

**Intranasal delivery of mitochondrial protein humanin rescues cell death and promotes mitochondrial function in Parkinson's disease**

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**Supplementary figures and tables**

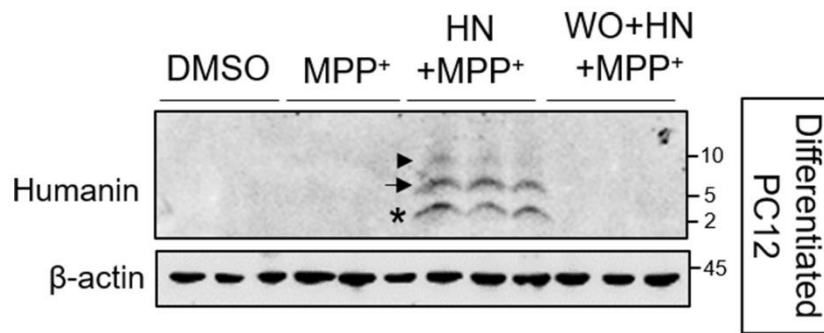
**Table S1. General characteristics of healthy controls and patients with Parkinson's disease.**

	PD (n = 21)	HC (n = 17)	p-value
Age (y)	61.48 ± 8.87	58.35 ± 4.05	0.19
Gender, male (%)	76.47	57.14	0.22
BMI	24.87 ± 2.51	25.70 ± 2.05	0.33
UPDRS III (n)	37.33 (3)	–	–
Family history (%)	19.05	–	–

BMI, body mass index; UPDRS III, part III of the Movement Disorders Society Unified Parkinson's Disease rating scale

**Table S2. Primers used for Real-time qPCR analysis**

Gene symbol	Forward primer	Reverse primer
12S rRNA (1201-1394)	AGCCTGTTCTGTAATCGATAAACCC	GCTATCGTAGTTTTCTGGGGTAGA
12S rRNA (1379-1536)	AGAAAACACTACGATAGCCCTTATGAAA	TAGGGGTTTTAGTTAAATGTCCTTTG
16S rRNA (1701-1784)	TACTACCAGACAACCTTAGCCAAAC	TACTATATCTATTGCGCCAGGTTTC
humanin	TTATGCCCCGCCTCTTCACGGGCA	CACGAGGGTTCAGCTGTCTCTTACTTTTA
16S rRNA (2933-3131)	GGATAACAGCGCAATCCTATTC	CTTTCGTACAGGGAGGAATTTG
B2M	TGCTGTCTCCATGTTTGATGTATCT	TCTCTGCTCCCCACCTCTAAGT
NRF1	ACAGCAGTGGCAAGATCTCA	GCAAGGCTGTAGTTGGTGCT
PGC-1 $\alpha$	CAGAGAACAGAAACAGCAGCA	TGGGGTCAGAGGAAGAGATAAA
ESRRA	GAGATCACCAAGCGGAGACG	ATGAGACACCAGTGCATTAC
SDHA	GAGATGTGGTGTCTCGGTCCAT	GCTGTCTCTGAAATGCCAGGCA
ATP5F1A	CATCTTGGTCCTGCCCTGAC	GCTGCAGATAGACAAGGCGA
ATP5F1D	GTCGTGGTGCATGCAGAG	GAAGAGTCGGCGTTCACTG
ACC2	CAAGTGCAAGATCTGTTTCCCTGATCG	CCGGAAGTTTAGGGTTTTCTGAAGCAT
ACLY	TGCTCGATTATGCACTGGAAGT	ATGAACCCATACTCCTTCCCAG
FASN	GGTCTTGAGAGATGGCTTGC	AATTGGCAAAGCCGTAGTTG
IDH3A	CCGCGTGGATCTCTAAGG	AATTTCTGGCCAATACCATCTC
MT-ND4	CTAGGCTCACTAAACATTCTA	CCTAGTTTTAAGAGTACTGCG
ATP5PB	CATCTTGGTCCTGCCCTGAC	GCTGCAGATAGACAAGGCGA



**Figure S1. Upregulation of intracellular humanin induced by humanin treatment is PI3K signaling-dependent.** Western blot analysis assessing the impact of PI3K inhibitor wortmannin on upregulation of intracellular humanin induced by HN treatment (10  $\mu$ M, 24 h) in MPP<sup>+</sup>-exposed differentiated PC12 cells. Pre-treatment with wortmannin (WO, 1  $\mu$ M) for 1 h significantly inhibited induction of intracellular humanin by its treatment. Asterisk, arrow, or arrowhead indicates the putative monomeric, dimeric, or trimeric form of humanin, respectively. HN: humanin.