Blood vessel

\[ \pi_c \]

\[ P_c \]

Interstitial Space

\[ \pi_i \]

\[ P_i \]

A. Normal setting. No net fluid movement into either the interstitial or the vascular compartment. There is a balance between oncotic pressure and hydrostatic pressure in each compartment. The blood vessel wall permeability is normal (semipermeable). Oncotic pressure works to hold fluid within a compartment; hydrostatic pressure works to push fluid out of a compartment.

B. Immediately after hypovolemia occurs (e.g., immediately post-hemorrhage). Net fluid movement into the vascular compartment. The hydrostatic pressure within the blood vessel \((P_c)\) is LESS than that in the interstitium \((P_i)\) due to hypovolemia. Oncotic pressure \((\pi_c)\) is HIGHER in the blood vessel than previously due to depletion of fluid. The blood vessel wall permeability is normal (semipermeable).
Figure 5. Transcapillary shifting of fluid during hypovolemic shock. Fluid movement is dictated by Starling’s law: Net fluid movement = \([P_c – P_i] – \delta[\pi_c – \pi_i]\) where \(P_c\) = hydrostatic pressure in the capillary, \(P_i\) = hydrostatic pressure in the interstitium, \(\pi_c\) = oncotic pressure in the capillary, \(\pi_i\) = oncotic pressure in the interstitium, and \(\delta\) = the reflection coefficient. The reflection coefficient essentially describes the “leakiness” of the blood vessel walls and their ability to retain proteins, electrolytes and other substances in the lumen of the capillary. In the situations discussed in this figure, the reflection coefficient is considered to be normal.