**Supplemental Tables and Figures:**

**Supplemental Figure 1.** Pie charts of **A.** voltage clamp (V=0) and **B.** current clamp (I=0) recordings of spontaneous neuronal activity of LHb neurons in intact synaptic transmission (same non-MD controls from Figure 6), BTRX (short-acting KOR antagonist), aticaprant (short-acting KOR antagonist), complete fast synaptic blockade (SynBl), DNQX (blocking AMPARs), APV (blocking NMDARs) or PTX (picrotoxin for blocking GABARs) conditions in slices from non-MD rats (n=19-45 cells/4-8 rats/group for KOR antagonists and synaptic blockade groups except the intact condition derived from Figure 6) (Chi squraed test, # p=0.0518, * p<0.05, ***p<0.0001).

**Supplemental Figure 2:** Basal depolarization-induced AP recordings of **A.** Ih- and **B.** Ih+ neurons from non-MD rats in conditions of intact synaptic transmission (black symbols), BTRX (pink symbols), aticaprant (blue symbols), synaptic transmission blockade (SynBl, green symbols), DNQX (purple symbols), APV (orange symbols), PTX (maroon symbols) or MD rats in intact synaptic transmission (open symbols). Group n (neurons/rat) noted for each condition in top graph. 2-way ANOVA, *p<0.05, ** p<0.01, ***P<0.001, ***p<0.0001. Statistical analyses summarized in Supplemental Table 4.

**Supplemental Figure 3. Effects of MD on Dynorphin A (Dyn-A 1-8) expression in the LHb persisted across development.** Example images of Dyn-A immunolabeling and quantification across ages **A**. PN16 and **B**. PN60 of non-MD and MD rats (PN16: n=6-7 rats/group, PN60: n=7-8 rats/group). For both, non-MD (left) and MD (right) immunolabeling for LHb neurons (NeuN, red, top), Dyn-A(1-8) peptide (green, middle) and merged overlay images (bottom panel) are shown. Scale bar= 50μm. MD significantly increased average LHb Dyn-A density compared to non-MD controls (PN16: unpaired Student's t-test, t(11)=2.04, *p<0.05; PN60: unpaired Student's t-test, t(12)=3.4, **p<0.01).

**Supplemental Table 1. Effects of U50,488, on select membrane and AP properties on LHb neurons in slices from control non-MD rats in intact synaptic transmission.** Data represent measurements of Ih current, resting membrane potential (RMP), AP threshold, input resistance (Rin), fast after-hyperpolarization current (fAHP), medium- after hyperpolarization current (mAHP), AP amplitude, AP half-width as combined (pooled data from Ih+ and Ih- neurons, n=22-21/19-18 left column), Ih- neurons (n=13-12/10-9, middle column) or Ih+ neurons (n=9/9, right column). line 1: mean±SEM,; line 2: Result for passing (yes/no) the normal distribution test (Shapiro Wilks test, a=0.05); line 3 statistical summary: effect of U50,488 used paired student t-test (parametric) or Wilcoxon matched-pairs test (nonparametric) *p<0.05, **p<0.001, ***p<0.0001. Effect of Ih at baseline unpaired t-test (parametric) or Mann-Whitney U test (nonparametric) †<0.05, ††<0.001, †††<0.0001; any trending effects denoted with # and p value.

**Supplemental Table 2. Effects of KOR antagonist, BTRX and U50,488 on membrane and AP properties of LHb neurons in slices from control non-MD rats in intact synaptic transmission.** Data are shown for similar measurements of intrinsic membrane and AP properties as presented in table 1 for combined (n=7/6, left column), Ih- neurons (n=3/3, middle column) or Ih+ neurons (n=4/4, left column). Line 1: mean±SEM; line 2: Result for passing (yes/no) the normal distribution test (Shapiro Wilks test, a=0.05); line 3 statistical summary: effect of U50,488 used paired student t-test (parametric) or Wilcoxon matched-pairs test (nonparametric) *p<0.05, **p<0.001, ***p<0.0001. Effect of Ih at baseline unpaired t-test (parametric) or Mann-Whitney U test (nonparametric) †<0.05, ††<0.001, †††<0.0001; any trending effects denoted with # and p value.

**Supplemental Table 3. Effects of KOR antagonist, aticaprant, and U50,488 on membrane and AP properties of LHb neurons in slices from control non-MD rats in intact synaptic transmission.** Data are shown for similar measurements of intrinsic membrane and AP properties as presented in table 1 for combined (n=10/9, left column), Ih- neurons (n=5/4,

middle column) or Ih+ neurons (n=5/5, left column). Line 1: mean±SEM; line 2: Result for passing (yes/no) the normal distribution test (Shapiro Wilks test, a=0.05); line 3 statistical summary: effect of U50,488 used paired student t-test (parametric) or Wilcoxon matched-pairs test (nonparametric) *p<0.05, **p<0.001, ***p<0.0001. Effect of Ih at baseline unpaired t-test (parametric) or Mann-Whitney U test (nonparametric) †<0.05, ††<0.001, †††<0.0001; any trending effects denoted with # and p value.

**Supplemental Table 4. Statistical analyses for data from Supplemental Figure 2.** Summary of statistical analyses for baseline comparisons of depolarization-induced AP generation in Ih- and Ih+ neurons from non-MD rats in KOR antagonists or synaptic blocker/s.

**Supplemental Table 5. Effects of complete fast-synaptic blockade and U50,488 on membrane and AP properties of LHb neurons in slices from control non-MD rats.** Data are shown for similar measurements of intrinsic membrane and AP properties as presented in table 1 for combined (n=17/14, left column), Ih- neurons (n=10/8, middle column) or Ih+ neurons (n=7/7, left column). Line 1: mean±SEM; line 2: Result for passing (yes/no) the normal distribution test (Shapiro Wilks test, a=0.05); line 3 statistical summary: effect of U50,488 used paired student t-test (parametric) or Wilcoxon matched-pairs test (nonparametric) *p<0.05, **p<0.001, ***p<0.0001. Effect of Ih at baseline unpaired t-test (parametric) or Mann-Whitney U test (nonparametric) †<0.05, ††<0.001, †††<0.0001; any trending effects denoted with # and p value.

**Supplemental Table 6. Effects of DNQX (AMPAR blockade) and U50,488 on membrane and AP properties of LHb neurons in slices from control non-MD rats.** Data are shown for similar measurements of intrinsic membrane and AP properties as presented in table 1 for combined (n=11/9, left column), Ih- neurons (n=4/4, middle column) or Ih+ neurons (n=7/5, left column). Line 1: mean±SEM; line 2: Result for passing (yes/no) the normal distribution test (Shapiro Wilks test, a=0.05); line 3 statistical summary: effect of U50,488 used paired student t-test (parametric) or Wilcoxon matched-pairs test (nonparametric) *p<0.05, **p<0.001,

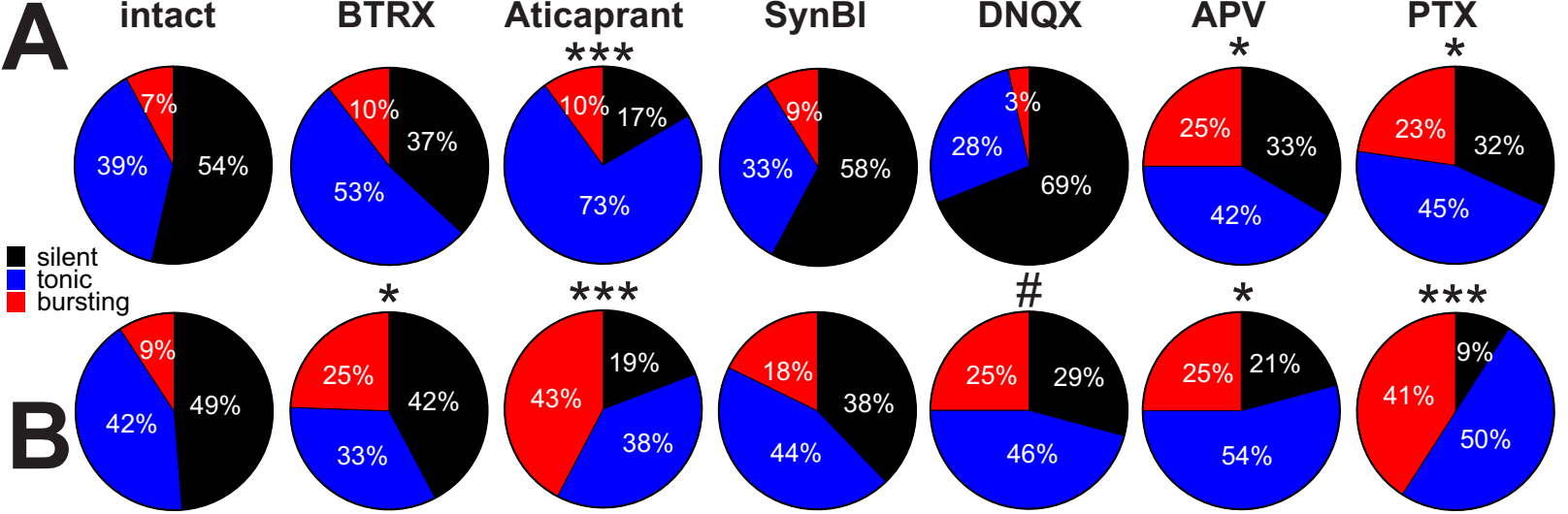
***p<0.0001. Effect of Ih at baseline unpaired t-test (parametric) or Mann-Whitney U test (nonparametric) †<0.05, ††<0.001, †††<0.0001; any trending effects denoted with # and p value.

**Supplemental Table 7. Effects of APV (NMDAR blockade) and U50,488 on membrane and AP properties of LHb neurons in slices from control non-MD rats.** Data are shown for similar measurements of intrinsic membrane and AP properties as presented in table 1 for combined (n=13/11, left column), Ih- neurons (n=5/4, middle column) or Ih+ neurons (n=8/8, left column). line 1: mean±SEM; line 2: Result for passing (yes/no) the normal distribution test (Shapiro Wilks test, a=0.05); line 3 statistical summary: effect of U50,488 used paired student t-test (parametric) or Wilcoxon matched-pairs test (nonparametric) *p<0.05, **p<0.001, ***p<0.0001. Effect of Ih at baseline unpaired t-test (parametric) or Mann-Whitney U test (nonparametric) †<0.05, ††<0.001, †††<0.0001; any trending effects denoted with # and p value.

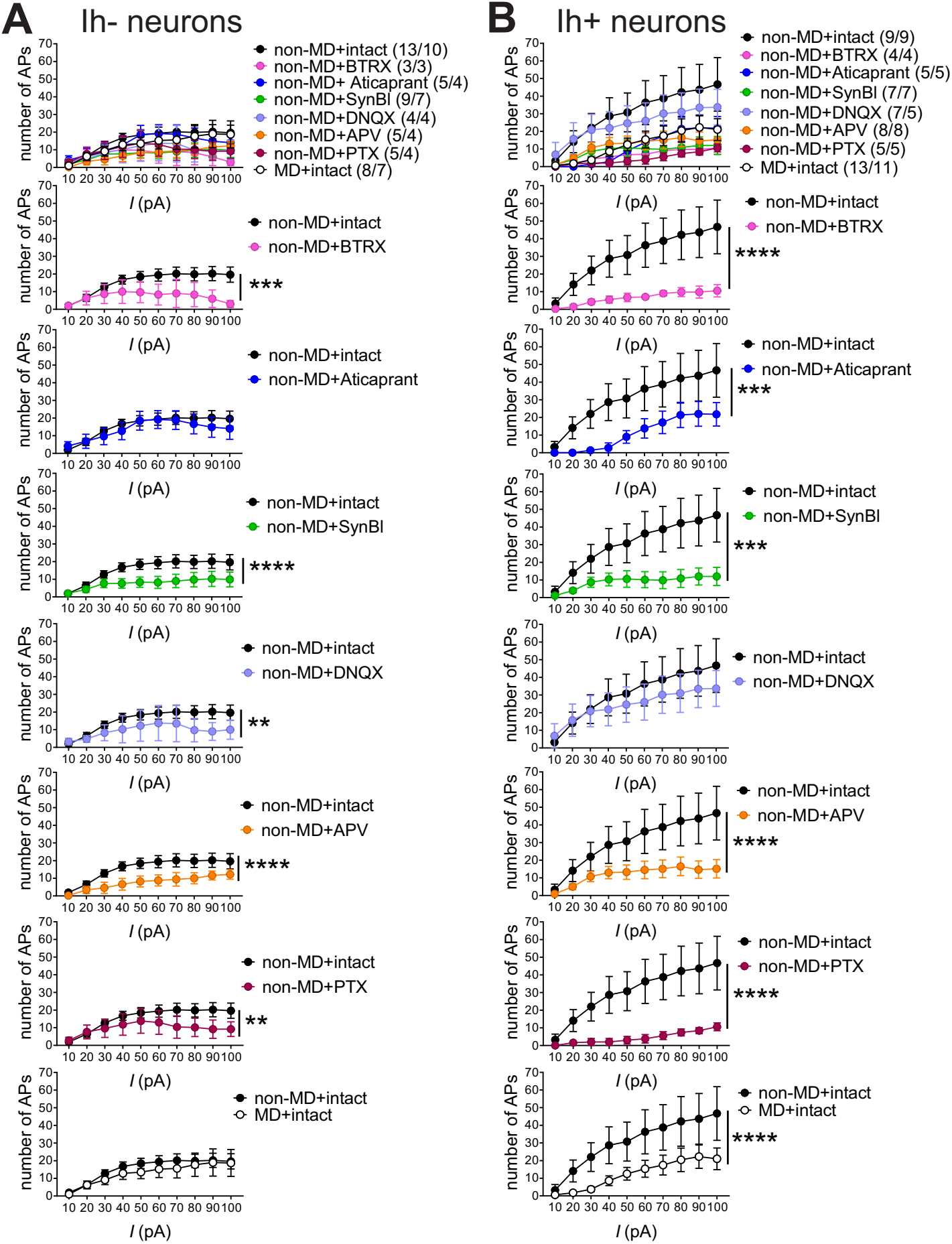
**Supplemental Table 8. Effects of PTX ($GABA_AR$ blockade) and U50,488 on membrane and AP properties of LHb neurons in slices from control non-MD rats.** Data are shown for similar measurements of intrinsic membrane and AP properties as presented in table 1 for combined (n=10/8, left column), Ih- neurons (n=5/4, middle column) or Ih+ neurons (n=5/4, left column). line 1: mean±SEM; line 2: Result for passing (yes/no) the normal distribution test (Shapiro Wilks test, a=0.05); line 3 statistical summary: effect of U50,488 used paired student t-test (parametric) or Wilcoxon matched-pairs test (nonparametric) *p<0.05, **p<0.001, ***p<0.0001. Effect of Ih at baseline unpaired t-test (parametric) or Mann-Whitney U test (nonparametric) †<0.05, ††<0.001, †††<0.0001; any trending effects denoted with # and p value.

**Supplemental Table 9. Effects of U50,488 on membrane and AP properties of LHb neurons in slices from MD rats with intact synaptic transmission.** Data are shown for

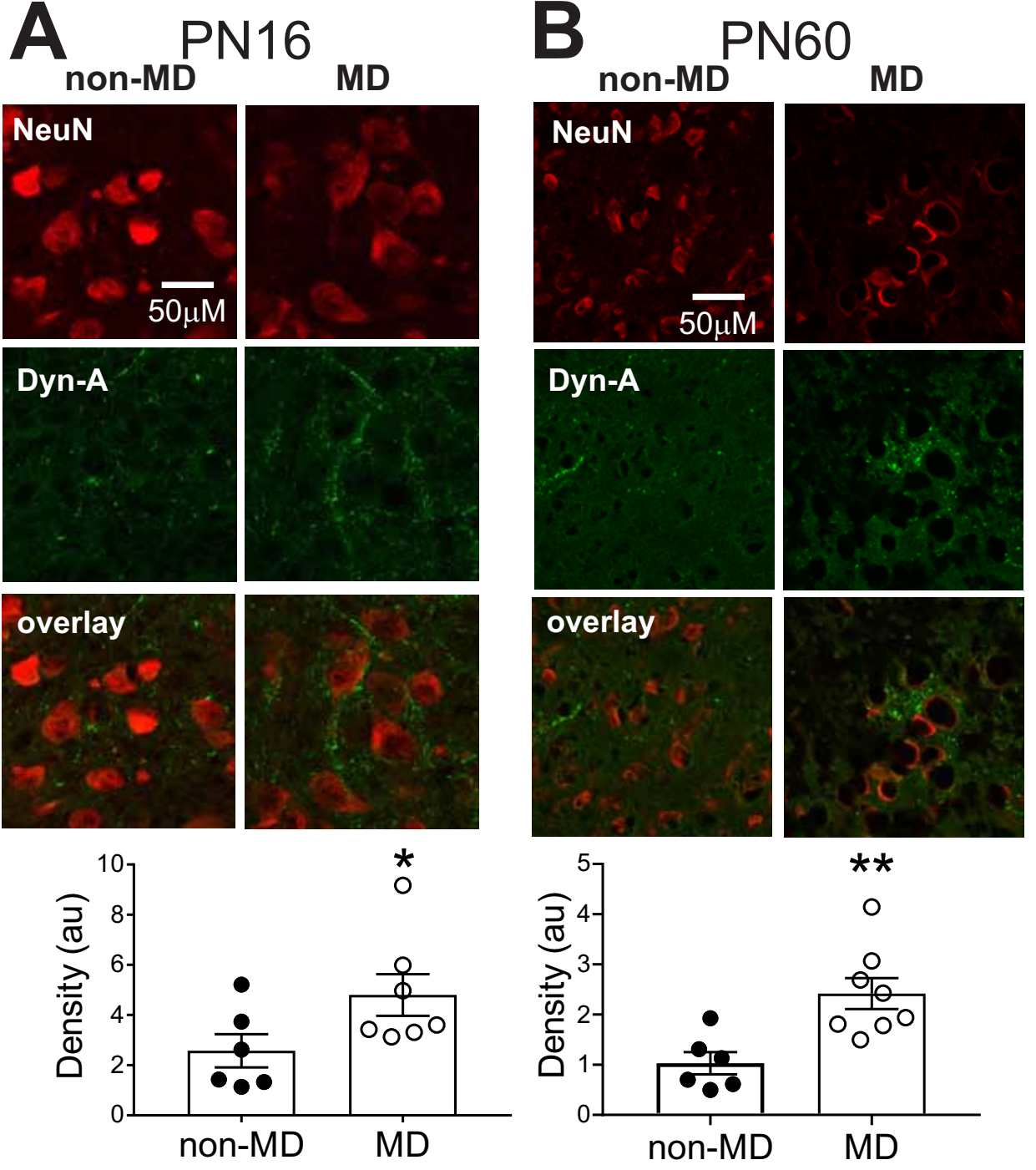
similar measurements of intrinsic membrane and AP properties as presented in table 1 for combined (n20/18,left column), Ih- neurons (n=8/7, middle column) or Ih+ neurons (n=12/11, left column). line 1: mean±SEM, (neurons/rat); line 2: Result for passing (yes/no) the normal distribution test (Shapiro Wilks test, a=0.05); line 3 statistical summary: (1) combined data: paired student t-test (parametric) or paired Mann-Whitney U test (nonparametric) (2) Across either Ih- or Ih+ data: mixed effects ANOVA (parametric) or RM Friedman's test followed with paired student t-test or Mann Whitney U test, where appropriate. Effect of U50,488: *p<0.05, **p<0.001, ***p<0.0001, effect of Ih (baseline difference): †<0.05, ††<0.001, †††<0.0001; Any trending effects denoted with # and p value stated.




**Supplemental Figure 1:** Pie charts of **A.** voltage clamp (V=0) and **B.** current clamp (I=0) recordings of spontaneous neuronal activity of LHb neurons in intact synaptic transmission,KOR anatgonists or synaptic blockers in slices from non-MD rats and those in intact synaptic transmission in slices from MD rats.




**Supplemental Figure 2:** Basal depolarization-induced AP recordings of **A.** Ih- and **B.** Ih+ neurons from non-MD rats in conditions of intact synaptic transmission or synaptic blockers.




**Supplemental Figure 3:** Effects of MD on Dynorphin A (Dyn-A 1-8) expression in the LHb persisted across development.

| | Combined | | Ih- | | Ih+ | |
|---|---|---|---|---|---|---|
| **Property** | **baseline** | **U50,488** | **baseline** | **U50,488** | **baseline** | **U50,488** |
| **Ih (pA)** | -19.9 ± 5.6 | NA | -3.3 ± 0.9 | NA | -56.3 ± 13.3 | NA |
| parametric | no | | yes | | no | |
| significance | | | ††† | | ††† | |
| **RMP (mV)** | -48.6 ± 2.5 | NA | -49.3 ± 3.8 | NA | -47.6 ± 3.0 | NA |
| parametric | yes | | yes | | yes | |
| significance | | | | | | |
| **Rin (MOhm)** | 374.8 ± 35 | 401.6 ± 35.4 | 472.3 ± 36.4 | 479.8 ± 46.4 | 244.7 ± 32.5 | 297.4 ± 31.6 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | | †† | | †† | * |
| **AP Threshold (mV)** | -37.1 ± 1.0 | -42.2 ± 1.4 | -34.8 ± 0.8 | -39.7 ± 1.2 | -40.4 ± 1.7 | -45.8 ± 2.8 |
| parametric | yes | no | yes | yes | yes | yes |
| significance | | *** | †† | ** | †† | ** |
| **fAHP (mV)** | -3.3 ± 2.3 | -8.0 ± 1.8 | -1.0 ± 2.9 | -4.4 ± 1.9 | -6.7 ± 3.4 | -13.12 ± 2.6 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | * | | | | * |
| **mAHP (mV)** | -34.1 ± 1.0 | -28.1 ± 1.5 | -36.1 ± 0.9 | -29.2 ± 1.4 | -31.1 ± 1.7 | -26.4 ± 3.1 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | *** | † | ** | † | * |
| **AP amplitude (mV)** | 105.9 ± 2.3 | 100.4 ± 2.5 | 107.1 ± 2.7 | 98.4 ± 2.7 | 104.2 ± 4.2 | 103.2 ±4.6 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | * | | * | | |
| **AP halfwidth (ms)** | 1.9 ± 0.1 | 1.7 ± 0.1 | 2.2 ± 0.2 | 2.1 ± 0.2 | 1.5 ± 0.2 | 1.3 ± 0.1 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | | †† | | †† | |

**Supplemental Table 1.** Membrane and AP properties of Ih- and Ih+ LHb neurons before and after U50,488 bath application in slices from non-MD control rats in intact synaptic transmission.

| | Combined | | Ih- | | Ih+ | |
|---|---|---|---|---|---|---|
| **Property** | **baseline** | **U50,488** | **baseline** | **U50,488** | **baseline** | **U50,488** |
| **Ih (pA)** | -30.7 ± 12.2 | NA | -7.2 ± 1.1 | NA | -48.4 ± 16.7 | NA |
| parametric | no | | yes | | no | |
| significance | | | #† p=0.0571 | | #† p=0.0571 | |
| **RMP (mV)** | -45.5 ± 4.2 | NA | -42 ± 8.8 | NA | -48 ± 4.2 | NA |
| parametric | yes | | yes | | yes | |
| significance | | | | | | |
| **Rin (MOhm)** | 443.8 ± 98.9 | 490.2 ± 95.9 | 646.0 ± 143.2 | 705.8 ± 103.9 | 292.2 ± 78.3 | 328.6 ± 80.44 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | # p=0.0945 | #† p=0.0666 | | #† p=0.0666 | |
| **AP Threshold (mV)** | -37.7 ± 1.4 | -40.6 ± 1.6 | -35.1 ± 1.8 | -37.8 ± 1.9 | -39.7 ± 1.6 | 42.7 ± 1.8 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | # p=0.0782 | | | | * |
| **fAHP (mV)** | -0.4 ± 3.3 | -11.4 ± 3.1 | 5.6 ± 6.1 | -6.6 ± 4.8 | -4.9 ± 2.1 | -14.9 ± 3.5 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | ** | | | | # p=0.0529 |
| **mAHP (mV)** | -33.4 ± 2.1 | -34.7 ± 2.2 | -36.5 ± 2.7 | -34.8 ± 1.7 | -31.1 ± 2.9 | -34.6 ± 3.9 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | | | | | |
| **AP amplitude (mV)** | 99.1 ± 4.1 | 94.3 ± 5.8 | 96.5 ± 7.4 | 85.6 ± 7.3 | 101.0 ± 5.4 | 100.8 ± 7.7 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | | | | | |
| **AP halfwidth (ms)** | 2.2 ± 0.3 | 2.2 ± 0.4 | 2.7 ± 0.4 | 2.9 ± 0.5 | 1.9 ± 0.3 | 1.6 ±0.3 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | | | | | * |

**Supplemental Table 2.** Membrane and AP properties of Ih- and Ih+ LHb neurons before and after U50,488 bath application in slices from non-MD control rats in the presence of BTRX.

| | Combined | | Ih- | | Ih+ | |
|---|---|---|---|---|---|---|
| **Property** | **baseline** | **U50,488** | **baseline** | **U50,488** | **baseline** | **U50,488** |
| **Ih (pA)** | -65.5 ± 23.3 | NA | -2.0 ± 1.7 | NA | -119.0 ± 27.4 | NA |
| parametric | no | | yes | | yes | |
| significance | | | †† | | | |
| **RMP (mV)** | -54.0 ± 4.4 | NA | -48.5 ± 6.4 | NA | -59.5 ± 5.5 | NA |
| parametric | no | | yes | | no | |
| significance | | | | | | |
| **Rin (MOhm)** | 404.0 ± 112.5 | 459.9 ± 124.6 | 663.6 ± 150.8 | 741.1 ± 170.4 | 144.4 ± 22.5 | 178.6 ± 36.1 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | * | †† | # p=0.0884 | †† | |
| **AP Threshold (mV)** | -37.4 ± 2.1 | -40.0 ± 1.8 | -33.9 ± 2.6 | -39.0 ± 2.6 | -40.8 ± 2.6 | -41.0 ± 2.6 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | * | #† p=p0.0948 | * | #† p=p0.0948 | |
| **fAHP (mV)** | -5.6 ± 3.3 | -7.6 ± 3.0 | -4.1 ± 5.2 | -6.8 ± 3.7 | -7.1 ± 4.4 | -8.4 ± 5.3 |
| parametric | yes | yes | yes | yes | no | yes |
| significance | | | | | | |
| **mAHP (mV)** | -34.2 ± 1.8 | -32.6 ± 1.7 | -36.5 ± 2.6 | -31.8 ± 2.2 | -31.8 ± 2.2 | -33.4 ± 2.8 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | | | | | |
| **AP amplitude (mV)** | 103.1 ± 4.2 | 90.9 ± 4.0 | 107.8 ± 6.0 | 91.9 ± 6.2 | 98.4 ± 5.8 | 89.9 ± 5.7 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | # p=0.0644 | | * | | |
| **AP halfwidth (ms)** | 1.9 ± 0.2 | 2.0 ± 0.2 | 2.3 ± 0.2 | 2.5 ± 0.2 | 1.5 ± 0.2 | 1.6 ± 0.2 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | | † | | † | |

**Supplemental Table 3.** Membrane and AP properties of Ih- and Ih+ LHb neurons before and after U50,488 bath application in slices from non-MD control rats in the presence of aticaprant.

| | | Ih- | Ih+ |
|---|---|---|---|
| non-MD vs BTRX | effect of treatment | F(1,140)=14.1, p<0.001 | F(1,110)=19.0, p<0.0001 |
| | effect of current | F(9,140)=1.3, p>0.05 n.s. | F(9,110)=0.9, p>0.05 n.s. |
| | treatment x current | F(9,190)=0.6, p>0.05 n.s. | F(9,110)=0.4, p>0.05 n.s. |
| non-MD vs Aticaprant | effect of treatment | F(1,170)=1.3, p>0.05 n.s. | F(1,120)=15.22, p<0.001 |
| | effect of current | F(9,170)=4.0, p=0.0001 | F(9,120)=2.1, p<0.05 |
| | treatment x current | F(9,170)=0.2, p>0.05 n.s. | F(9,120)=0.2, p>0.05 n.s. |
| non-MD vs SynBl | effect of treatment | F(1,200)=28.7, p<0.0001 | F(1,140)=25.8, p<0.0001 |
| | effect of current | F(9,200)=3.8, p<0.01 | F(9,140)=1.7, p>0.05 n.s. |
| | treatment x current | F(9,200)=0.7, p>0.05 n.s. | F(9,140)=0.6, p>0.05 n.s. |
| non-MD vs DNQX | effect of treatment | F(1,150)=8.1, p<0.01 | F(1,140)=0.04, p>0.05 n.s. |
| | effect of current | F(9,150)=2.0, p<0.05 | F(9,140)=2.8, p<0.01 |
| | treatment x current | F(9,150)=0.3, p>0.05 n.s. | F(9,140)=0.04, p>0.05 n.s. |
| non-MD vs APV | effect of treatment | F(1,170)=33.4, p<0.0001 | F(1,130)=13.9, p<0.001 |
| | effect of current | F(9,170)=43.5, p<0.001 | F(9,130)=1.7, # p=0.0881 |
| | treatment x current | F(9,170)=0.5, p>0.05 n.s. | F(9,130)=0.4, p>0.05 n.s. |
| non-MD vs PTX | effect of treatment | F(1,160)=9.2, p<0.01 | F(1,120)=28.1, p<0.0001 |
| | effect of current | F(9,160)=2.3, p<0.05 | F(9,120)=1.2, p>0.05 n.s. |
| | treatment x current | F(9,160)=0.6, p>0.05 n.s. | F(9,120)=0.5, p>0.05 n.s. |
| non-MD vs MD | effect of treatment | F(1,187)=2.3, p>0.05 n.s. | F(1,190)=26.8, p<0.0001 |
| | effect of current | F(9,187)=5.0, p>0.0001 | F(9,190)=4.0, p=0.0001 |
| | treatment x current | F(9,187)=0.1, p>0.05 | F(9,190)=0.3, p>0.05 n.s. |

**Supplemental Table 4.** Statistical Analyses (2-way ANOVA) for the data from Supplemental Figure 2.

| | Combined | | Ih- | | Ih+ | |
|---|---|---|---|---|---|---|
| **Property** | **basline** | **U50,488** | **baseline** | **U50,488** | **baseline** | **U50,488** |
| **Ih** | -14.0 ± 5.2 | NA | -2.1 ± 1.2 | NA | -33.9 ± 9.3 | NA |
| parametric | no | | yes | | yes | |
| significance | | | †† | | †† | |
| **RMP** | -45.7 ± 2.7 | NA | -44.2 ± 3.7 | NA | -47.9 ± 4.0 | NA |
| parametric | yes | | yes | | yes | |
| significance | | | | | | |
| **Rin** | 408.9 ± 53.3 | 516.4 ± 57.1 | 493.1 ± 65.5 | 611.6 ± 65.6 | 268.7 ± 59.8 | 357.7 ± 71.1 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | ** | † | ** | † | |
| **AP Threshold** | -34.7 ± 1.7 | -40.9 ± 1.6 | -32.1 ± 2.4 | -38.2 ± 1.9 | -38.5 ± 1.8 | -44.8 ± 2.1 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | *** | †# p=0.0679 | ** | †# p=0.0679 | ** |
| **fAHP** | -7.3 ± 1.7 | -11.8 ± 1.7 | -8.2 ± 2.5 | -13.3 ± 2.3 | -6.0 ± 2.3 | -9.7 ± 2.4 |
| parametric | yes | yes | yes | yes | yes | no |
| significance | | ** | | * | | * |
| **mAHP** | -36.2 ± 1.9 | -30.3 ± 1.8 | -39.0 ± 2.7 | -34.0 ± 1.7 | -32.3 ± 1.5 | -24.9 ± 2.6 |
| parametric | no | yes | yes | yes | yes | yes |
| significance | | *** | †# p=0.0753 | ** | †# p=0.0753 | ** |
| **AP amplitude** | 108.6 ± 1.5 | 95.7 ± 1.6 | 108.4 ± 2.0 | 94.4 ± 2.5 | 108.8 ± 2.7 | 97.6 ± 1.6 |
| parametric | yes | no | yes | yes | yes | yes |
| significance | | *** | | *** | | ** |
| **AP halfwidth** | 1.9 ± 0.1 | 2.0 ± 0.1 | 2.1 ± 0.1 | 2.3 ± 0.1 | 1.6 ± 0.2 | 1.6 ± 0.2 |
| parametric | no | yes | yes | yes | yes | yes |
| significance | | | † | | † | |

**Supplemental Table 5.** Membrane and AP properties of Ih- and Ih+ LHb neurons before and after U50,488 bath application in slices from non-MD control rats with fast synaptic transmission blocked.

| | combined | | Ih- | | Ih+ | |
|---|---|---|---|---|---|---|
| **Property** | baseline | U50,488 | baseline | U50,488 | baseline | U50,488 |
| **Ih** | -37.8 ± 13.4 | NA | -2.2 ± 1.5 | NA | -58.1 ± 16.7 | NA |
| parametric | no | | yes | | no | |
| significance | | | † | | † | |
| **RMP** | -45.7 ± 3.0 | NA | -39.7 ± 2.9 | NA | -49.1 ± 4.0 | NA |
| parametric | yes | | yes | | yes | |
| significance | | | | | | |
| **Rin** | 449.0 ± 107.0 | 534.35 ± 122.68 | 838.7 ± 121.5 | 1020.2 ± 108.7 | 226.3 ± 55.1 | 256.7 ± 26.7 |
| parametric | yes | no | no | yes | no | yes |
| significance | | * | †† | | †† | |
| **AP Threshold** | -39.3 ± 1.7 | -42.9 ± 2.2 | -34.1 ± 1.7 | -38.5 ± 1.3 | -40.7 ± 2.4 | -44.9 ± 3.1 |
| parametric | yes | yes | yes | yes | no | yes |
| significance | | ** | | | | ** |
| **fAHP** | -7.0 ± 2.8 | -11.0 ± 1.9 | -8.6 ± 6.8 | -15.5 ± 2.7 | -6.7 ± 2.8 | -8.8 ± 2.0 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | | | | | |
| **mAHP** | -33.1 ± 1.6 | -28.4 ± 2.5 | -34.3 ± 1.9 | -31.4 ± 2.1 | -32.7 ± 2.2 | -27.2 ± 3.4 |
| parametric | yes | yes | yes | yes | yes | no |
| significance | | * | | | | * |
| **AP amplitude** | 102.1 ± 5.6 | 88.7 ± 4.9 | 111.8 ± 10.2 | 94.7 ± 6.0 | 96.5 ± 6.2 | 85.3 ± 7.0 |
| parametric | yes | yes | yes | yes | no | yes |
| significance | | * | | # p=0.0935 | | |
| **AP halfwidth** | 2.1 ± 0.2 | 2.0 ± 0.2 | 2.7 ± 0.4, n4/4 | 2.4 ± 0.1 | 1.7 ± 0.2 | 1.9 ± 0.2 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | | † | | † | |

**Supplemental Table 6.** Membrane and AP properties of Ih- and Ih+ LHb neurons before and after U50,488 bath application in slices from non-MD control rats with AMPARs blocked using DNQX.

| | combined | | Ih- | | Ih+ | |
|---|---|---|---|---|---|---|
| **Property** | baseline | U50,488 | baseline | U50,488 | baseline | U50,488 |
| **Ih** | -31.0 ± 10.6 | NA | -4.9 ± 1.7 | NA | -47.3 ± 14.5 | NA |
| parametric | no | | yes | | no | |
| significance | | | †† | | †† | |
| **RMP** | -43.5 ± 2.9 | NA | -46.3 ± 6.1 | NA | -41.8 ± 2.9 | NA |
| parametric | yes | | yes | | yes | |
| significance | | | | | | |
| **Rin** | 323.3 ± 39.1 | 383.0 ± 36.6 | 331.6 ± 53.5 | 387.9 ± 55.5 | 318.2 ± 56.8 | 379.9 ± 51.1 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | ** | | # p=0.0976 | | * |
| **AP Threshold** | -37.2 ± 1.1 | -40.2 ± 1.5 | -35.3 ± 1.6 | -37.2 ± 2.7 | -38.4 ± 1.3 | -42.1 ± 1.5 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | * | | | | # p=0.0617 |
| **fAHP** | -2.7 ± 1.4 | -6.3 ± 1.5 | -3.8 ± 3.1 | -4.8 ± 3.2 | -2.0 ± 1.3 | -7.3 ± 1.4 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | ** | | # p=0.0594 | | * |
| **mAHP** | -33.4 ± 1.3 | -31.4 ± 1.6 | -35.7 ± 1.8 | -34.5 ± 2.2 | -31.9 ± 1.6 | -29.5 ± 1.9 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | | | | | |
| **AP amplitude** | 107.4 ± 2.5 | 104.8 ± 3.9 | 114.8 ± 2.3 | 101.6 ±5.5 | 102.8 ± 2.8 | 106.7 ± 5.6 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | | † | # p=0.0620 | † | |
| **AP halfwidth** | 2.3 ± 0.3 | 2.4 ± 0.3 | 2.9 ± 0.6 | 3.2 ± 0.6 | 1.9 ± 0.2 | 1.9 ± 0.2 |
| parametric | no | no | no | yes | yes | yes |
| significance | | | † | | † | |

**Supplemental Table 7.** Membrane and AP properties of Ih- and Ih+ LHb neurons before and after U50,488 bath application in slices from non-MD control rats with NMDARs blocked using APV.

| | combined | | Ih- | | Ih+ | |
|---|---|---|---|---|---|---|
| **Property** | baseline | U50,488 | baseline | U50,488 | baseline | U50,488 |
| **Ih** | -58.6 ± 27.5 | NA | -0.7 ± 3.1 | NA | -116.5 ± 41.5 | NA |
| parametric | no | | yes | | no | |
| significance | | | † | | † | |
| **RMP** | -52.3 ± 3.1 | NA | -46.6 ± 4.0 | NA | -58.0 ± 3.3 | NA |
| parametric | yes | | yes | | yes | |
| significance | | | †# p=0.0583 | | †# p=0.0583 | |
| **Rin** | 328.8 ± 98.7 | 421.4 ± 116.7 | 506.4 ± 161.3 | 657.6 ± 44.5 | 151.1 ± 44.5 | 185.2 ± 44.9 |
| parametric | no | no | yes | yes | yes | yes |
| significance | | ** | †# p=0.0665 | | †# p=0.0665 | ** |
| **AP Threshold** | -36.8 ± 2.1 | -39.4 ± 2.2 | -35.8 ± 2.0 | -37.8 ± 3.9 | -37.9 ± 3.9 | -41.0 ± 4.1 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | * | | # p=0.0985 | | # p=0.0861 |
| **fAHP** | -3.7 ± 1.7 | -7.14 ± 2.6 | -3.1 ± 2.4 | -5.7 ± 4.8 | -4.2 ± 2.8 | -8.6 ± 2.4 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | # p=0.0876 | | | | # p=0.0833 |
| **mAHP** | -34.8 ± 2.1 | -30.6 ± 2.1 | -33.5 ± 2.6 | -30.8 ± 2.5 | -36.1 ± 3.4 | -30.3 ± 3.8 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | ** | | # p=0.0508 | | ** |
| **AP amplitude** | 115.9 ± 5.0 | 111.0 ± 3.2 | 117.6 ± 7.9 | 112.4 ± 5.7 | 114.3 ± 7.0 | 109.7 ± 3.5 |
| parametric | yes | yes | yes | yes | no | yes |
| significance | | | | | | |
| **AP halfwidth** | 2.3 ± 0.4, n10/7 | 1.9 ± 0.3 | 3.1 ± 0.6 | 2.5 ± 0.5 | 1.4 ± 0.1, n5/4 | 1.3 ± 0.1 |
| parametric | no | no | yes | yes | yes | yes |
| significance | | | † | | † | |

**Supplemental Table 8.** Membrane and AP properties of Ih- and Ih+ LHb neurons before and after U50,488 bath application in slices from non-MD control rats with $GABA_A$Rs blocked using Picrotoxin (PTX).

| | combined | | Ih- | | Ih+ | |
|---|---|---|---|---|---|---|
| **Property** | baseline | U50,488 | baseline | U50,488 | baseline | U50,488 |
| **Ih** | -28.0 ± 5.9 | NA | -4.1 ± 1.5 | NA | -44.0 ± 6.4 | NA |
| parametric | no | | yes | | yes | |
| significance | | | ††† | | ††† | |
| **RMP** | -47.6 ± 1.9 | NA | -44.9 ± 2.4 | NA | -49.5 ± 2.7 | NA |
| parametric | yes | | yes | | yes | |
| significance | | | | | | |
| **Rin** | 305.6 ± 36.5 | 339.3 ± 45.0 | 421.5 ± 55.8 | 485.1 ± 79.8 | 228.3 ± 33.9 | 242.0 ± 31.2 |
| parametric | yes | no | yes | | yes | |
| significance | | # p=0.0813 | †† | | †† | |
| **AP Threshold** | -37.1 ± 1.2 | -41.3 ± 1.7 | -37.0 ± 2.2 | -43.1 ± 2.6 | -37.1 ± 1.4 | -40.1 ± 2.2 |
| parametric | yes | yes | no | yes | yes | yes |
| significance | | ** | | * | | * |
| **fAHP** | -6.2 ± 1.8 | -10.2 ± 1.9 | -5.4 ± 3.3 | -10.6 ± 3.9 | -6.8 ± 2.3 | -9.9 ± 2.1 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | * | | | | |
| **mAHP** | -34.2 ± 1.1 | -28.1 ± 1.6 | -33.3 ± 1.7 | -26.6 ± 2.6, | -34.9 ± 1.5 | -29.2 ± 2.1 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | *** | | * | | * |
| **AP amplitude** | 107.6 ± 1.4 | 95.6 ± 2.6 | 107.8 ± 2.3 | 98.9 ± 4.6 | 107.5 ± 1.7 | 93.4 ± 3.0 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | *** | | # p=0.0591 | | ** |
| **AP halfwidth** | 1.9 ± 0.1 | 2.0 ± 0.1 | 2.1 ± 0.2 | 2.3 ± 0.1 | 1.7 ± 0.1 | 1.8 ± 0.1 |
| parametric | yes | yes | yes | yes | yes | yes |
| significance | | | †# p=0.0735 | | †# p=0.0735 | |

**Supplemental Table 9.** Membrane and AP properties of Ih- and Ih+ LHb neurons before and after U50,488 bath application in slices from MD rats in intact synaptic transmission.