Quantal release by regulated exocytosis depends on the storage of neurotransmitter inside secretory vesicles. For classical transmitters, this requires transport from the cytoplasm, a process that generally involves exchange for luminal H+. Coupling to H+ should restrict the activity of these transporters to acidic internal membranes such as synaptic vesicles, and prevent non-vesicular release when they reside at the plasma membrane as part of the synaptic vesicle cycle. However, glutamate transport depends on membrane potential, indicating the potential for non-quantal efflux across the plasma membrane. By developing the use of electrophysiology to study the vesicular glutamate transporters, we have identified a series of regulatory mechanisms with implications for both quantal and non-quantal release.

Recent relevant publications: