Report

13 April 2021

|  |  |
| --- | --- |
| Aim | Repeat experiments from last report, 3 compartments, changing impermeant charge in middle compartment.  AREA SCALE CONSTANT  ATPase Variable |
| Setup | \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Compartment settings:  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Comp1 Comp2 Comp3  Radius 5.000000e-05 5.000000e-05 5.000000e-05  Length 2.500000e-04 2.500000e-04 2.500000e-04  Volume 1.963495e-12 1.963495e-12 1.963495e-12  Na\_i 1.400000e-02 1.400000e-02 1.400000e-02  K\_i 1.226650e-01 1.226650e-01 1.226650e-01  Cl\_i 5.000000e-03 5.000000e-03 5.000000e-03  X\_i 1.549000e-01 1.549000e-01 1.549000e-01  z\_i -8.500000e-01 -8.500000e-01 -8.500000e-01  ATPase pump rate 1.036427e-06 1.036427e-06 1.036427e-06  KCC2 pump rate 2.072854e-08 2.072854e-08 2.072854e-08  Vm 0.000000e+00 0.000000e+00 0.000000e+00  Ek 0.000000e+00 0.000000e+00 0.000000e+00  ECl 0.000000e+00 0.000000e+00 0.000000e+00  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Extracellular anion concentrations:  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Na: 145.0 mM  K: 3.5 mM  Cl: 119.0 mM  X: 29.5 mM  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Simulation settings:  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Total time (mins): 30.0  Timestep (ms): 1.0  ATPase Model type: J\_ATP = p \* (Na\_in/Na\_out)^3  Pump rate: 0.1  Area scale type: Constant  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Impermeant anion changes:  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  No change of intracellular impermeant anion concentration mid simulation  Comp2 : change in intracellular impermeant anion charge - valence: -1.2, between: 400.0s and 1000.0s  No change of extracellular impermeant anion concentration mid simulation |
| Final values: |  |
|  |  |
|  |  |
|  |  |
|  |  |
| Conclusion | Similar results as before, ATPase in adjacent compartments working slightly harder |

|  |  |
| --- | --- |
| Aim | Repeated experiment with 3 compartments as above, just with a constant ATPase and constant area scale… expect to have the ATPase values for all compartments to be equal in the boundary graph |
| Setup | \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Compartment settings:  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Comp1 Comp2 Comp3  Radius 5.000000e-05 5.000000e-05 5.000000e-05  Length 2.500000e-04 2.500000e-04 2.500000e-04  Volume 1.963495e-12 1.963495e-12 1.963495e-12  Na\_i 1.400000e-02 1.400000e-02 1.400000e-02  K\_i 1.226650e-01 1.226650e-01 1.226650e-01  Cl\_i 5.000000e-03 5.000000e-03 5.000000e-03  X\_i 1.549000e-01 1.549000e-01 1.549000e-01  z\_i -8.500000e-01 -8.500000e-01 -8.500000e-01  ATPase pump rate 1.036427e-06 1.036427e-06 1.036427e-06  KCC2 pump rate 2.072854e-08 2.072854e-08 2.072854e-08  Vm 0.000000e+00 0.000000e+00 0.000000e+00  Ek 0.000000e+00 0.000000e+00 0.000000e+00  ECl 0.000000e+00 0.000000e+00 0.000000e+00  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Extracellular anion concentrations:  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Na: 145.0 mM  K: 3.5 mM  Cl: 119.0 mM  X: 29.5 mM  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Simulation settings:  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Total time (mins): 30.0  Timestep (ms): 1.0  ATPase Model type: Constant  Pump rate: 0.1  Area scale type: Constant  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Impermeant anion changes:  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  No change of intracellular impermeant anion concentration mid simulation  Comp2 : change in intracellular impermeant anion charge - valence: -1.2, between: 400.0s and 1000.0s  No change of extracellular impermeant anion concentration mid simulation |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
| Conclusion: | Appears that you can have non-isopotential neurons and different chloride driving force even with fixed ATPase… |