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Studies on the Constituents of Higher Fungi of Korea

Antitumor Polysaccharides from the Carpophores of Some Basidiomycetes

Byong Kak Kim, Eung Chil Choi, Kyeong Soo Chung, Chang Yul Kang, Sook Hee Kim, Jin Sook Kim, You Jin Kim, Kyong Lim Lee and Jong Kil Lee

Department of Microbial Chemistry, College of Pharmacy, Seoul National University, Seoul 151, Korea
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Abstract □ To develop new potent antitumor substances with low toxicity from natural products, especially from higher fungi of Korea, the carpophores of some wild basidiomycetes were collected and the antitumor test for their polysaccharides was done. The dried carpophores were extracted with hot water, and from the extracts, crude polysaccharides were obtained by alcohol precipitation. The alcohol precipitated crude polysaccharides were partially purified by dialysis and then used as the samples for antitumor tests. Among tested, the polysaccharide of *Laccaria laccata*, *Trametes sanguineus*, *Armillariella mellea*, *Clitocybe infundibuliformis*, and *Xeromphallina campanella* respectively showed the inhibition ratio of 75%, 72%, 94%, 55%, and 47% when administered *i.p.* once dailly for ten days at the dose level of 20mg/kg/day into the mice implanted with 10^6 cells of sarcoma 180/mouse. However, those of *Craterellus cornucopiodes*, *Daedaleopsis confrogosa*, and *Coriolus* sp. showed almost no activities.

Keywords □ Basidiomycetes, Antitumor activity against sarcoma 180, Polysaccharides, *Laccaria laccata Trametes sanguineus*, *Armillariella mellea*, *Clitocybe infundibuliformis*, *Xeromphallina campanella*, *Craterellus cornucopioides*, *Daedaleopsis confrogosa*, *Coriolus* sp.

The fungal materials(Table I.) were collected at various locations in Korea during the period of Jun, 1979 to October, 1981. The dried carpophores were fully soaked in distilled water and then homogenized with a blendor for 5 minutes. The homogenated carpophores were extracted with hot water on a boiling water bath. The extracts were condenced in vacuum at 50~60°C and mixed with three volumes of 95% ethanol. The alcohol precipitated crude polysaccharides were obtained by centrifugation at 8000rpm for 30 minutes. The crude polysaccharrides were dissolved in distilled water and dialysed in Visking tubes against distilled water at 4°C for seven days. The dialysates were freeze-dried to yield polysaccharide powders, which were used as the samples for antitumor tests. Antitumor tests were carried out as described in the previous reports[1~2]. The test animals were implanted with sarcoma 180 (10^6 cells/mouse) subcutaneously into the left groin 24 hour before polysaccharide administration. Polysaccharide administration was carried out once daily for ten days at the dose level of 20mg/kg or 50mg/kg. Thirty days after tumor implantation the mice were sacrificed and the weights of solid tumors were measured to calculate the inhibition ratios.

The inhibition ratios of the samples against sarcoma 180 vary from 0.5% to 94% (Table II). Among nine samples from eight species; the polysaccharide of *A. mellea* exhibited the highest antitumor activity(94%), and those of *L. laccata* and *T. sanguineus*, farely good acti-

Table I: Fungal materials and the polysaccharide yields.

Species	Sample wt. (g)	Polysaccharide obtained (g)	Percent yield	Collection	
				Location	Date
Clitocybe infundibuliformis	10	0.73	7.3%	Gwang-neung	1981.10.
Craterellus cornucopiodes	40	2.37	5.9%	Gwang-neung	1981.10.
Xeromphalina campanella	40	1.50	3.8%	Gwang-neung	1981.10.
Laccaria laccata	50	1.20	2.4%	Suweon	1981. 8.
Armillariela mellea	25	4.20	16.8%	Gwang-neung	1981.10.
Coriolus sp.	80	2.70	3.4%	Chung-cheong-nam-do	1981.10.
Trametes sanguineus	30	2.40	8.0%	Suweon	1979. 6. ~1980. 7.
Daedaleopsis confrogosa	110	11.00(1:1)*	10.0%	Eu-jeong-bu	1981.10.
		2.50(1:3)**	2.3%		

*The polysaccharides were obtained by mixing the concentrated hot water extract with equal volume of 95% ethanol.

** The polysaccharides were obtained by precipitating with two-fold volume of 95% ethanol after removal of (1:1) precipitation.

Table II. Antitumor activities of the samples.

Sample	Dose	Average tumor wt. (g)	Inhibition ratio (%)	Complete regression
Clitocybe infundibuliformis	20mg/kg	2.47±0.81[a]	55%	1/10
Control	—	5.56±0.42	—	0/10
Craterellus cornucopioides	20mg/kg	4.10±0.76[c]	0.5%	0/10
Control	—	4.12±1.13	—	0/10
Xeromphalina campanella	20mg/kg	2.92±0.78[a]	47%	2/10
	50mg/kg	2.34±0.57[a]	58%	0/10
Control	—	5.56±0.42	—	0/10
Laccaria laccata	20mg/kg	0.55±0.27[b]	75%	6/11
	50mg/kg	0.77±0.49[a]	65%	4/10
Control	—	2.20±0.53	—	0/10
Armillariella mellea	20mg/kg	0.31±0.13[b]	94%	2/10
Coriolus sp.	20mg/kg	3.84±0.22[a]	27%	0/11
Control	—	5.26±0.41	—	0/ 9
Daedaleopsis confrogosa	(1 : 1) 20mg/kg	4.34±0.42[a]	22%	0/10
	50mg/kg	3.84±0.26[b]	31%	0/10
	(1 : 3) 20mg/kg	4.56±0.26[b]	18%	0/10
	50mg/kg	4.45±0.37[a]	20%	0/10
Control	—	5.56±0.42	—	0/10

Trametes sanguineus	10mg/kg	2.56±0.42[a]	72%	2/ 8
	50mg/kg	2.73±0.28[a]	71%	1/ 8
Control	—	9.26±0.81	—	0/ 8

a: Mean ±S.E ($p<0.01$)
b: Mean±S.E ($p<0.001$)
c: Mean±S.E ($p<0.1$)

vities (72~75%), while those of *C. infundibuliformis* and *X. campanella*, moderate activities (47%~55%). The other samples exhibited almost negligible activities.

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LITERATURE CITED

1) Kim. B.K., Chung, H.S., Chung, K.S., and Yang, M.S., Studies on the antincoplastic components of Korean basidiomycetes. *Kor. J. Mycol.* 8, 107 (1980).
2) Lee, S.A., Chung, K.S., Shim, M.J., Choi, E.C., and Kim, B.K., Studies on the antitumor components of Korean basidiomycetes(II). Antitumor components of *Schizophyllum commune* and *Auricularia auricularia-judae*. *Kor. J. Mycol.* **9**, 25 (1981).