36. Vitamins and Tumor Growth.

III. Vitamin B Content of Rat Tumors.

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In 1928, working on the Rous chicken sarcoma, we¹⁾ reported that the vitamin B content of the tumor tissue is very small, if not practically nil. Jackson and Kranz,²⁾ in 1929, published several experiments showing that human as well as mouse carcinoma contain but very little vitamin B. We now propose to describe our findings on two types of transplantable rat tumors, namely, the Fujinawa sarcoma and Flexner-Jobling carcinoma.

Fujinawa sarcoma. (A) *Pigeon test.* 6 pigeons were kept on a polished rice diet, with the supplementary forced feeding of 0.5 gr. per day of McCollum's salt mixture, so as to induce polyneuritis. From the 16th day on, 3 of the pigeons were given in addition forced feeding of 0.5 gr. of dried sarcoma tissue per day per pigeon, and the effect of the sarcoma feeding on the development of polyneuritis was observed. In this, as well as in other experiments to follow, tumor material was obtained from freshly killed rats, minced and dried in an open glass dish over water bath at a temperature not exceeding 70°–80° C.

As shown in the following table, the sarcoma feeding somewhat delayed the death from polyneuritis, but by no means prevented it.

Pigeon No.	Initial body wt.	Body wt. 16th day		Final weight	Death from polyneuritis in
1	314	258	Sarcoma feeding from 16th day: 0.5 gr. per pigeon per day	228	31 days
2	324	242		196	34 " (average)
3	265	229		165	51 " (38.6 days)
4	315	240	Controls	187	26 days
5	298	—		218	20 "
6	274	—		225	42 " (average)
7	252	—		205	47 " (30.5 days)
8	287	—		162	23 "
9	262	—		172	25 "

1) Nakahara, W. and Somekawa, E. Proc. 4 (1928), 440.

2) Jackson, H. Jr. and Kranz, C.I., Jour. Clin. Invest., vol. 6, 607, 1929.

(B) *Rat test.* Young albino rats were placed on a vitamin B deficient diet, consisting of horse meat protein 15%, starch 65%, butter 15%, McCollum's salt mixture 5%, and water ad libitum. At the point when the growth of the rat came to a standstill, or slight decline was noted, the additional feeding of the tumor material was started, according to the usual procedure in this type of experiments. The results of three experiments, as given below, show that the rat sarcoma contains very little vitamin B, probably about one-tenth the amount contained in the normal rat liver.

Rat No.	Initial body wt.	Body wt. 19th day		Body wt. 29th day	Average effect of test feeding
1 2	35 gr. 37 "	51 gr. 48 "	0.5 gr. sarcoma daily from 19th day	47 gr. 55 "	Gain 1.5 gr.
3 4 5	40 gr. 35 " 40 "	44 gr. 49 " 48 "	Controls	35 gr. 49 " 39 "	Loss 6 gr.
1 2	46 gr. 48 "	27th day 63 gr. 63 "	1 gr. sarcoma daily from 27th day	37th day 81 gr. 75 "	Gain 15 gr.
3 4	46 gr. 44 "	53 gr. 58 "	Controls	50 gr. 41 "	Loss 10 gr.
1 2	43 gr. 42 "	21st day 45 gr. 34 "	1 gr. sarcoma daily from 21st day	28th day 57 gr. 45 "	Gain 11.5 gr.
3 4 5	46 gr. 57 " 58 "	46 gr. 57 " 58 "	0.2 gr. liver daily from 21st day	55 gr. 69 " 72 "	Gain 11.6 gr.

Flexner-Jobling Carcinoma. The vitamin B content of this tumor was assayed by rat tests alone, with results quite comparable to the case of the Fujinawa sarcoma.

Rat No.	Initial body wt.	Body wt. 21st day		Body wt. 28th day	Average effect of test feeding
1 2 3	45 gr. 45 " 42 "	42 gr. 40 " 47 "	1 gr. carcinoma daily from 21st day	64 gr. 57 " 53 "	Gain 15 gr.
4 5	64 gr. 57 "	67 gr. 57 "	0.2 gr. carcinoma daily from 21st day	64 gr. 53 "	Loss 3.5 gr.
6 7	44 gr. 64 "	55 gr. 56 "	0.2 gr. liver daily from 21st day	64 gr. 63 "	Gain 8 gr.

Summary. Transplantable rat tumors, both sarcoma and carcinoma, contain vitamin B, but only in small amounts. This fact affords further data for the conclusion that malignant tumors in general are not rich in vitamin B.