Anti-melanogenic effects of *Cnidium monnieri* extract via p38 signaling-mediated proteasomal degradation of tyrosinase

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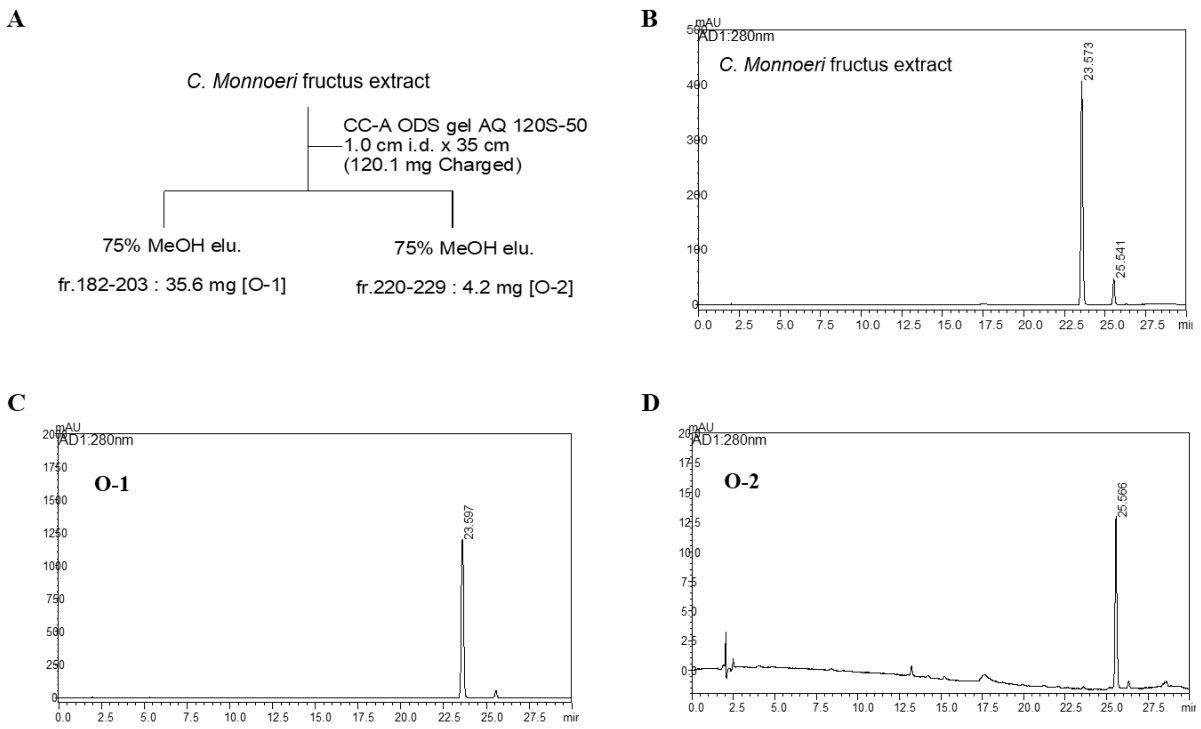
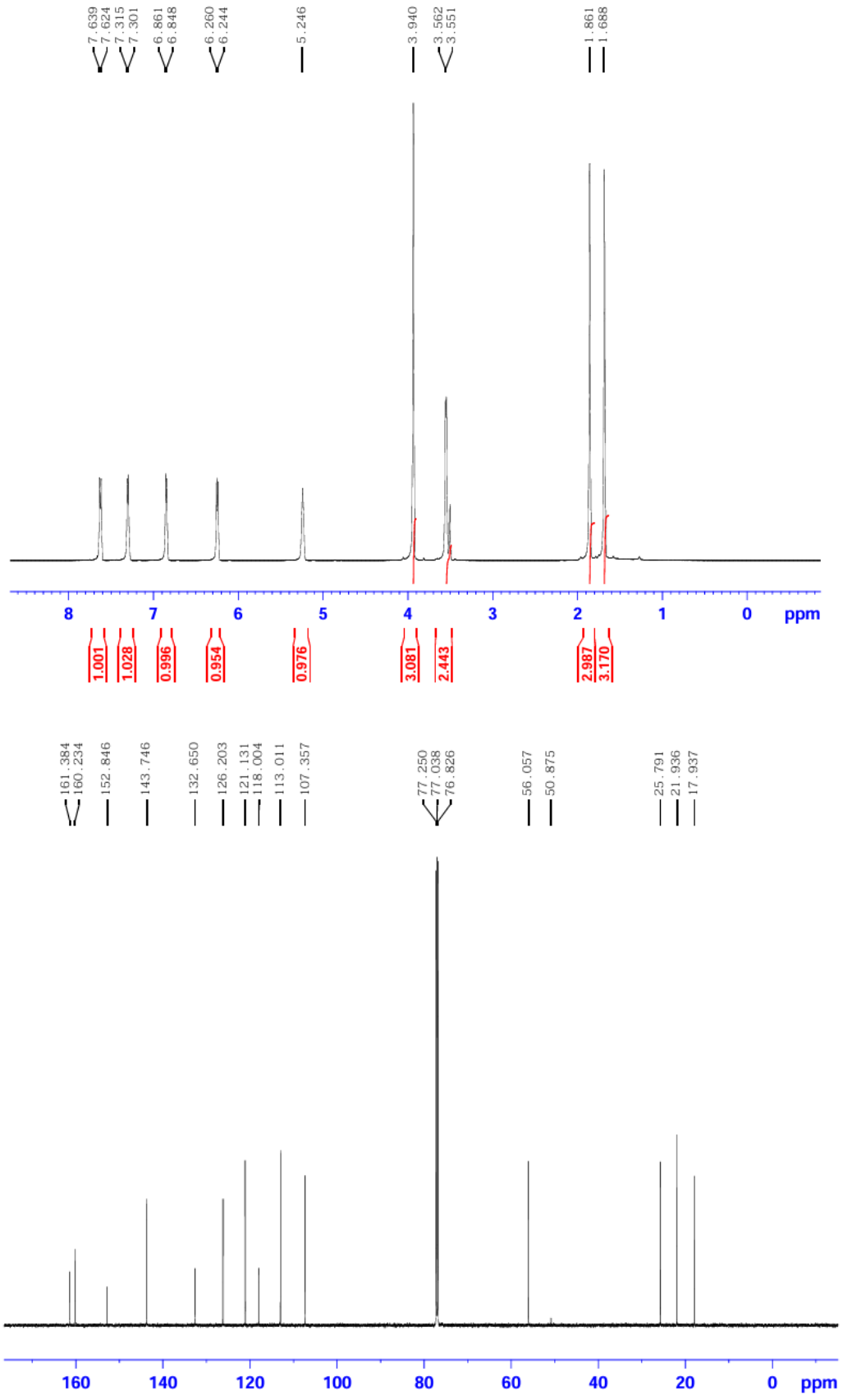


Supporting information Figure s1. Isolation procedure of *C. Monnoeri* fructus extract and compound of *C. Monnoeri* fructus extract fractionated by semi-preparative HPLC. (A) Isolation procedure of *C. Monnoeri* fructus extract. (B-D) Compounds of *C. Monnoeri* fructus extract fractionated by semi-preparative HPLC. The flow rate of the mobile phase was maintained at 5, and the compound was detected at 280 nm. The main substance was separated at Rt 23.6 min and named O-1.

Supporting information table s1. NMR data of O-1 in $CDCl_3$ (600 MHz)

No.	O-1 ($CDCl_3$, 600 MHz)		Osthol ($CDCl_3$, 400 MHz)	
	δ_H (J in Hz)	δ_C, mult.	δ_H (J in Hz) [1]	δ_C, mult. [2]
2	-	161.4	-	161.3
3	6.25 (d, 9.0)	112.8	6.25 (d, 9.4)	112.9
4	7.63 (d, 9.0)	143.7	7.61 (d, 9.4)	143.8
4a	-	113.0	-	113.0
5	7.31 (d, 8.4)	126.2	7.29 (d, 8.7)	126.2
6	6.85 (d, 8.4)	107.3	6.83 (d, 8.7)	107.4
7	-	160.2	-	160.2
8	-	118.0	-	117.9
8a	-	152.8	-	152.8
1'	3.55 (d, 6.6)	21.9	3.52 (d, 7.4)	21.9
2'	5.25 (d, 6.6)	121.1	5.22 (t, 7.4)	121.2
3'	-	132.7	-	132.6
4'	1.86 (s)	25.8	1.84 (s)	25.8
5'	1.69 (s)	17.9	1.67 (s)	17.9
7-OCH_3	3.94 (s)	56.1	3.92 (s)	56.0



Supporting information Figure s2. 1D NMR data for osthol (600 MHz, $CDCl_3$)

Reference

1. ITO, C.; FURUKAWA, H. Constituents of *Murraya exotica* L. Structure elucidation of new coumarins. *Chem. Pharm. Bull.* **1987**, *35(10)*, 4277-4285.
2. Zhou, P.; Takaishi, Y.; Duan, H.; Chen, B.; Honda, G.; Itoh, M.; Takeda, Y.; Kodzhimatov, O.K.; Lee, K.H. Coumarins and bicoumarin from *Ferula sumbul*: anti-HIV activity and inhibition of cytokine release. *Phytochemistry* **2000**, *53(6)*, 689-697.