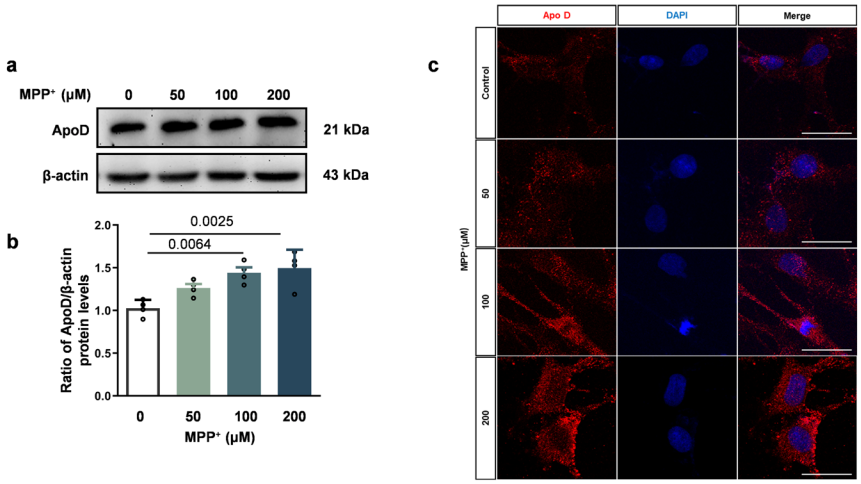
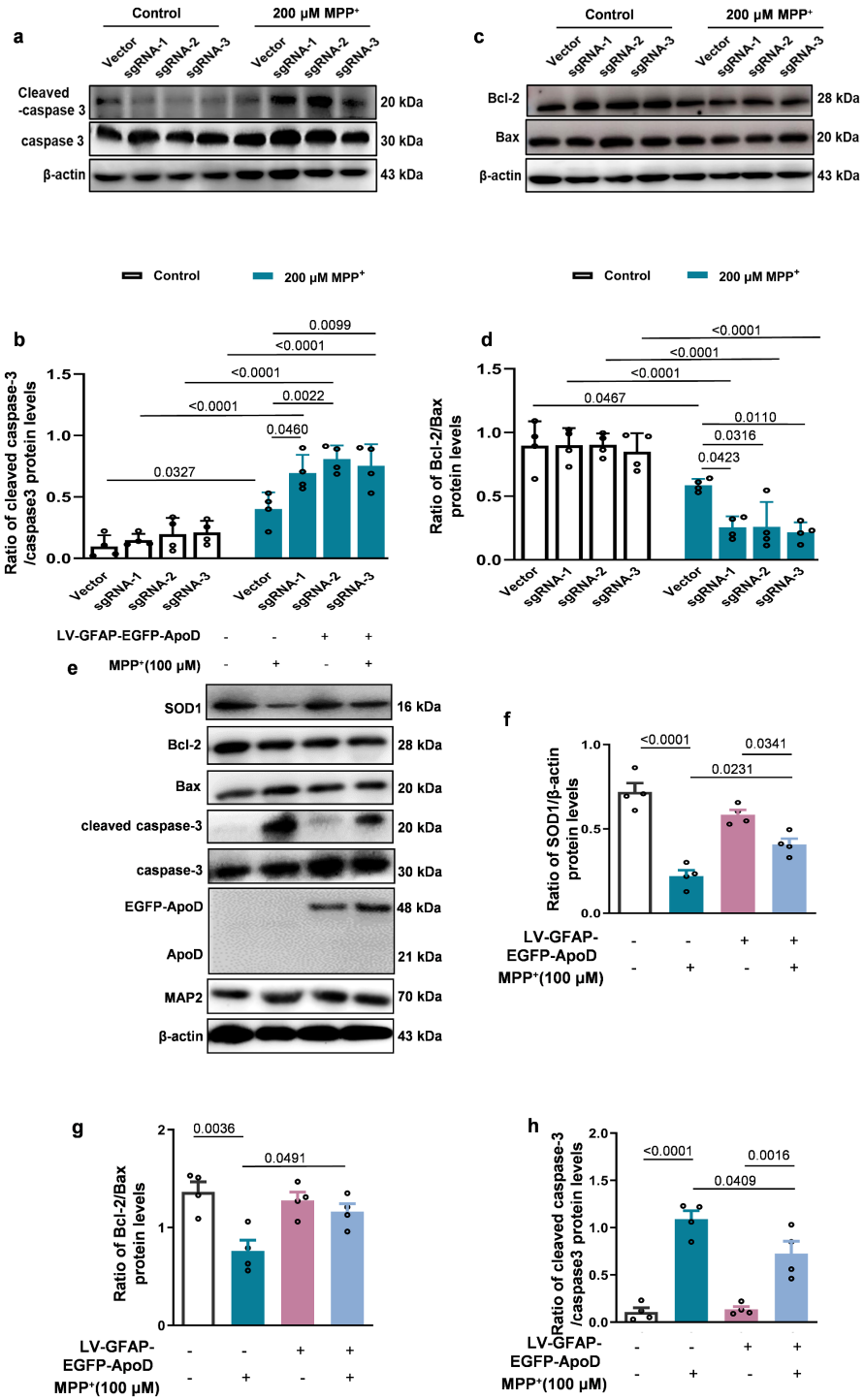


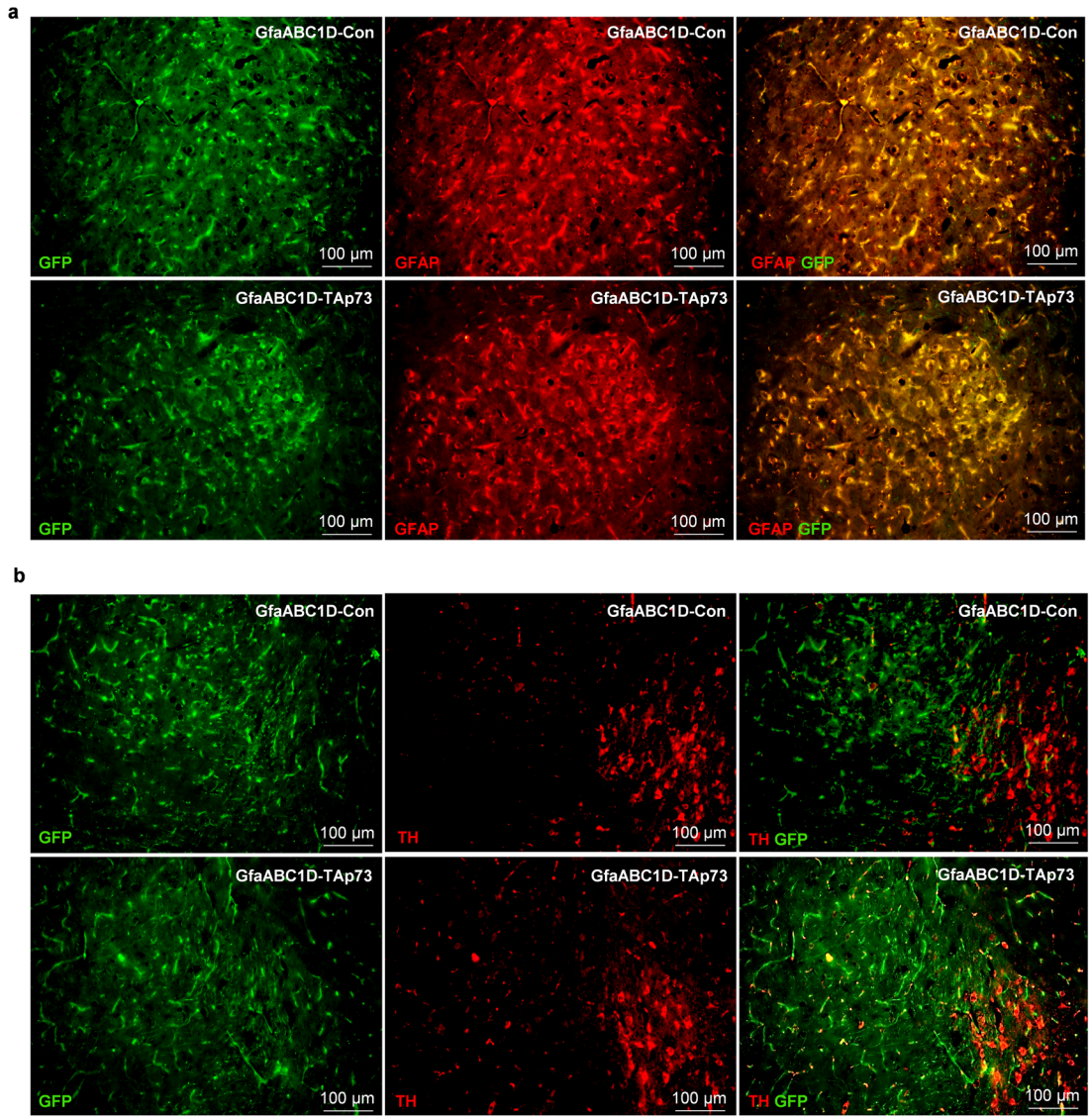
Supplementary Figure 1 Changes in the ApoD levels in C6 cells treated with MPP$^+$.

(a-b) Western blotting and statistical analysis of the expression of ApoD in C6 cells treated with MPP$^+$ (50-200 μM). The higher protein levels of the ApoD were shown in 200 μM MPP$^+$-treated C6 cells, compared with that of control. n = 4. **(c)** Immunofluorescence staining of the expression of ApoD in C6 cells treated with MPP$^+$(50-200 μM). Scale bars = 25 μm. Statistics were calculated using one-way ANOVA with a false discovery rate *<0.05* (**b**). Data were presented as mean ± SEM.


a
Control
200 μM MPP+
Vector
sgRNA-1
sgRNA-2
sgRNA-3
Cleaved -caspase 3
caspase 3
β-actin
20 kDa
30 kDa
43 kDa
c
Bcl-2
Bax
28 kDa
20 kDa
b
Ratio of cleaved caspase-3 /caspase3 protein levels
0.0099
<0.0001
<0.0001
0.0022
<0.0001
0.0460
0.0327
LV-GFAP-EGFP-ApoD
MPP+(100 μM)
d
Ratio of Bcl-2/Bax protein levels
<0.0001
<0.0001
<0.0001
0.0467
0.0110
0.0316
0.0423
e
SOD1
Bcl-2
Bax
cleaved caspase-3
caspase-3
EGFP-ApoD
ApoD
MAP2
β-actin
16 kDa
28 kDa
20 kDa
20 kDa
30 kDa
48 kDa
21 kDa
70 kDa
43 kDa
f
Ratio of SOD1/β-actin protein levels
<0.0001
0.0341
0.0231
LV-GFAP-EGFP-ApoD
MPP+(100 μM)
g
Ratio of Bcl-2/Bax protein levels
0.0036
0.0491
h
Ratio of cleaved caspase-3 /caspase3 protein levels
<0.0001
0.0016
0.0409

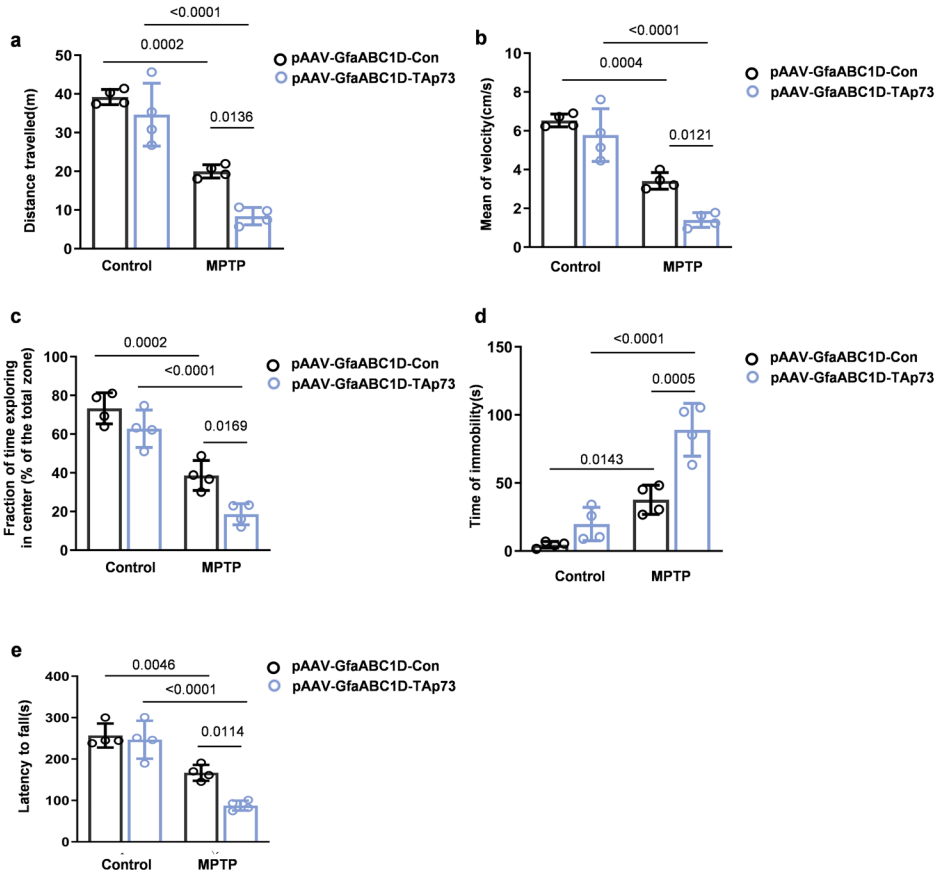
Supplementary Figure 2 Changes in the anti-oxidation and anti-apoptosis levels in neurons co-cultured with knockdown/up-regulated ApoD astrocytes treated with MPP^+.

(a-b) Western blotting and statistical analysis of the protein levels of cleaved caspase-3 and caspase-3 in MES23.5 cells co-cultured with sgApod C6 cells (sgRNA-1-sgRNA-3) treated with MPP^+ (200 μM). It showed that when 200 μM MPP^+ was applied to the co-culture system, the cleaved caspase-3 activity was enhanced in MES23.5 cells co-cultured with sgApod C6 cells, compared with that of the controls. n = 4. **(c-d)** Western blotting and statistical analysis of the protein levels of Bcl-2 and Bax in MES23.5 cells co-cultured with sgApod C6 cells treated with 200 μM MPP^+. The ratio of Bcl-2 and Bax protein levels was reduced in MES23.5 cells co-cultured with sgApod C6 cells treated with MPP^+, compared with that of the control. n = 4. **(e-h)** Overexpression of astrocytic ApoD could antagonize the protein levels of SOD1 in primary cultured VM neurons of the co-cultures treated with MPP^+. The ratio of Bcl-2 and Bax protein levels was increased in primary cultured VM neurons of the co-cultures with LV-ApoD astrocytes treated with MPP^+, compared with that of the control. It showed that cleaved caspase-3 activity was reduced in primary cultured VM neurons of the co-cultures with LV-ApoD astrocytes treated with MPP^+ compared with the control. n = 4. Statistics were calculated using two-way ANOVA with a false discovery rate <0.05 (**b, d**) or by one-way ANOVA with a false discovery rate <0.05 (**f-h**). Data were presented as mean ± SEM.



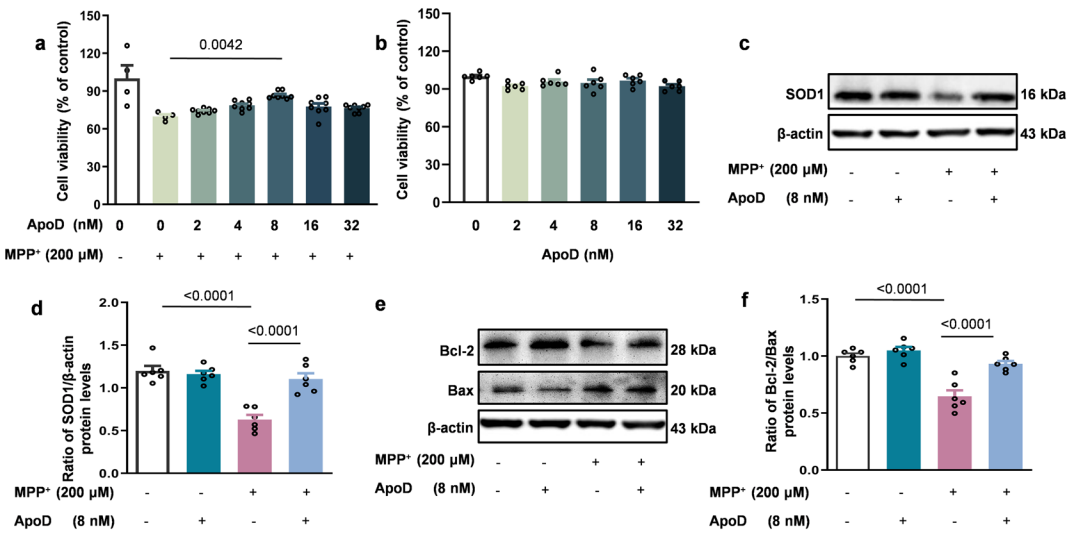
Supplementary Figure 3 AAVs Infected Astrocytes with a High Efficiency in the SN.

(a) Colocalization of GFP and GFAP shows that GFP is driven by the astrocyte-specific promoter, which labels astrocytes with high efficiency. n = 3 mice/group. Scale bars = 100 μm. **(b)** Colocalization of GFP and TH. n = 3 mice/group. Scale bars = 100 μm.



Supplementary Figure 4 Effects of astrocytes-specific knockdown of TAp73 on the autonomous movement ability and coordination of MPTP-treated PD mice.

(a-d) Open field test showed the changes in distance travelled, mean of velocity, fraction of time exploring in center and time of immobility. A significant decrease in the distance traveled was observed in MPTP-shTAp73 mice. Similar trends were found in the mean of velocity and the fraction of time exploring in the center in MPTP-shTAp73 mice, compared with that of MPTP-treated mice. A significant increase in the immobility time was observed in MPTP-shTAp73 mice. n = 6 mice/group. **(e)** The rotarod test at 4 to 40 r.p.m. was performed. It could reduce the time on the rotarod in MPTP-shTAp73 mice, compared with that of the MPTP-treated mice. n = 6 mice/group. Statistics were calculated using two-way ANOVA with a false discovery rate *<0.05* **(a-e)**. Data were presented as mean ± SEM.



Supplementary Figure 5 Effects of exogenous ApoD on MES23.5 cells treated with MPP$^+$.

(a) Effect of exogenous ApoD (2-32 nM) on cell viability in MES23.5 cells treated with 200 μM MPP$^+$. Pretreatment with 8 nM ApoD for 24 hrs in MES23.5 cells could antagonize the cytotoxicity induced by 200 μM MPP$^+$ treatment. n = 6. **(b)** Effects of different concentrations of ApoD on cell viability of MES23.5 cells. ApoD itself did not produce any additional toxic effects on MES23.5 cells. n = 6. **(c-d)** Western blotting and statistical analysis of the protein levels of SOD1 in MES23.5 cells. Pretreatment ApoD for 24 hrs, the expression of SOD1 protein levels was significantly increased in MPP$^+$-treated MES23.5 cells, compared with that of the control. n = 6. **(e-f)** Western blotting and statistical analysis of the protein levels of Bcl-2 and Bax in MES23.5 cells. Pretreatment ApoD for 24 hrs, the expression of Bcl-2 and Bax protein levels were significantly increased in MPP$^+$-treated MES23.5 cells, compared with that of the control. n = 6. Statistics were calculated using one-way ANOVA with a false discovery rate *<0.05* **(a, d, f).** Data were presented as mean ± SEM.

Original data of western blotting

Fig. 1

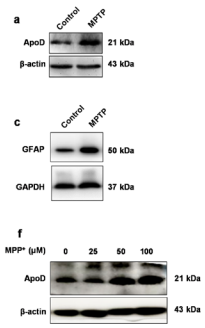


Fig. 2

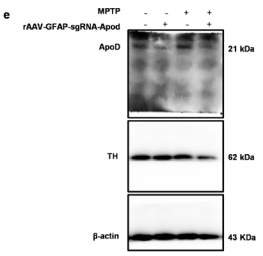


Fig. 3

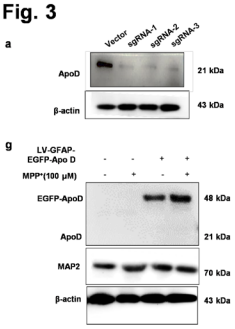


Fig. 4

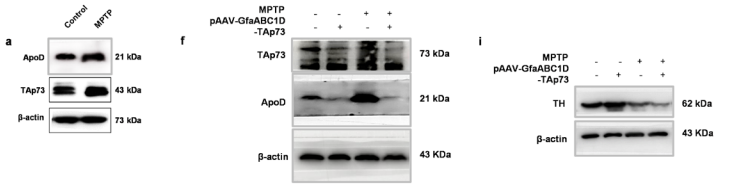


Fig. 5

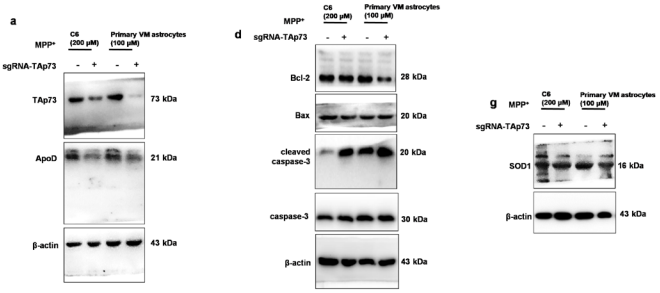


Fig. 6

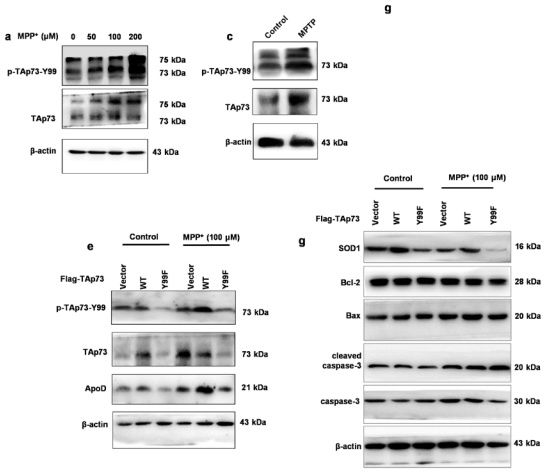
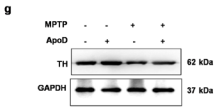
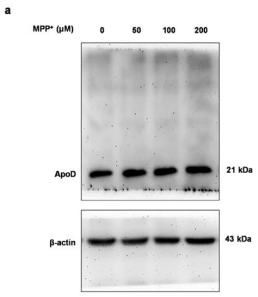


Fig. 7

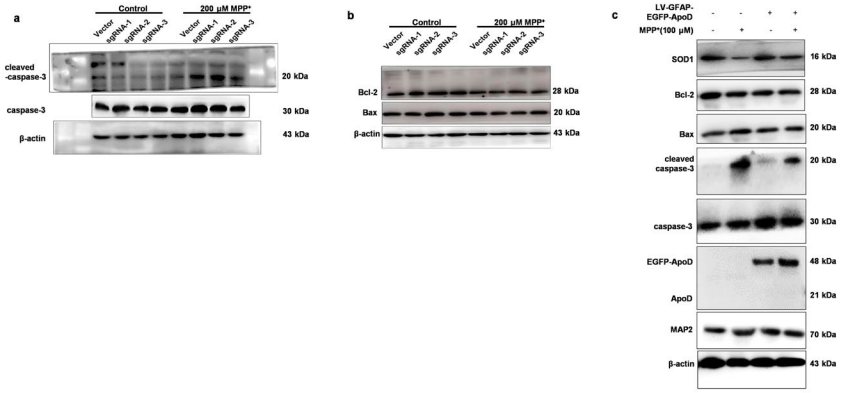


Original data of western blotting

Supplementary Figure 1



Supplementary Figure 2



Supplementary Figure 5