## Supplementary material

### Supplementary Table 1. One-way ANOVA between 5HT3AEGFP subtypes with Bonferroni’s correction for multiple comparisons.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Sub-groups compared*** | **AHP amplitude (mV)** | **V rest (mV)** | **Sag (mV)** | **Rebound depolarization (mV)** | **Input resistance (MΩ)** | **Time constant (τ) (ms)** |
| **Type I v Type II** | *F*2,90= 14.30,  *p=*0.50 | *F*2,90= 12.98,  *p=*1.00 | *F*2,90= 14.55,  *p=*1.00 | *F*2,90= 8.99,  *p=*1.00 | *F*2,90= 12.52,  *p=*0.49 | *F*2,90= 19.94,  *p=*0.31 |
| **Type I vs Type III** | *F*2,90= 14.30,  *p<*0.001 | *F*2,90= 12.98,  *p<*0.001 | *F*2,90= 14.55,  *p<*0.001 | *F*2,90= 8.99,  *p=*0.002 | *F*2,90= 12.52,  *p<*0.001 | *F*2,90= 19.94,  *p<*0.001 |
| **Type III vs Type II** | *F*2,90= 14.30,  *p=*0.01 | *F*2,90= 12.98,  *p=*0.005 | *F*2,90= 14.55,  *p<*0.001 | *F*2,90= 8.99,  *p=*0.003 | *F*2,90= 12.52,  *p=*0.01 | *F*2,90= 19.94,  *p=*0.001 |

### Supplementary Figure 1. 5HT3aEGFP cells are not MSN cells.

An example of the spine morphologies of 5HT3aEGFP Ctip2-positive and an EGFP labeled MSN cell demonstrating the absence of spines on the dendrites of 5HT3aEGFP cells (left panel). The typical spiny characteristics of an MSN,(right panel) that was never observed within the 5HT3aEGFP population.

### Supplementary Figure 2. . Single channel image for immunohistochemical analysis.

Double and triple immunostainings of the dorsal striatal 5HT3aEGFP population for EGFP and PV, NPY/SST, CR, nNOS, and TH showing the single signals of the merged images showed in figure 2.

### Supplementary Figure 3. 6-OHDA unilateral lesion for counting 5HT3aEGFP-TH cells in the dorsolateral striatum.

### A. To be able to detect the TH+ cells in striatum and study the overlapping with the 5HT3aEGFP population, a unilateral 6-OHDA lesion was performed to lower the surroundings levels of TH. After the lesion both the number of cells in the substantia nigra SN and the striatal TH level in the ipsilateral hemisphere were substantially lowered. B. A quantification of the optical TH+ density in the striatum showed a significant decreased in the lesioned striatum compared to the non-lesioned one (p<0.05).

### Supplementary Figure 4. 5HT3aEGFP-FS cells are likely to be normal FS cells.

### One subgroup of cells labeled with 5HT3aEGFP exhibit physiological profiles that resemble typical striatal FS cells (A and B), with high rates of action potential generation, fast spike timing and deep and fast after-hyperpolarizations. No statistical differences in intrinsic membrane properties could be detected when comparing 5HT3aEGFP-FS cells to Lhx6EGFP-FS cells (C). In addition, dual patch recordings of a pair of 5HT3aEGFP-FS cells demonstrate that they are electrically coupled, much like typical FS cells (D) by which stimulation of one cell in the pair produces a depolarizing response in the other cell and vice versa.