

Lung Compliance

- Compliance of the lung is the ease of distensibility or elasticity of the lung: Is it inflexible or relaxed?
- Picture a balloon that is very rigid and has never been blown up before: It takes quite a bit of pressure to blow up the balloon. This is known as a decrease in compliance.

or

- Compare a bicycle tire tube to a tire off a semi truck; which one would be easier or more flexible to blow up with air? The tire off a semi truck is much more rigid and would take more pressure to fill with air than the bicycle tire, so the semi truck tire would have a lower compliance.
- Picture a balloon that is quite flexible and has been blown up many times. The rubber becomes relaxed and quite floppy. It takes very little pressure to blow up this balloon. This is known as increased compliance.

Elastance

- The desire of something to return to its normal shape; this is the opposite of compliance.

↑ Cl = ↓ Elastance – Lung tissue that is flexible and floppy and requires lower pressures to get a volume of air in.

↓ Cl = ↑ Elastance – Lung tissue that is inflexible or rigid and requires higher pressures to get a volume of air in.

One example of a disease that would cause a lung to have ↑ Cl is a pt that has COPD from smoking (COPD Chronic Obstructive Pulmonary Disease) – Emphysema and/or Chronic Bronchitis.

A lung that is restricted in some way, or is not easily opened for breathing, is low Cl. A couple examples of diseases that would cause the lung to have ↓ Cl are: pleural effusion, pneumothorax, pulmonary edema, pneumonia.

The formula for (lung compliance) $Cl = \frac{\Delta \text{Volume Litres}}{\Delta \text{Pressure cmH}_2\text{O}}$

- If the volume you are placing in a lung is 0.5 litres and it takes 50cmH₂O of pressure to get the volume in, your $Cl = 0.5L / 50\text{cmH}_2\text{O} = 0.01L/\text{cmH}_2\text{O}$, and this is a low compliance.
- If the volume you are placing in a lung is 0.5 litres and it only takes 10cmH₂O of pressure to get that volume in, your $Cl = 0.5L / 10\text{cmH}_2\text{O} = 0.05L/\text{cmH}_2\text{O}$, and this is a higher compliance (number) than the example above.

Airway Resistance (Raw)

- Airway resistance is the resistance of the movement of air through an airway.
- If an airway is narrowed by secretions or edema (swelling) the Raw is said to be increased. A good example of a disease that has increased Raw is asthma.
- If an airway is enlarged, the Raw is said to be decreased.
- An increase in airway resistance causes difficulty in the passing of air or ventilation to alveoli for gas exchange, and this can cause alveoli to collapse and therefore cause shunt.
- Picture yourself breathing through a very small straw and how difficult it may be to get the air in and out of that small orifice. This is an example of increased airway resistance.
- Now picture yourself breathing through a large garden hose in comparison to the straw. It is much easier to get the air in and out, and this is an example of decreased airway resistance.