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SUPPLEMENTARY INFORMATION

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Aggregated single-walled carbon nanotubes attenuate the behavioural and neurochemical effects of methamphetamine in mice

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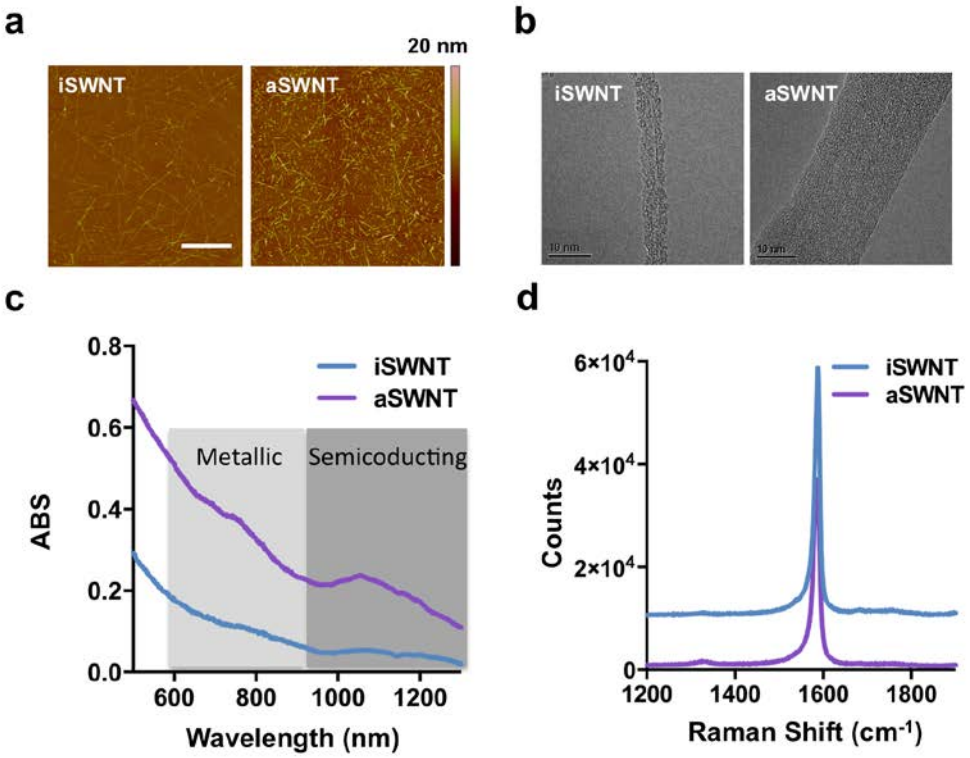
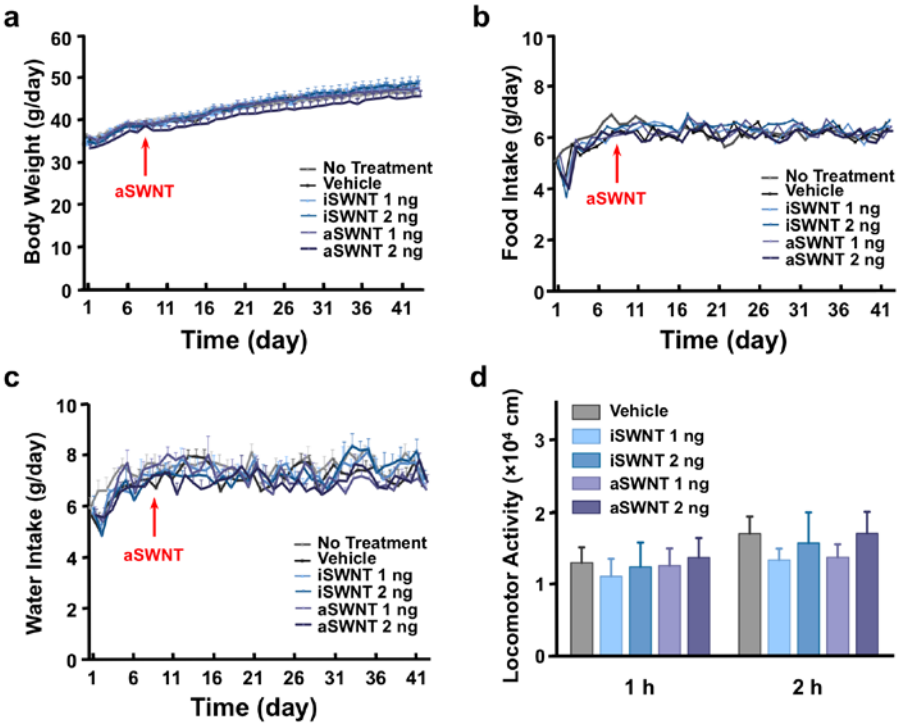


Supplementary Fig. 1. Characterization of iSWNT and aSWNT. a, Atomic force microscopy (AFM) images of iSWNTs and aSWNTs. **b,** Typical high resolution transmission electron microscopy (HR-TEM) micrographs of iSWNTs and aSWNTs. **c,** Visible-near-infrared (vis-NIR) absorption spectra of iSWNTs and aSWNTs. The peaks in the 900-1,300 nm range correspond to E11 sub-band absorption for semiconductors, while the peaks in the 550-900 nm range correspond to the second E22 sub-band transitions for metals. **d,** Raman spectra with excitation at 633 nm of iSWNTs and aSWNTs.



Supplementary Fig. 2. Effects of microinjection of SWNTs into a lateral cerebral ventricle on general health conditions. **a,** Body weight. **b/c,** food/water intake (n=12 mice per group)**.** Measurements began from 1 day before the intracranial guide cannula implantation surgery. SWNTs were given 7 days after the recovery from surgery and lasted for over 30 days. **d,** Total distance traveled (cm) within 1 hr or 2 hrs after SWNT administration.

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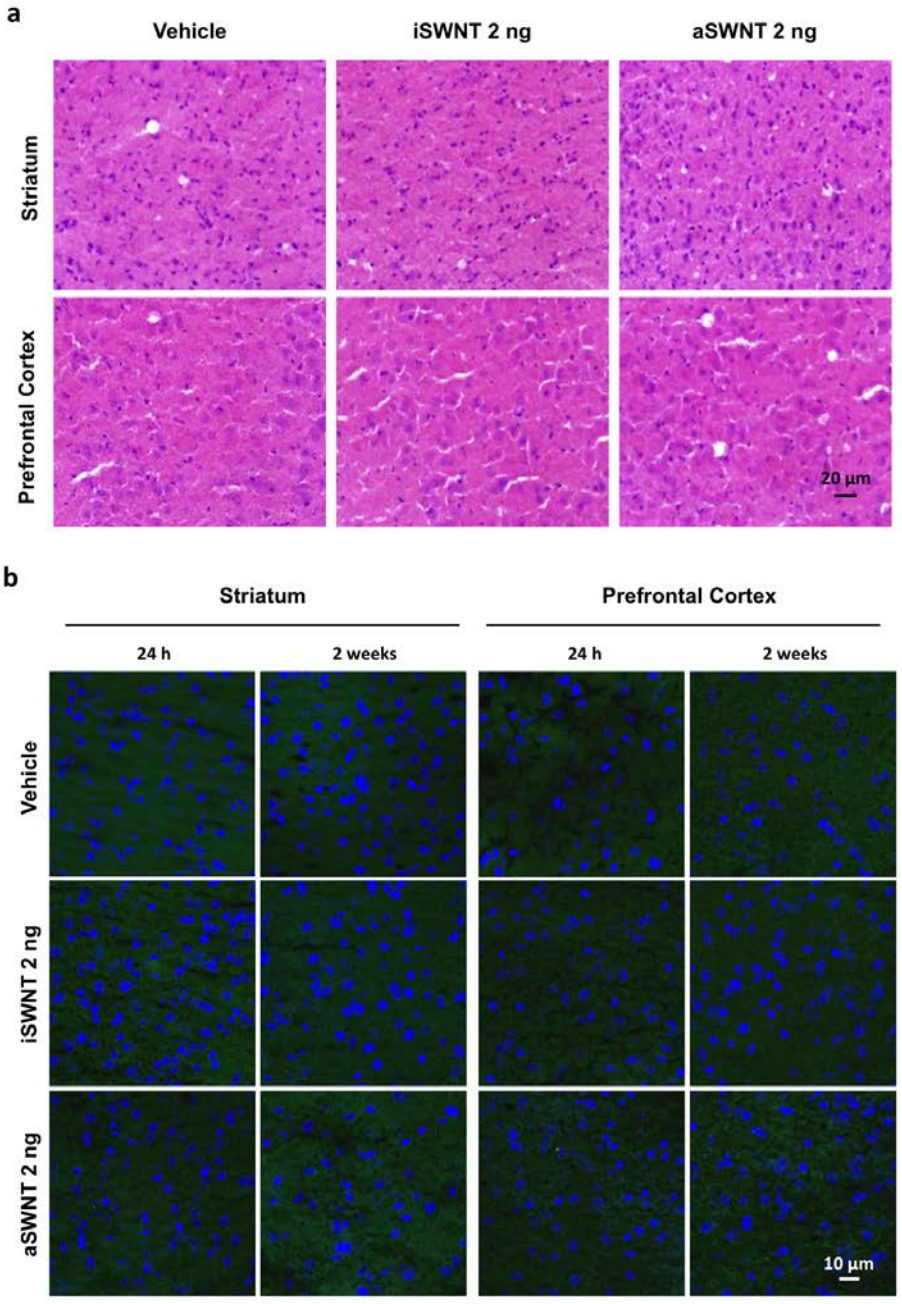

Supplementary Fig. 3. Effects of SWNTs on cellular structures in the striatum and PFC in mice. **a,** H&E staining of cell nuclei, illustrating that no significant difference was observed in nucleus-staining between the vehicle and SWNT treatment groups measured at 24 hrs after microinjection of SWNTs. **b,** TUNEL-staining of DNA fragments in the striatum and PFC, illustrating that

SWNTs did not cause obvious cell injury or death measured at 24 hrs or 2 weeks after SWNT administration.

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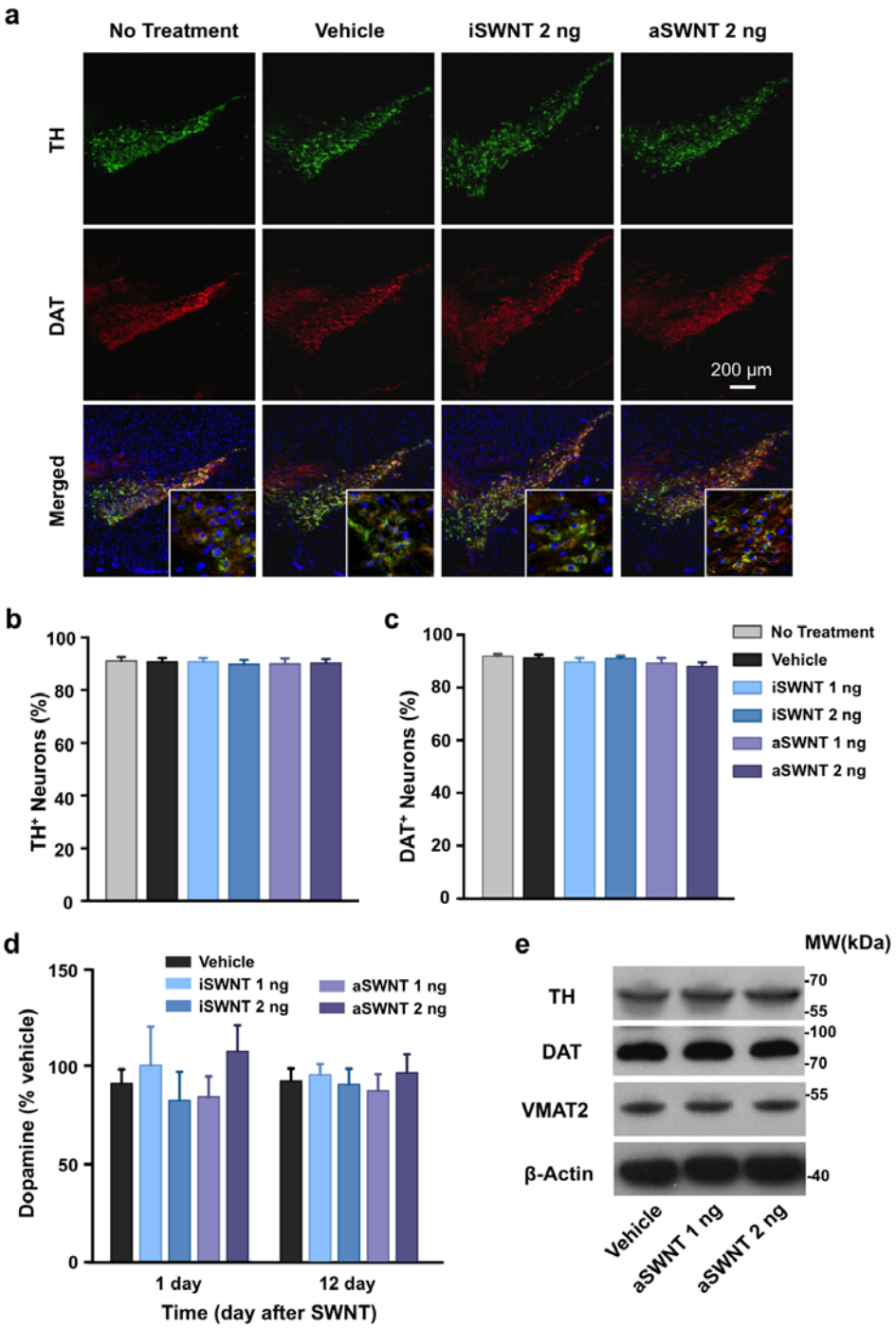

Supplementary Fig. 4. Effect of SWNTs on midbrain dopamine neuronal structure, striatal dopamine contents and dopaminergic neuronal marker proteins. **a,** TH- and DAT-immunostaining, showing the normal structures of the ventral tegmental area (VTA) and the substantia nigra (SN) measured at

24 hrs after microinjection of vehicle or SWNTs. Scale bar; 200 μm. Inserted images show merged TH and DAT double immunostaining under high magnification (scale bar: 20 μm). **b/c**, TH-positive or DAT-positive neurons (% no-treatment control). Neurons were counted randomly from 8 slices from 3 mice in each group. **d,** Microinjection of SWNTs had no effect on striatal dopamine contents measured 1 day or 12 days after SWNTs administration. **e,** Representative Western blot results, illustrating that SWNTs had no effect on expression of striatal TH, DAT or VMAT2 measured 24 hrs after SWNTs administration.

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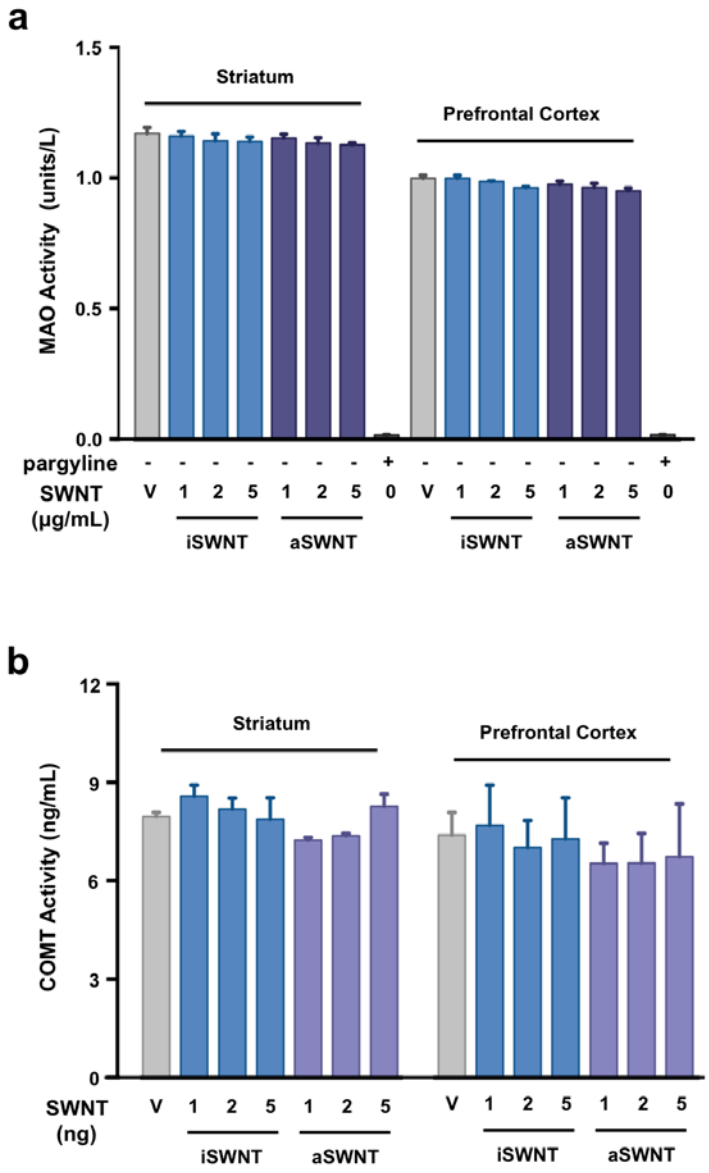

Supplementary Fig. 5. Effects of SWNTs on MAO (**a**) or COMT (**b**) activities in the striatum and PFC in mice in the absence of METH treatment. Neither iSWNTs nor aSWNTs altered MAO or COMT activities. In contrast, the selective MAO inhibitor pargyline strongly inhibited MAO activities in both the striatum and PFC. (**a**, striatum, $F_{7,16}$=14.82, p<0.001; PFC, $F_{7,16}$=34.14, p<0.001; **b,** striatum, $F_{8,18}$=0.58, p>0.05; PFC, $F_{8,18}$=1.51, p=0.05, one-way ANOVA). The error bars indicate the S.E.M. of the mean values from 4 brain samples (from 4 mice) in each group. Each brain sample was replicated 3

times technically. V – vehicle.

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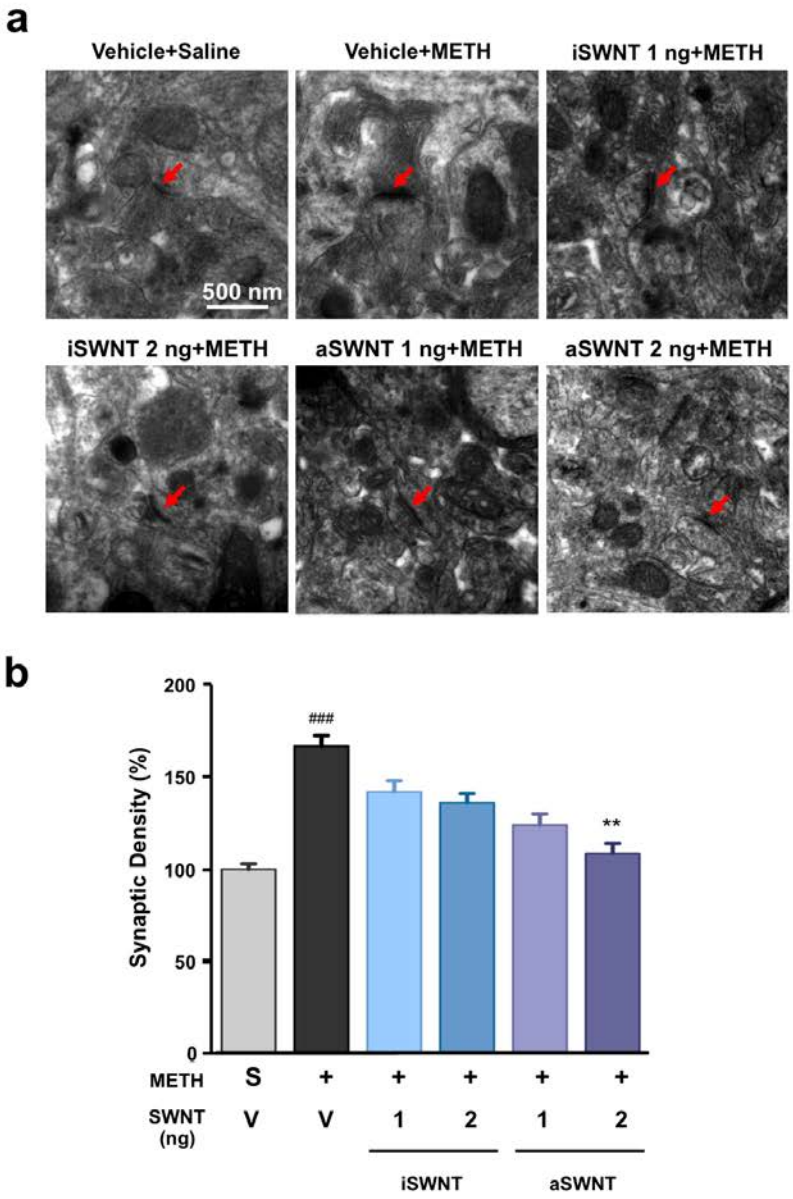

Supplementary Fig. 6. Effects of SWNTs on METH-enhanced synaptic densities in the PFC. **a,** TEM images showing the structure of synapses (red arrows). **b,** Quantitative analysis of the synaptic density in randomly selected 20 slices from 4 mice in each group, illustrating a reduction in METH-enhanced synaptic densities after SWNTs administration ($F_{5,11}$=21.26, p<0.001, one-way ANOVA). $^{###}p$<0.001, compared to vehicle + saline group (gray bar); $^{**}p$<0.01, compared to vehicle + METH group (black bar). S – saline, V – vehicle.