Supplemental information

Procedure of amperometric recording in mouse striatum *in vivo*

The stimulation electrode (Φ0.23 mm) was composed by two twisted stainless steel wires coated with insulated layer on the outside (Plastics One Inc., USA). A mini-adaptor was used for the connection of electrode with stimulation system. We recorded DA release with carbon fiber electrodes (CFE, Φ 7 μm, Amoco Performance Products, Greenville, SC), which were produced similar as previously reported[1], but with slight modifications. Briefly, a carbon fiber was preloaded into a glass capillary (Φ 1 mm), which was pulled by a vertical puller (Narashige PP380, Tokyo, Japan) to produce 2 non-symmetric glass-insulated pre-electrodes, with a long (>100 μm) and a short (<50 μm) insulation neck. For *in vivo* recording, we only used the pre-electrodes with long insulations. The exposed carbon fiber tip was cut to ~400 μm.

The anesthetized mouse was fixed on a stereotaxic instrument. Body temperature was kept at 37°C with a heating pad. O_2 was supplied by a mask. Then the skin on the head was removed to expose the skull. The stimulation electrode and CFE were implanted in the MFB and striatum respectively after two holes (Φ 2-4 mm) were drilled. By designing a stimulation protocol using the software MBA-1 (Yibo, Wuhan, China), the electric stimulation was given to MFB through the AD/DA converter (INBIO, Wuhan, China) and the stimulus isolator (WPI, A395) (Fig.1A, yellow line). The voltage on CFE electrode was hold at 780 mV with voltage-clamp mode, and the oxidation current was amplified by a patch-clamp amplifier, filtered by a low pass filter at 50 Hz, and transformed to digital signal via an AD/DA converter. An oscilloscope (Tek, USA) was used for real-time monitoring the electric signals. The positions of the stimulation electrode were adjusted to obtain the maximal signal of DA overflow. Experiments were performed 5 min later when the signals were stable. The flow chart of major steps was shown in sFig. 1.

Data analysis and noise shooting of amperometric DA signal

Data analysis and noise shooting was composed by three steps, including loading the

data, removing the stimulation artifact and reduction of noise (sFig. 2).

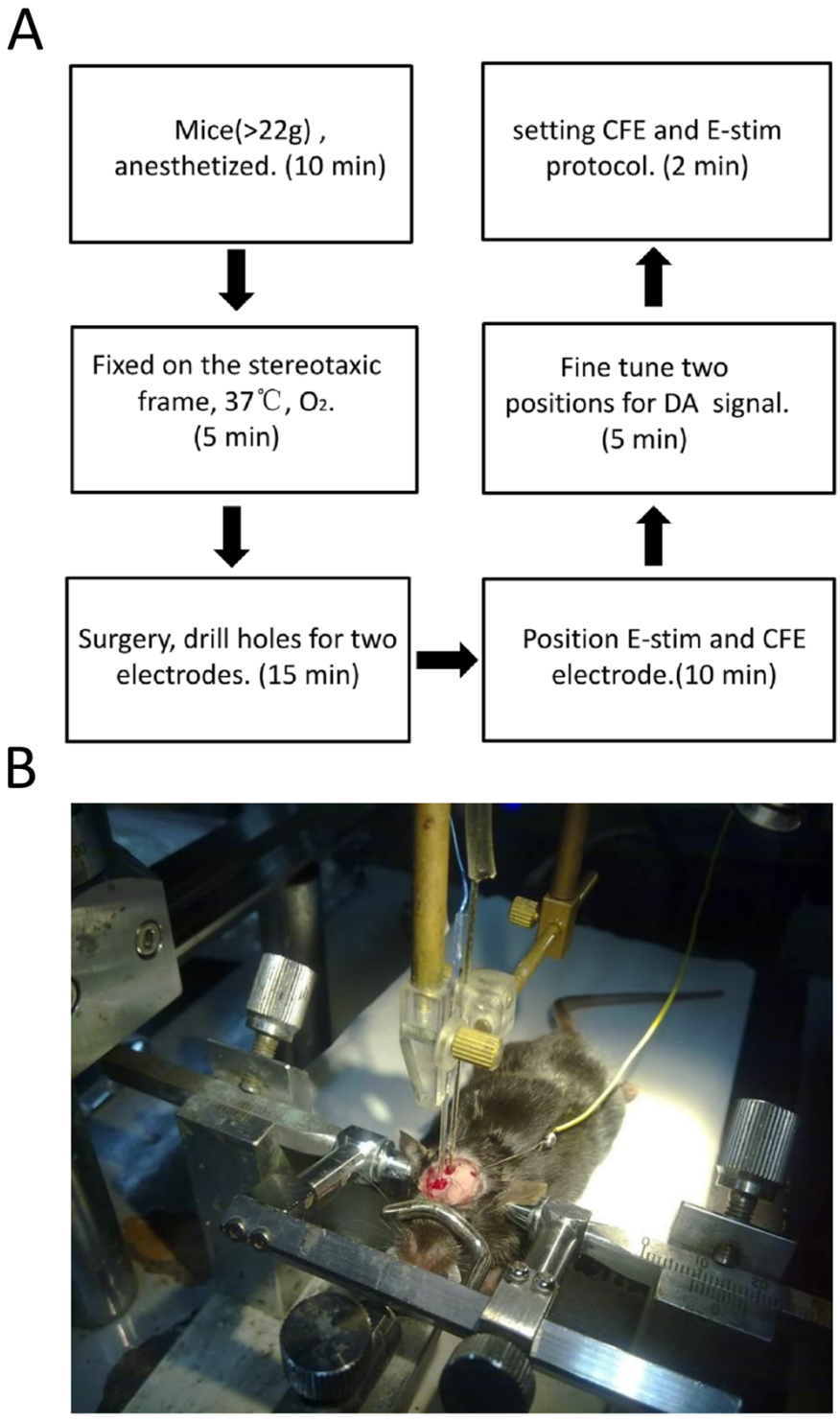
Procedure for Fast scan cyclic voltammetry **(FSCV) recording of DA release in mouse striatum *in vivo***

FSCV recording of DA release in mice striatum *in vivo* contains three major parts, including in vitro DA solution test, recording DA release *in vivo* and data analysis (sFig. 3A). The voltage scan is from -0.4 to +1 V, with scan speed at 200 V/s. The interval of two scan waves is 100 ms (sFig. 3B and 3C). Gain is set at 0.0005 mV/pA, while sample rate at 20 kHz. 10~15 scans are averaged for background subtraction. The in vitro DA solution test was realized through fast-flow of DA solution to CFE on electrophysiology setup.

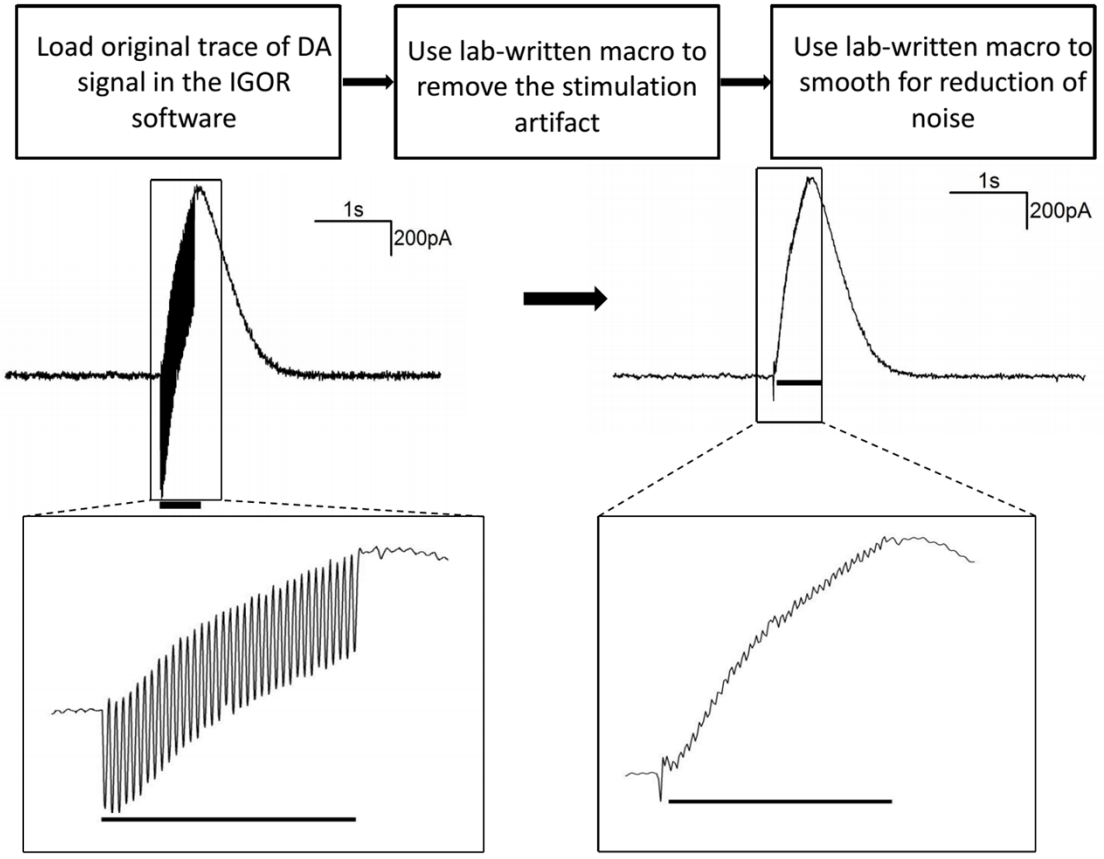
Supplemental References:

1. S. R. Wang, W. Yao, H. P. Huang, B. Zhang, P. L. Zuo, L. Sun, H. Q. Dou, Q. Li, X. J. Kang, H. D. Xu, M. Q. Hu, M. Jin, L. Zhang, Y. Mu, J. Y. Peng, C. X. Zhang, J. P. Ding, B. M. Li and Z. Zhou, *J Neurochem*, 2011, **119**, 342-353.

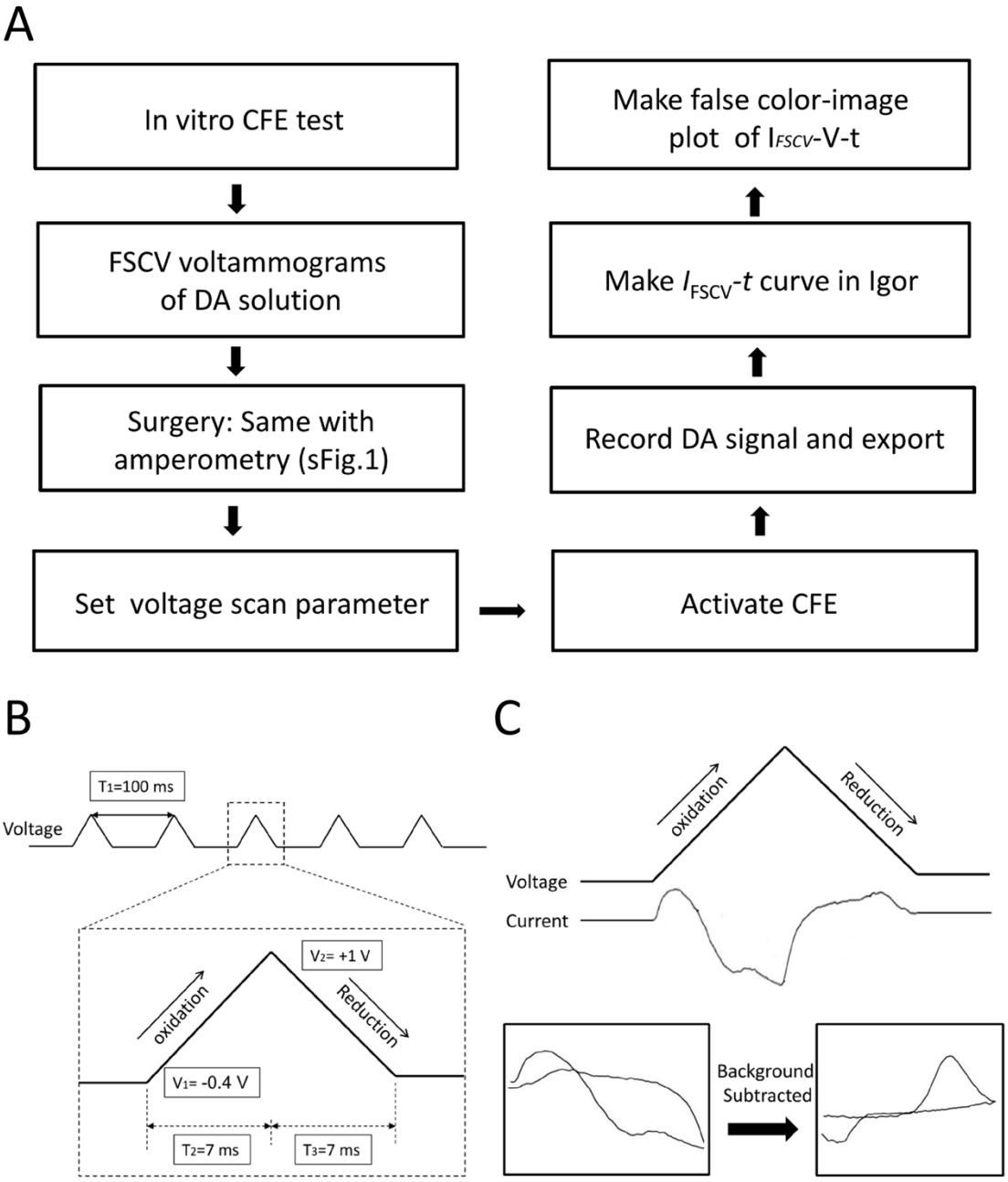
Supplemental figures:



Supplemental Figure 1. Procedure of amperometric recording in mouse striatum *in vivo*. (A) The major steps of amperometric recording in mice striatum in vivo, all steps cost 40-50 min in total. (B) A photo showing our DA recording in mouse striatum *in vivo*.



Supplemental Figure 2. Data analysis and noise shooting of amperometric DA signal. Upper panel, the flow (three steps) for data analysis. Middle panel, illustration for the DA signal traces before and after processing. Two lower inserts represent the electric stimulation artifact and its removal at expanded time scale.



Supplemental Figure 3. Brief procedure for FSCV recording of DA release in mouse striatum *in vivo*. (A) Eight steps for FSCV recording of DA release in mice striatum *in vivo*. (B) Diagram of Continuous trigonal voltage scan. T_1 represents the interval between two trigonal voltage scan waves. Under box, illustration for a trigonal voltage wave at expanded scale. V_1 represents the constant voltage, V_2 represents the peak voltage. T_2 and T_3 represent oxidation time and reduction time

respectively. (C) Upper panel, showing the current in response to a trigonal voltage scan. Lower panel, showing the process of background subtraction. Left box, original voltammogram. Right box, background subtracted voltammogram.