Calculation of the Muller cell (MC) as an electrical cable.

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for(i=0; i<N; i++)                                                    (1)
    Rp[i+1]=Ro[i]+Ri[i]+Rm[i]*Rd[i]/(Rm[i]+Rp[i]);                    (2)
for(i=N; i>0; i--)                                                    (3)
    Rd[i]=Ro[i]+Rin[i]+Rm[i+1]*Rp[i+1]/(Rm[i+1]+Rd[i+1]);             (4)
for(i=1; i<=N; i++) {                                                 (5)
    Vm[i]=E[i]*(1-Rm[i]/(Rm[i]+Rd[i]*Rp[i]/(Rd[i]+Rp[i])));           (6)
    Tail[i]=Vm[i];                                                    (7)
    for(j=i+1; j<=N; j++) {                                           (8)
        Tail[j]=Tail[j-1]*(Rd[j-1]-Ro[j-1]-Ri[j-1])/Rd[j-1];          (9)
        sTail[j]+=Tail[j];                                            (10)
        }                                                             (11)
    for(j=i-1; j>0; j--) {                                            (12)
        Tail[j]=Tail[j+1]*(Rp[j+1]-Ro[j]-Ri[j])/Rp[j+1];              (13)
        sTail[j]+=Tail[j];                                            (14)
        }                                                             (13)
    }                                                                 (16)
for(i=1; i<=N; i++)                                                   (17)
    Vm[i]+=sTail[i];                                                  (18)
```

N – number of the real transmembrane elements in the cable, =81 in this circuit,

Rm[i] – transmembrane resistance of MC per one percent of the retinal depth, at the position *i*,

Ro[i] – resistance of extracellular space per one percent of the retinal depth, between the transmembrane positions *i* and *i*-1,

Ri[i] – resistance of MC cytoplasm per one percent of the retinal depth, between the transmembrane positions *i* and *i*-1,

Rp[i] – resistance for K^+ current flowing in proximal direction (toward smaller *i*) from the transmembrane positions *i*,

Rd[i] – resistance for K^+ current flowing in distal direction (toward larger *i*) from the transmembrane positions *i*,

Vm[i] – local transmembrane voltage of MC, at the position *i*,

E[i] – value of local K^+ battery, relative to rest (3.6 mM), at the position *i*,

Tail[i] – the voltage that a certain K^+ battery induced on a certain transmembrane resistance,

sTail[i] – the cumulative voltage that all the batteries of the circuit induced on the transmembrane resistor *i*,.

E[i] is calculated from the Potassium Parameters text file that is loaded to the program. The values of *Rm[i]*, *Ro[i]*, and *Ri[i]* are directly loaded to the program from the Cell Parameters text file. All other variables are calculated by the program. The program consists of a series of loops that repeatedly perform the same calculations for different circuit elements.

Lines 1 to 4:

Determination of the resistances of the parts of the circuit proximally to the position *i*, i.e., with indexes < *i*. and distally to the position *i*, i.e., with indexes > *i*. To perform these calculations, virtual elements located at both ends of the circuit, proximally to the most proximal real $R_m[1]$ (*Rm*[0], *Ro*[0], and *Ri*[0]) and distally to the most distal real $R_m[81]$ (*Rm*[82], *Ro*[81], and *Ri*[81]) were added; all these virtual elements have values of 1e19 MΩ, being prohibitively high for current.

Lines 5 and 6:

Determination of the transmembrane voltage at location *i* taking into consideration the voltage drop on $R_m[i]$ due to the current from the battery *E[i]*.

Lines 7 to 11:

Determination of the voltage drops from the current generated by the battery *E[i]* on all *Rm[j]* proximal to it, i.e., $j < i$.

Lines 7 and 11 to 16:

Determination of the voltage drops from the current generated by the battery *E[i]* on all *Rm[j]* distal to it, i.e., $j > i$.

Lines 17 and 18:

The final determination of the $V_m[i]$ taking into consideration all voltage drops from the currents generated by all batteries other than *E[i]*, which was already counted in line 6.

After completion of these calculations that are related to the distribution of *E[i]* at time = t, the program recalculates voltages for the next time step t+1 with the appropriate new distribution of *E[i]* starting from line 5. Using this algorithm, the program determined *Vm* at each of 81 transmembrane locations and at 100 moments of time. Finally, the extracellular transretinal potential at the retinal depth of interest *x* is calculated with the following equation:

$$Vo[x] = (Vm[x] - Vm[1]) * \sum_{i=1}^{x-1} Ro[i] \,/\, (\sum_{i=1}^{x-1} Ro[i] + \sum_{i=1}^{x-1} Ri[i]).$$