The molecular mechanism of three novel peptides from C-phycocyanin alleviate MPTP-induced Parkinson's disease-like pathology in zebrafish

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Supplementary Information

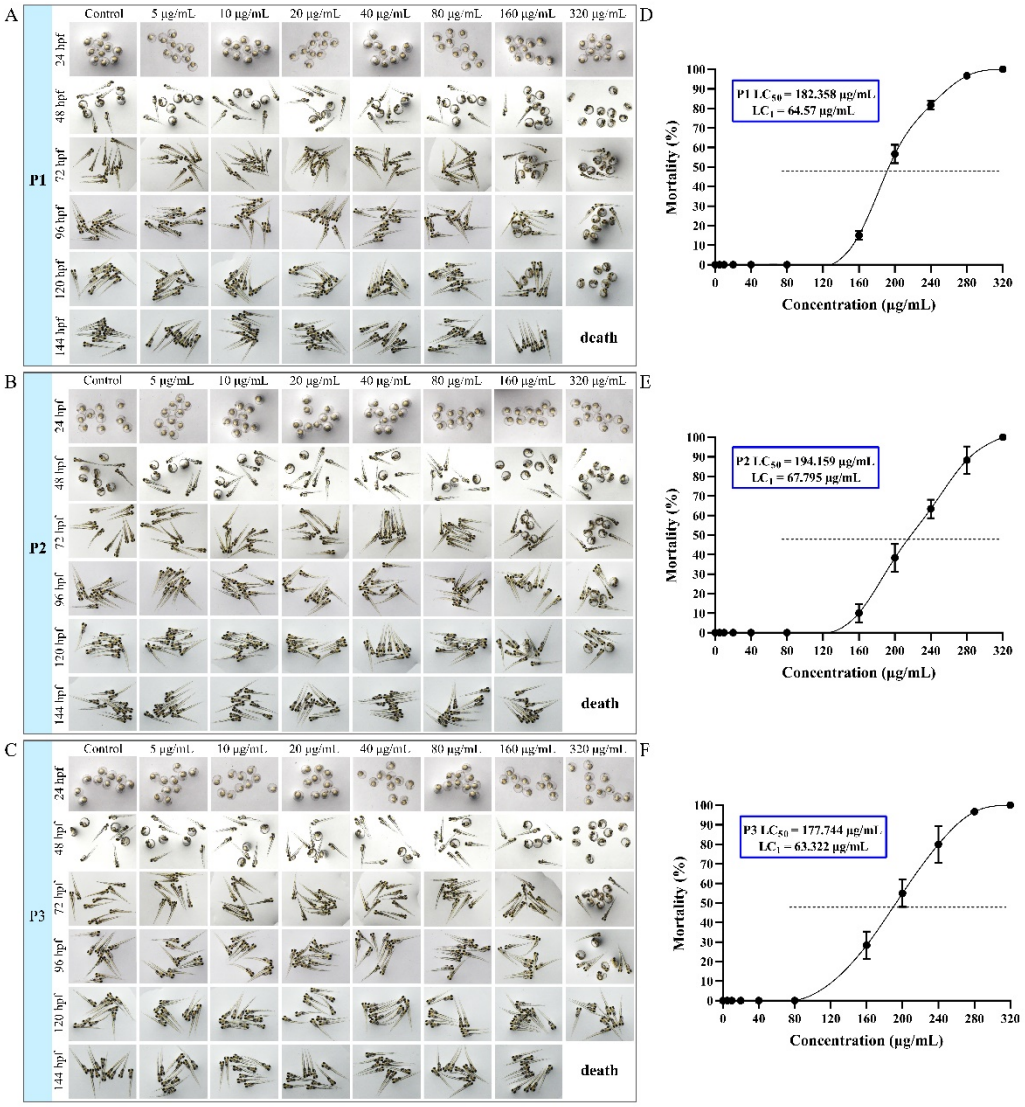
Supplementary Table 1.

The gene primers for quantitative real-time PCR

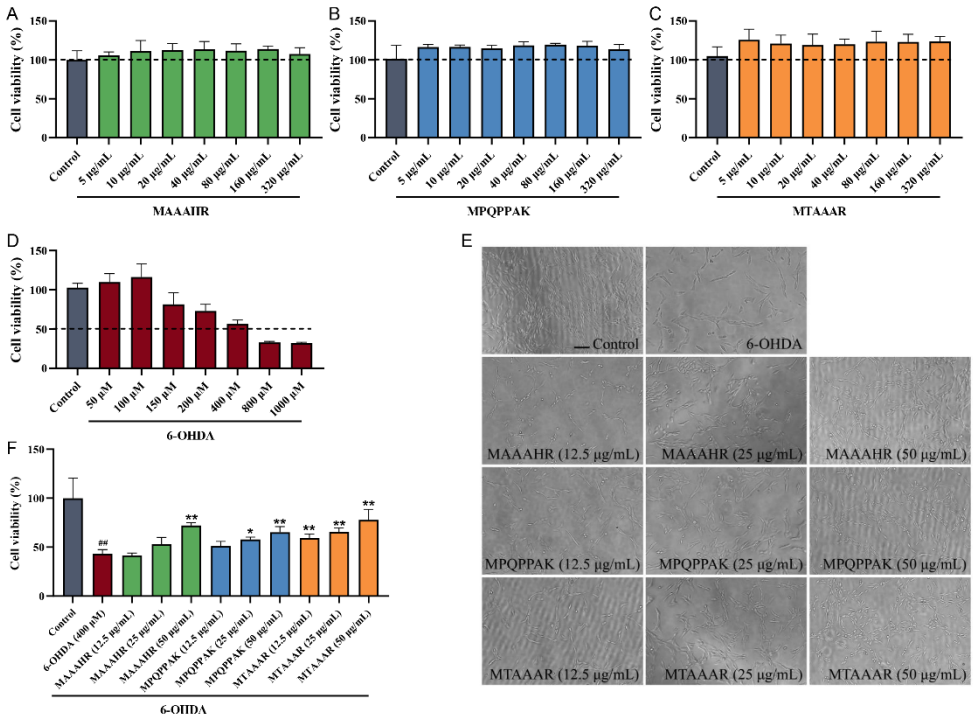
Primer		Sequence	Length (nucleotide)
rps18	Forward	ATACAGCCAGGTCCTTGCTAATG	23
	Reverse	GTGACGGAGACCACGGTGAG	20
keap1	Forward	ATACCAACCAGACACCAACAC	21
	Reverse	GGTTTGTCCATCATAGCCTCC	21
nrf2	Forward	ATGTCTAAAATGCAGCCAAGCC	22

	Reverse	CGGTAGCTGAAGTCGAACAC	20
gclc	Forward	CGGATGGAGAGTGGAGTTCA	20
	Reverse	TTCGCTTCTGGGCTACCTT	19
gclm	Forward	ATCCATCAGAAGTGCGGTAG	20
	Reverse	TGCAGGTGTGTCAGTGTCT	19
ho-1	Forward	AAGCAAAGCGGCAGAGAAC	19
	Reverse	TGGAGCAGTCAGATGAAGTGT	21
nqo1	Forward	CTGGGTGGTGTGTTTGAAGAA	21
	Reverse	GCTGTGGTAATGCCGTAGG	19
α-syn	Forward	ATGGATGTTTTTATGAAGGGGC	22
	Reverse	ACGCTGTCTTTGGTCTTGCT	20
parkin	Forward	GGCAATGAAGATGATGTGGAAC	22
	Reverse	ATCACGTTGGGATGAGCACT	20
beclin1	Forward	AGAGCATTGAGACAAAGCGTGAA	23
	Reverse	TCTGCCAAGGCGGAAGTTATT	21
atg5	Forward	AGGGGATAACAGCACAAACG	20
	Reverse	CTTCTTATGCAGCGTGTCCA	20
map1lc3b	Forward	AAAGGAGGACATTTGAGCAG	20
	Reverse	AATGTCTCCTGGGAAGCGTA	20
atg3	Forward	GGCTGTTTGGATATGATGAG	20
	Reverse	AGCAGGTGGAGGGAGATTAG	20
caspase-1	Forward	TCAGCAAAGGAAATGGAT	18
	Reverse	TTAGACGGCGGTAGACAT	18
caspase-3	Forward	TCAGTCACGGCGATGAGGG	19
	Reverse	CCTCGACAAGCCTGAATAAAGAAC	24
caspase-8	Forward	AAGACCTGATTCTGCGACTG	20
	Reverse	TAGGCTGAGACACCTTTACG	20
caspase-9	Forward	GAGACCAACCAGGCCAAGAC	20
	Reverse	TCTCGTGCCTTATGCGTTTAGAT	23
bax	Forward	GGCTATTTCAACCAGGGTTCC	21
	Reverse	TGCGAATCACCAATGCTGT	19

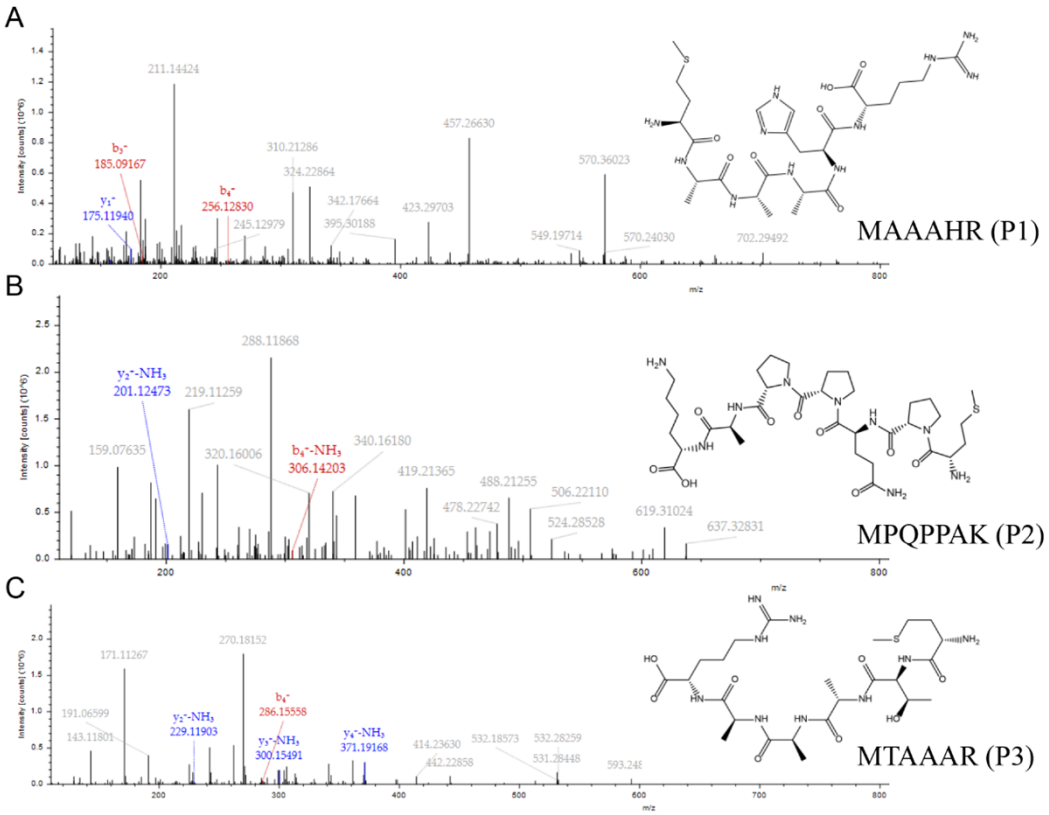
bcl-2	Forward	TCACTCAGTTCAGACCCTCAT	21
	Reverse	ACGCTTTCCACGCACAT	17



Supplementary Fig. 1. The effects of three peptides on the morphology and mortality of zebrafish embryonic/larval. (A)-(C) The overall developmental morphology of zebrafish at 24–144 hpf. (D)-(F) The mortality of zebrafish larvae at 144 hpf.



Supplementary Fig. 2. Effects of three novel peptides on 6-OHDA-induced PC12 cell death. (A) Cells were treated for 6 h with or without different concentrations of MAAAHR. (B) Cells were treated for 6 h with or without different concentrations of MPQPPAK. (C) Cells were treated for 6 h with or without different concentrations of MTAAAR. (D) PC12 cells were incubated for 12 h with different concentrations of 6-OHDA. (E) Morphological changes in PC12 cells were visualized under an inverted microscope. (F) Cells were pretreated for 6 h with or without different concentrations of C-PC peptides. All groups were exposed to 400 μM 6-OHDA for another 12 h after the pretreatment. In A-F, cell viability was measured by the CCK8 assay and the results are expressed as a percentage of that of the control group (without treatment with 6-OHDA). $^{\#\#}p < 0.01$ vs. Control; $^{*}p < 0.05$, $^{**}p < 0.01$ vs. 6-OHDA group.



Supplementary Fig. 3. MS/MS spectra and structures of the three peptides from C-Phycocyanin (C-PC). (A) MAAAHR (P1). (B) MPQPPAK (P2). (C) MTAAAR (P3).