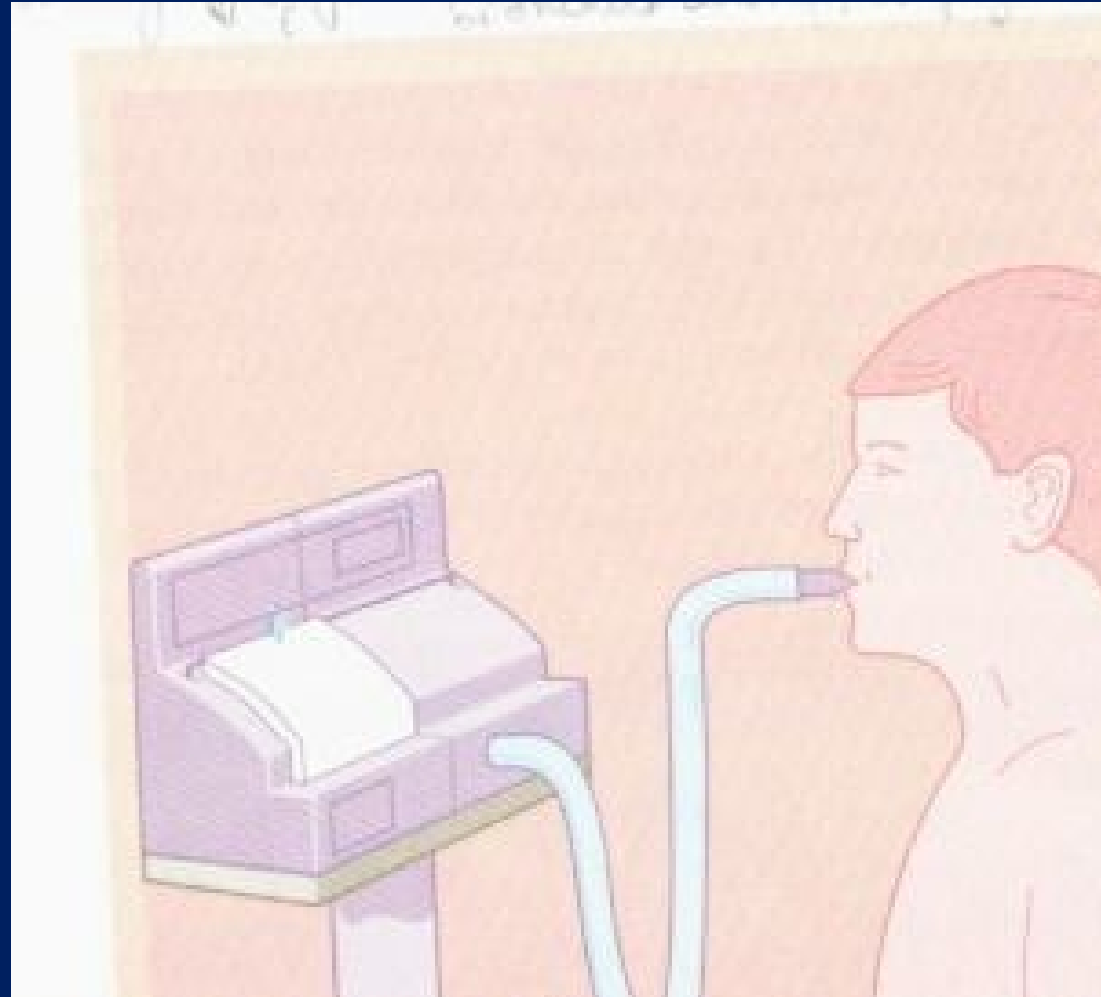


Dynamic Spirometry





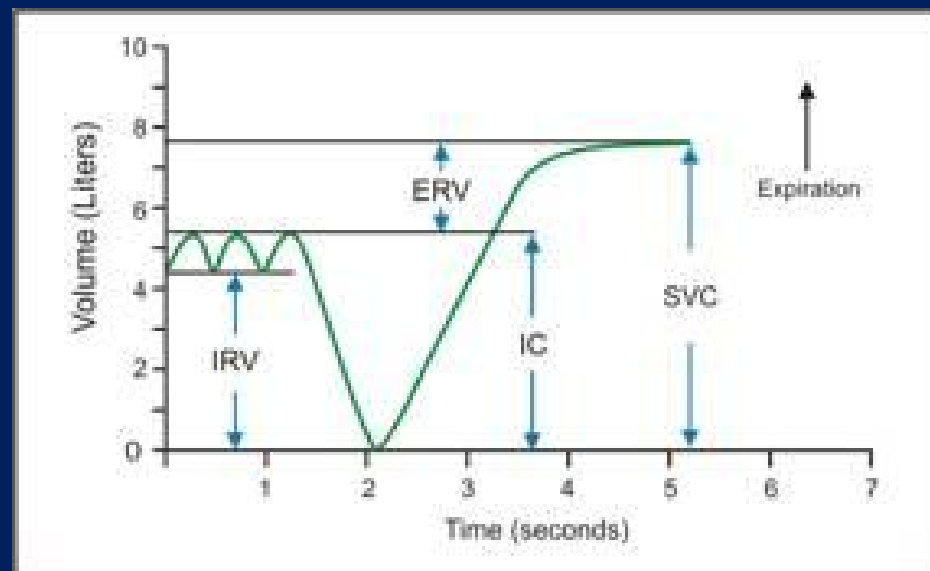
Spirometry

It provides an objective measurement of lung function.

It analyzes volume and velocity of expired air

Static test

Performed without regard to time



Relaxed Vital capacity: Volume of expired air measured after a maximal inspiration

Dynamic test

Performed at forcible and maximum effort against **time**

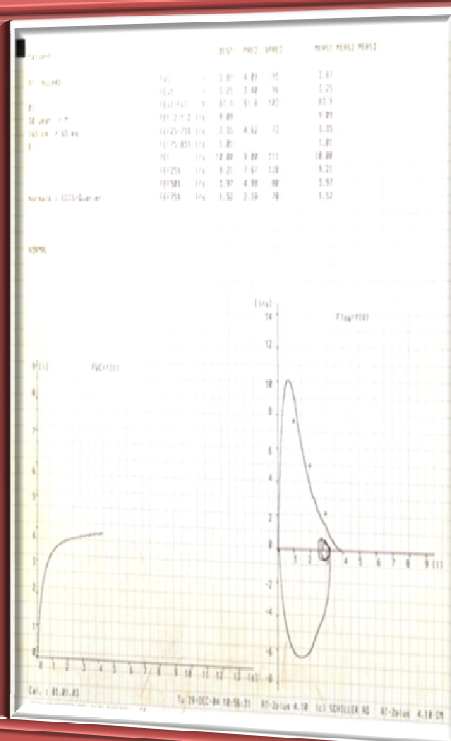
It measures the **rate** at which the lung changes volume during forced breathing measures

Forced vital capacity

The maximum volume of air that can be forcibly and rapidly exhaled following a max inspiration.

Two types of curves can be obtained

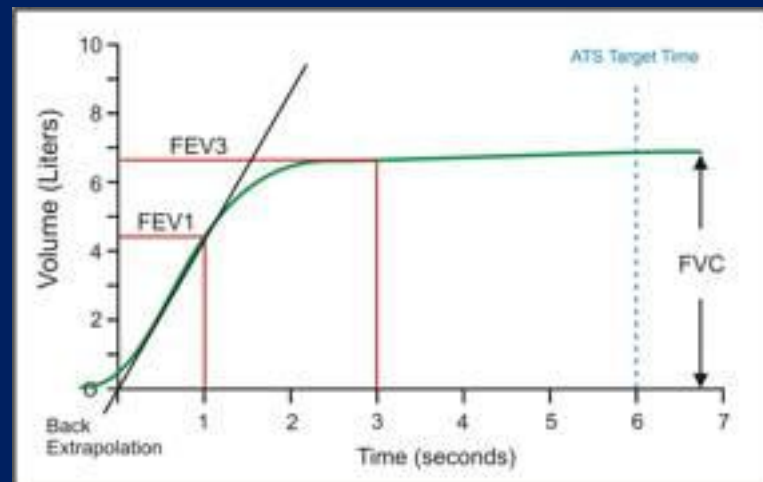
**Forced
expiratory
curve**



**Flow
Volume
curve**

Forced Expiratory Curve

- The subject takes a maximal inspiration and then exhales as rapidly, as forcibly, & as maximally as possible.
- A plot of volume against time:



FEV₁ : Volume of air expelled in the 1st sec of forced expiration starting from full inspiration

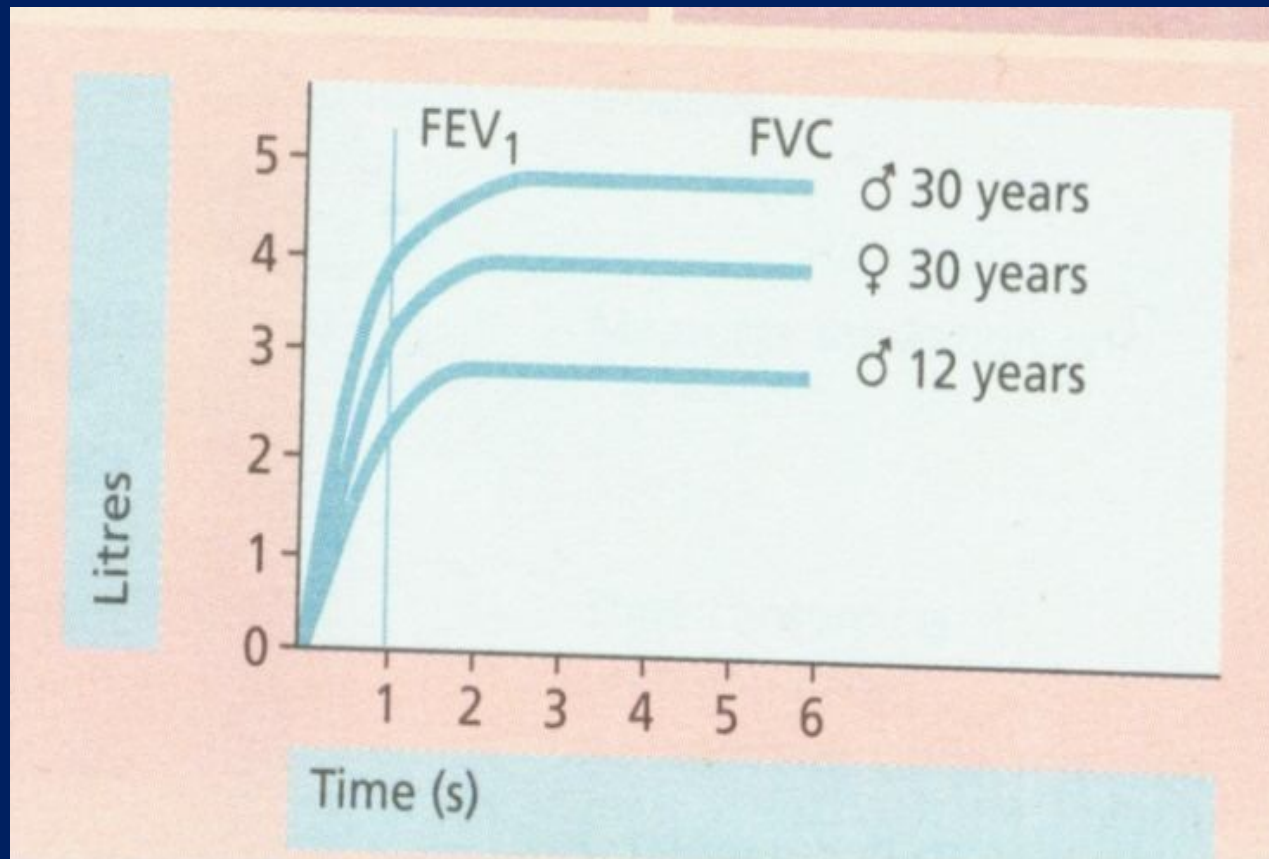
FEV₁ = 4l/sec

(plateau) **FVC = 5l/sec**

(FEV₁/FVC) * 100 ≥ 80%

NL: able to exhale 80% from VC in the 1st sec

- ❑ Value may decline to 60% in old age.
- ❑ NI values vary with sex, height, race.



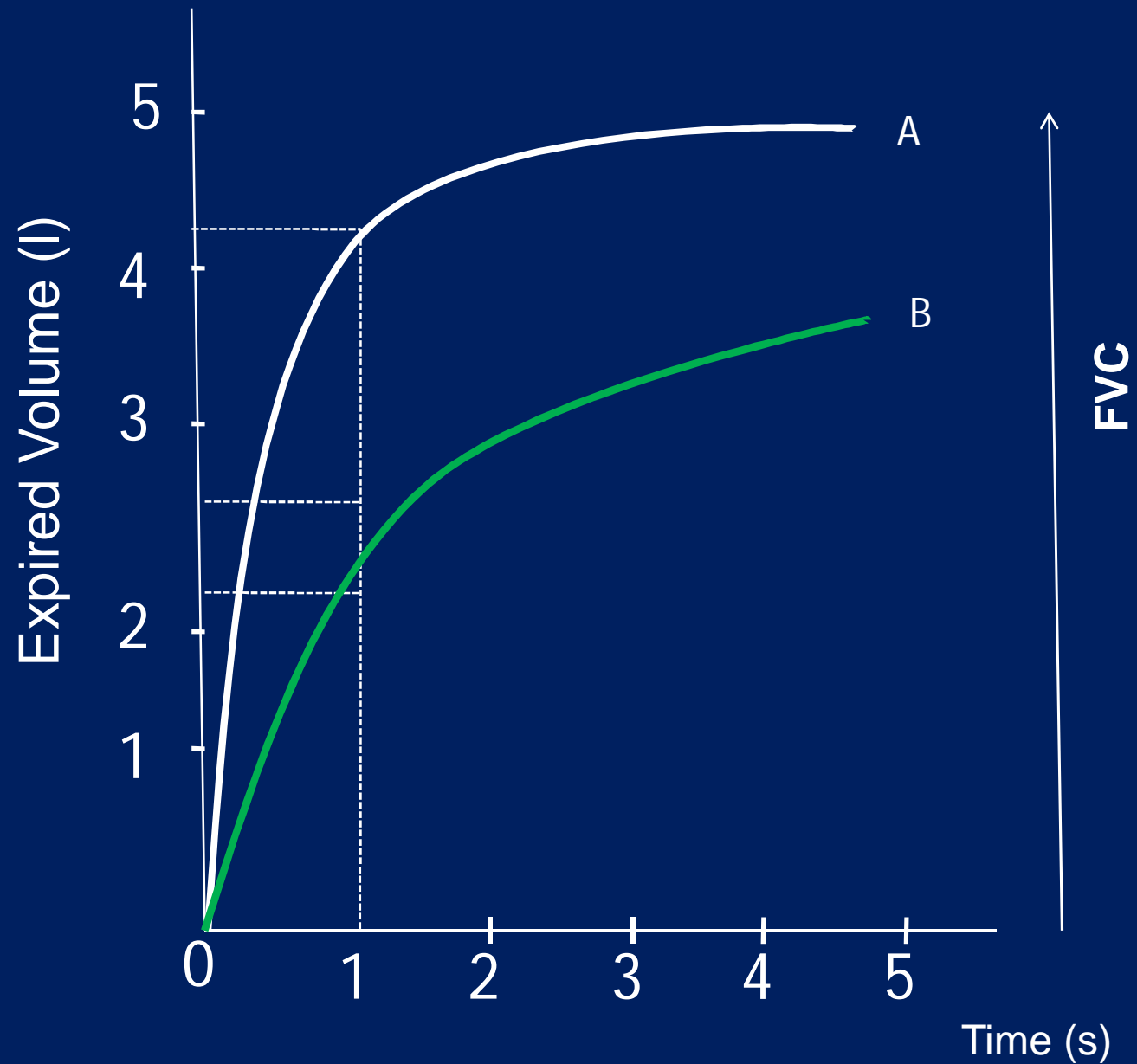
The curve
helps \neq

```
graph TD; A["The curve helps ≠"] --> B["obstructive LD"]; A --> C["Restrictive LD"];
```

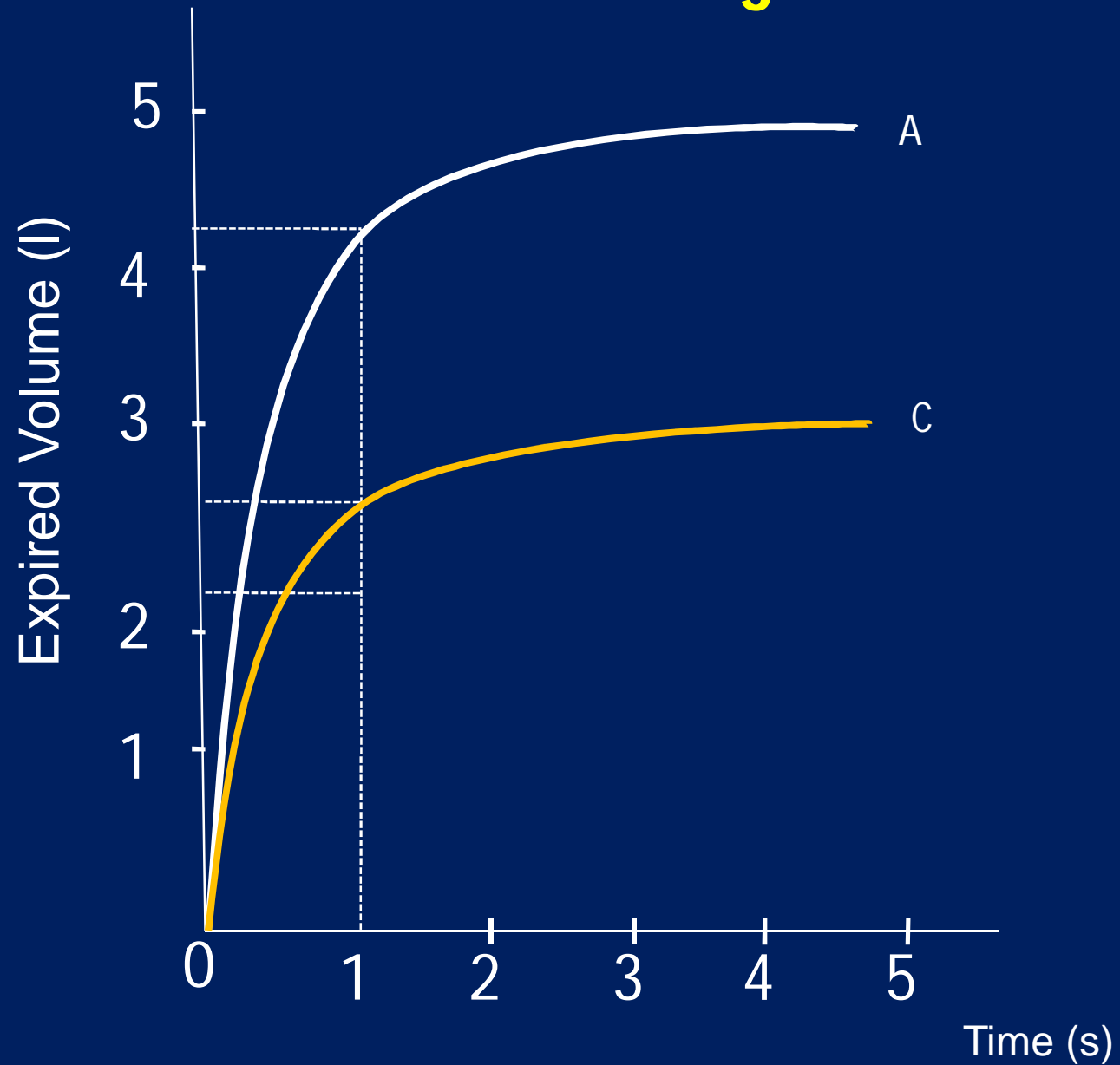
obstructive
LD

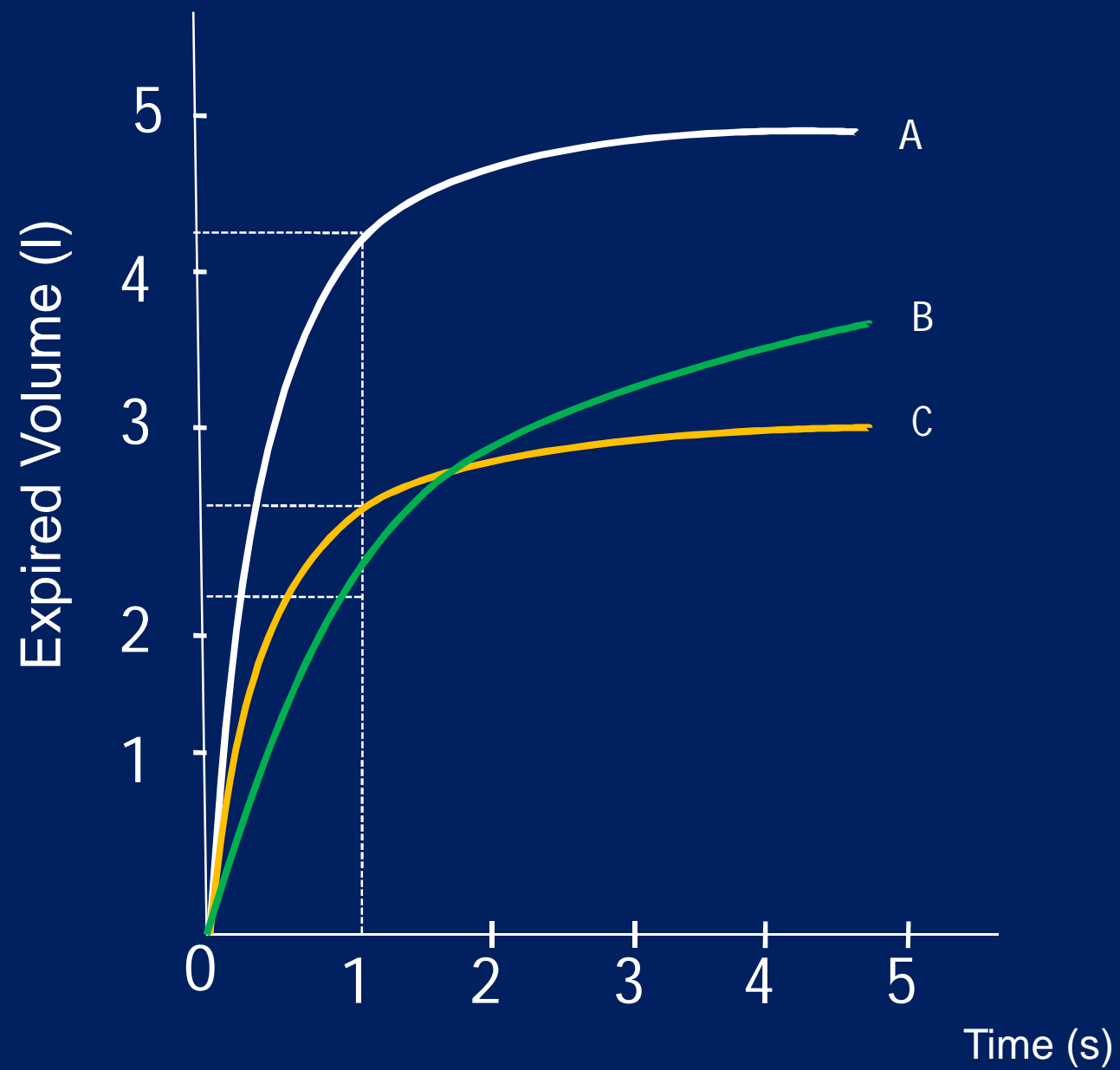
Restrictive
LD

Obstructive lung disease



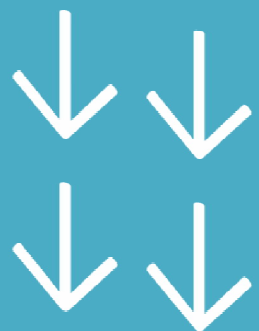
Restrictive lung disease



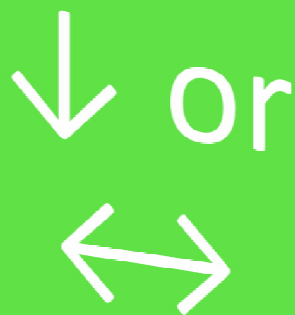


Obstructive lung disease

FEV_1



FVC



FEV_1/FVC

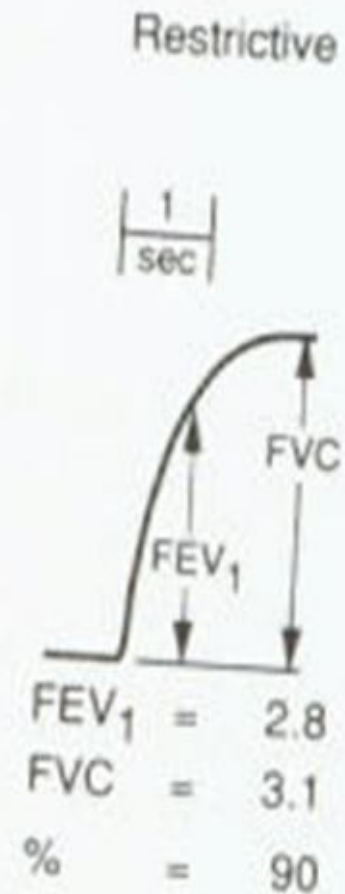
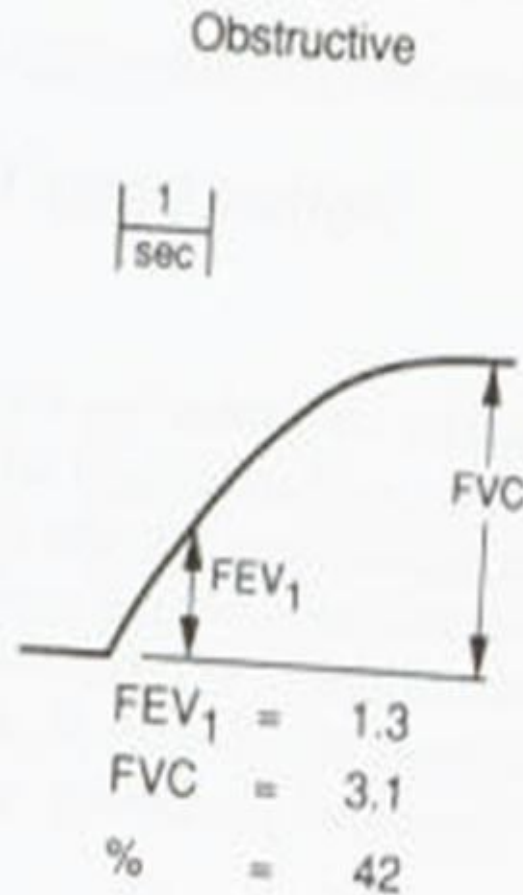
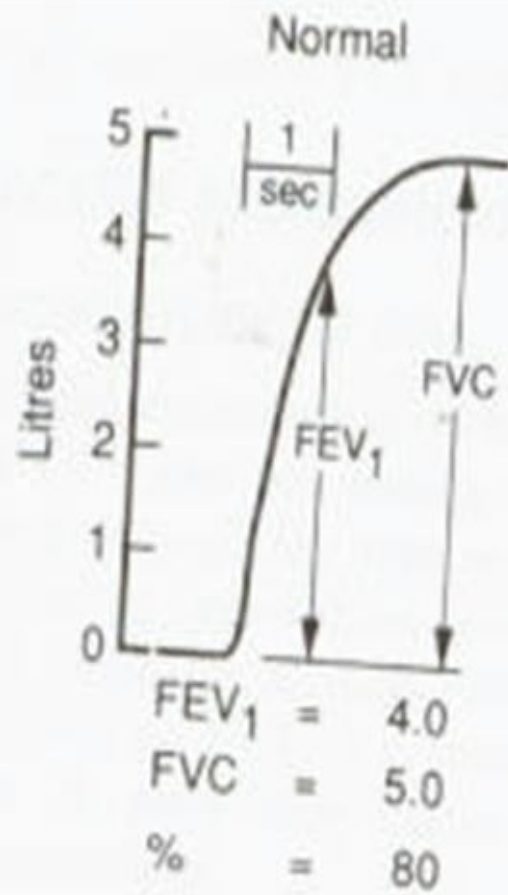


Restrictive lung disease

FEV_1 ↓
↓

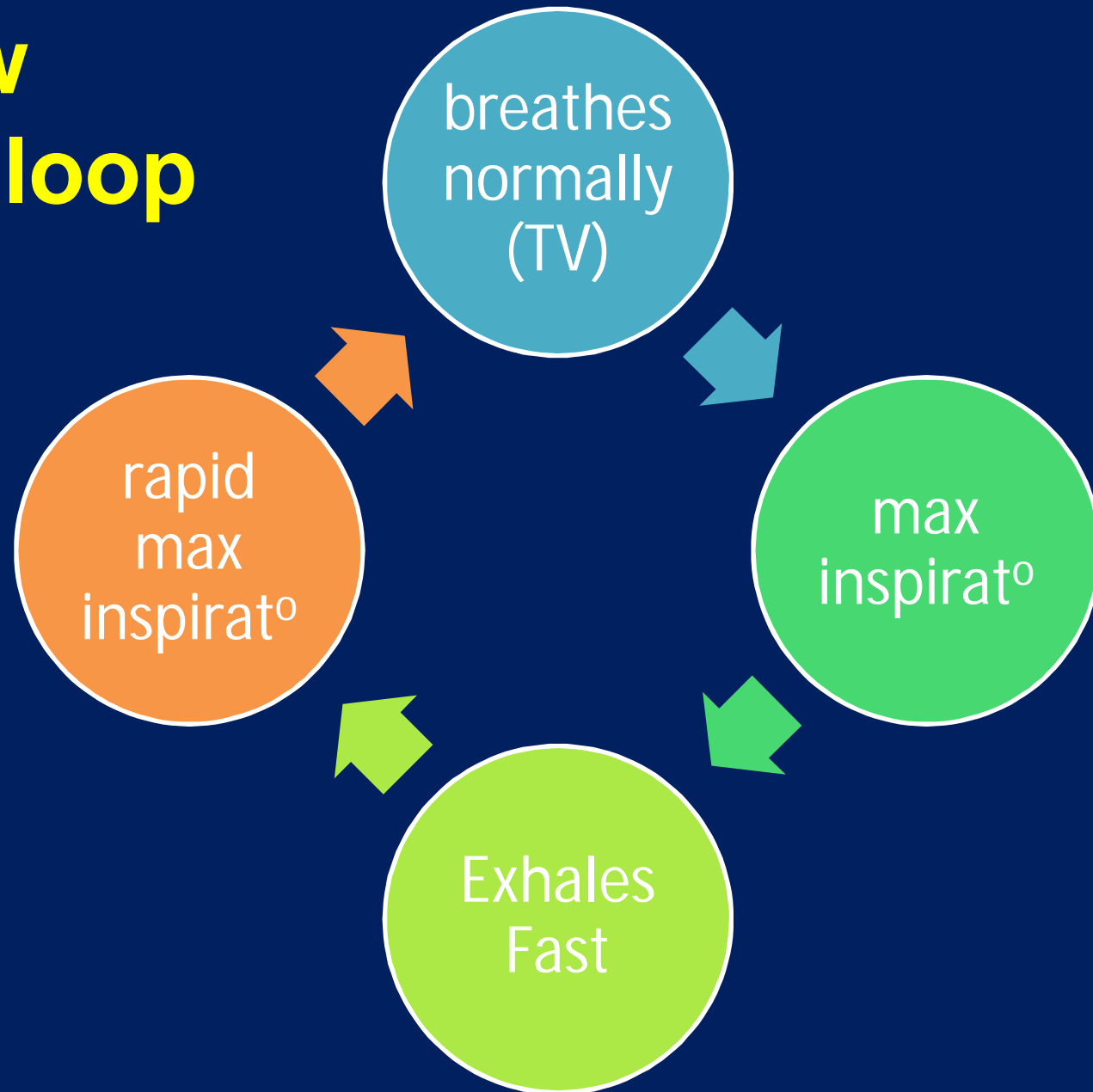
FVC
↓ ↓

$FEV_1 /$
FVC
↔ or ↑

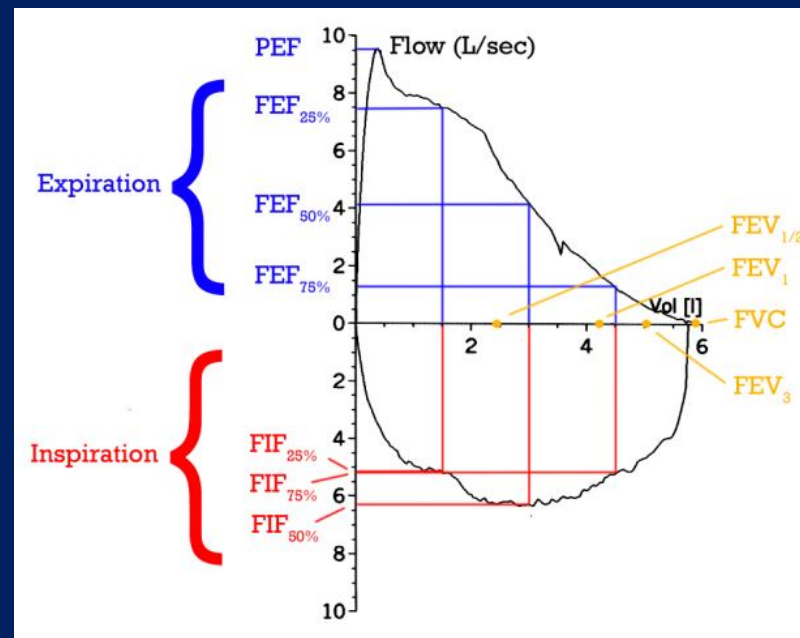


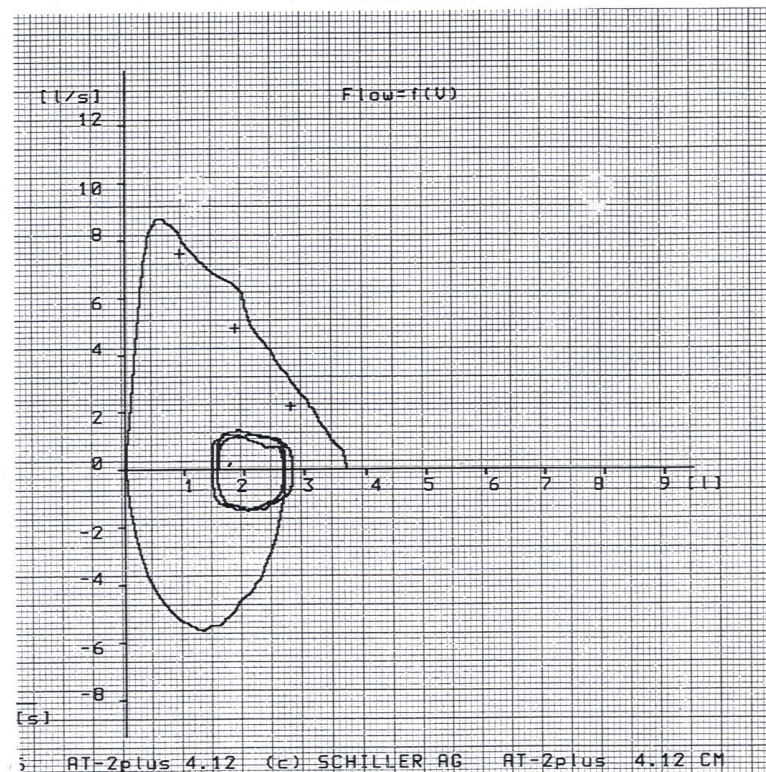
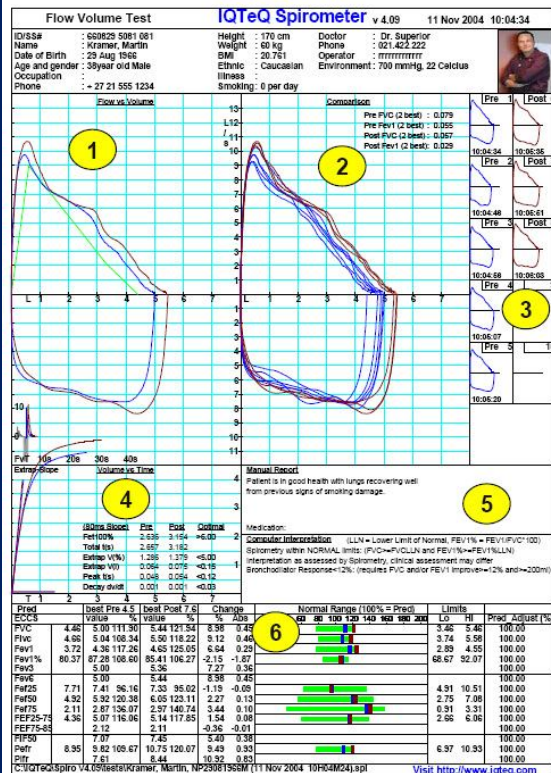
Volume	Normal	Obstructive	Restrictive
FVC	5	↓ or ↔ (5)	↓ (3)
FEV ₁	4	↓↓↓ (2)	↓ (2.7)
FEV ₁ %	80%	↓ (40%)	↔ or ↑ (90)

Flow Volume loop

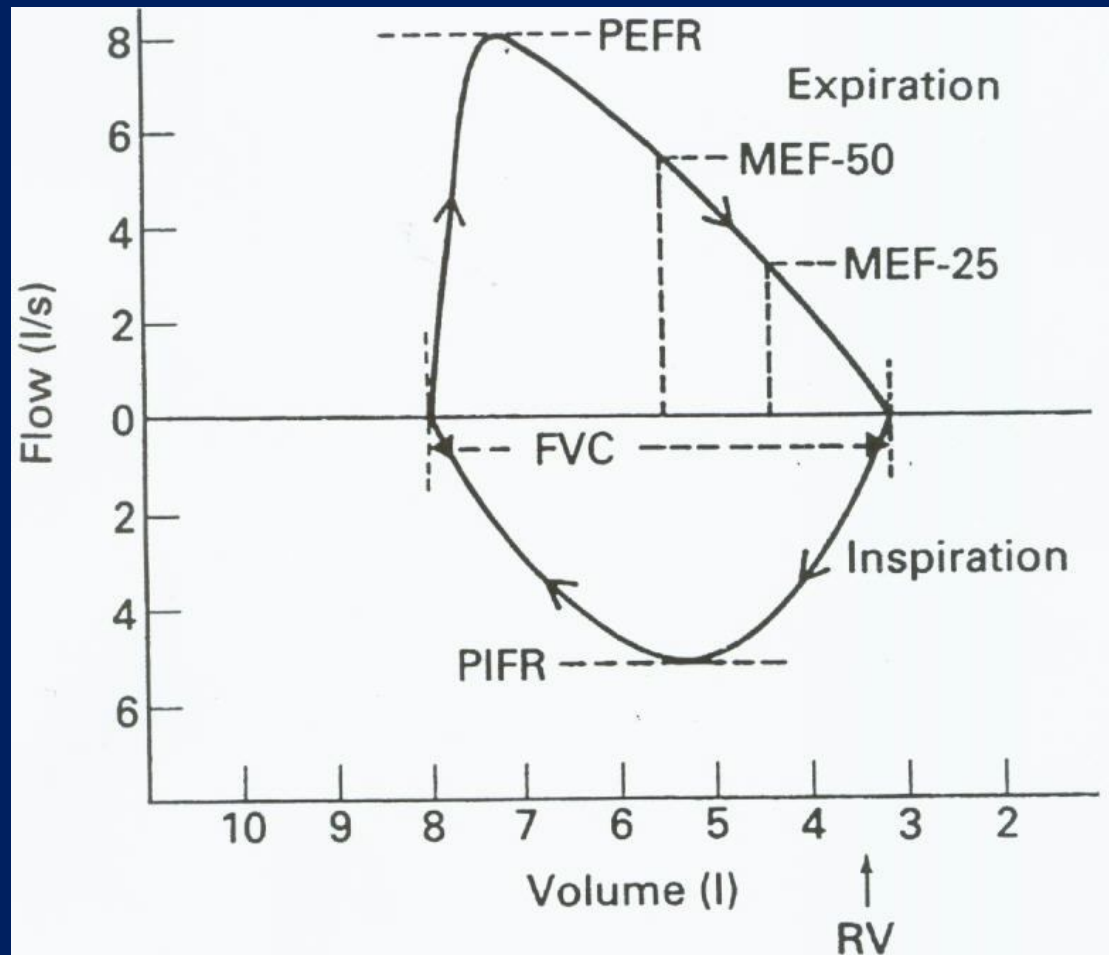


This measures exp & insp **flow** as a function of exhaled **volume** rather than against time.







Flow Volume loop





- **Measurements on flow V loop**

- 
- **PEFR** : Greatest flow achieved during the manoeuvre = 6- 12l/sec
 - **PIFR** = 6l/sec

- 
- **MEF50**: max expiratory flow at 50% of FVC
= 4- 6 l/sec
 - **MEF25**= 2.5 l/sec

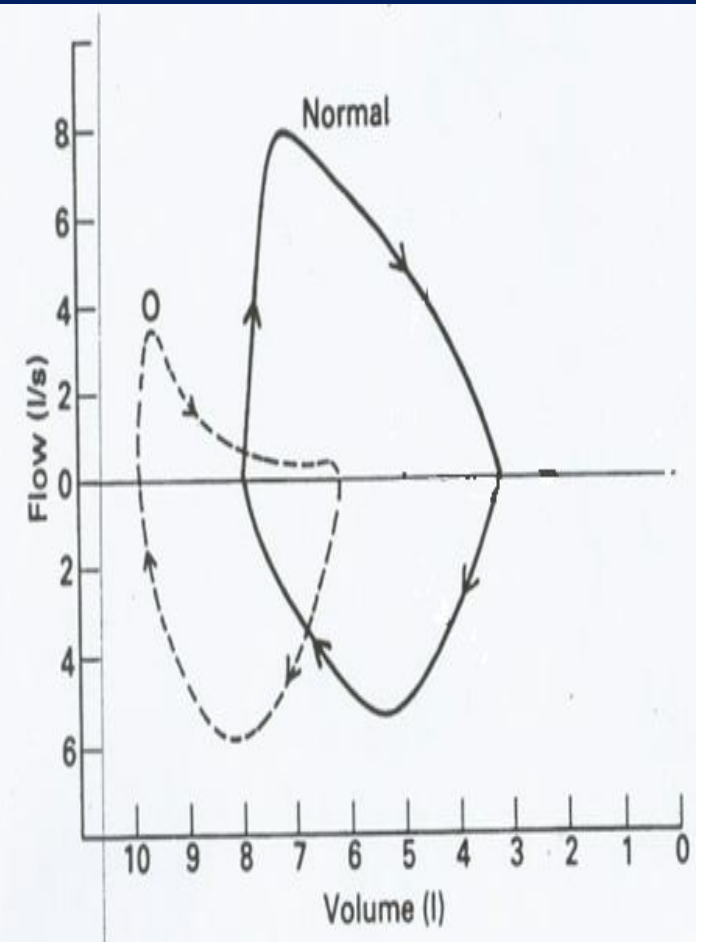
Obstructive LD

MEF50↓

Effort
independent
part of
curve:
concave

PEFR↓

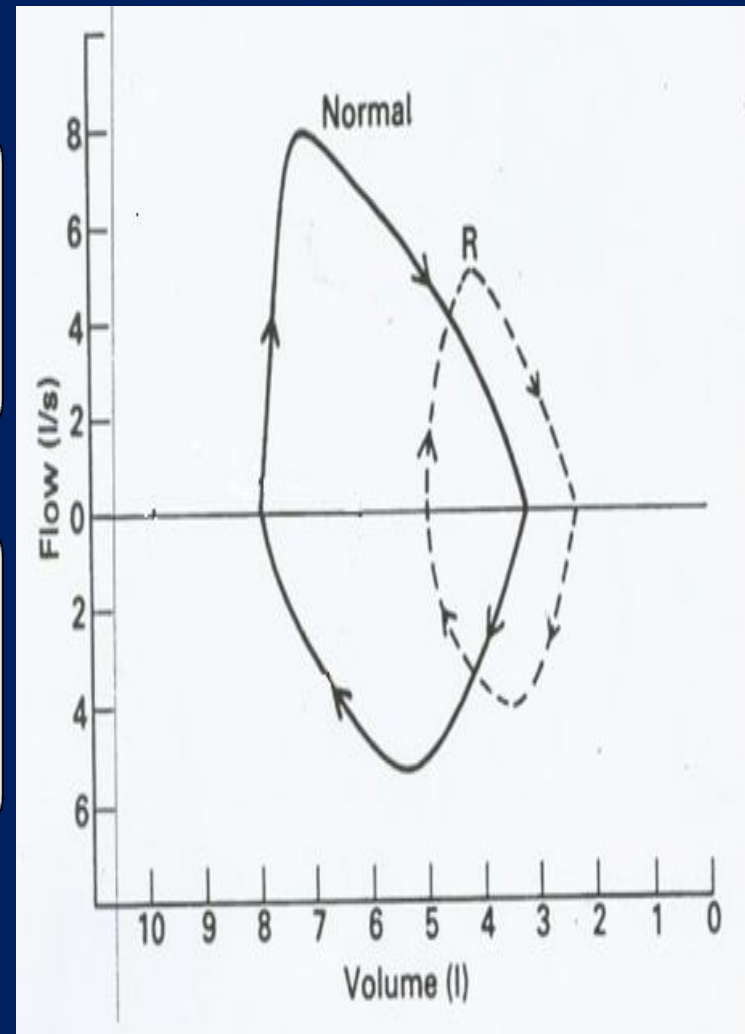
Inspiratory
loop
Normal

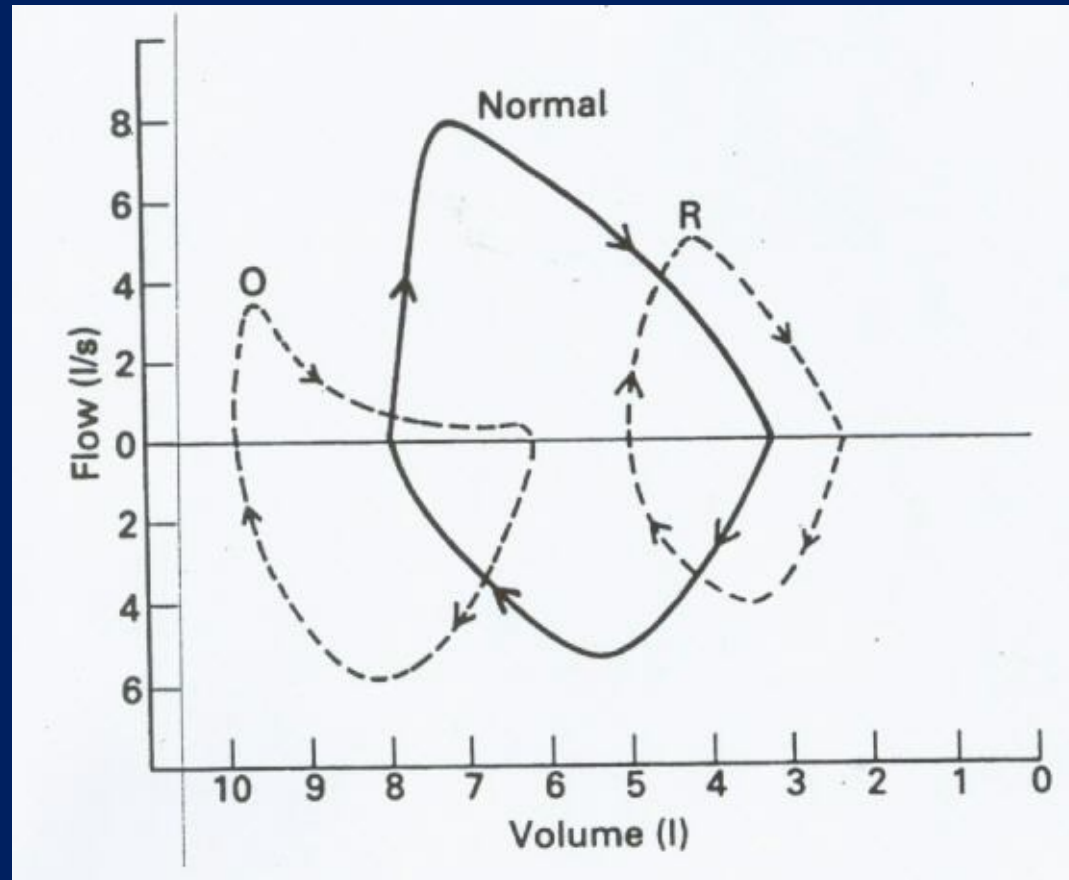


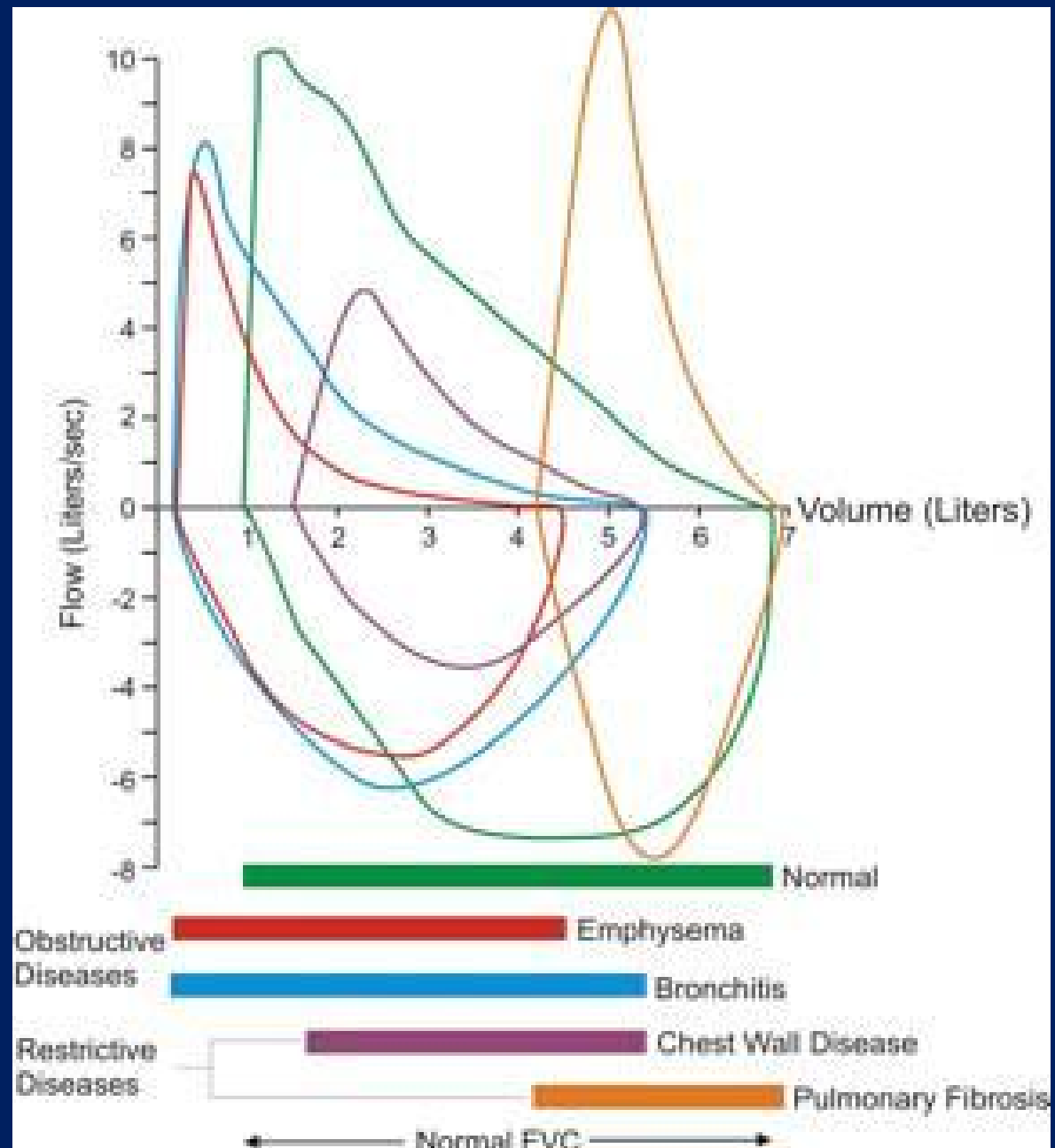
Restrictive LD

**Miniature loop
(elliptical)**

**All flow
parameters ↓**







Importance of spirometry

Assess physical fitness .

Helps in the diagnosis of certain pulmonary diseases (obstructive & restrictive).

Follow disease progression.

Thank You