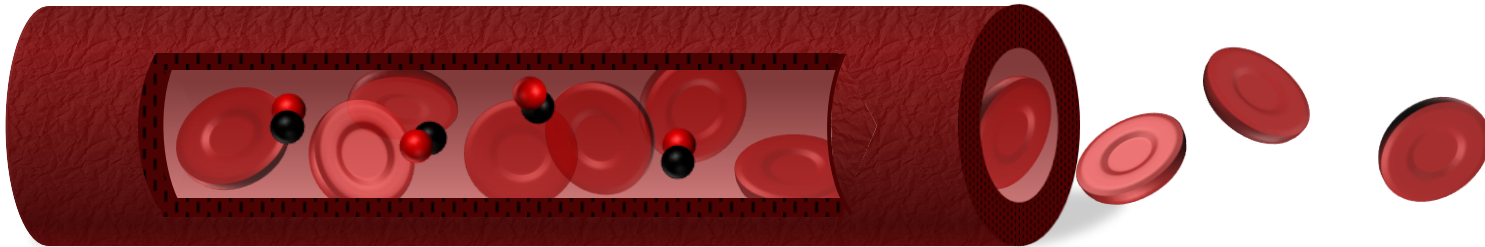
Diffusing Capacity of Carbon Monoxide (DLCO)

DLCO is a rough surrogate for the overall function of the alveolar-capillary membrane.

$$\dot{V}_x = \frac{D \times A \times \Delta P}{\Delta x}$$

\dot{V}_x – Rate of gas diffusion
D – Diffusion coefficient
A – Surface area
 ΔP – Partial pressure gradient
 Δx – Thickness of membrane

Fick's Law of Diffusion



Diffusing Capacity of Carbon Monoxide (DLCO)

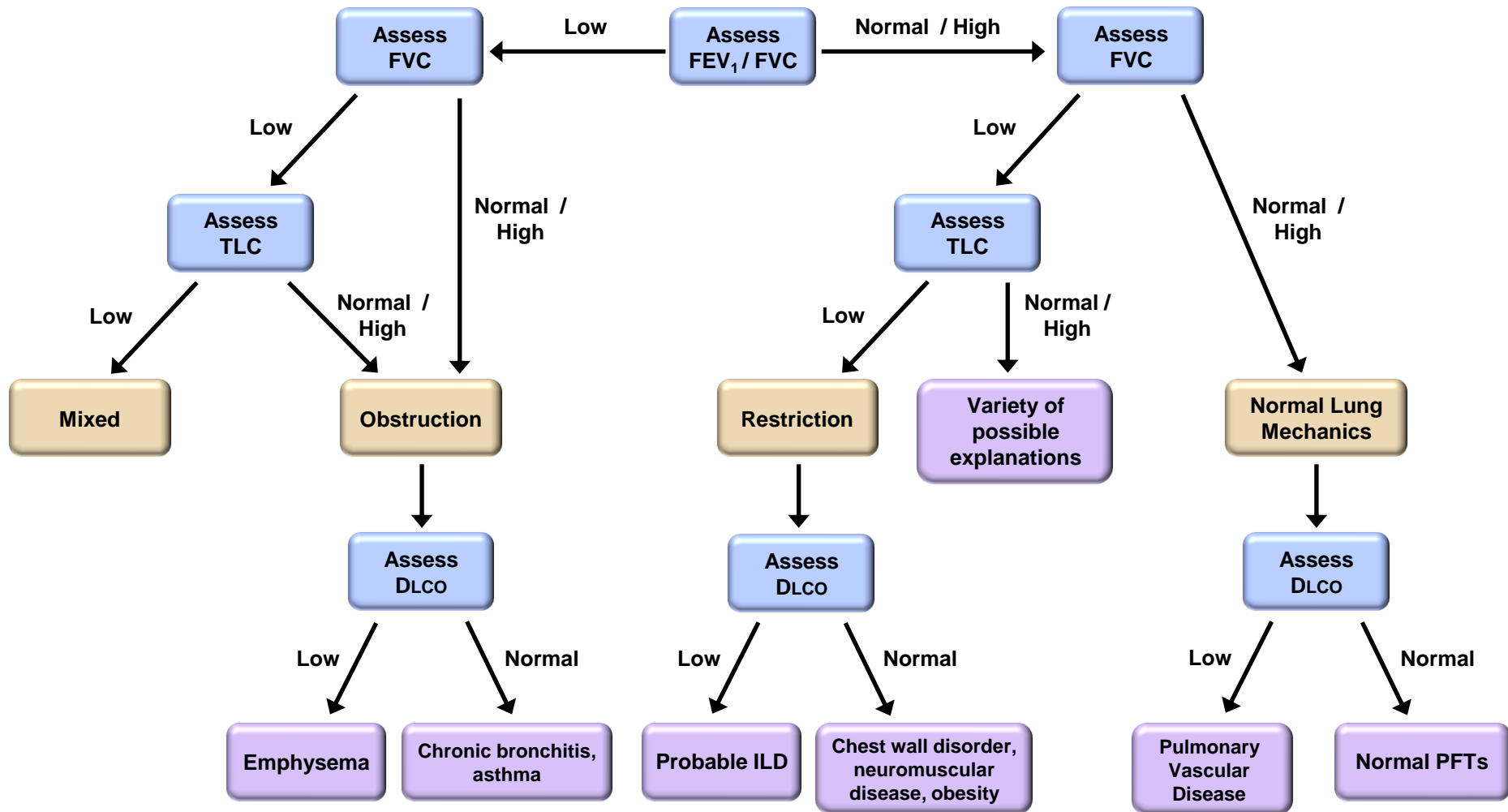
Conditions and Physiologic States That Alter DLCO

- ↓ DLCO: ↓ Membrane surface area (e.g. emphysema)
↑ Membrane thickness (e.g. ILD)
Pulmonary hypertension
Anemia
- ↑ DLCO: Exercise, supine position
Asthma
Pulmonary hemorrhage
Polycythemia
Mild left heart failure

Adjusting the DLCO

- Anemia/Polycythemia:
 - The predicted DLCO should be adjusted downwards for anemia, and upwards for polycythemia.

- Abnormal lung volume (DLCO/VA ratio)
 - Predicted DLCO is occasionally adjusted downwards for low lung volumes and upwards for high lung volumes.
 - This can be misleading if the etiology of the abnormal volume is not carefully considered, and thus, this should only be done cautiously.



Diffusing Capacity of Carbon Monoxide (DLCO)

Primary Indications for Measuring DLCO:

- To categorize a patient with restrictive lung disease as either probable ILD versus extrathoracic restriction (e.g. obesity, neuromuscular disease).
- To identify early ILD in high-risk patients (e.g. chronic amiodarone use, history of chest radiation, stage I sarcoidosis).
- To quantify anatomic emphysema in patients with COPD.
- To document disability for legal purposes.



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