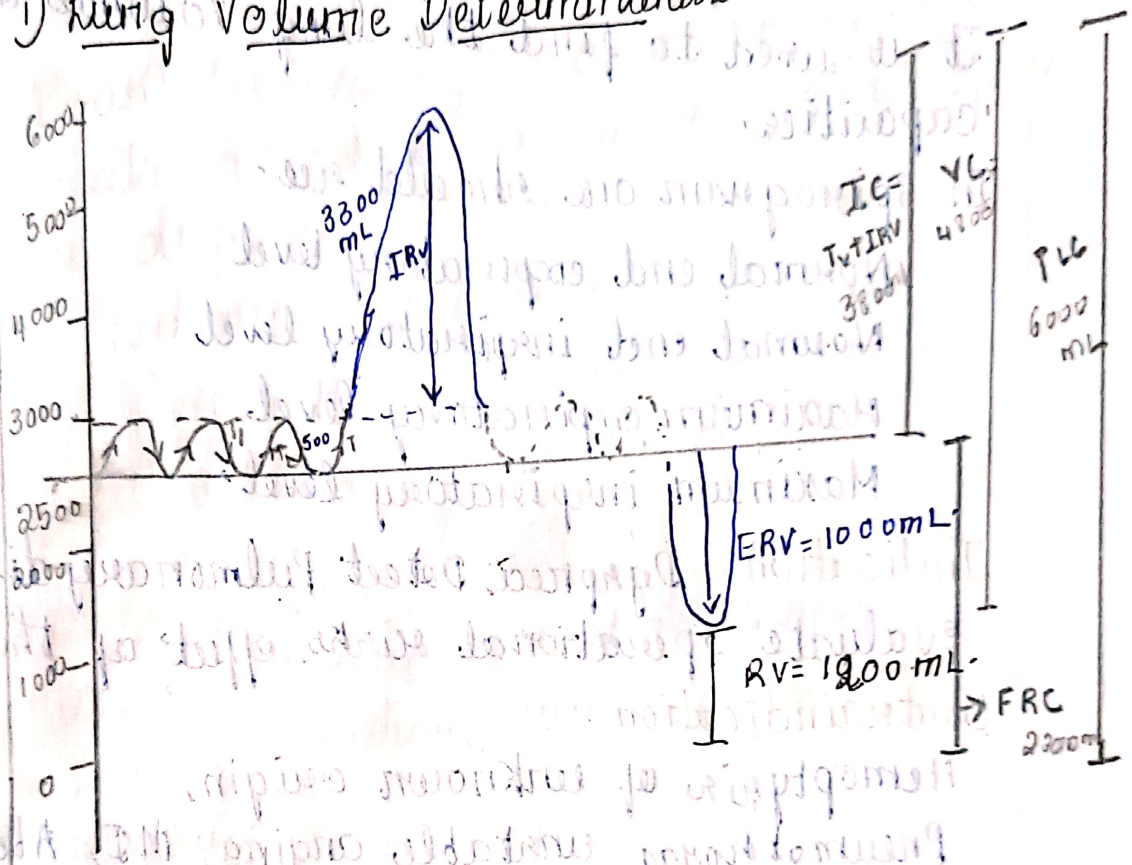
Pulmonary Function Test

There are the tests that are helpful in observing the function status of Respiratory system
- lung function test is based on the measurement of the air breathed in and out in quiet and forced breathing.

1) Lung Volume Determinants



Volumes

1) Tidal Volume: In and out in quiet respiration = 500mL.
2) Inspiratory reserve volume = IRV = 3300mL.
   Forceful inspiration after normal inspiration.
3) Expiratory reserve volume = ERV = 1000mL
   Forceful expiration after normal expiration.
4) Residual volume = 1200mL
   Volume of air after forceful expiration.

Capacities

1) Inspiratory Capacity: Tv + IRV = 500 + 3300 = 3800mL.
   - Total air after normal expiration can be inspired.
2) Functional Residual Capacity: ERV + RV = 1000 + 1200 = 2200mL
   Total air in lungs after normal expiration.

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3) Vital Capacity - Total volume expelled after forceful inspiration.
TV + IRV + ERV = 500 + 3300 + 1000 = 4800 mL.

4) Total Lung Capacity ⇒ Volume of air in lung after deep inspiration.
TV + IRV + ERV + RV ⇒ 500 + 3300 + 1000 + 1200 = 6000 mL

2) Spirometry:
It is used to find the lung volumes and capacities.
In Spirogram one should see.
Normal end expiratory level
Normal end inspiratory level
Maximum expiratory level
Maximum inspiratory level.
Indication: Dyspnea, Detect Pulmonary disease, evaluate operational risks, effects of therapies
Contraindication:
Hemoptysis of unknown origin,
Pneumothorax, unstable angina, MI, Abdominal or thoracic surgery recently.

Forced Expiratory volume (FEV_1) / Forced Vital Capacity (FVC) = $\frac{4}{5} \times 100 = 80\%$ of Total vital capacity.
(Maximum air after deep inspiration.)
If it decreases Obstructive ($\downarrow FEV_1$).
Increases - Restrictive ($\downarrow FVC$)

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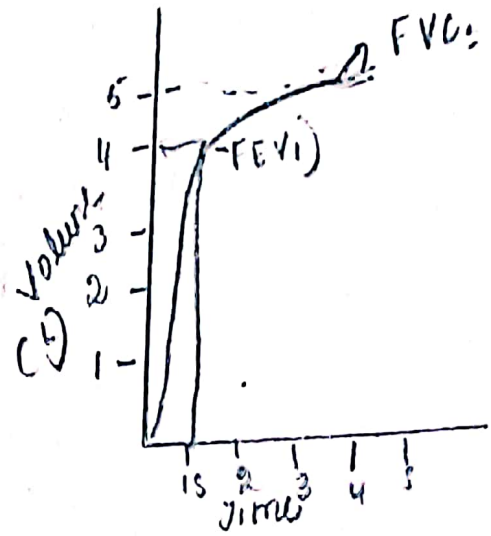

$\frac{FEV_1}{FVC} \times 100 = 80\%$ of total vital capacity.

Peak Expiratory Flow rate is the maximum rate at which air can be expired after a deep inspiration.

Normal = 400 L/min
Restrictive = 200 L/min
Obstructive = 100 L/min.

Obstructive
Upper → Croup, Epiglottitis, Tumor
Lower → Asthma, COPD, Cystic Fibrosis.

Restrictive
- Poliomyelitis.
- Myasthenia Gravis.
- Flail chest.
- Spinal Cord disease.
- Paralysis of diaphragm
- Pleural effusion.

Other LFTs
1) Pulse oximetry.
2) Arterial Blood Gas analysis.
3) Six Minute walk Test.
4) Cardiopulmonary test 5) Exhaled nitric oxide

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