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나노입자화 한 복분자 추출물의 면역 활성 증진

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Enhancement of Immuno Modulatory Activities of *Rubus coreanus* Miquel Extracts by Nano-encapsulation Process

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Objectives

This study was conducted to obtain the basic data for using nano-capsulated *Rubus coreanus* Miquel as a medicinal crop. We analyzed the effect of immuno modulatory activities on *Rubus coreanus* Miquel, the edible fruit which is traditionally used for tonic and treatment of impotence and back pain.

Materials and Methods

R. coreanus extracted by aqueous extracts at 60℃. The size of nano-particles was measured by DLS (Dynamic Light Scattering) and the penetration of immune cells was observed under real time confocal microscope.

Results

The promotion of human B and T cell growth was showed above 50%, compared to the case of other conditions. The secretion of IL-6 and TNF-α was also enhanced as 2.44×10^{4} pg/cell and 1.94×10^{-4} pg/cell by adding nano samples. NK cell activation was improved up to 29% higher than the conventional extraction process. The secretion of NO^{-} from macrophage showed 14.9 μM by nano-encapsulation process extracts, which was higher than others. The size of nanoparticles was in the range of 50~300 nm, which can effect the penetration into the cells.

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* 시험성적

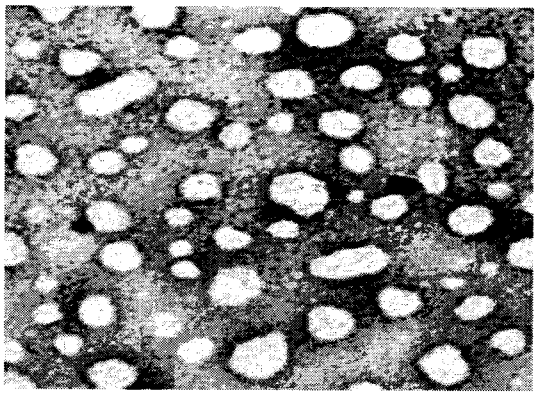

Fig. 1. TEM micrograph of nanoparticle from the extract of *R. coreanus*. Scale of bar is 200 ㎚.

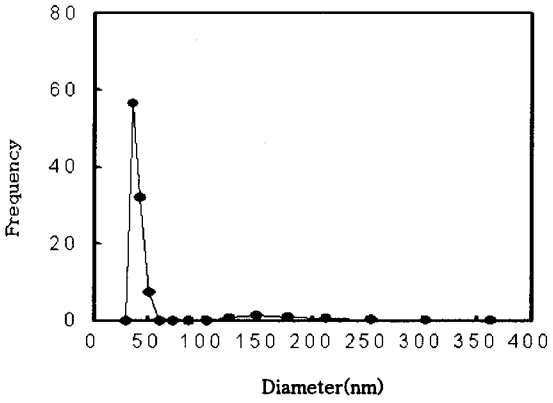

Fig. 2. Size distribution of nanoparticles with 0.2% gelatin using image analyzer.

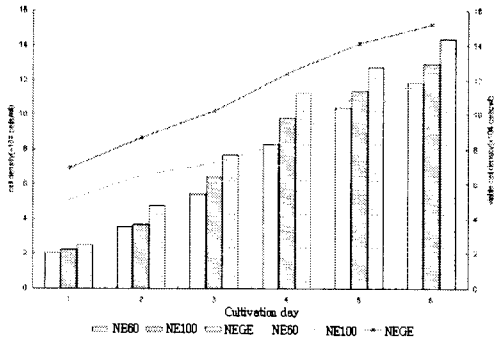

Fig. 3. The NK cell growth by adding the supernatant of B cells containing normal-extracts and nanoparticle of *R. coreanus*.

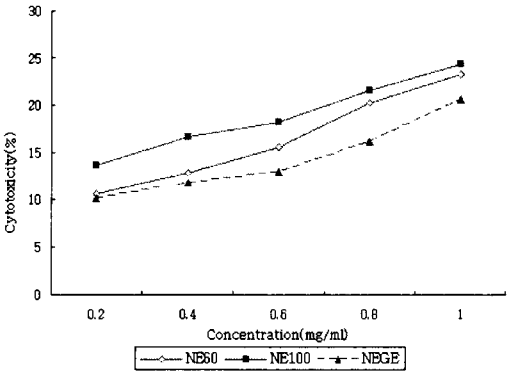

Fig. 4. Cytotoxicity on the nano particle of *R. coreanus*

Table 1. The B and T cell growth by adding 0.5 ㎎/㎖ of *R. coreanus*

Sample	Time (day)	Concentration	
		B cell ($\times 10^4$ cell/㎖)	T cell (10^{-4}pg/㎖)
*NE60	1	1.89 ± 0.21	1.68 ± 0.12
	2	3.64 ± 0.22	2.86 ± 0.32
	3	5.12 ± 0.55	4.06 ± 0.44
	4	7.06 ± 0.95	5.32 ± 0.51
	5	8.33 ± 0.13	7.32 ± 0.11
	6	9.88 ± 1.21	10.98 ± 0.25
**NE100	1	1.95 ± 0.53	1.59 ± 0.11
	2	3.54 ± 0.13	3.88 ± 0.65
	3	5.65 ± 0.66	5.59 ± 1.23
	4	6.78 ± 1.65	7.23 ± 0.32
	5	9.23 ± 2.30	10.88 ± 0.22
	6	10.91 ± 1.22	12.15 ± 1.35
***NEGE	1	2.68 ± 0.61	3.02 ± 0.36
	2	4.96 ± 2.36	5.22 ± 0.95
	3	7.30 ± 1.32	8.19 ± 1.30
	4	10.12 ± 0.62	12.42 ± 0.26
	5	13.11 ± 0.89	16.22 ± 1.32
	6	16.04 ± 1.33	14.88 ± 1.39

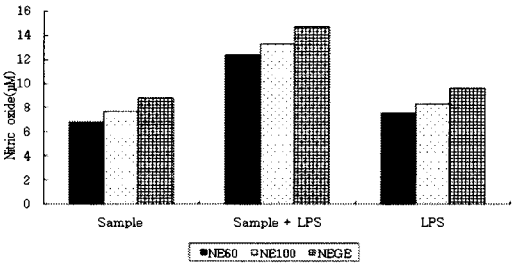

Fig. 5. Stimulation of ntric oxide production by adding the extracts from *R. coreanus*($p < 0.05$).

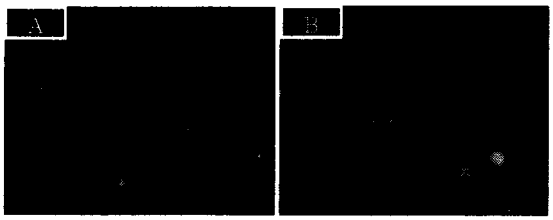

Fig. 6. Confocal microscope photographs of immune cell after 1 hr of growth in media containing nanoparticle of *R. coreanus*.