

## Both statements are true

Edema refers to the presence of excess fluid in the body tissues. In most instances, edema occurs mainly in the extracellular fluid compartment, but it can involve intracellular fluid as well.

Two conditions are especially prone to cause intracellular swelling: (1) depression of the metabolic systems of the tissues, and (2) lack of adequate nutrition to the cells. Note: Intracellular edema can also occur in inflamed tissues. Inflammation usually has a direct effect on the cell membranes to increase their permeability, allowing sodium and other ions to diffuse into the interior of the cell, with subsequent osmosis of water into the cells.

Extracellular fluid edema occurs when there is excess fluid accumulation in the extracellular spaces. There are two general causes of extracellular fluid edema: (1) abnormal leakage of fluid from the plasma to the interstitial spaces across the capillaries, and (2) failure of the lymphatics to return fluid from the interstitium back into the blood. The most common clinical cause of interstitial fluid accumulation is excessive capillary fluid filtration.

Any one of the following changes can **increase the capillary filtration rate**:

- Increased capillary filtration coefficient
- Increased capillary hydrostatic pressure
- Decreased plasma colloid osmotic pressure

**Important:** Two major forces influence fluid movement between capillaries and interstitial fluid: **Hydrostatic Pressure** and **Colloid Osmotic Pressure** (*Oncotic Pressure*). Increased hydrostatic pressure pushes fluid out of a system, while increased colloid osmotic pressure draws fluid into a system.

**Net fluid movement** between the capillary and interstitial fluid can be determined by the following equation: **Net Pressure =  $[P_c - P_i] - [\pi_c - \pi_i]$**

**P**= Hydrostatic Pressure;  **$\pi$** = Colloid Osmotic Pressure; **c**= capillary; **i**= interstitial fluid

A **positive** Net Pressure number means **filtration** (*fluid moves out of capillaries*) will occur; while a **negative** Net Pressure number indicates **absorption** (*fluid moves into capillaries*) will take place.

Generally, hydrostatic pressure is higher in the capillaries than the interstitial fluid, so **hydrostatic pressure** tends to favor **filtration**. On the other hand, **colloid osmotic pressure** usually favors **absorption** because the colloid osmotic pressure is also higher in the capillaries (*remember—higher colloid osmotic pressure draws fluid into a system!*).