

Work of Breathing

work performed by respiratory muscles.

during breathing ::

In normal quiet breathing.

Inspiration ^{Cont m}
(active)

expiration

Passive

elastic recoil

No work.

overcome (R) of Air Flow

expand lung against elastic force of lung / chest wall

Airway Tissue

Recoil

elastic Tissue

surface Tension

Resistive Work

(%35)

Elastic work

(%65)

↑ in surfactant deficiency / S.T

↑ Pulmonary Fibrosis

↓ Compliance
↑↑↑↑

Normally

lung is ↑C

Airway Resistance is ↓

Work of breathing

%3 of total energy (quiet)

%5 of total energy (exercise)

People with obstructive lung disease
↓C lung
↓ Compliance
↑ Airway Resistance
↑ Tissue Resistance
↑ Surfactant deficiency
↑ Pulmonary Fibrosis
↓ Compliance
↑↑↑↑
%30 of total energy (even at rest)

rest

* Work of Breathing → ↑↑ :-

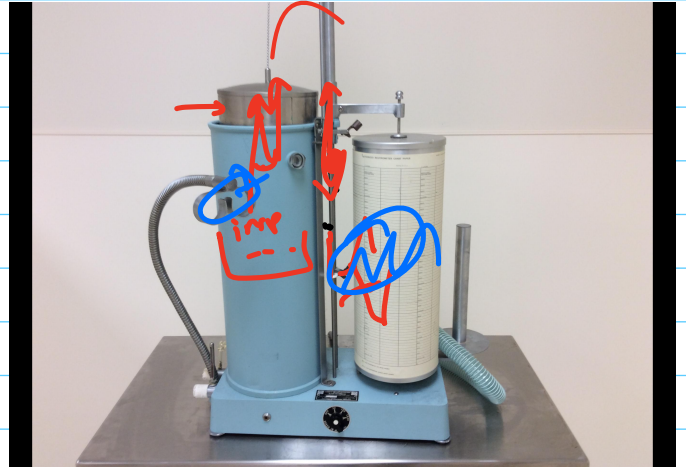
- ① - ↓ pulmonary C → Lung Fibrosis / RDS
- ② - ↑ airway R → COPD — ~~expir~~ expir
- ③ - ↑ ventilation → exercise — active
- ④ - ↓ elastic Recoil (Emphysema) → ~~Passive expiration~~
↳ collapse of Airways (IR)
↳ Forced expiration (active)
 ↓
 even during rest.

x expand

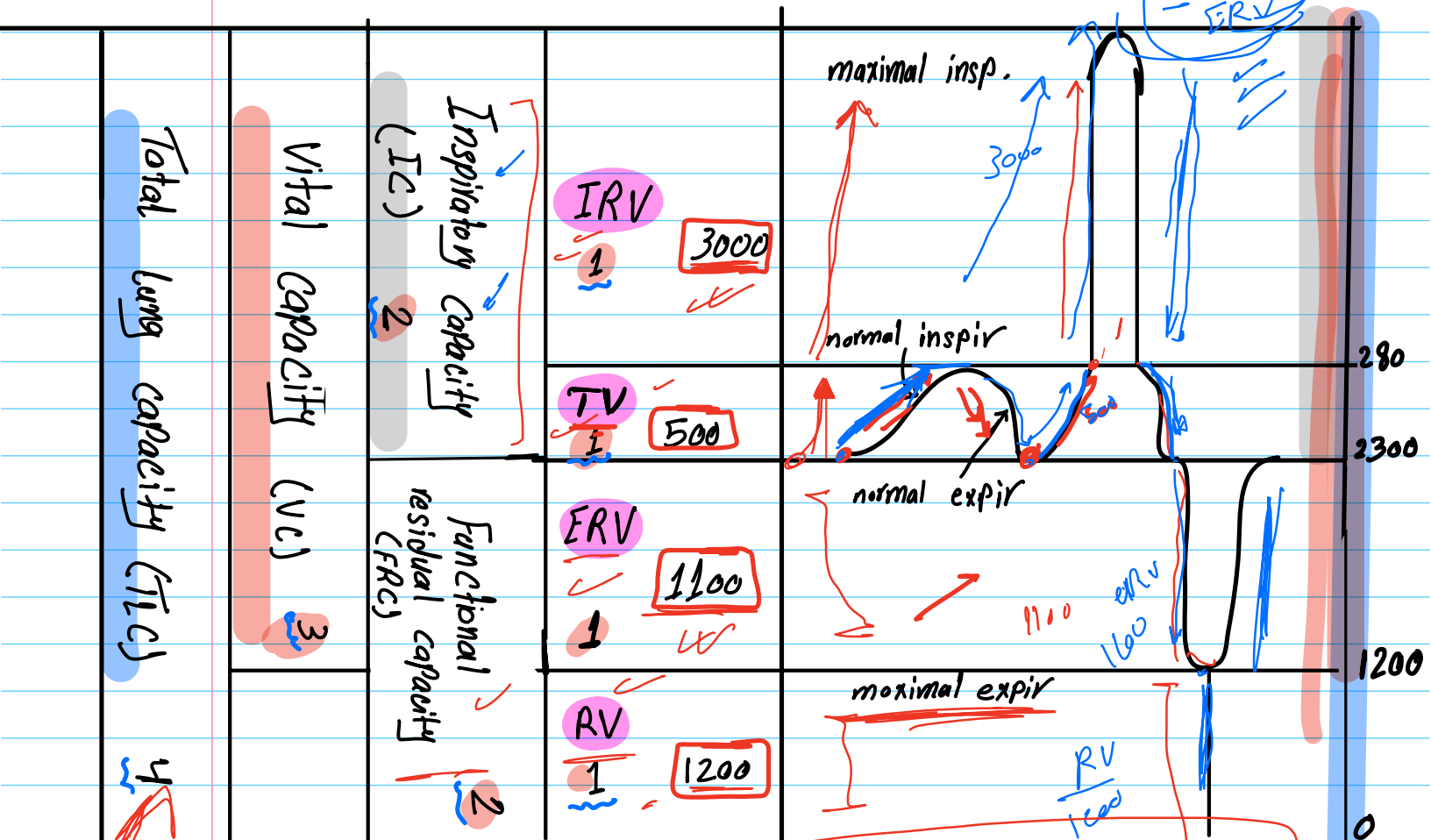


Lung volumes and capacities

spirometre



Lung volumes → static (not related to time)
 → Dynamic → per unit time



$$TV + IRV + ERV + RV$$

→ Tidal volume (TV) = 500 ml → ✓

→ Inspiratory Reserve volume = 3000 ml → ✓

→ Expiratory Reserve volume = 1000 ml → ✓

→ Residual volume = 1200 ml → ✓

→ Inspiratory capacity (IC) = TV + IRV
= 500 + 3000 = 3500 ml

→ Functional residual capacity (FRC) = RV + ERV
= 1200 + 1000
= 2200 ml

→ Total lung capacity (TLC) = TV + IRV + ERV + RV = 5700 ml

→ Vital capacity (VC) = TLC - RV =
= TV + IRV + ERV = 4500 ml

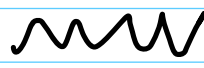
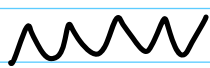
→ vital ?? →
↓

determine _____

→ 20
25

→ male and females

→ athletic and athenic



* Residual volume

Can not be measured by spirometer

→ RV + VC

→ Total lung capacity

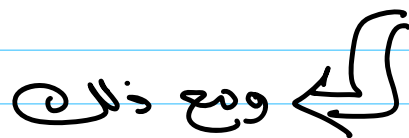
→ Can not be expelled except chest wall is opened

→ x -ve Ipp
→ collapse

← pneumothorax →

Small volume of air

(minimal air) → remain in the lung



→ About 150 ml

infanticide

⇒ Medicolegal (الطب الشرعي)



→ respiratory muscles
→ lung tissue
→ Diaphragm

→ Compliance → VC → lung fibrosis
→ RDS
→ scagister

→ deformity

→ Pain

→ Pleura
→ fracture
→ rib

→ ↑ abdominal
→ Conten

→ pregnant
→ ascitic

Significance :- of RV :-

minimal
+
air

① maintain aeration of Blood bet breathes



HR 72/min : 12/min RR

6 : 1

② prevent marked change of O_2 & CO_2 in arterial Blood

③ - prevent lung collapse → inspiration

④ - Normally → 20% of TLC

~~RT~~
RT

B.A / Emptysema

collapse
↓

RT → difficult expirato

↓
RV →

~~_____~~

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∴

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