

**Supplementary Table S1. GVS threshold determination in the pilot experiment.**

| Mouse | GVS day | GVS (with a frequency of 1 Hz) amplitude (mA) |      |      |      |      |      |      |      |      |      |     |      |      |      |      |      |   |
|-------|---------|---|------|------|------|------|------|------|------|------|------|-----|------|------|------|------|------|---|
|       |         | 0   | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.09 | 0.1 | 0.11 | 0.12 | 0.13 | 0.14 | 0.15 |   |
| 1     | 1       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | +    | +    | +    | ++   | X    | X |
| 2     | 1       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | -    | +    | +    | +    | ++   | X |
| 3     | 1       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | +   | +    | +    | ++   | X    | X    | X |
| 4     | 1       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | +    | +    | +    | ++   | X    | X |
| 5     | 1       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | +    | +    | ++   | X    | X    | X |
| 1     | 2       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | +    | +    | ++   | X    | X    | X |
| 2     | 2       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | -    | +    | +    | ++   | X    | X |
| 3     | 2       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | +   | +    | ++   | X    | X    | X    | X |
| 4     | 2       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | +    | +    | +    | ++   | X    | X |
| 5     | 2       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | -    | +    | +    | ++   | X    | X |
| 1     | 3       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | +    | +    | ++   | X    | X    | X |
| 2     | 3       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | +    | +    | +    | ++   | X    | X |
| 3     | 3       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | +   | +    | +    | ++   | X    | X    | X |
| 4     | 3       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | -    | +    | +    | ++   | X    | X |
| 5     | 3       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | -    | +    | +    | ++   | X    | X |
| 1     | 4       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | +    | +    | +    | ++   | X    | X |
| 2     | 4       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | +    | +    | ++   | X    | X    | X |
| 3     | 4       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | +   | +    | ++   | X    | X    | X    | X |
| 4     | 4       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | +    | +    | ++   | X    | X    | X |
| 5     | 4       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | -    | +    | +    | ++   | X    | X |
| 1     | 5       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | +    | +    | ++   | X    | X    | X |
| 2     | 5       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | +    | +    | +    | ++   | X    | X |
| 3     | 5       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | +    | +    | +    | ++   | X    | X |
| 4     | 5       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | +    | +    | +    | ++   | X    | X |
| 5     | 5       | -   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -   | -    | +    | +    | ++   | X    | X |

GVS threshold: **0.1012** ± 0.06658 mA, min: 0.09 mA, max: 0.11 mA

GVS: galvanic vestibular stimulation; -: no nystagmus; +: nystagmus; ++: strong nystagmus with facial muscle activities; x: no GVS application

**Supplementary Table S2. The VOR response to sinusoidal stimulation 3 days post UL in the GVS and the non-GVS groups compared to baseline.**

|          |                              | 0.08 Hz    | 0.1Hz      | 0.16 Hz    | 0.32 Hz    | 0.64 Hz    | 1 Hz       | Total      |
|----------|------------------------------|------------|------------|------------|------------|------------|------------|------------|
| Gain     | GVS                          | 0.41±0.07  | 0.52±0.05  | 0.57±0.06  | 0.61±0.06  | 0.64±0.04  | 0.61±0.05  | 0.56±0.05  |
|          | Non-GVS                      | 0.14±0.03  | 0.18±0.03  | 0.23±0.05  | 0.26±0.02  | 0.29±0.03  | 0.27±0.03  | 0.23±0.03  |
|          | <i>p</i> -value <sup>a</sup> | <0.001     | <0.001     | <0.001     | <0.001     | <0.001     | <0.001     | <0.001     |
|          | <i>p</i> -value <sup>b</sup> | 0.008      | 0.008      | 0.008      | 0.008      | 0.008      | 0.008      | 0.008      |
|          | <i>p</i> -value <sup>c</sup> | 0.018      | 0.018      | 0.018      | 0.018      | 0.018      | 0.018      | 0.018      |
| Phase    | GVS                          | 30.50±4.06 | 22.12±5.20 | 17.67±3.45 | 10.84±4.80 | 7.04±5.14  | 4.00±2.28  | 15.36±1.72 |
|          | Non-GVS                      | 40.09±7.07 | 35.56±7.48 | 25.18±3.82 | 24.20±3.19 | 15.74±6.86 | 10.64±5.31 | 25.24±1.55 |
|          | <i>p</i> -value <sup>a</sup> | 0.008      | 0.008      | 0.001      | <0.001     | 0.012      | 0.005      | <0.001     |
|          | <i>p</i> -value <sup>b</sup> | 0.008      | 0.021      | 0.011      | 0.139      | 0.678      | 0.110      | 0.011      |
|          | <i>p</i> -value <sup>c</sup> | 0.018      | 0.018      | 0.018      | 0.018      | 0.018      | 0.018      | 0.018      |
| Symmetry | GVS                          | 6.69±1.78  | 2.91±1.77  | 0.55±0.21  | 0.47±0.48  | 0.60±0.39  | 0.56±0.23  | 1.96±0.42  |
|          | Non-GVS                      | 15.32±2.40 | 12.58±3.03 | 6.81±2.42  | 2.81±1.57  | 2.14±1.40  | 2.22±1.85  | 6.98±1.27  |
|          | <i>p</i> -value <sup>a</sup> | <0.001     | <0.001     | <0.001     | 0.001      | 0.003      | 0.142      | <0.001     |
|          | <i>p</i> -value <sup>b</sup> | 0.008      | 0.011      | 0.953      | 0.594      | 0.374      | 0.859      | 0.011      |
|          | <i>p</i> -value <sup>c</sup> | 0.018      | 0.018      | 0.018      | 0.018      | 0.018      | 0.063      | 0.018      |

The average values of the two groups were compared by Mann-Whitney U tests. The VOR changes in each group were tested by Wilcoxon signed rank tests. <sup>a</sup>=statistics between the GVS and non-GVS groups by Mann-Whitney U test. <sup>b</sup>=statistics between baseline and the GVS groups by Wilcoxon signed rank test. <sup>c</sup>=statistics between the baseline and non-GVS groups by Wilcoxon signed rank test. VOR, vestibulo-ocular reflex; GVS, galvanic vestibular stimulation.

**Supplementary Table S3. The VOR response to sinusoidal stimulation 7 days post UL in the GVS and the non-GVS groups compared to baseline.**

|          |                              | 0.08 Hz    | 0.1Hz      | 0.16 Hz    | 0.32 Hz    | 0.64 Hz    | 1 Hz       | Total      |
|----------|------------------------------|------------|------------|------------|------------|------------|------------|------------|
| Gain     | GVS                          | 0.56±0.05  | 0.63±0.06  | 0.72±0.05  | 0.75±0.06  | 0.76±0.06  | 0.72±0.06  | 0.69±0.05  |
|          | Non-GVS                      | 0.22±0.04  | 0.25±0.01  | 0.36±0.03  | 0.42±0.04  | 0.48±0.08  | 0.44±0.09  | 0.36±0.04  |
|          | <i>p</i> -value <sup>a</sup> | <0.001     | <0.001     | <0.001     | <0.001     | <0.001     | <0.001     | <0.001     |
|          | <i>p</i> -value <sup>b</sup> | 0.008      | 0.008      | 0.008      | 0.008      | 0.008      | 0.008      | 0.008      |
|          | <i>p</i> -value <sup>c</sup> | 0.018      | 0.018      | 0.018      | 0.018      | 0.018      | 0.018      | 0.018      |
| Phase    | GVS                          | 27.90±5.49 | 20.45±2.72 | 12.90±2.43 | 8.92±2.73  | 4.72±2.22  | 2.71±1.44  | 12.93±1.04 |
|          | Non-GVS                      | 38.20±6.99 | 31.35±7.86 | 24.97±5.96 | 19.49±6.13 | 10.68±5.82 | 12.16±6.10 | 22.81±3.73 |
|          | <i>p</i> -value <sup>a</sup> | 0.008      | 0.001      | 0.003      | 0.001      | 0.031      | 0.001      | <0.001     |
|          | <i>p</i> -value <sup>b</sup> | 0.011      | 0.011      | 0.374      | 0.441      | 0.314      | 0.678      | 0.139      |
|          | <i>p</i> -value <sup>c</sup> | 0.018      | 0.018      | 0.018      | 0.018      | 0.018      | 0.018      | 0.018      |
| Symmetry | GVS                          | 1.92±0.75  | 0.81±0.26  | 0.67±0.25  | 0.53±0.28  | 0.44±0.23  | 0.29±0.21  | 0.78±0.15  |
|          | Non-GVS                      | 10.17±2.94 | 8.55±3.79  | 4.83±2.50  | 2.69±2.22  | 1.35±0.91  | 0.93±0.21  | 4.75±1.66  |
|          | <i>p</i> -value <sup>a</sup> | <0.001     | <0.001     | <0.001     | 0.031      | 0.042      | 0.001      | <0.001     |
|          | <i>p</i> -value <sup>b</sup> | 0.441      | 0.515      | 0.594      | 0.953      | 0.678      | 0.139      | 0.314      |
|          | <i>p</i> -value <sup>c</sup> | 0.018      | 0.018      | 0.018      | 0.043      | 0.028      | 0.018      | 0.018      |

The average values of the two groups were tested by Mann-Whitney U tests. The VOR changes in each group were tested by Wilcoxon signed rank tests. <sup>a</sup>=statistics between the GVS and non-GVS groups by Mann-Whitney U test. <sup>b</sup>=statistics between baseline and the GVS groups by Wilcoxon signed rank test. <sup>c</sup>=statistics between the baseline and non-GVS groups by Wilcoxon signed rank test. VOR, vestibulo-ocular reflex; GVS, galvanic vestibular stimulation.

**Supplementary Table S4. The VOR response to sinusoidal stimulation 14 days post UL in the GVS and the non-GVS groups compared to baseline.**

|          |                              | 0.08 Hz    | 0.1Hz      | 0.16 Hz    | 0.32 Hz    | 0.64 Hz    | 1 Hz      | Total      |
|----------|------------------------------|------------|------------|------------|------------|------------|-----------|------------|
| Gain     | GVS                          | 0.60±0.03  | 0.70±0.03  | 0.83±0.03  | 0.83±0.04  | 0.85±0.03  | 0.77±0.02 | 0.76±0.02  |
|          | Non-GVS                      | 0.37±0.07  | 0.45±0.03  | 0.55±0.07  | 0.61±0.07  | 0.65±0.05  | 0.62±0.03 | 0.54±0.04  |
|          | <i>p</i> -value <sup>a</sup> | <0.001     | <0.001     | <0.001     | <0.001     | <0.001     | <0.001    | <0.001     |
|          | <i>p</i> -value <sup>b</sup> | 0.008      | 0.008      | 0.173      | 0.139      | 0.953      | 0.066     | 0.008      |
|          | <i>p</i> -value <sup>c</sup> | 0.018      | 0.018      | 0.018      | 0.018      | 0.018      | 0.018     | 0.018      |
| Phase    | GVS                          | 26.46±3.56 | 20.04±4.38 | 14.84±2.05 | 7.85±2.22  | 4.53±3.06  | 2.57±1.36 | 13.05±1.47 |
|          | Non-GVS                      | 29.67±4.80 | 25.88±6.59 | 18.36±4.82 | 13.38±3.50 | 10.57±2.86 | 4.15±1.52 | 17.00±2.08 |
|          | <i>p</i> -value <sup>a</sup> | 0.606      | 0.091      | 0.142      | 0.002      | 0.001      | 0.114     | 0.001      |
|          | <i>p</i> -value <sup>b</sup> | 0.066      | 0.038      | 0.028      | 0.859      | 0.051      | 0.767     | 0.086      |
|          | <i>p</i> -value <sup>c</sup> | 0.028      | 0.018      | 0.018      | 0.043      | 0.018      | 0.310     | 0.018      |
| Symmetry | GVS                          | 1.80±1.77  | 0.68±0.38  | 0.78±0.78  | 0.50±0.26  | 0.41±0.33  | 0.55±0.41 | 0.79±0.53  |
|          | Non-GVS                      | 7.98±4.74  | 3.04±1.69  | 1.26±0.68  | 0.88±0.50  | 0.64±0.25  | 0.48±0.34 | 2.38±0.92  |
|          | <i>p</i> -value <sup>a</sup> | <0.001     | <0.001     | <0.001     | 0.071      | 0.681      | 0.758     | <0.001     |
|          | <i>p</i> -value <sup>b</sup> | 0.214      | 0.515      | 0.139      | 0.678      | 0.260      | 0.767     | 0.594      |
|          | <i>p</i> -value <sup>c</sup> | 0.018      | 0.018      | 0.018      | 0.128      | 0.310      | 0.735     | 0.018      |

The average values of the two groups were tested by Mann-Whitney U tests. The VOR changes in each group were tested by Wilcoxon signed rank tests. <sup>a</sup>=statistics between the GVS and non-GVS groups by Mann-Whitney U test. <sup>b</sup>=statistics between baseline and the GVS groups by Wilcoxon signed rank test. <sup>c</sup>=statistics between the baseline and non-GVS groups by Wilcoxon signed rank test. VOR, vestibulo-ocular reflex; GVS, galvanic vestibular stimulation.