**Electronic Supplementary Information**

**Selenium-Doped Carbon Quantum Dots Efficiently Ameliorate Secondary Spinal Cord Injury via Scavenging Reactive Oxygen Species**

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**Figure S1.** Images of the spinal cord. (A) Image of normal spinal cord. (B) Image of the injured spinal cord after the establishment of the spinal cord injury model. Scale bar = 4 mm.

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**Figure S2.** 1H NMR and 13C NMR spectra of L-selenocystine. (A) 1H NMR spectra of l-selenocystine, (B) 13C NMR spectra of l-selenocystine.

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**Figure S3.** NMR spectra of the Se-CQDs. (A) 1H NMRspectra of the Se-CQDs. (B) 13C NMR spectra of the Se-CQDs.

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**Figure S4.** FTIR spectra of the Se-CQDs and l-selenocystine.



**Figure S5.** UV-Vis absorption spectra of Se-CQDs in water at various concentrations.



Figure S6. Fluorescence spectra of Se-CQDs in water at a concentration of 1 mg mL-1.



**Figure S7.** In vitro toxicity study of the Se-CQDs. (A) Viability of PC12 cells, astrocytes and N2a cells incubated with different concentrations of Se-CQDs for 24 h. (B) Viability of PC12 cells, astrocytes and N2a cells incubated with different concentrations of Se-CQDs for 48 h. Data are presented as the means ± SDs, with n = 3 for each group.



Figure S8. Se-CQDs scavenge ROS to protect N2a cells from ROS-induced oxidative damage. (A) Effect of H2O2 on the viability of N2a cells. (B) Protective effect of Se-CQDs against H2O2-induced oxidative damage in N2a cells. The concentration of H2O2 was 250 μM. (C) Intracellular ROS levels in N2a cells were measured by DCF staining, scale bar = 50 μm. (D) Live/dead straining of N2a cells under different conditions, scale bar = 50 μm.

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**Figure S9.** Se-CQDs scavenge ROS to protect PC12 cells *in vitro*. (A) Intracellular ROS levels in PC12 cells were measured by DCFH-DA staining. (B) Quantitative analysis of the fluorescence intensity of DCF in the cells. (C) Live/dead staining of PC12 cells. Scale bar = 20 μm. (D) Quantitative analysis of the number of dead cells. \*\*P < 0.01.

地图的截图

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**Figure S10.** Body weights of the rats with spinal cord injury from the different groups (n=9) after treatment at different time intervals. No diﬀerence in body weight was observed between the rats from the three groups.

手机屏幕的截图

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**Figure S11.** Quantitative analysis of Luxol fast blue (LFB) staining and G-ratio. (A) Quantitative analysis of relative LFB staining. (B) Quantitative analysis of the G-ratio. \*P < 0.05 and \*\*P < 0.01.

Table S1. Antibodies dilution information used in the immunofluorescent (IF) staining

|  |  |  |
| --- | --- | --- |
| Antibody | Application | Dilution |
| anti-GFAP | IF | 1:1000 |
| anti-NF200 | IF | 1:200 |
| anti-NeuN | IF | 1:500 |
| anti-CS56 | IF | 1:200 |
| Anti-CD68 | IF | 1:200 |
| DAPI | IF | 1:1000 |
| Anti-Mouse IgG (H+L) labeled with Alexa-488 | IF | 1:1000 |
| Anti-Rabbit IgG (H+L) labeled with Alexa-546 | IF | 1:500 |
| Anti-Rabbit IgG (H+L) labeled with Alexa-488 | IF | 1:1000 |
| Anti-Mouse IgG (H+L) labeled with Alexa-546 | IF | 1:500 |

Table S2. Antibodies dilution information used in the western blotting (WB)

|  |  |  |
| --- | --- | --- |
| Antibody | Application | Dilution |
| anti-caspase-9 | WB | 1:1000 |
| anti-cleaved caspase-3 | WB | 1:1000 |
| anti-Bcl-2 | WB | 1:1000 |
| anti-Bax | WB | 1:1000 |
| anti-GAPDH | WB | 1:5000 |