# $K_v7$-type Channel Currents in Spiral Ganglia Neurons: Involvement in Sensorineural Hearing Loss

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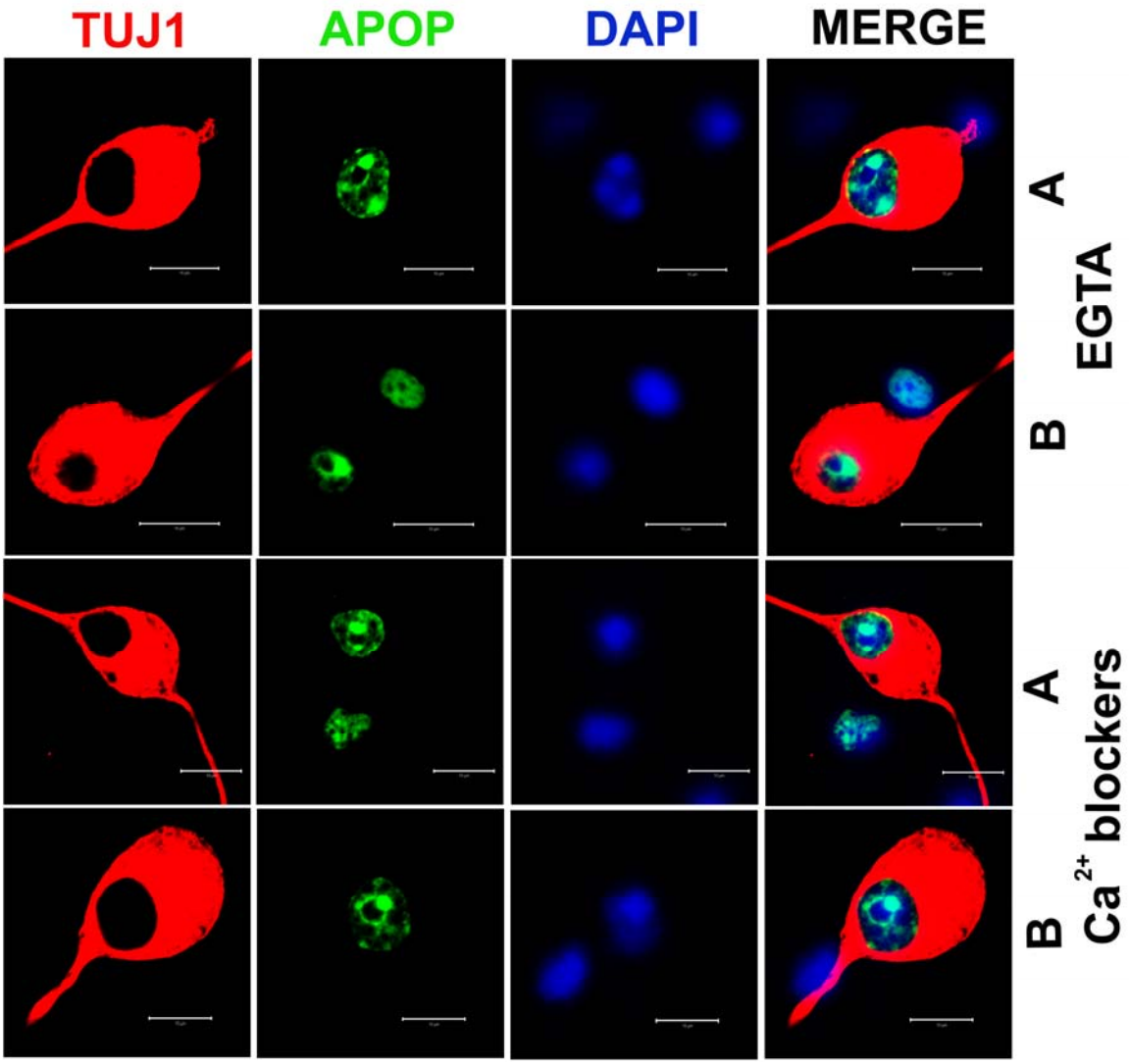
Supplementary Figure 1 (S1)

**Effects of linopirdine under reduced extracellular $Ca^{2+}$ conditions**. Upper and second panels show apical (A) and basal (B) SGNs in culture with BDNF/NT3 growth factors and reduced bath $Ca^{2+}$ (~300 μM). The third and fourth row shows apical (A) and basal SGNs in the presence of 10 μM linopirdine and a cocktail of $Ca^{2+}$ channel blockers. TUJ1 = neuronal maker, Apop (apoptosis = TUNEL- positive, DAPI= nuclei stain).

Supplementary figure 1 (S1)



Supplementary Table S1-8

Table S1

Changes in action potential waveforms at different ages

| Apex | 2 week old (n = 11) | 3-4 month old (n = 12) | 17 month old (n = 9) |
|---|---|---|---|
| Rmp (mV) | -63 ± 4 | -65 ± 2 | -60 ± 3# |
| Threshold (mV) | -44 ± 3 | -39 ± 2** | -35 ± 2**## |
| AP (duration) (ms) | 8 ± 2 | 6 ± 1** | 6 ± 0* |
| Latency (ms) | 5 ± 1 | 3 ± 0** | 4 ± 1* |
| Max depolarization. slope (mV/ms) | 104 ± 38 | 136 ± 26 | 118 ± 20 |
| Max repolarization slope (mV/ms) | -54 ± 18 | -75 ± 16* | -68 ± 15 |
| Half width (ms) | 0.5 ± 0.2 | 0.5 ± 0.1 | 0.6 ± 0.1 |

**p<0.01, *p<0.05 vs 2 week

##p<0.01,#p<0.05 vs 3-4 month

Rmp = Resting membrane potential; Max = Maximum, AP = action potential

Table S2

| Base | 2 week (0.5 months) old (n = 9) | 3-4 month old (n = 7 ) | 17 month old (n = 7) |
|---|---|---|---|
| Rmp (mV) | -57 ± 2 | -60 ± 4 | -54 ± 3*# |
| Threshold (mV) | -40 ± 2 | -38 ± 1 | -35 ± 3.0** # |
| Spike number | 43 ± 10 | 18 ± 5** | 34 ± 7*## |
| AP duration (ms) | 6 ± 1 | 8 ± 2* | 8 ± 1** |
| Latency (ms) | 4 ± 1 | 6 ± 1* | 5 ± 1* |
| Max depolarization slope (mV/ms) | 177 ± 40 | 164 ± 36 | 129 ± 17*# |
| Max repolarization slope (mV/ms) | -123 ± 26 | -107 ± 26 | -90 ± 21* |
| Half Width (ms) | 0.6 ± 0.1 | 0.7 ± 0.1 | 0.7 ± 0.2* |

**p<0.01, *p<0.05 *versus* 2 week

##p<0.01, # p<0.05 *versus* 3-4 month

Rmp = Resting membrane potential; Max = Maximum, AP = action potential

Table S3

The effect of linopirdine on action potentials

| 2 week (0.5 month) old mice | Base (n = 11) | | Apex (n = 12) | |
|---|---|---|---|---|
| | Control | Linopirdine (10 μM) | Control | Linopirdine (10 μM) |
| Spike number | 40 ± 13 | 47 ± 6 | 1 ± 0 | 1 ± 0 |
| Rmp (mV) | -62 ± 3 | -53 ± 3* | -63 ± 4 | -57 ± 3 |
| Threshold(mV) | -39 ± 3 | -38 ± 3 | -43 ± 3 | -43 ± 2 |
| AP duration (ms) | 7 ± 1 | 6 ± 1 | 9 ± 2 | 7 ± 1 |
| Latency (ms) | 5 ± 1 | 4 ± 1* | 5 ± 1 | 4 ± 1* |
| Max depolarization slope (mV/ms) | 180 ± 48 | 156 ± 55 | 105 ± 42 | 95 ± 12 |
| Max repolarization slope (mV/ms) | -125 ± 36 | -105 ± 40 | -52 ± 19 | -49 ± 8 |
| Half width (ms) | 0.6 ± 0.1 | 0.66 ± 0.2 | 0.55 ± 0.1 | 0.61 ± 0.1 |

Rmp = Resting membrane potential; Max = Maximum, AP = action potential

*p<0.05, **p<0.01 Treatment *versus* control

Table S4

| 3-4 month old mice | Base (n = 9) | | Apex (n = 8) | |
|---|---|---|---|---|
| | Control | Linopirdine (10 μM) | Control | Linopirdine (10 μM) |
| Spike number | 19 ± 5 | 40 ± 7 ** | 1 ± 0 | 1 ± 0 |
| Rmp (mV) | -57 ± 4 | -51 ± 3* | -63 ± 4 | -60 ± 4 |
| Threshold (mV) | -40 ± 2 | -39 ± 3 | -39 ± 2 | -37 ± 4 |
| AP duration (ms) | 8 ± 2 | 7 ± 2 | 6 ± 1 | 6 ± 1 |
| Latency (ms) | 5 ± 2 | 5 ± 1 | 3 ± 0 | 3 ± 0 |
| Max depolarization slope (mV/ms) | 182 ± 46 | 119 ± 49 | 136 ± 26 | 79 ± 26** |
| Max repolarization slope (mV/ms) | -121 ± 39 | -79 ± 32 | -75 ± 16 | -45 ± 16** |
| Half width (ms) | 0.6 ± 0.2 | 0.7 ± 0.3 | 0.5 ± 0.1 | 0.6 ± 0.2 |

Rmp = Resting membrane potential; Max = Maximum, AP = action potential

*p<0.05, **p<0.01 Treatment *versus* control

Table S5

| 17 month old mice | Base (n = 5) | | Apex (n = 6) | |
|---|---|---|---|---|
| | Control | Linopirdine (10 μM) | Control | Linopirdine (10 μM) |
| Spike number | 22 ± 7 | 38 ± 7 ** | 1 ± 0 | 1 ± 0 |
| Rmp (mV) | -54 ± 4 | -44 ± 4* | -60 ± 4 | -60 ± 4 |
| Threshold (mV) | -37 ± 4 | -35 ± 5 | -36 ± 2 | -34 ± 4 |
| AP duration (ms) | 7 ± 0 | 6 ± 2 | 6 ± 1 | 6 ± 1 |
| Latency (ms) | 5 ± 1 | 4 ± 2 | 4 ± 0 | 3 ± 0 |
| Max depolarization slope (mV/ms) | 134 ± 13 | 177 ± 46 | 139 ± 26 | 82 ± 26* |
| Max repolarization slope (mV/ms) | -99 ± 8 | -129 ± 40 | -89 ± 16 | -65 ± 16* |
| Half width (ms) | 0.6 ± 0 | 0.6 ± 0 | 0.5 ± 0.1 | 0.6 ± 0.2 |

Rmp = Resting membrane potential; Max = Maximum, AP = action potential

*p<0.05, **p<0.01 Treatment *versus* control

Table S6

The effect of retigabine on action potentials

| 2 week (0.5 month) old mice | Base (n = 4) | | Apex (n = 5) | |
|---|---|---|---|---|
| | Control | Retigabine (10 μM) | Control | Retigabine (10 μM) |
| Spike number | 29 ± 12 | 2 ± 1 | 1 ± 0 | 0** |
| Rmp (mV) | -58 ± 2 | -64 ± 1* | -66 ± 4 | -75 ± 5* |
| Threshold (mV) | -40 ± 2 | -40 ± 1 | -39 ± 3 | - |
| AP duration (ms) | 7 ± 1 | 6 ± 3 | 6 ± 2 | - |
| Latency (ms) | 4 ± 0 | - | 4 ± 1 | - |
| Max depolarization slope (mV/ms) | 166 ± 33 | - | 131 ± 109 | - |
| Max repolarization slope (mV/ms) | -104 ± 41 | - | -85 ± 42 | - |
| Half width (ms) | 0.7 ± 0.2 | - | 0.6 ± 0.2 | - |

Rmp = Resting membrane potential; Max = Maximum, AP = action potential

*p<0.05, **p<0.01 Treatment *versus* control

Table S7

3-4 month old mice

| | Base (n = 7) | | Apex (n = 8) | |
|---|---|---|---|---|
| | Control | Retigabine (10 μM) | Control | Retigabine (10 μM) |
| Spike number | 20 ± 6 | 0.4 ± 0.5** | 1 ± 0 | 0** |
| Rmp (mV) | -59 ± 3 | -66 ± 3 * | -62 ± 2 | -66 ± 3 |
| Threshold (mV) | -37 ± 3 | - | -42 ± 3 | - |
| AP duration (ms) | 8 ± 2 | - | 8 ± 1 | - |
| Latency (ms) | 5 ± 2 | - | 6 ± 2 | - |
| Max depolarization. Slope (mV/ms) | 152 ± 37 | - | 125 ± 31 | - |
| Max repolarization slope (mV/ms) | -94 ± 27 | - | -71 ± 39 | - |
| Half Width (ms) | 0.7 ± 0.2 | - | 0.8 ± 0.5 | - |

Rmp = Resting membrane potential; Max = Maximum, AP = action potential

*p<0.05, **p<0.01 Treatment *versus* control

Table S8

17 month old mice

| | Base (n = 5) | | Apex (n = 6) | |
|---|---|---|---|---|
| | Control | Retigabine (10 μM) | Control | Retigabine (10 μM) |
| Spike number | 22 ± 6 | 1 ± 1** | 1 ± 0 | 0** |
| Rmp (mV) | -59 ± 3 | -69 ± 2 * | -61 ± 2 | -67 ± 2* |
| Threshold (mV) | -37 ± 3 | - | -42 ± 3 | - |
| AP duration (ms) | 6 ± 2 | - | 7 ± 1 | - |
| Latency (ms) | 3 ± 1 | - | 5 ± 2 | - |
| Max depolarization. Slope (mV/ms) | 89 ± 37 | - | 125 ± 31 | - |
| Max repolarization slope (mV/ms) | -93 ± 17 | - | -71 ± 39 | - |
| Half Width (ms) | 0.4 ± 0.2 | - | 0.5 ± 0.2 | - |

Rmp = Resting membrane potential; Max = Maximum, AP = action potential

*p<0.05, **p<0.01 Treatment *versus* control