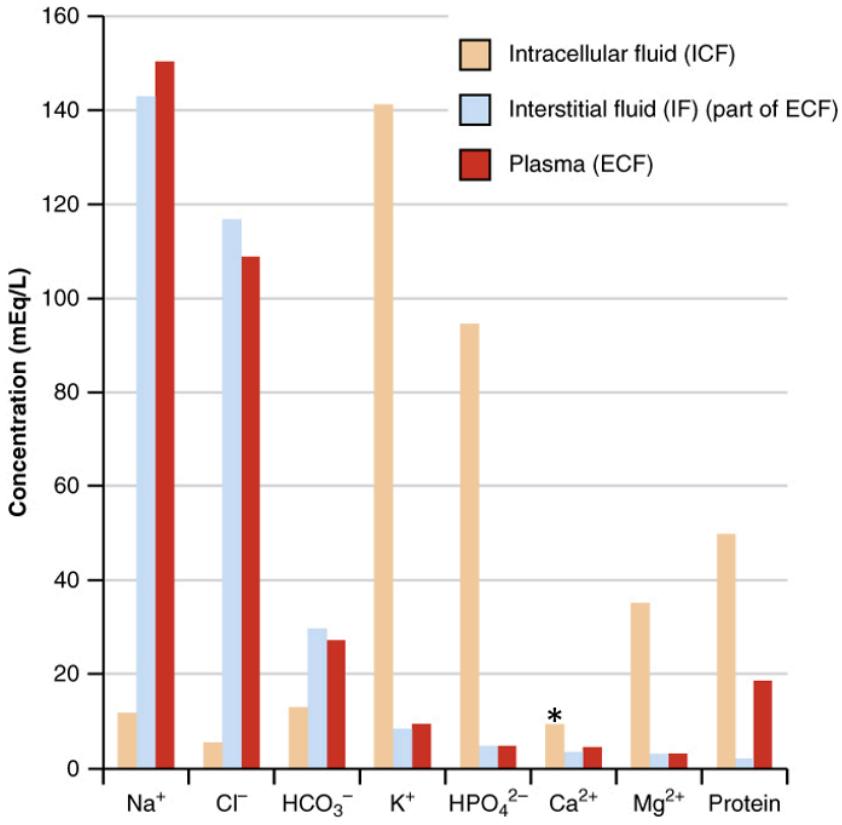
1.2.1

# Fluid Compartments

The cell is the functional unit of the body, but it cannot survive outside of an environment of water, nor without its most important structure, the biological membrane. This membrane effectively separates water in the body into two distinct fluid compartments, the **intracellular fluid** compartment (ICF) and the **extracellular fluid** compartment (ECF). The ICF is the larger of the two compartments, containing approximately two-thirds of the total body water. Total body water averages 42 liters for a 154lb (70kg) man (the usual physiological reference). The ECF is comprised of the other one-third of total body water and acts as the buffer between the cells and the outside environment. In other words, everything that enters or leaves the body must pass through the ECF. The ECF can be further divided into **interstitial fluid** (fluid in direct contact with the outside of cells) and **plasma** (water component of the blood). The regulation of what passes, when it passes, and how much passes is a major theme of cellular function. As stated, without water life cannot exist, thus water movement, a phenomenon called **osmosis**, is an essential characteristic of life. Movement of water between the ICF and ECF must occur through cell membranes that are essentially impermeable to water. Thus, the movement occurs through special protein water channels called **aquaporins** and is driven by **osmotic pressure gradients**. The pressure gradients are determined by the molecules or ions dissolved in the water. These molecules and ions (**solutes**) exist in a state of **chemical disequilibrium**, which means they are not equally distributed between the ICF and ECF (see figure below).




**Distribution of common solutes in ICF, ECF and Plasma**

Wikimedia Commons; File:2704 Concentration of Elements in Body Fluids.jpg

**Note the Asterix on the intracellular value of Ca2+. Although Ca2+ is technically more concentrated in the ICF compared to the ECF (based on actual concentrations), it is contained within structures of the smooth endoplasmic reticulum (so it doesn't contribute to the ICF concentration unless released), making the "effective" ICF concentration act as if it is lower when compared to ECF.*