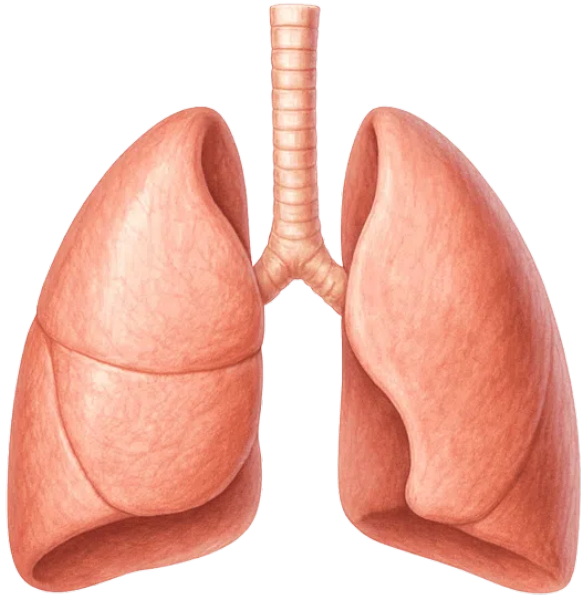
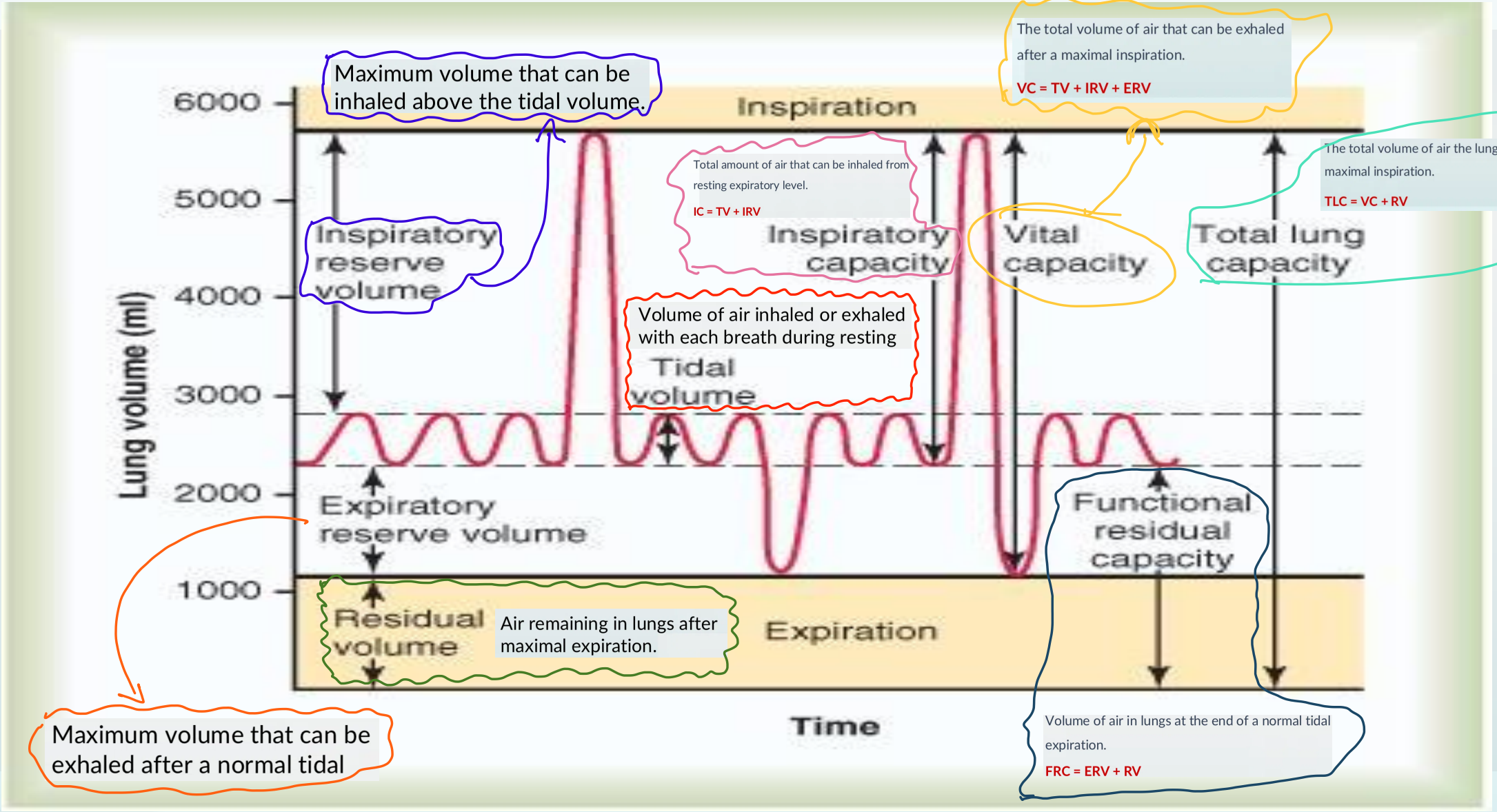
How to Spirometry

Physio
OSPE



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Spirogram


Maximum volume that can be inhaled above the tidal volume.
The total volume of air that can be exhaled after a maximal inspiration.
VC = TV + IRV + ERV
6000
5000
4000
3000
2000
1000
Lung volume (ml)
Inspiration
Inspiratory reserve volume
Total amount of air that can be inhaled from resting expiratory level.
IC = TV + IRV
Inspiratory capacity
Vital capacity
Total lung capacity
The total volume of air the lungs can hold after maximal inspiration.
TLC = VC + RV
Volume of air inhaled or exhaled with each breath during resting
Tidal volume
Expiratory reserve volume
Functional residual capacity
Residual volume
Air remaining in lungs after maximal expiration.
Expiration
Time
Maximum volume that can be exhaled after a normal tidal
Volume of air in lungs at the end of a normal tidal expiration.
FRC = ERV + RV



Standard Spirometric Indices

FVC

Forced Vital Capacity

Total volume of air forcibly exhaled in one breath.

FEV1

Forced Expiratory Volume in 1 Second

Volume of air expired in the first second of the blow.

Ratio

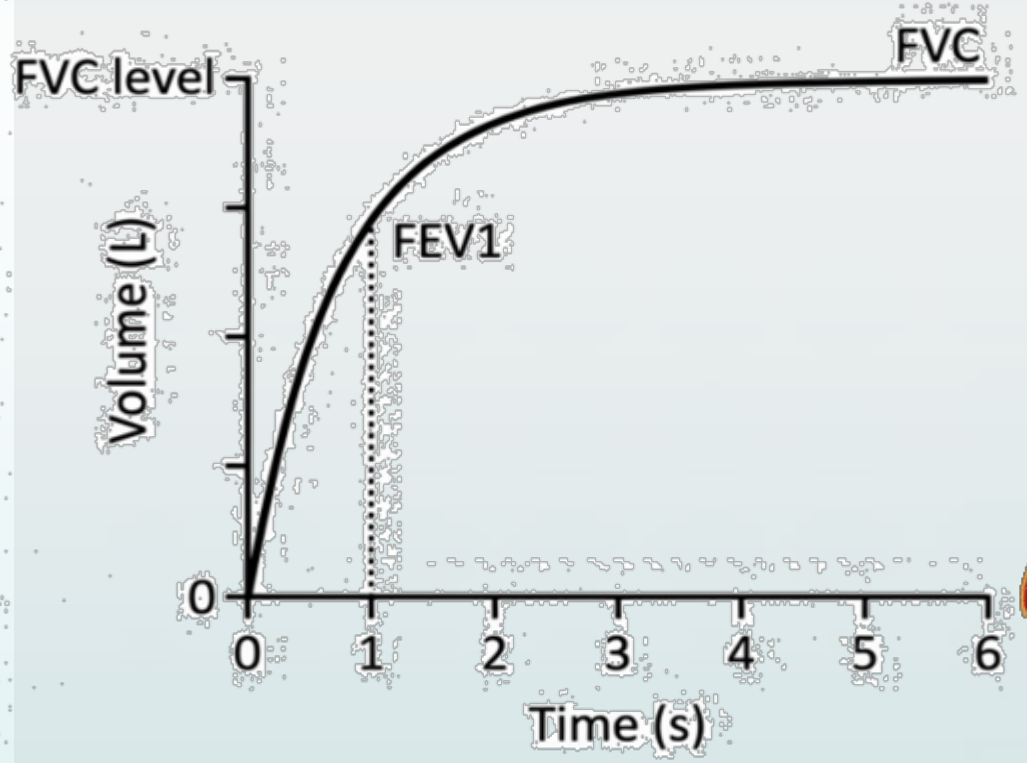
FEV1 / FVC

The fraction of air exhaled in the first second relative to the total.

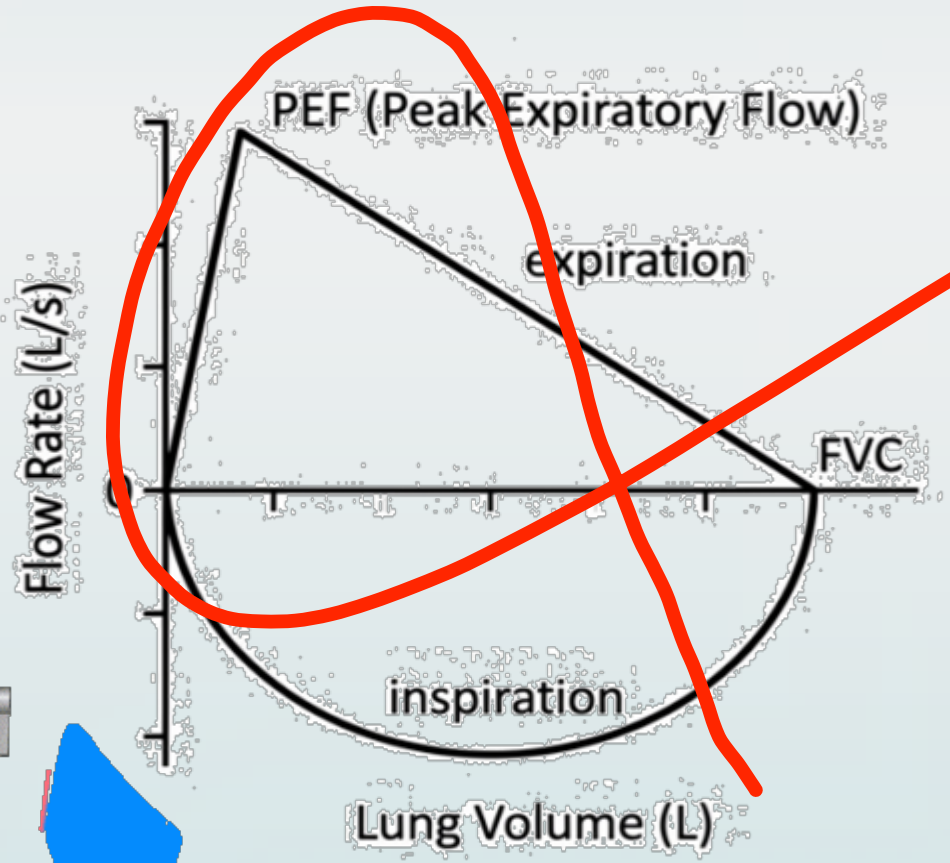
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Spirometry findings

Visualizing the Data: Two Perspectives



Shows cumulative volume over time.



Shows flow rate vs. volume. Note the triangular expiratory shape.





Predicted Normal Values

Factors Influencing Predicted Values:

- Age
- Height
- Weight
- Sex
- Ethnic Origin

The Golden Rule for Diagnosis

Normal Volume

FEV1 & FVC > 80%

of predicted value.

Normal Flow Ratio

FEV1/FVC Ratio > 0.7

(or 70-80%)

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PFT Report

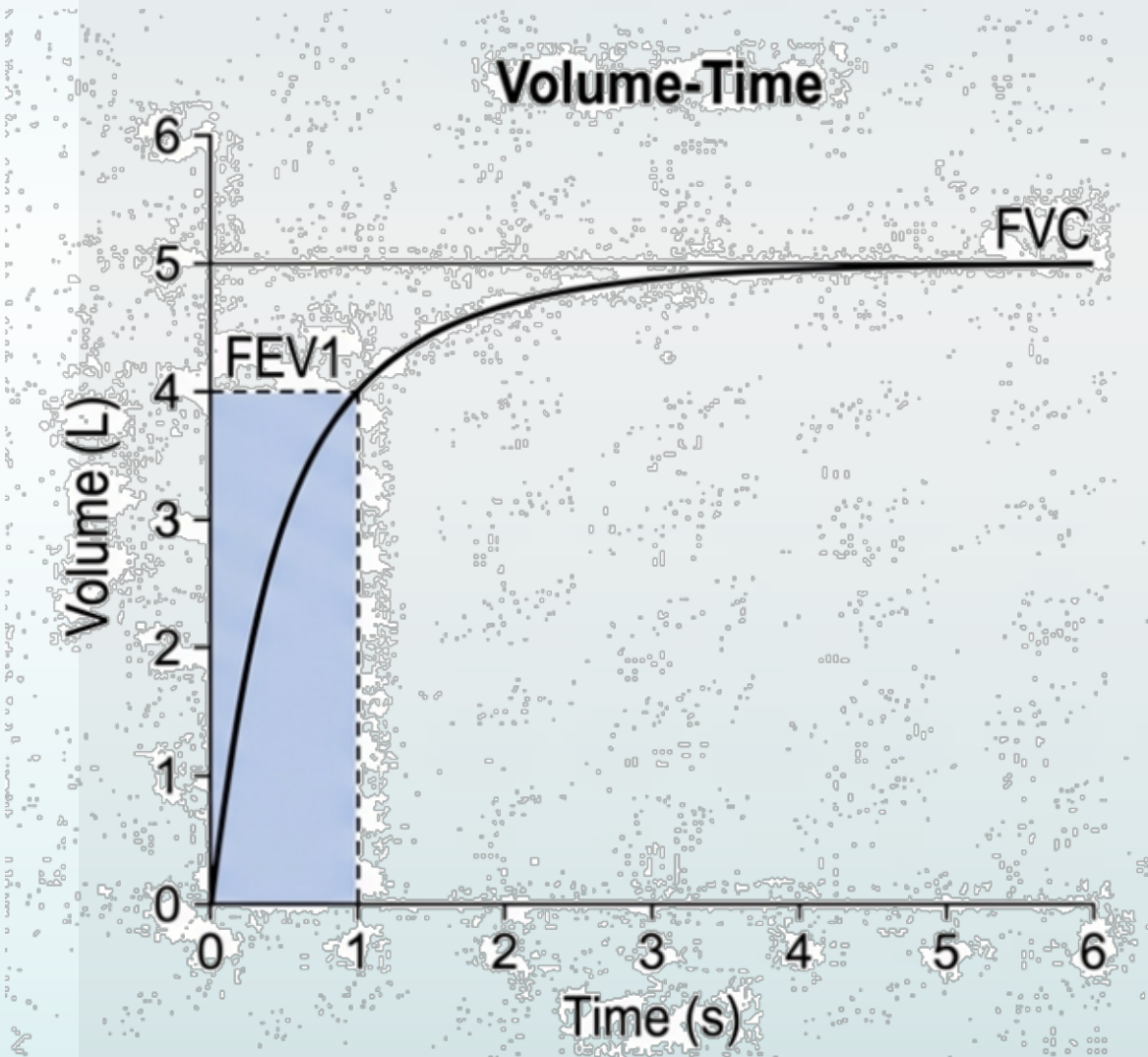
Parameter	Predicted (Ref)	Actual (Patient)	% Predicted
FVC (Liters)			
FEV1 (Liters)			
FEV1/FVC Ratio			
TLC (Liters)			



Diagnosis: Normal pattern

Parameter	Predicted (Ref)	Actual (Patient)	% Predicted
FVC (Liters)	4.8	5	104 %
FEV1 (Liters)	3.84	4	104 %
FEV1/FVC Ratio	0.8	0.8	
TLC (Liters)			

Diagnosis: Normal pattern



Parameter	Value	Interpretation
FEV1	4.0 L	High volume in 1st sec
FVC	5.0 L	Normal total volume
Ratio	0.8 (80%)	**Normal (> 0.7)**

Interpretation: The patient can expel the majority of their lung volume almost immediately.

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Diagnosis: Obstructive Disease

Asthma, Emphysema, Chronic Bronchitis

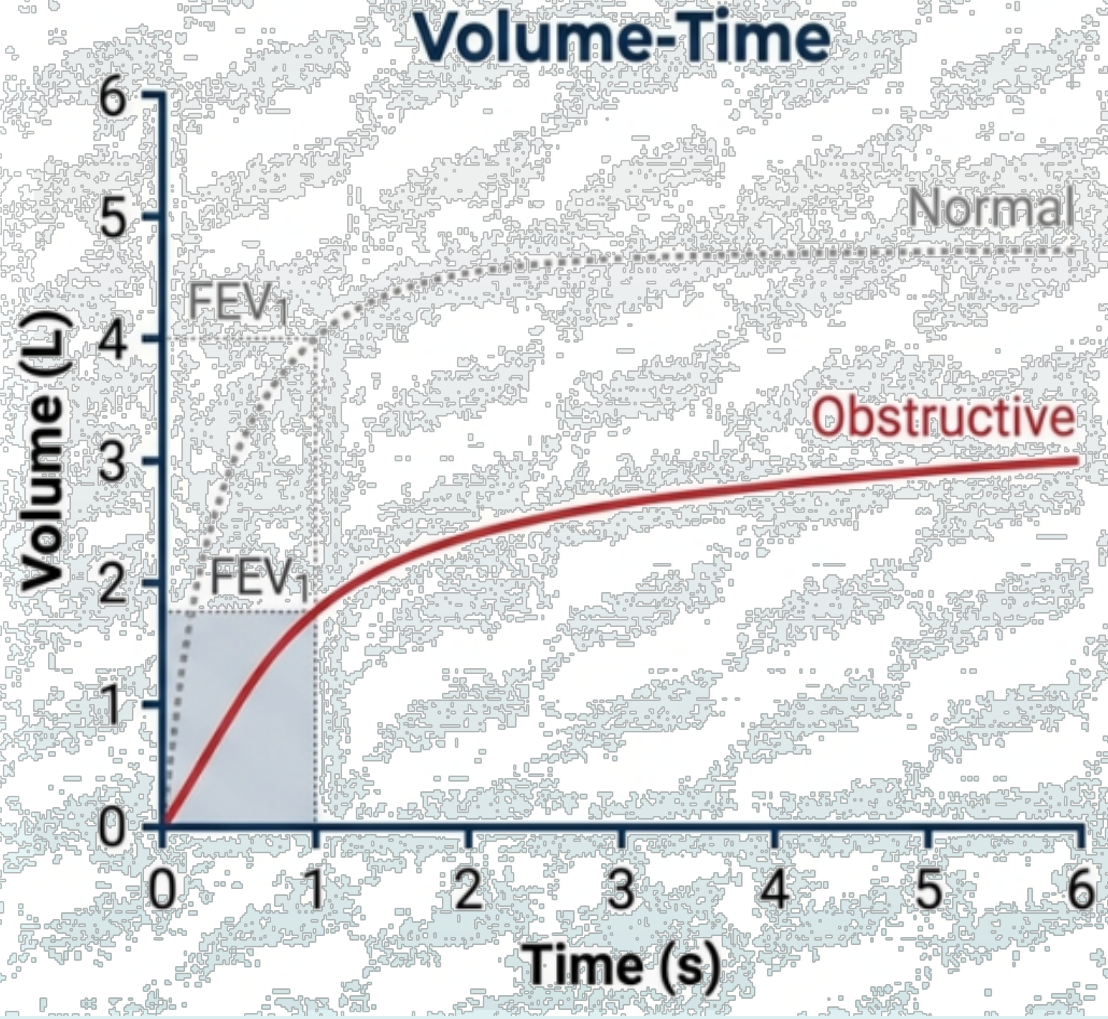
Parameter	Predicted (Ref)	Actual (Patient)	% Predicted
FVC (Liters)	4	3.2 normal or decreased	80 %
FEV1 (Liters)	3.2	1.8 decreased	56 %
FEV1/FVC Ratio	0.8	0.56 < 0.7	
TLC (Liters)			

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Diagnosis: Obstructive Disease

(Flow Problem)

Asthma, Emphysema, Chronic Bronchitis



Diagnostic Criteria

- ☑ FEV1: Decreased (< 80%)
- ☐ FVC: Normal or Decreased
- ☑ **Ratio: < 0.7 (Hallmark Sign)**

Example Data:
FEV1 = 1.8L | FVC = 3.2L | Ratio = 0.56



Diagnosis: Restrictive Disease

Pulmonary Fibrosis, ILDs, Pneumoconiosis

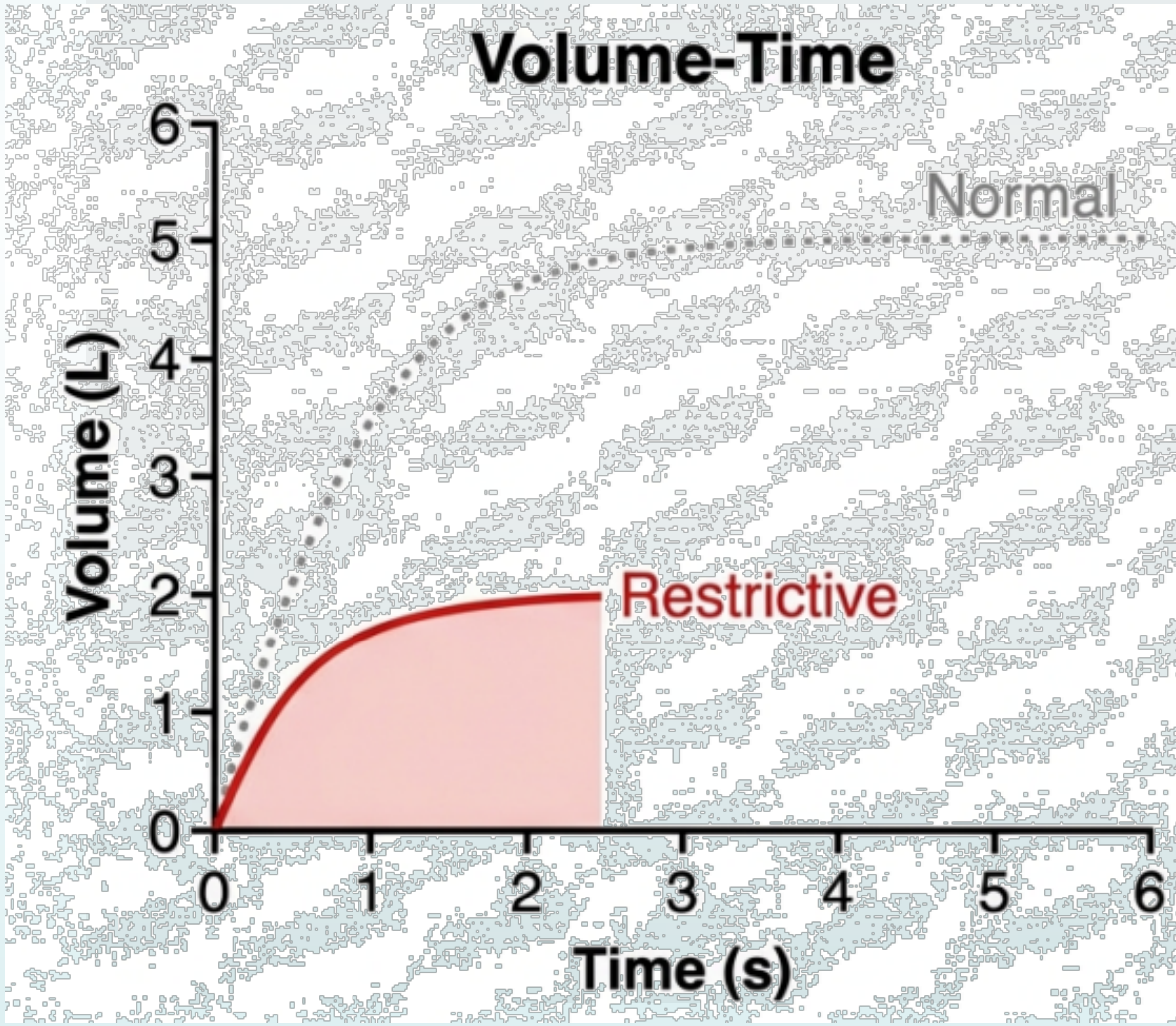
Parameter	Predicted (Ref)	Actual (Patient)	% Predicted
FVC (Liters)	4	2 ↓↓↓	50 %
FEV1 (Liters)	3.2	1.9 ↓	59 %
FEV1/FVC Ratio	0.8	0.95 normal or High	
TLC (Liters)			

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Diagnosis: Restrictive Disease

(Volume Problem)

Pulmonary Fibrosis, ILDs, Pneumoconiosis



Diagnostic Criteria

[ ] FEV1: Decreased

[✓] **FVC:** Significantly Decreased (< 80%)

[✓] **Ratio:** Normal or High (> 0.7)

Example Data:

FEV1 = 1.9L | FVC = 2.0L | Ratio = 0.95

FEV1 = 1.9L | FVC = 2.0L | Ratio = 0.95



Spirometry findings

Parameter	**Obstructive** (Asthma/COPD)	**Restrictive** (Fibrosis)
FEV1	Markedly Decreased	Decreased or Normal
FVC	Normal or Decreased	Markedly Decreased
FEV1/FVC Ratio	Decreased (< 0.7)	Normal or Increased
TLC	Increased (Hyperinflation)	Decreased

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PFT Interpretation

Parameter	Predicted (Ref)	Actual (Patient)	% Predicted	Clinical Interpretation
FVC (Liters)	4.80	4.60	96%	
FEV1 (Liters)	3.90	2.10	54%	
FEV1/FVC Ratio	0.81	0.45		
TLC (Liters)	6.20	7.50	121%	

NORMAL

SIGNIFICANT OBSTRUCTION

OBSTRUCTIVE PATTERN

HYPERINFLATION (COPD)

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