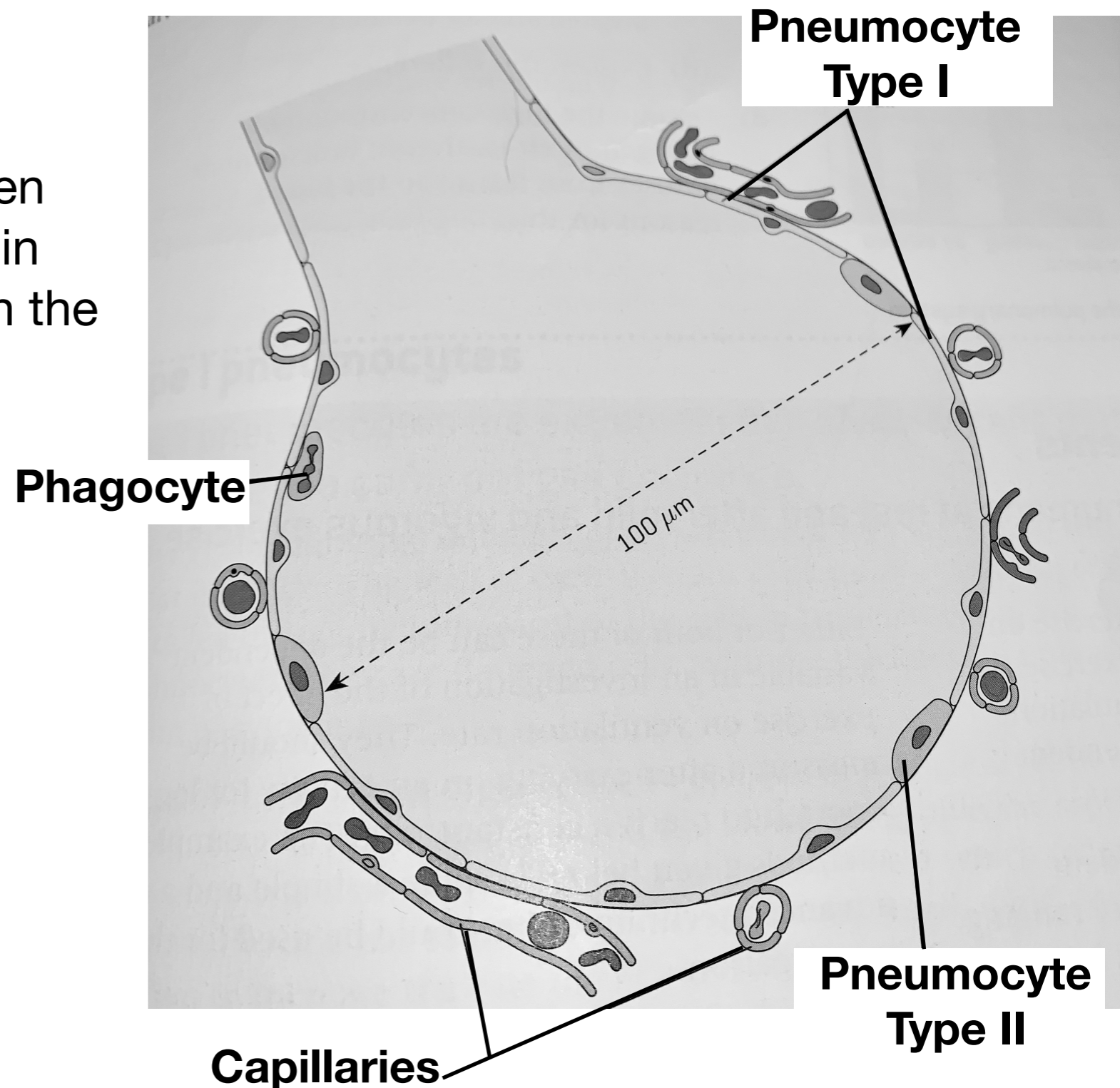


Gas Exchange 6.4

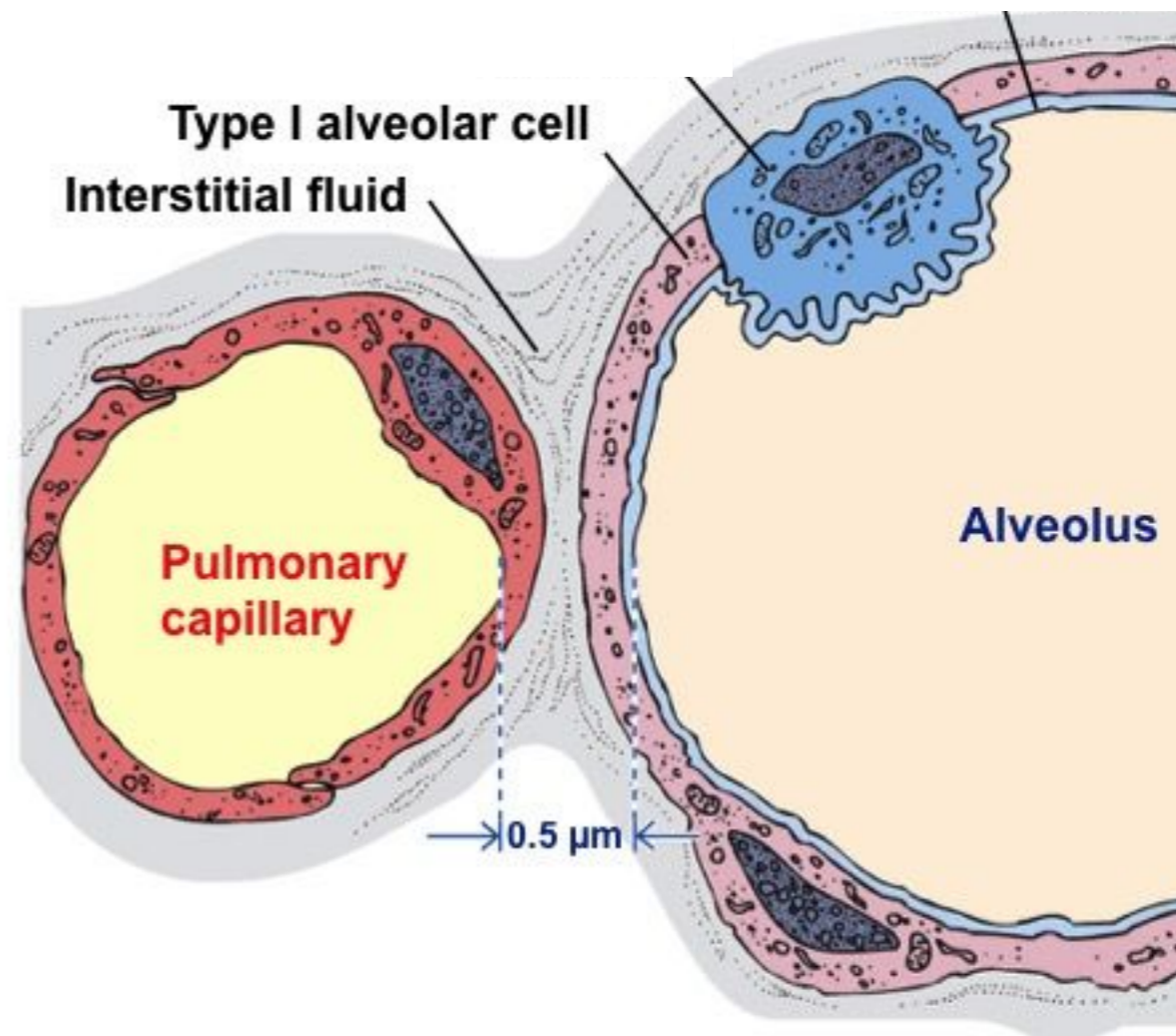
Ventilation

- **ventilation** is about maintaining a gradient difference in gasses
- concentration gradients of oxygen and carbon dioxide between air in the alveolus and blood flowing in the adjacent capillary
- Capillaries
 - O₂ Low
 - CO₂ High
- Alveolus
 - O₂ High
 - CO₂ low



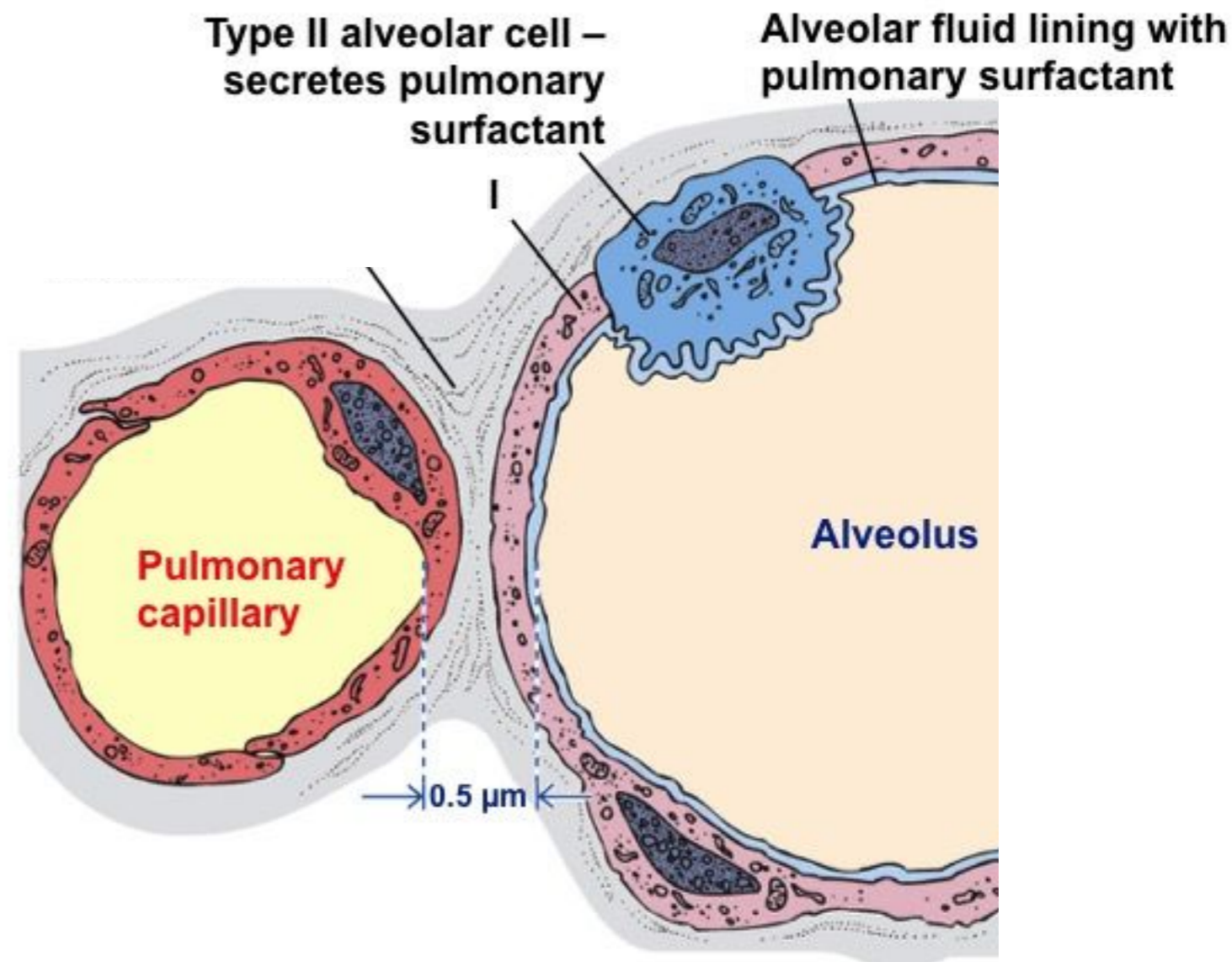
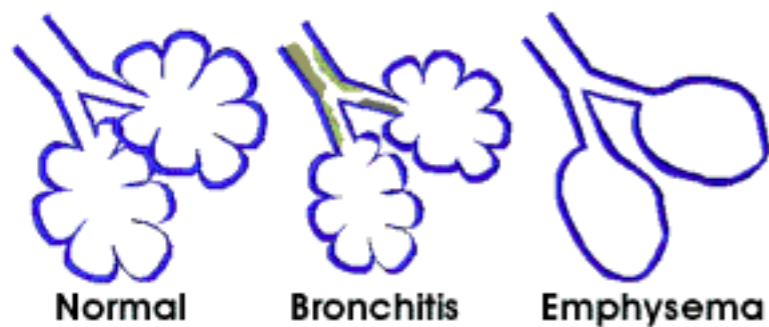
Type I Pneumocytes

- Thin, creating lots of surface area
- Most common cell
- Adjacent to a capillaries
- The distance molecules (O₂/CO₂) must diffuse is small -only for membranes to cross
- Rapid gas exchange



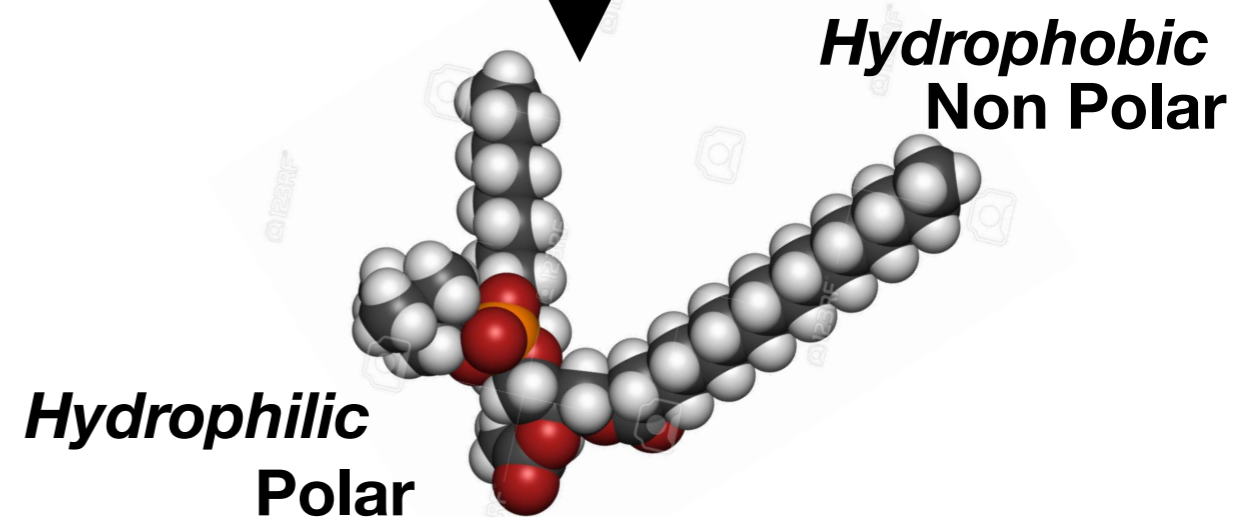
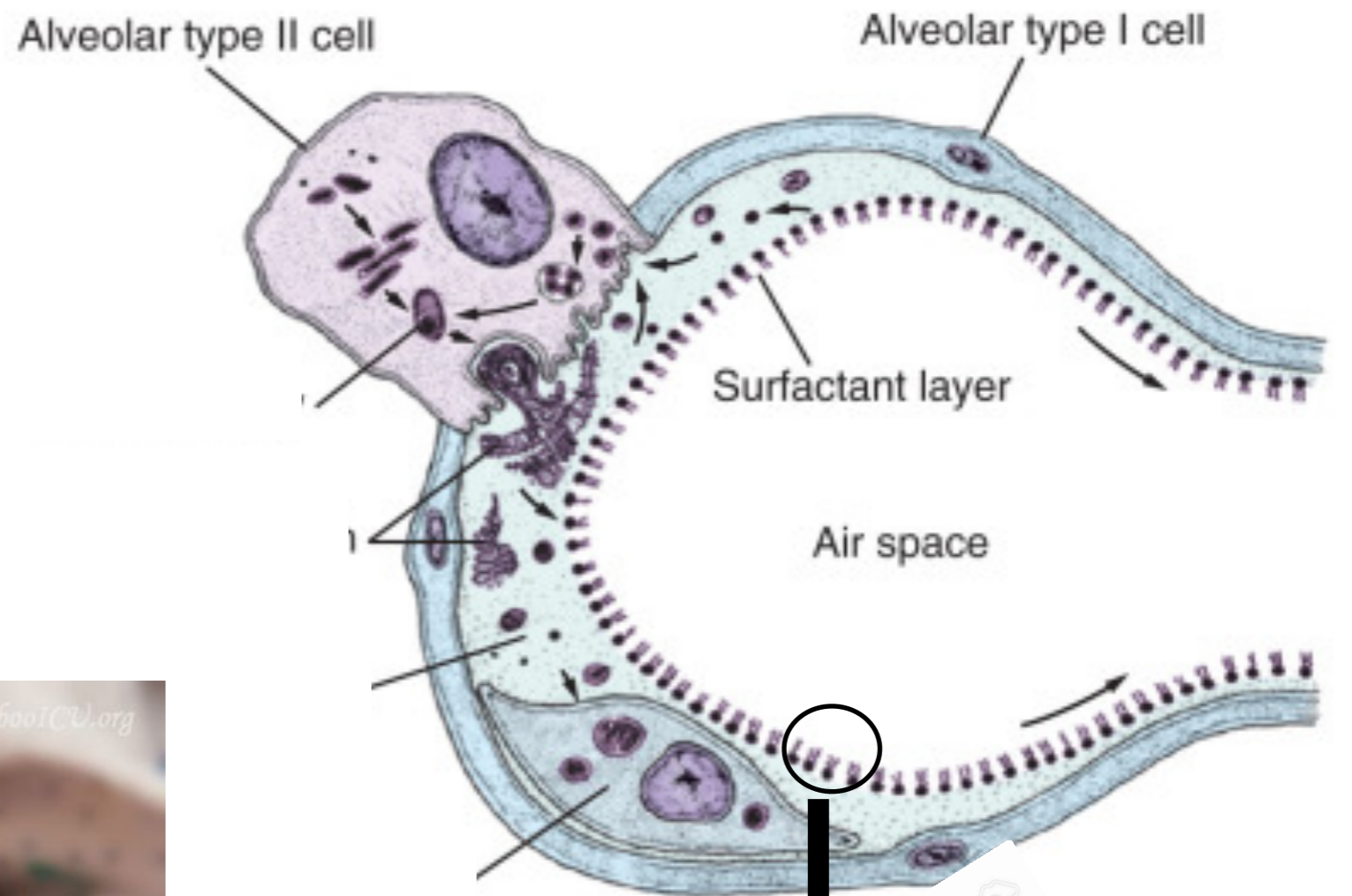
Type II Pneumocytes

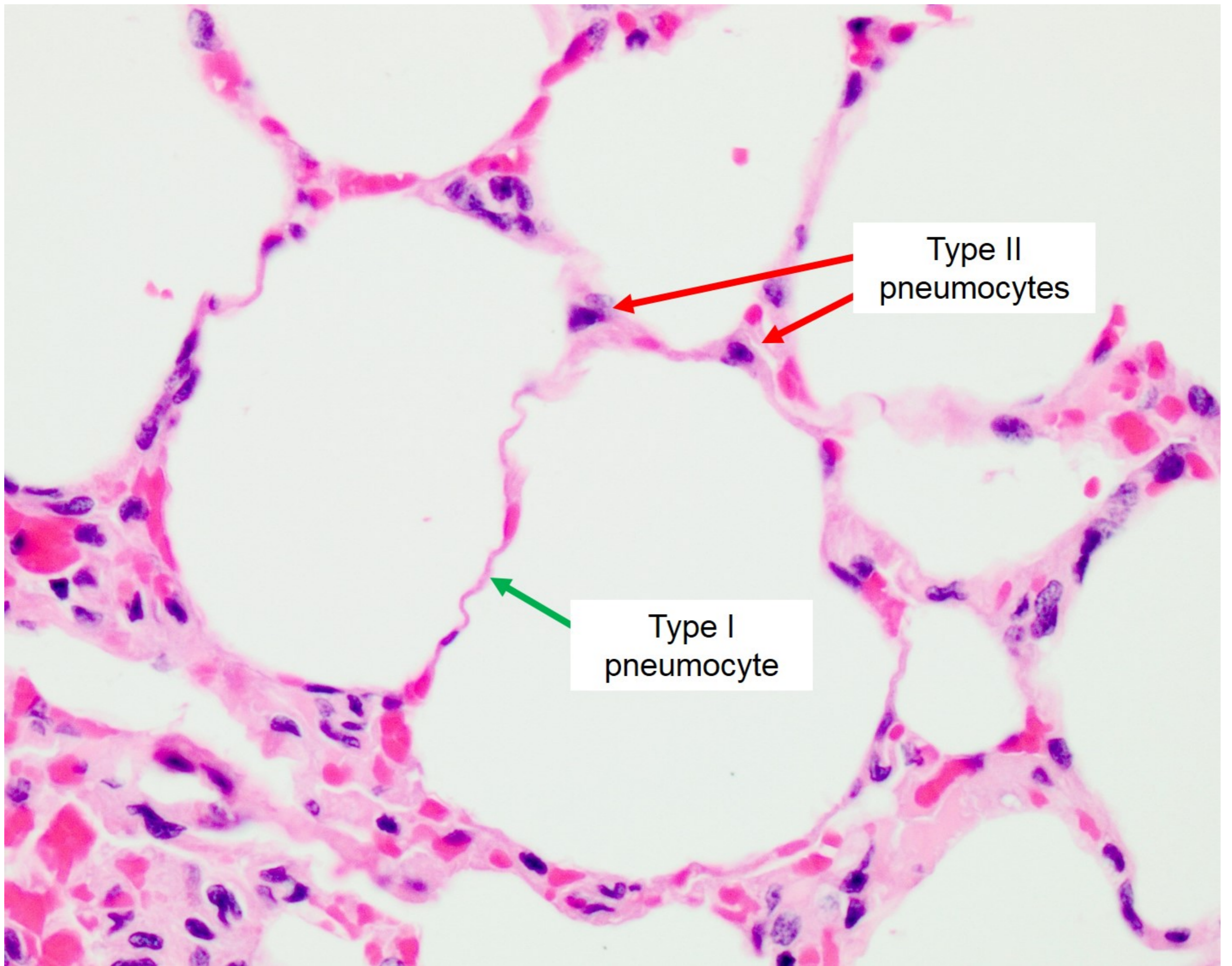
- represent 5% of lung surface
- Type II secrete a surfactant
- creates a moist surface to promote oxygen dissolving
- also promotes carbon dioxide evaporation
- surfactant also prevent collapse during exhalation



Type II Pneumocytes

- Type II surfactant is similar to membrane molecular structure
- Premature babies are lack surfactant and can suffer respiratory distress

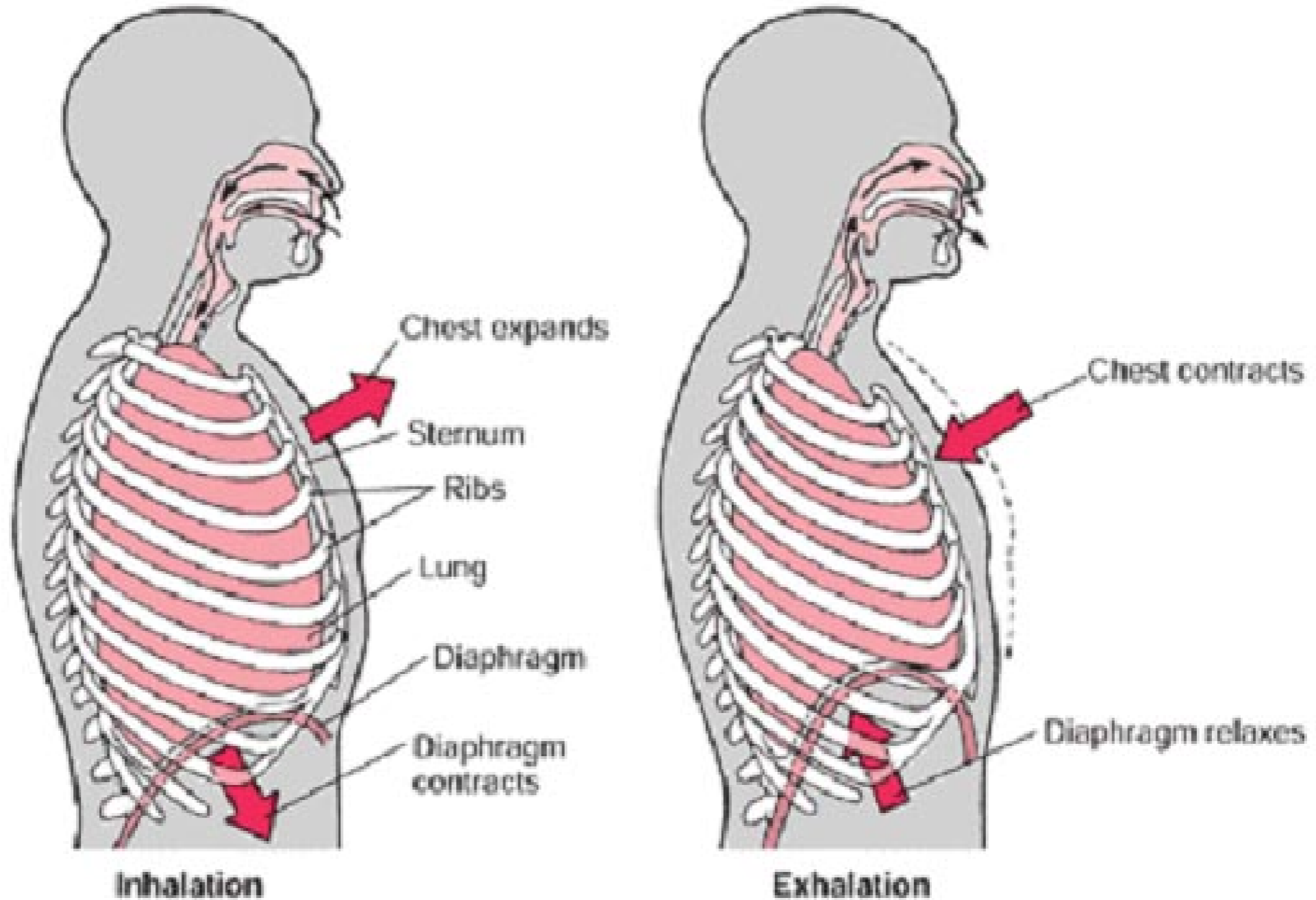




Type II
pneumocytes

Type I
pneumocyte

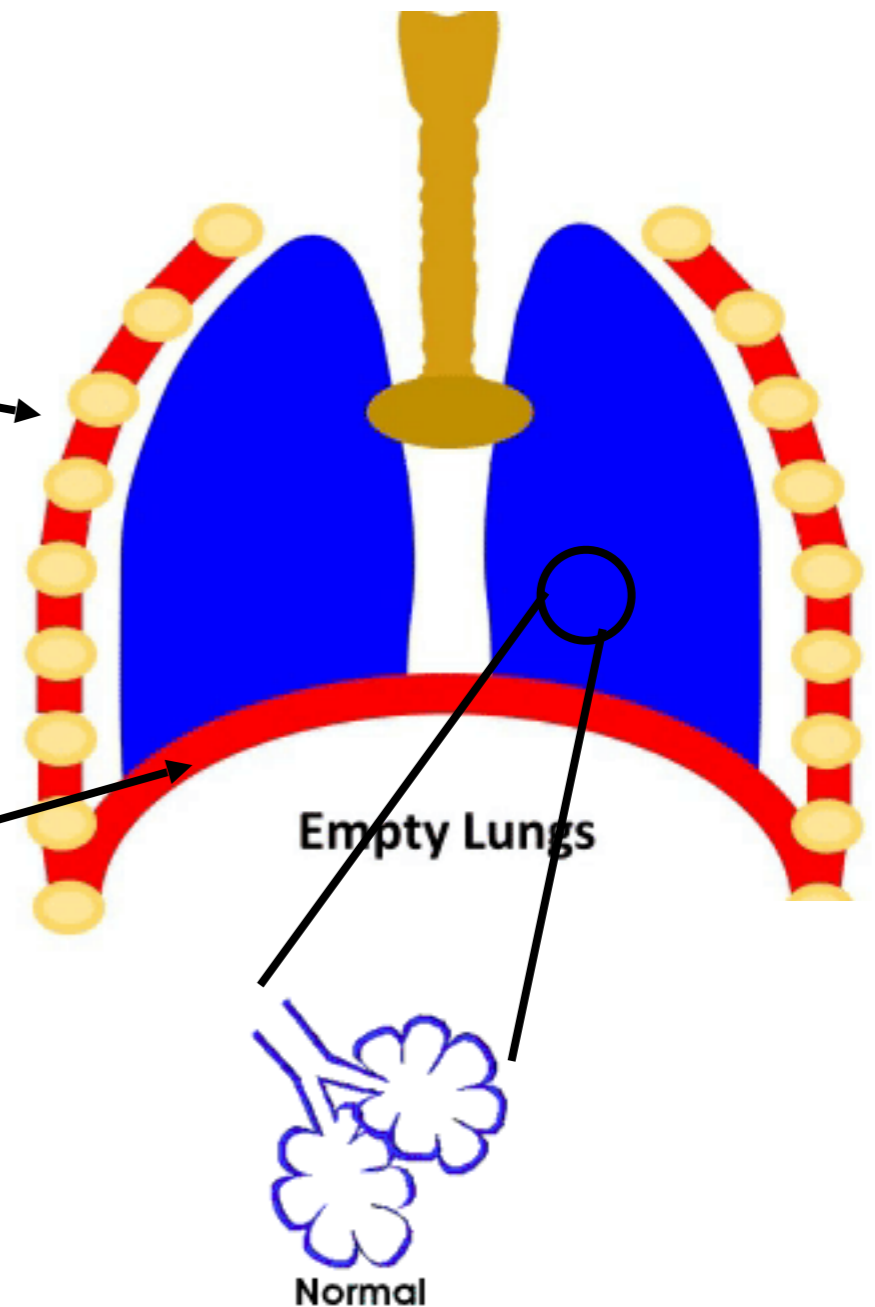
The Mechanics of Breathing



Two muscles involved.

Intercostal
Muscles

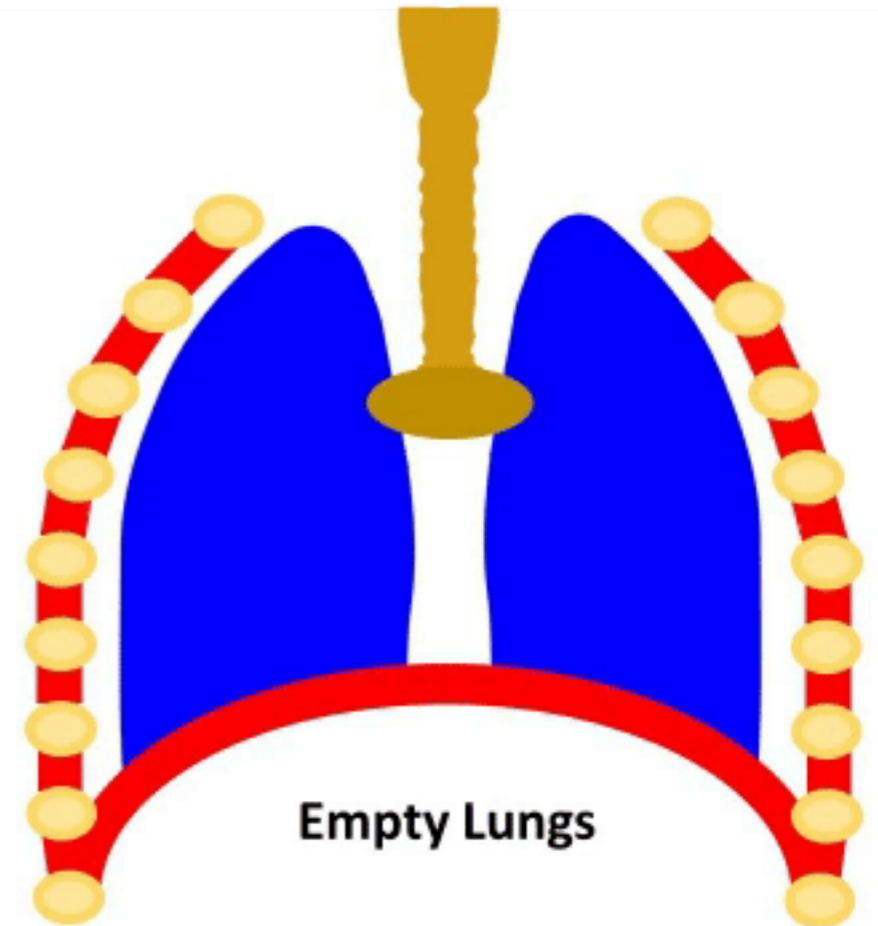
Diaphragm



Two muscles involved.

Intercostal Muscles- moves the rib cage

Diaphragm- Muscle layer that separates the cavity of the (lungs) from the abdomen (stomach)



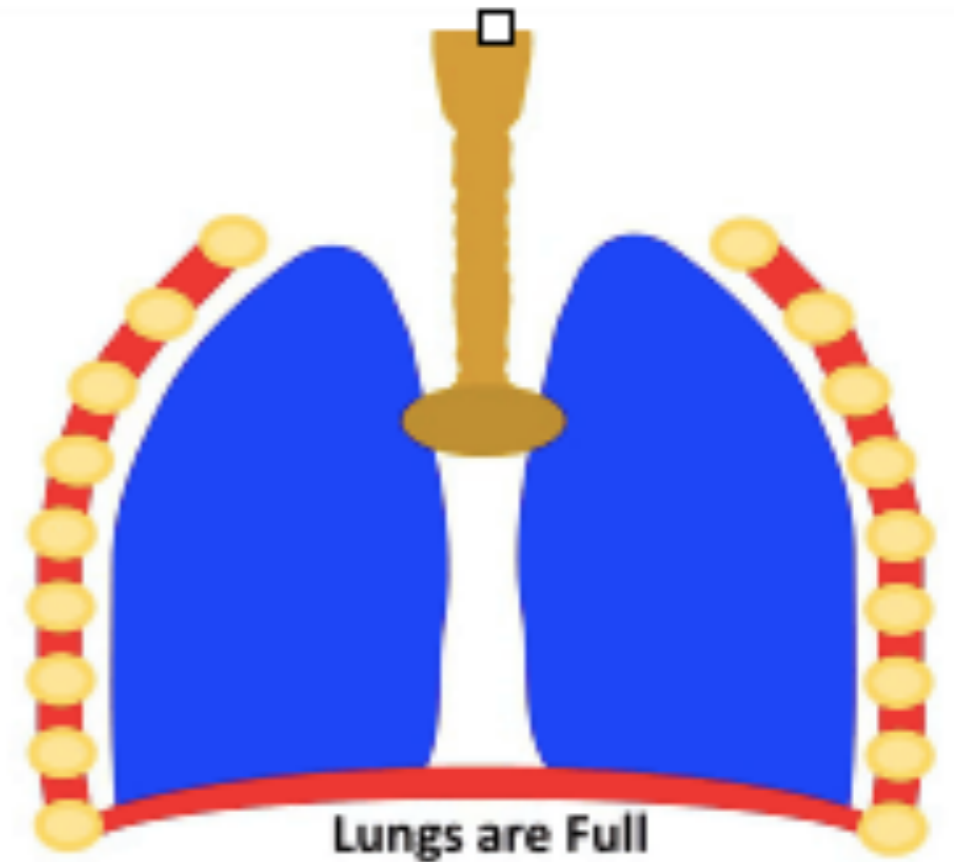
Inhalation

External intercostals contract- ribs move up and out

Diaphragm contracts- to exert a pull force downward/abdominal muscle relax

(this increase the amount of space in the chest which **lowers thoracic air pressure**)

Air rushes in



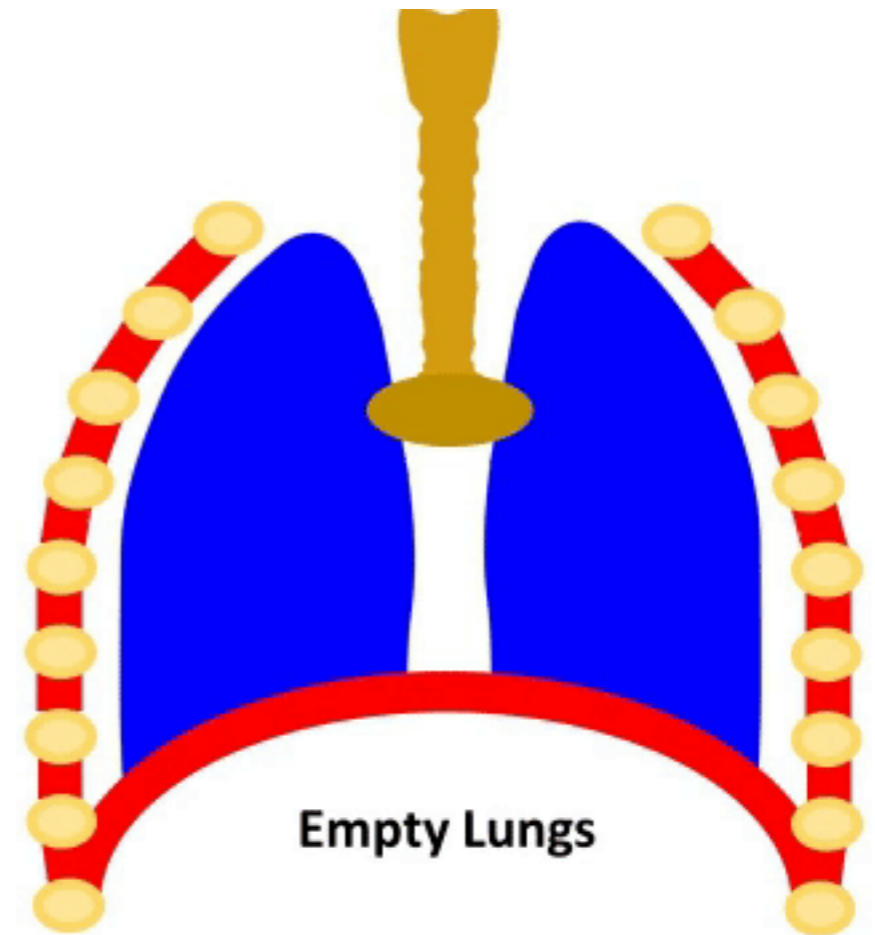
Exhalation

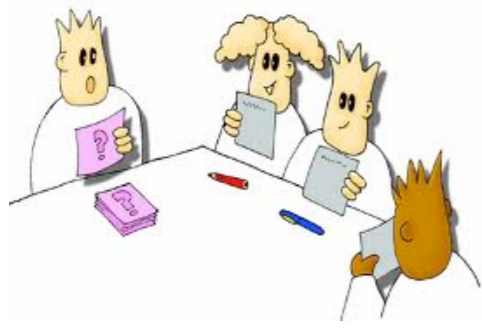
Internal intercostals relax- ribs move down and in

Diaphragm relaxes- diaphragm lengthens and move upward/ abdominal muscles contract

(this decrease the amount of space in the chest which **increases** thoracic air pressure)

Air rushes out

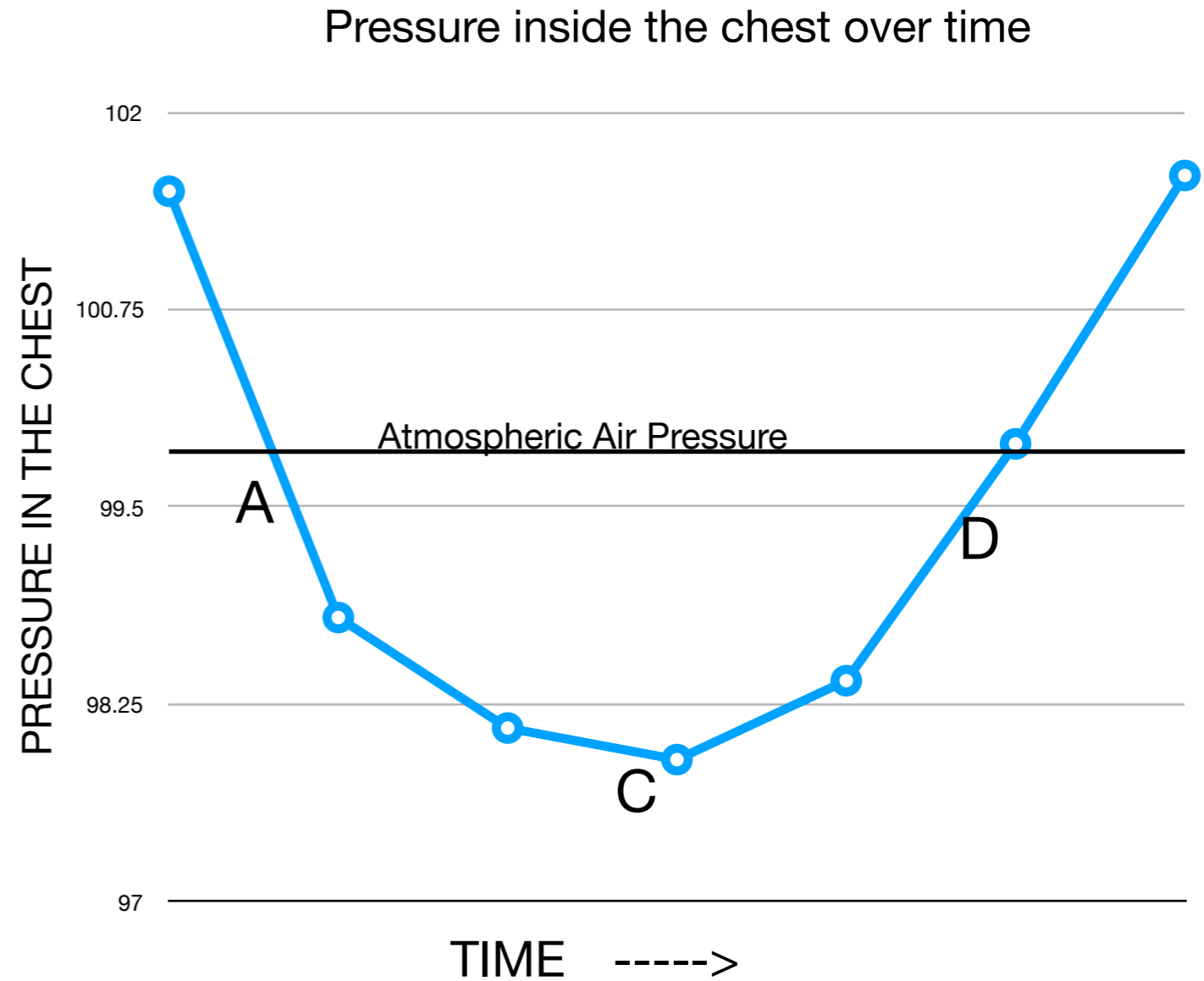




The air pressure inside the chest cavity was measured over 5 seconds and the graph below was generated. Study the graph which shows the changes in the pressure inside the chest. Section A of the graph shows the air pressure when the lungs are moving, and section C shows the air pressure in the chest when the lungs have stopped momentarily. Section D of the graph shows the air pressure when the lungs are moving again

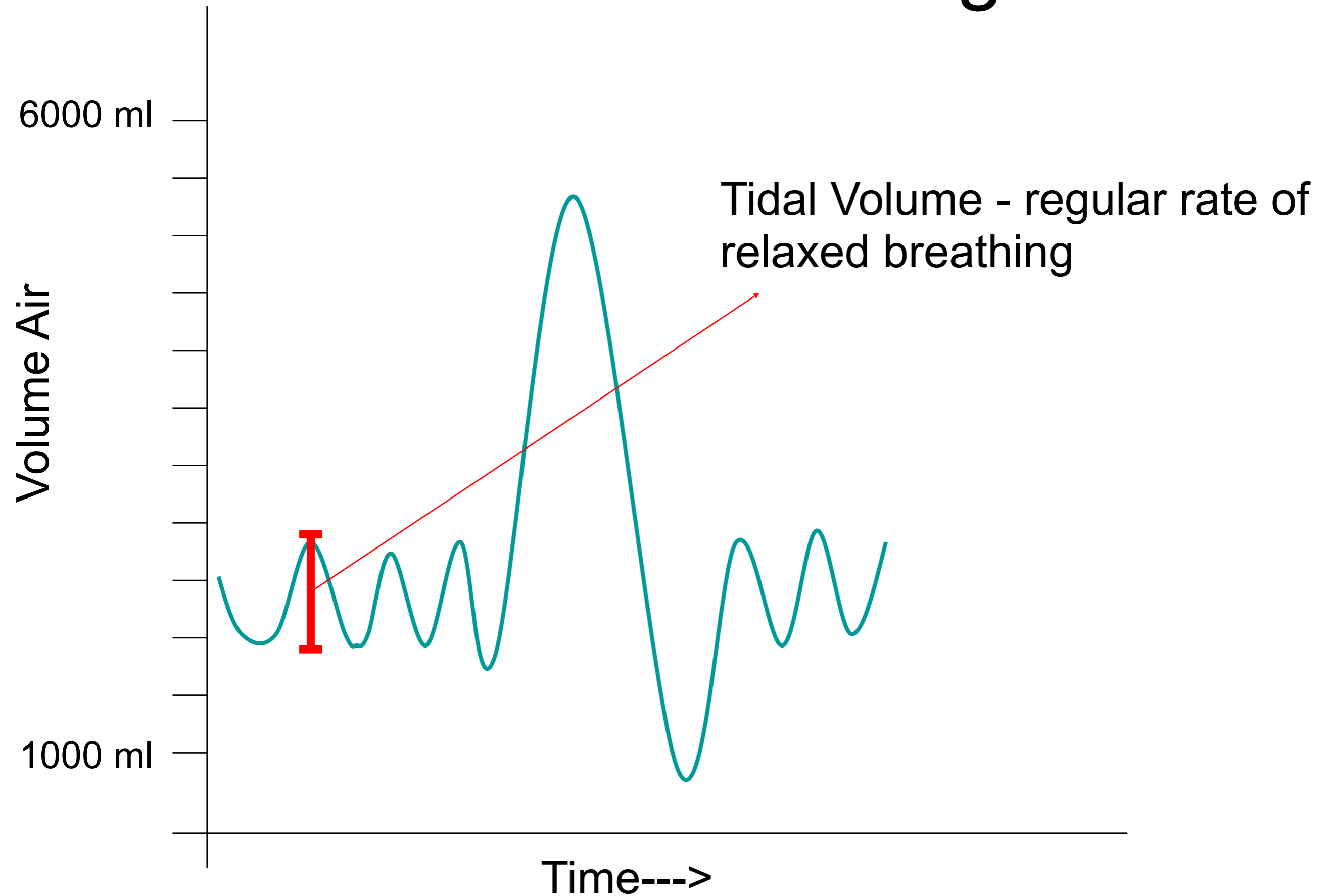
a. What is the diaphragm and intercostal muscles that control breathing doing at A? Explain.

b. What is the diaphragm and intercostal muscles that control breathing doing at D? Explain

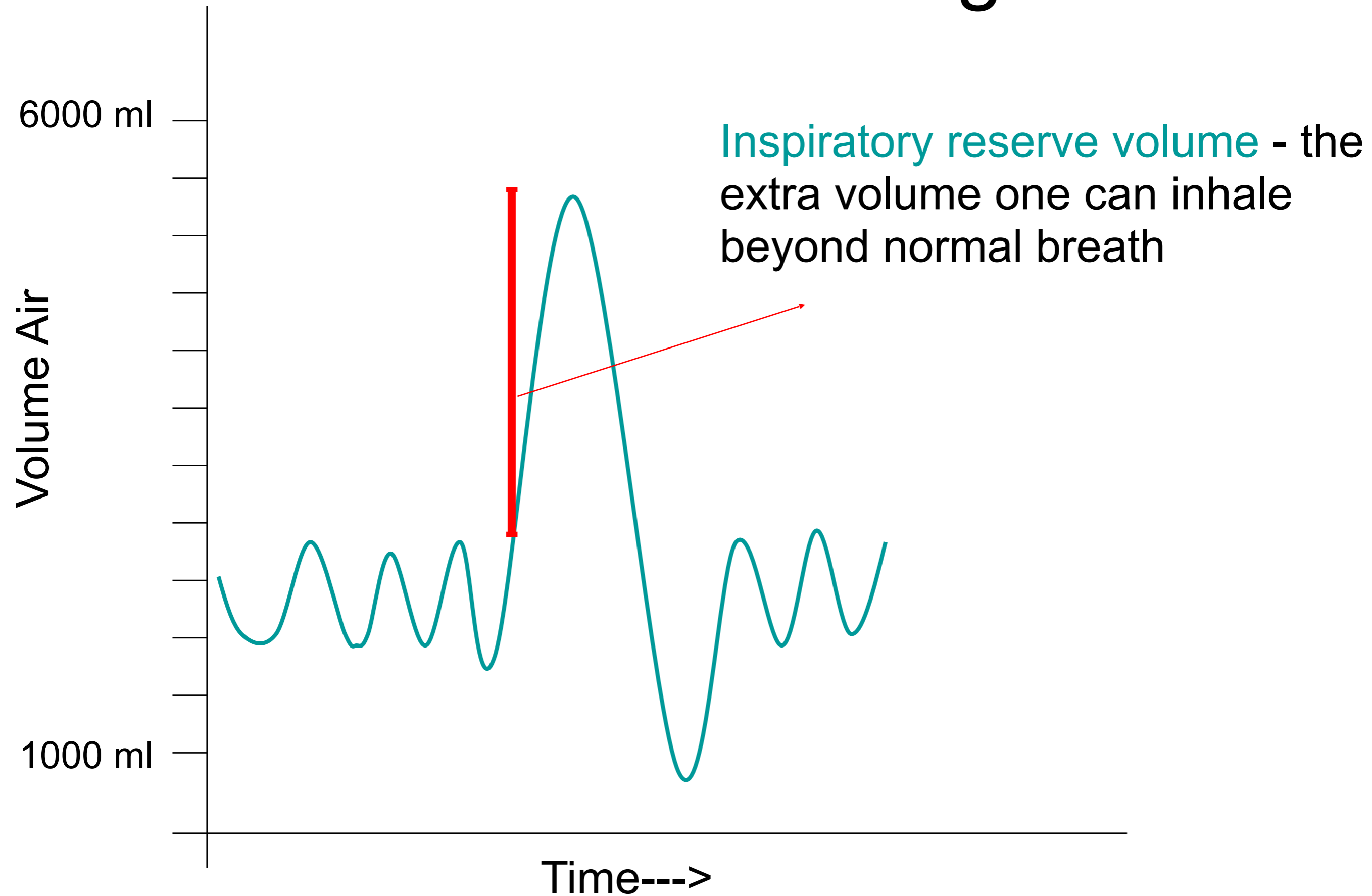




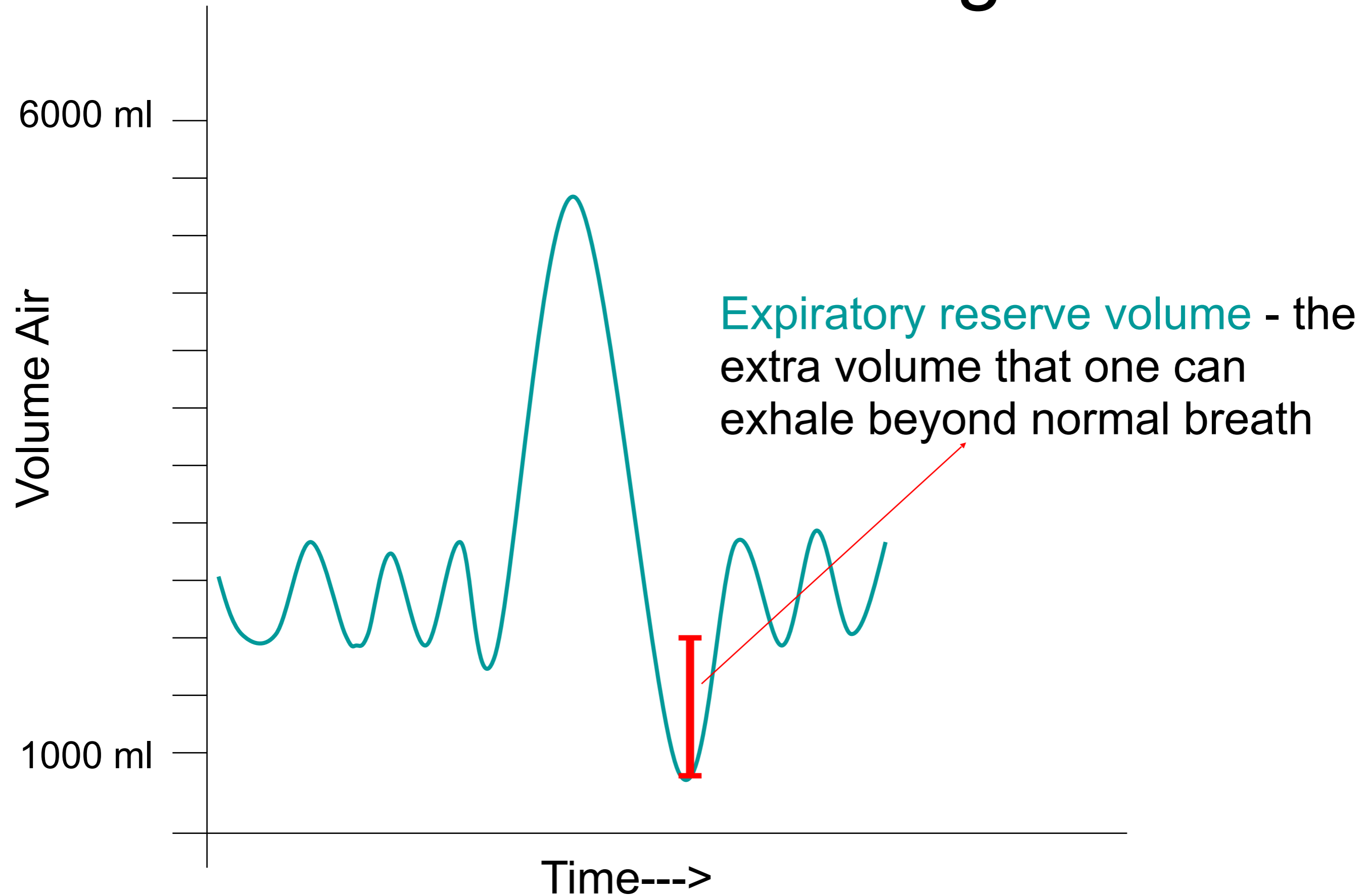
Part of Breathing



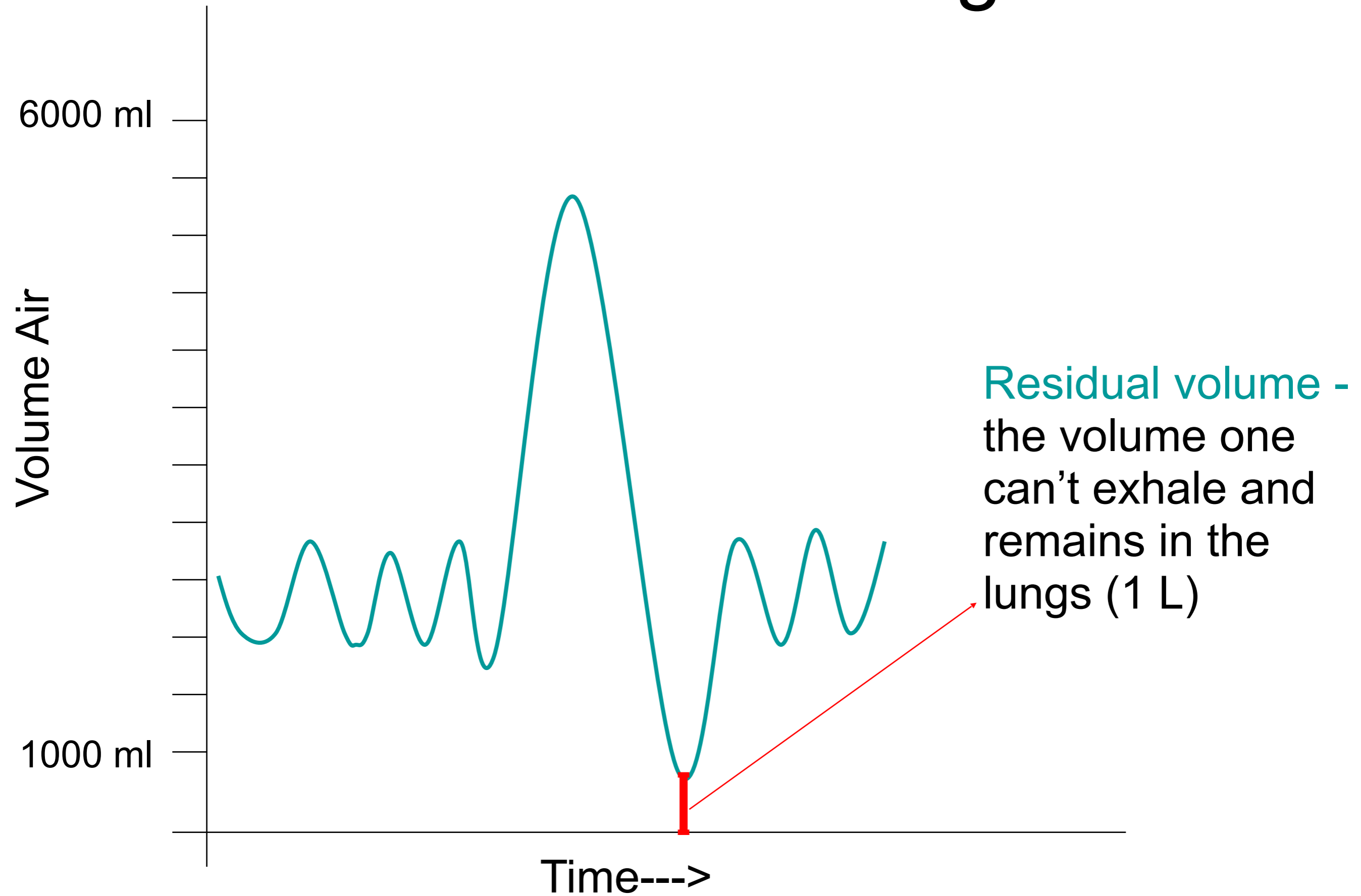
Part of Breathing



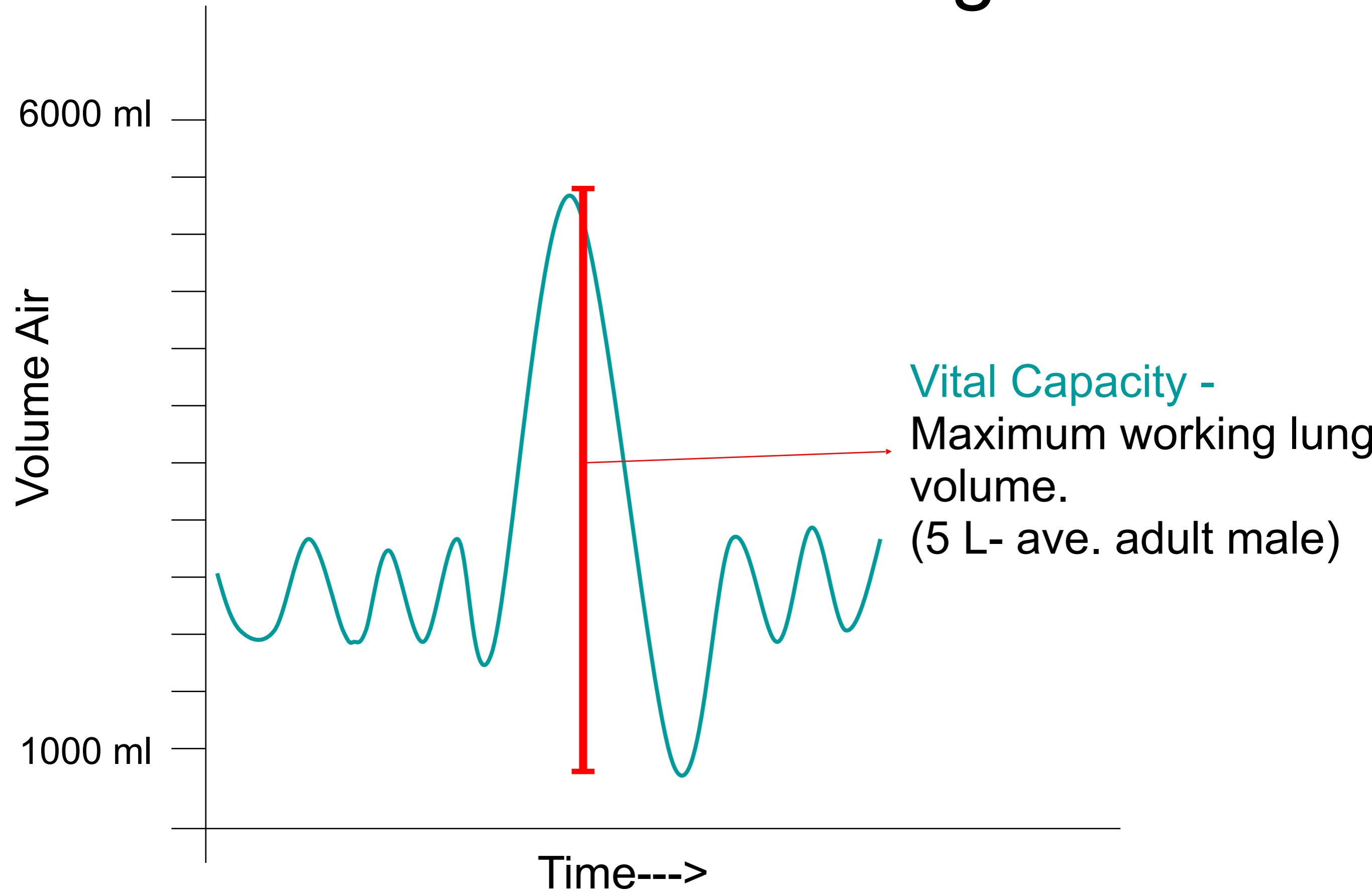
Part of Breathing



Part of Breathing

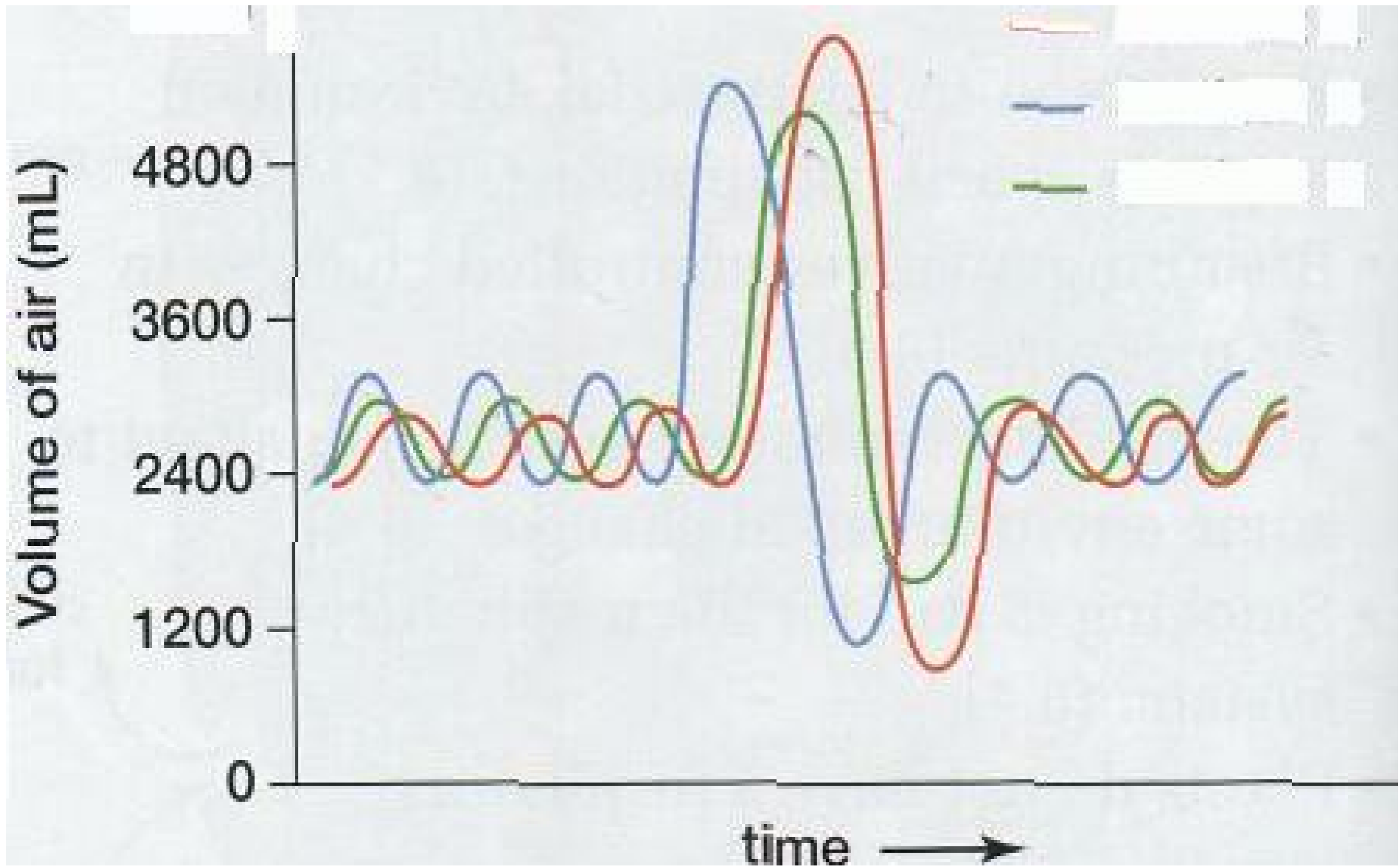


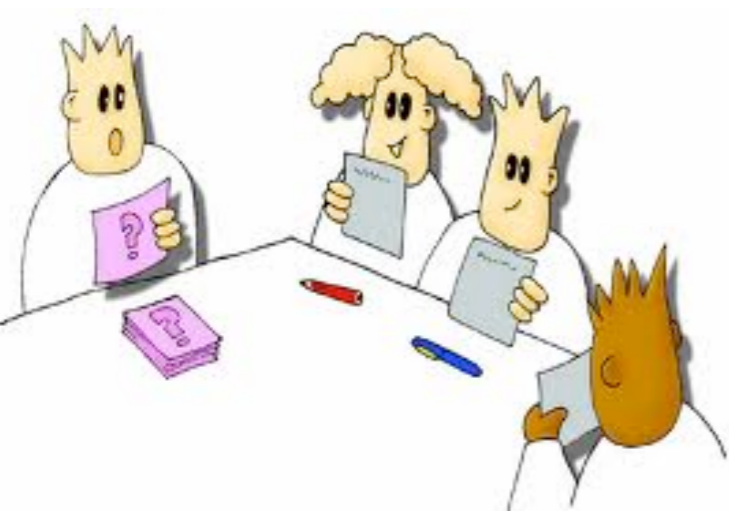
Part of Breathing



	Male	Female
Vital capacity (FVC)	4.8 L	3.7 L
Tidal volume (Vt)	500mL	390mL
Total lung capacity (TLC)	6.0 L	4.7 L

Who is....





What parts of breathing is represented by the following?

a. A student sneezes

b. Normal sleeping rhythm.

c. A student exhales and then gets punched in the stomach and gets the wind knocked out of them.

d. Nick reaches the end of a marathon with a sprint

e. A student takes a breath before swimming to the bottom of a pool's deep end.

f. A patient's lungs collapse