

Antitumor Activity on Sarcoma 180 of the Polysaccharides from *Tremella fuciformis* BERK

Polysaccharide preparations from homobasidia¹⁾ are well known to inhibit the growth of sarcoma 180 implanted subcutaneously in mice. This tumor-inhibiting effect is considered to be host-mediated, and is not attributable to cytotoxic action on tumor cells. No report is found on such an effect of polysaccharides obtained from *Tremella fuciformis* BERK (Tremellaceae), which belongs to heterobasidia. In the preceding communication,²⁾ we described on the isolation and the characterization of the polysaccharides (A, B, and C) prepared from the fruit bodies of this fungus. The present paper deals with an antitumor effect of the polysaccharides obtained from the fruit bodies of *Tremella fuciformis* BERK, which grow in Japan and in China, on the implanted sarcoma 180 in mice.

Male and female mice of ddY strain, supplied from an animal farm in Shizuoka Prefecture, were used for experiments. All the animals were kept on semi-synthetic diet, pellet CE-2 (CLEA Japan Inc., Tokyo), with water *ad libitum*. Sarcoma 180 ascites cells, maintained by serial intraperitoneal transplantation into ddY male mice, were used. Seven-day-old tumor cells were employed as a material for the experiment. The cells transplanted in a dose of 0.2 ml (2×10^6 cells) subcutaneously into the right groin or the back of mice.

TABLE I. Effect of Polysaccharide Preparations from
Tremella fuciformis BERK on Sarcoma 180 (1)

Sample	No. of mice	Dose (mg/kg \times 7)	ΔG^a (g)	Mean tumor Wt. \pm S.D. ^{b)} (g)	Tumor growth inhibition (%)
Japanese					
A	10	30	+5.0	0.61 \pm 0.24	63.5
B	10	30	+6.1	0.84 \pm 0.37	50.3
C ^{c)}	10	30	+2.7	0.31 \pm 0.11	81.4
Chinese					
A	10	5	+6.9	1.06 \pm 0.46	37.4
B	10	5	+8.7	1.44 \pm 0.33	14.7
C	10	5	+6.6	1.00 \pm 0.40	39.8
Control	10		+7.5	1.67 \pm 0.82	

a) body weight change; b) standard deviation; c) Crude polysaccharide was used, due to the poor yield of its alkaline extract. Sarcoma 180 tumor cells were transplanted subcutaneously into the right groin of male mice. One day after the transplantation, the polysaccharides were injected intraperitoneally for 7 days. The tumor was weighed on the 2nd week after the transplantation.

As shown in Tables I and II, all of these polysaccharides gave the antitumor effect on the subcutaneously implanted sarcoma 180 in mice. It seems that the polysaccharides from Japanese fungus showed much highly activity than the compounds from Chinese fungus. Also, in the case of Japanese fungus, the C-polysaccharide (alkaline extract fraction) was more effective than the A- and B-compounds (aqueous extract fraction).

The active antitumor polysaccharides so far prepared from homobasidia are mostly glucans having a certain structure consisting of β -(1 \rightarrow 3)- or β -(1 \rightarrow 6)-linked D-glucose residues,¹⁾ whereas all of the polysaccharides from *Tremella fuciformis* BERK belonging to heterobasidia

1) H. Nakayoshi, *Nippon Saikingaku Zasshi*, **22**, 641 (1967); *idem, ibid.*, **23**, 7 (1968); S. Shibata, Y. Nishikawa, C.F. Mei, and F. Fukuoka, *Gann*, **59**, 159 (1968); G. Chihara, J. Hamuro, Y. Maeda, T. Sasaki, and F. Fukuoka, *Nature*, **222**, 687 (1969); T. Sasaki, Y. Arai, T. Ikekawa, G. Chihara, and F. Fukuoka, *Chem. Pharm. Bull.* (Tokyo), **19**, 821 (1971).

TABLE II. Effect of Polysaccharide Preparations from *Tremella fuciformis* BERK on Sarcoma 180 (2)

Sample	Dose ($\mu\text{g}/\text{mouse} \times 10$)	$\Delta G^a)$ (g)	Complete regression	Mean tumor wt. \pm S.D. ^{b)} (g)	Tumor growth inhibition (%)
Japanese					
A	2000	+3.9	4/10	0.35 ± 0.72	67.9
B	2000	+2.1	3/10	0.42 ± 0.78	61.5
C ^{c)}	1000	+2.4	2/9	0.09 ± 0.09	91.7
Chinese					
A	2000	+3.5	3/10	0.59 ± 1.34	45.9
B	2000	+3.1	4/10	0.21 ± 0.42	80.8
C	2000	+4.3	2/9	0.25 ± 0.55	77.1
Control		+4.2	1/10	1.06 ± 1.09	

a) body weight change; b) standard deviation; c) Crude polysaccharide was used, due to the poor yield of its alkaline extract.

Sarcoma 180 tumor cells were transplanted subcutaneously into the back of female mice. One day after the transplantation, the polysaccharides were injected intraperitoneally for 10 days. The tumor was weighed on the 4th week after the transplantation.

are acidic heteroglycans composed mainly of xylose, glucuronic acid and mannose.²⁾ This difference is of interest in connection with the report³⁾ that heteroglycans obtained from some lichens showed a marked antitumor activity on subcutaneously implanted sarcoma 180.

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2) S. Ukai, K. Hirose, and T. Kiho, *Chem. Pharm. Bull.* (Tokyo), **20**, 1347 (1972).

3) Y. Nishikawa, The 92nd Annual Meeting of the Pharmaceutical Society of Japan, Osaka, April 1972 (Meeting abstract, I, p. 136).