# *Supplementary Material*

## Supplementary Table 1. Abbreviations

| Definition | Abbreviation |
|---|---|
| **Isocortex** | |
| Orbital area | ORB |
| Agranular insular area | AI |
| Somatomotor areas | MO |
| Perirhinal area | PERI |
| Somatosensory areas | SS |
| **Olfactory region** | **OLF** |
| Main olfactory bulb | MOB |
| Accessory olfactory bulb | AOB |
| Anterior olfactory nucleus | AON |
| Dorsal part of the AON | AONd |
| Lateral part of the AON | AONl |
| Medial part of the AON | AONm |
| Posteroventral part of the AON | AONpv |
| Piriform cortex | PC |
| Anterior piriform cortex | APC |
| Rostral part of the APC | rAPC |
| Caudal part of the APC | cAPC |
| Posterior piriform cortex | PPC |
| Taenia tecta | TT |
| Dorsal part of the TT | TTd |
| Ventral part of the TT | TTv |
| Nucleus of the lateral olfactory tract | NLOT |
| Cortical amygdalar area | COA |
| Anterior part of the COA | COAa |
| Posterolateral part of the COA | COApl |
| Posteromedial part of the COA | COApm |
| Postpiriform transition area | TR |
| Piriform-amygdalar area | PAA |
| **Hippocampal formation** | **HPF** |
| Hippocampal region | HIP |
| Retrohippocampal region | RHP |

| | |
|---|---|
| Lateral entorhinal cortex | LEC |
| **Cortical subplate** | **CTXsp** |
| Endopiriform nucleus | EP |
| Basomedial amygdalar nucleus | BMA |
| Basolateral amygdalar nucleus | BLA |
| **Cerebral nuclei** | **CNU** |
| Striatum | STR |
| Anterior amygdalar area | AAA |
| Central amygdalar area | CEA |
| Medial amygdalar area | MEA |
| Pallidum | PAL |
| Substantia innominate | SI |
| Magnocellular nucleus | MA |
| Medial septal complex | MSC |
| **Interbrain** | **IB** |
| Thalamus | TH |
| Midline group of the dorsal thalamus | MTN |
| Hypothalamus | HY |
| **Midbrain** | **MB** |
| Ventral tegmental area | VTA |
| Dorsal raphe nucleus | DR |
| **Hindbrain** | **HB** |
| Locus coeruleus | LC |
| **Others** | |
| Lateral olfactory tract | LOT |
| Basal forebrain | BF |
| Amygdala | AMY |
| Anterior to posterior | AP |
| Adeno-associated virus | AAV |
| Rabbit virus | RV |
| γ-aminobutyric acid | GABA |
| Excitatory postsynaptic currents | EPSC |
| Phosphate buffered saline | PBS |
| Paraformaldehyde | PFA |

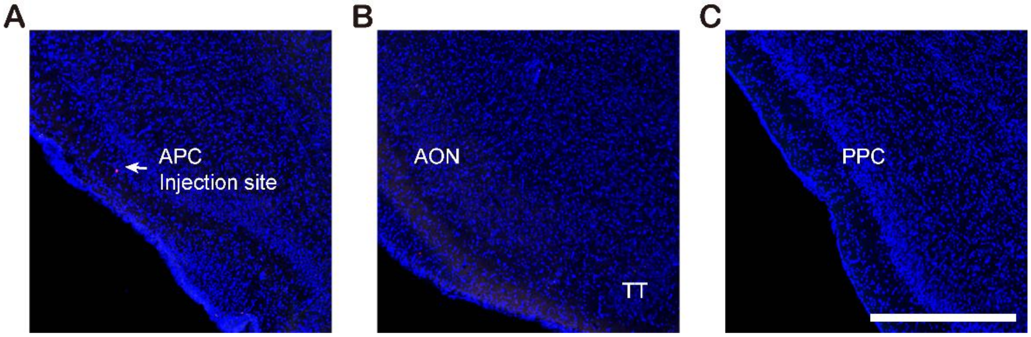
**Supplementary Table 2. Statistical analyses**

| Figure | Target | Data values | P values | Methods |
|---|---|---|---|---|
| 2B | OLF | 77.44%±0.96% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 68.74%±1.43% | <0.001 | T-tests |
| | OLF | 82.93%±1.54% for APC$^{Gad2+}$ vs PPC$^{Gad2+}$, 57.07%±4.17% | <0.001 | T-tests |
| | HPF | 2.00%±0.43% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 8.37%±1.38% | 0.001 | T-tests |
| | HPF | 0.89%±0.29% for APC$^{Gad2+}$ vs PPC$^{Gad2+}$, 7.24%±1.74% | 0.002 | T-tests |
| | CNU | 4.07%±0.34% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 8.44%±0.50% | <0.001 | T-tests |
| | CNU | 5.80%±0.85% for APC$^{Gad2+}$ vs PPC$^{Gad2+}$, 15.81%±1.79% | 0.002 | T-tests |
| 2C | Ipsi-MOB | 15.43%±1.38% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 11.63%±0.96% | 0.048 | T-tests |
| | Ipsi-MOB | 37.50%±5.39% for APC$^{Gad2+}$ vs PPC$^{Gad2+}$, 5.67%±2.53% | <0.001 | T-tests |
| | Ipsi-PC | 20.79%±1.77% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 44.26%±1.73% | <0.001 | T-tests |
| | Ipsi-PC | 22.71%±6.82% for APC$^{Gad2+}$ vs PPC$^{Gad2+}$, 42.55%±4.50% | 0.044 | T-tests |
| | Ipsi-AON | 30.77%±1.62% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 6.96%±1.02% | <0.001 | T-tests |
| | Ipsi-AON | 14.33%±6.88% for APC$^{Gad2+}$ vs PPC$^{Gad2+}$, 1.83%±0.41% | 0.083 | T-tests |
| | Ipsi-EP | 7.85%±0.74% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 7.81%±0.27% | 0.956 | T-tests |
| | Ipsi-EP | 8.57%±1.03% for APC$^{Gad2+}$ vs PPC$^{Gad2+}$, 12.36%±2.29% | 0.115 | T-tests |
| | Ipsi-RHP | 1.73%±0.38% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 5.87%±0.98% | 0.003 | T-tests |
| | Ipsi-RHP | 0.89%±0.29% for APC$^{Gad2+}$ vs PPC$^{Gad2+}$, 6.22%±1.41% | 0.002 | T-tests |
| | Contra-AON | 13.06%±1.39% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 0.25%±0.11% | <0.001 | T-tests |
| | Contra-AON | 4.09%±2.50% for APC$^{Gad2+}$ vs PPC$^{Gad2+}$, 0.13%±0.08% | 0.164 | T-tests |
| 4B | MOB | 24.68%±1.37% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 17.20%±1.01% | 0.001 | T-tests |
| | AON | 28.55%±2.25% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 10.12%±1.33% | <0.001 | T-tests |
| | PC | 30.45%±2.65% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 64.97%± 1.34% | <0.001 | T-tests |
| | TT | 8.45%±1.62% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 3.10%±0.32% | 0.009 | T-tests |
| | NLOT | 3.26%±0.82% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 0.69%±0.21% | 0.013 | T-tests |
| | AOB | 2.41%±0.64% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 0.28%±0.16% | 0.009 | T-tests |
| | COA | 1.14%±0.14% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 2.35%±0.30% | 0.004 | T-tests |
| 4E | COAa | 76.62%±8.13% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 46.68%±10.67% | 0.050 | T-tests |
| | COApl | 18.32%±6.99% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 24.70%±8.48% | 0.575 | T-tests |
| | COApm | 5.06%±2.39% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 28.63%±7.73% | 0.016 | T-tests |
| 5B | AON | 86.63%±1.66% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 9.09%±3.94% | <0.001 | T-tests |
| | PC | 30.45%±2.65% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 64.97%±1.34% | <0.001 | T-tests |
| | NLOT | 3.26%±0.82% for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 0.69%±0.21% | 0.013 | T-tests |
| 5C | AON | 0.7898±0.1277for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 0.0315±0.0126 | 0.001 | T-tests |
| | PC | 0.1066±0.0226for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 0.0344±0.0067 | 0.015 | T-tests |
| | NLOT | 0.2153±0.0326 for APC$^{Vglut2+}$ vs PPC$^{Vglut2+}$, 2.7267±0.7597 | 0.007 | T-tests |

| | | | | |
|---|---|---|---|---|
| 5E | APC$^{\text{Vglut2+}}$ | rAPC vs cAPC vs PPC | <0.001 | ANOVA |
| | PPC$^{\text{Vglut2+}}$ | rAPC vs cAPC vs PPC | <0.001 | ANOVA |
| | APC$^{\text{Vglut2+}}$ | 87.74%±2.44% for rAPC vs cAPC, 11.50%±2.23% | <0.001 | B-tests |
| | APC$^{\text{Vglut2+}}$ | 11.50%±2.23% for cAPC vs PPC, 0.76%±0.41% | 0.004 | B-tests |
| | PPC$^{\text{Vglut2+}}$ | 54.59%±7.09% for rAPC vs cAPC, 36.48%±4.37% | 0.082 | B-tests |
| | PPC$^{\text{Vglut2+}}$ | 36.48%±4.37% for cAPC vs PPC, 8.92%±3.57% | 0.006 | B-tests |
| 6B | ORB | 37.88%±1.84% for APC$^{\text{Vglut2+}}$ vs PPC$^{\text{Vglut2+}}$, 1.34%±0.85% | <0.001 | T-tests |
| | AI | 34.47%±3.02% for APC$^{\text{Vglut2+}}$ vs PPC$^{\text{Vglut2+}}$, 49.19%±4.34% | 0.093 | T-tests |
| | MO | 11.82%±2.30% for APC$^{\text{Vglut2+}}$ vs PPC$^{\text{Vglut2+}}$, 1.75%±0.43% | 0.002 | T-tests |
| | PERI | 5.02%±1.05% for APC$^{\text{Vglut2+}}$ vs PPC$^{\text{Vglut2+}}$, 15.58%±3.69% | 0.021 | T-tests |
| | SS | 2.14%±0.82% for APC$^{\text{Vglut2+}}$ vs PPC$^{\text{Vglut2+}}$, 15.21%± 4.22% | 0.012 | T-tests |
| 7B | HIP | 11.81%±4.86% for APC$^{\text{Vglut2+}}$ vs PPC$^{\text{Vglut2+}}$, 30.04%±2.03% | 0.006 | T-tests |
| | RHP | 88.19%±4.86% for APC$^{\text{Vglut2+}}$ vs PPC$^{\text{Vglut2+}}$, 69.96%±2.03% | 0.006 | T-tests |
| 8B | SI | 47.98%±2.35% for APC$^{\text{Vglut2+}}$ vs PPC$^{\text{Vglut2+}}$, 43.16%±2.37% | 0.178 | T-tests |
| | MA | 29.27%±2.70% for APC$^{\text{Vglut2+}}$ vs PPC$^{\text{Vglut2+}}$, 30.91%±4.05% | 0.473 | T-tests |
| | MSC | 22.64%±2.04% for APC$^{\text{Vglut2+}}$ vs PPC$^{\text{Vglut2+}}$, 23.87%±2.88% | 0.733 | T-tests |

T-tests: Student's t-tests; ANOVA: one-way ANOVA tests; B-tests: Bonferroni tests

**Supplementary Figure 1**



**Supplementary Figure 1**. Representative images of coronal brain sections after injecting AAV-Dio-GFP-TVA and AAV-Dio-RVG and RV-EnvA-ΔG-dsRed into wild-type mice. (A) Coronal brain section containing the injection site (APC) showed a very limited number of EnvA-dsRed positive neurons. (B, C) Coronal brain sections containing the AON, TT and PPC showed no RV labeled neurons. Scale bar: 500 µm.