**Supplemental Information: Description of ion channel activities**

The individual equations for KCNQ channels were written as the following:

The equations for KCNMA1 channels were written as the following:

All equations for KDR channels were written as the following:

The equations for voltage-gated sodium channels were written as the following:

The functions vtrapαm(V) and vtrapβm(V) were written as follows:

vtrapαm(V) = function(voltage) vtrap((13.1-(voltage+65)), 4)

vtrapβm(V) = function(voltage) vtrap(((voltage+65)-40.1), 5)

The function vtrap in these functions was written as follows:

vtrap <- function(x,y) {

if(x/y < 1E-6) {

result\_vtrap <- y \* (1-x/y/2)

} else {

result\_vtrap <- x / (exp(x/y) - 1)

}

}

The gating parameter *h* was calculated using the following equations:

The equations for high-threshold voltage-gated calcium channels were written as the following:

The equations for low-threshold voltage-gated calcium channels were written as the following:

The function ‘efun’ referenced in equations (6) and (7) in the Results section of the manuscript was written as follows:

efun <- function(z) {

if(z < 1E-4) {

efun <- 1 - z/2

} else {

efun <- z / (exp(z) - 1)

}

}