1. To develop a computational tool to dynamically model ion homeostasis, volume regulation and electrical changes that occur within a neuron
   1. Create a single compartmental model
   2. Create a multicompartmental model incorporating the properties of diffusion and electrical drift
   3. Create a tool to visualize the changes to the ionic concentrations, electrical properties and cell volume within each compartment as these properties vary with time
2. Investigate the effect of impermeant anions on the isopotential status of neurons.
3. Investigate how excitatory or inhibitory synaptic input is modified by the presence of impermeant anions.
4. Investigate the impermeant anions have on information processing (action potential generation).
5. Explore how any observed effects may be relevant to disease processes.

## 1. A multi compartmental neuronal model p

(is this in methods or results)

## 2. Concentration of impermeant anions underpins compartment volumes

Single compartment model

* Adding impermeants of same charge 🡪 No voltage difference, only volume difference.
* Altered ion changes do not have a difference to volume.

Multi

* Same situation, volume changes in the altered compartment
* Altered ion changes do not make a difference.

## 3. Charge of impermeant anions affect membrane potentials

Single compartment model

* Altered impermeant charge 🡪 voltage difference + volume difference.

Multi

* Increased charge in 1 comp, decreased charge in 1 comp
* Alter charge and concentration of one compartment

## 4. Heterogenous distribution of impermeant anion charge along a dendrite can result in a non-isopotential dendrite with fixed chloride driving force