

## Unit - IV

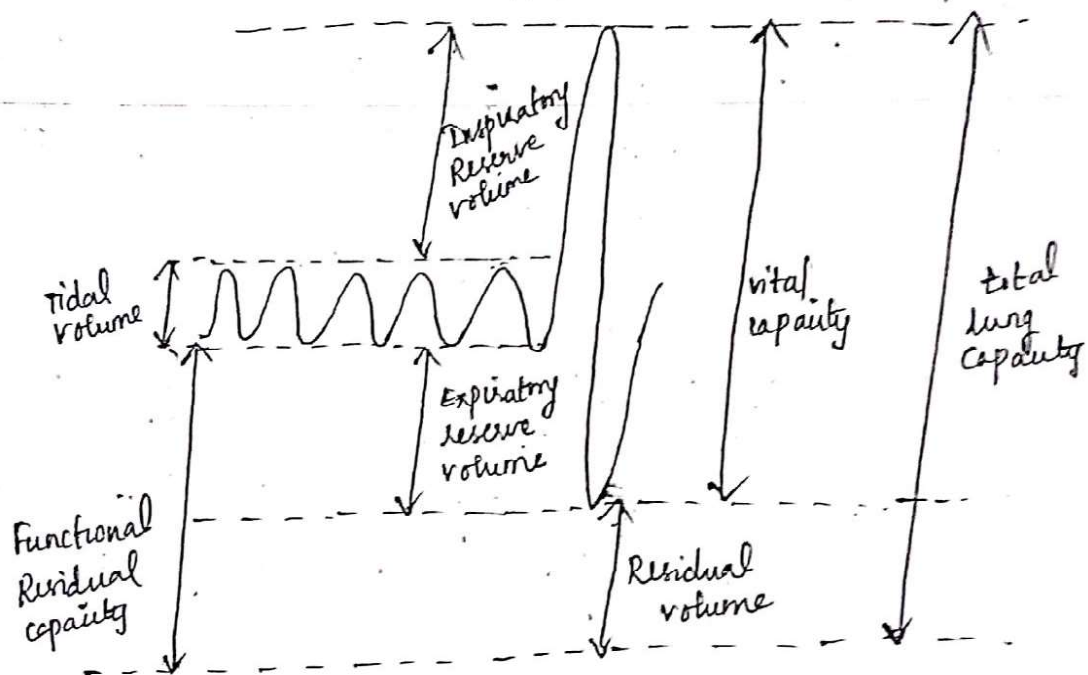
### Lung volume & lung Capacities

It refers to the volume of the air in the lungs at different phases of respiratory cycle.

Lung volumes are directly measured.

But lung capacities are inferred from lung volume.

Spirometry is an instrument, which is used to directly measure lung volume & lung capacity.



### Lung volumes

- 1) Tidal volume (TV)
- 2) Inspiratory reserve volume (IRV)
- 3) Expiratory Reserve volume (ERV)
- 4) Residual volume (RV)

① Tidal volume

The amount of air inspired or expired during normal quiet breathing

TV = 500ml for normal adult

② Inspiratory Reserve volume

Extra volume of air inhaled after tidal volume by max inspiratory effort

3000ml in adult

$$IRV = VC - (TV + FRC)$$

③ Expiratory Reserve volume

Extra volume of air that can be exhaled after tidal volume by max. respiratory effort

1200ml in normal adult

$$ERV = FRC - RV$$

④ Residual volume (RV)

The volume of the air left out in the lung after forceful expiration or complete respiration (2000ml / 1200ml in a range of the normal Male/fem)

Lung capacities

↳ combination of 2 or more lung volumes

① Inspiratory capacity

② Expiratory capacity

③ Functional Residual capacity (FRC)

④ vital capacity (VC)

⑤ Total lung capacity (TLC)

### ① Inspiratory capacity (IC)

Max. volume of air that can be inspired after normal tidal (expiration)

$$IC = TV + IRV = 500 + 3000 = 3500 \text{ ml}$$

### ② Functional expiratory capacity (EC)

Max. volume of air that can be expired after normal tidal expiration

$$\begin{aligned} EC &= TV + ERV \\ &= 1100 + 1200 \\ &= 2300 \text{ ml} \end{aligned}$$

### ③ Functional residual capacity (FRC)

The volume of air remaining in the lungs after normal tidal expiration

$$\begin{aligned} FRC &= ERV + RV \\ &= 1100 + 1200 \\ &= 2300 \text{ ml} \end{aligned}$$

### ④ vital capacity (VC)

Max. amount of air expelled after deepest possible inspiration

$$\begin{aligned} VC &= TV + IRV + ERV \\ &= 500 + 3000 + 1100 \\ VC &= 4600 \text{ ml} \end{aligned}$$

### Total lung capacity (TLC)

volume of air present in lung after max. inspiration

$$\begin{aligned} TLC &= VC + RV \\ &= 4600 + 1200 = 5800 \text{ ml} \end{aligned}$$