**How are Vrest, time constant, input resistance,… related to membrane parameters and currents?**

* Factoid – the time constant formula t = RC holds for both series and parallel RC circuits ([Link-Wikipedia](https://en.wikipedia.org/wiki/RC_circuit)); Why? … it depends on charging and discharging of the capacitor, the ‘dynamics’ in the system. YOU PROVE IT
* If a user specifies their neuron properties with RMP as Vrest, input resistance as Rin, time constant as t, what is their link to the parameters of a neuron (membrane resistance Rm or Rleak, cm, …? Note that Rleak = 1/Gleak= 1/(gleak\*Area)
* To answer this, let’s note the following: Rin = DV/DI ~ Rleak (if active conductances do not contribute; can be modified for the case of the HCN current)
* First, set Eleak = Vrest (if H-current present, use this formula: xxxxxxxxxxxxxx)
* Then adjust gleak (and Area, if needed) to get the right Rin
* Then adjust cm to get the right tau, using t = cm /gleak (note that t it does not depend on area! Why is that so?)
* If cm is out of range, then will have to adjust Area.
* To adjust slope – try the CaS-A or/and CaT-KCa combinations. Walt was able to get the CaT-KCa combination to help adjust slope of the F-I curve. Can also use Na, but that will affect spiking. These sub-modules need further study.
* To adjust rheobase – perhaps the same modules as above….but needs further study of how to tune them together.
* ……
* How does nature adjust these cellular characteristics?