The growth of tumors can be retarded by reduction of food intake in experimental animals. The effect of overfeeding has been little studied. In the present studies rats which were hosts to Walker carcinoma 256 were overfed by stomach tube. Tumor growth was not increased.

MATERIALS AND METHODS

Male rats of the Sprague-Dawley strain were maintained on Rockland rat diet until they reached a weight of approximately 375 gm. Thereafter they were fed a fluid medium carbohydrate diet (Table 1) administered by stomach tube each morning and late afternoon. During adaptation to force-feeding, the amount of diet was increased gradually to prevent the development of food shock. The animals were brought to a full feeding of 66 cc/rat/day, which represents a normal caloric intake for rats of this weight, and were maintained at this level for 7 days. At this time a suspension of Walker carcinoma 256 was injected either subcutaneously into each flank or intramuscularly into each thigh of the rats. After the implantations of tumor were completed, all the rats were weighed and matched into two groups. It was decided by a toss of a coin which group should be overfed. Rats of the control groups continued to receive 66 cc of diet/rat/day. The experiment was continued for 10 or 11 days, at which time the rats were killed and the tumors weighed.

RESULTS

The data are summarized in Table 2. In experiment 1, the tumors were implanted subcutaneously. Overfeeding was started on the day the tumor was implanted. Beginning at the normal intake of 26 cc/rat/day, the increment was 1 cc/rat/day for 10 days. The tumor (implant) failed to grow in one rat of the overfed group. At the end of 10 days, overfed rats had gained an average of 68 gm., as compared with 25 gm. for the controls, but there was no significant difference in the average weights of tumors.

In experiment 2, the tumors were implanted...
subcutaneously. Beginning with the normal intake of 26 cc/rat/day, the increment was 2 cc/rat/day in the overfed group. At the end of 11 days the overfed rats had gained an average of 82 gm. as compared with 26 gm. for the controls. In this experiment the average tumor weight in the overfed group was significantly less than the average value for controls. This may be related to alimentary glycosuria and signs of debility among these overfed rats during the last few days of the experiment.

In experiment 3, the tumors were implanted intramuscularly. Beginning with a normal food intake of 26 cc/rat/day, the increment was 1 cc/rat/day in the overfed group. At the end of 10 days the overfed rats had gained an average of 83 gm. as compared with 21 gm. for the controls. There was no significant difference in the average weights of tumors. All tumors grew to larger size when the implants were intramuscular rather than subcutaneous.

Experiment 4 was a repetition of experiment 3, but the gains in weight were less in each group—an average of 67 gm. in the overfed group and of 18 gm. for the controls. There was no significant group difference in the average weights of tumors.

In experiment 5, one group of rats was overfed by an increment of 1 cc/rat/day, until the total was 52 cc/rat/day, before the tumors were implanted in either the overfed or control groups. The tumor implant failed to grow in two control rats and in one overfed rat. Although the overfed rats gained in body weight much more rapidly than did the controls, and remained in good condition throughout the experiment, there was no significant difference in the average weight of tumors.

It is concluded that under the conditions of these experiments the growth of the tumor is optimal in rats given a normal caloric intake and is not accelerated by overfeeding. It would be unsafe to conclude that the growth of tumors is unaffected by overfeeding and obesity under other conditions.

SUMMARY

Male rats were implanted either subcutaneously or intramuscularly with Walker carcinoma 256 and fed a fluid medium carbohydrate diet by stomach tube each morning and late afternoon. In each of five experiments, half of the rats were given a normal caloric intake, and the remaining rats were overfed for periods of 10 or 11 days. Overfeeding resulted in more rapid gain in body weight, but did not accelerate the growth of the tumors.
Weights of Tumors in Overfed Rats

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