

## *Cell Calcium Terminology*

- ER** The ER, or endoplasmic reticulum, is a cell organelle with a phospholipid bilayer (membrane) much like that of the cell's membrane. Rough ER has ribosomes on the outer perimeter. Smooth ER has no ribosomes. The membrane contains  $Ca^{2+}$  ionic channels, active transport pumps. The ER in muscle and cardiac cells is smooth and is called the sarcoplasmic reticulum, or SR.
- Ribosome** A two subunit cytosolic particle. Each subunit consists of proteins and rRNA. RNA unlike DNA is a single stranded molecule.
- cytosolic** intracellular
- cytoplasm** the intracellular fluid
- ligand** an ion or molecule that binds to a protein.
- agonist** a drug which mimics the action of a neurotransmitter at the synapse.
- antagonist** a drug which blocks the action of a neurotransmitter
- Buffering** certain ions and molecules are "buffered" in the sense that they have two species: bound and free. Within a cell, for example, there is bound and free calcium. Several high affinity sites within the cell tend to bind much of the calcium and keep it from interacting with other parts of the cell. Usually only the free calcium (or calcium not bound to such sites) is involved in activating or inactivating channels or receptors, for instance.
- channels** proteins imbedded in a membrane (phospholipid bilayer) which is permeable to ions - typically of only one type.
- receptor** a proteins imbedded in a membrane which ligands can bind to. Once a ligand (or less generally agonist/antagonist) is bound to a receptor there is usually a conformational change which allows other chemicals to be released or produced on the side of the membrane which the ligand is not bound. Unlike channels, receptors are not permeable to ions.
- voltage-gated channels** channels whose permeability is affected by the transmembrane potential.
- receptor activated channels** some channels have receptor sites for ligands which either increase (activate) or decrease (inactivate) their permeability. For instance, there are  $Ca^{2+}$ -activated  $K^+$  channels which allow only potassium ions at a rate which tends to increase in the presence of calcium.
- second messenger** The activation (or inactivation) of a receptor or channel may cause a "second messenger" to be released which in turn acts on some other type of channel or receptor. The term "second messenger" is sometimes used because only the "other" receptor is of interest.
- SERCA pump** an energy consuming pump (usually involving ATP) which allows an active transport of calcium ions up a chemical gradient.