pinged on each cm^2 of exposed tissue/second with grounds in place. Ion densities were only slightly less when tissues were ungrounded. Ciliary rates were determined with a strobotachometer(1).

Results. Fig. 1 typifies results obtained with the 3 monkeys. As is true with mice, rats, guinea pigs and rabbits, negative air ions enhanced the efficiency of the tracheal surface clearing mechanism while positive ions depressed it. In tissues untreated with air ions the minor trauma produced by touching the surface with a probe induced no more than a brief vascular reaction, but after exposure to positive ions this procedure resulted in prompt production of a well-defined ecchymotic area. Grounding the rectifying circuit did not measurably influence the tissue response.

In both human specimens the layer of mucus was minimal and it was not possible to measure rates of mucus flow. However, the characteristic effects of air ions on ciliary activity were well defined in each instance. As indicated in Fig. 2, treatment with negative ions raised rate of beat, and it quickly returned to normal when ion source was removed. Positive ions depressed the rate and this depression was reversible.

Conclusions. Positive air ions depress ciliary activity of trachea of monkeys and man, while negative ions increase it.

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Carcass Weight Changes in Rats Bearing Walker Carcinosarcoma 256. (24998)

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Liver hypertrophy has been frequently observed in tumor-bearing rodents(1) and enlargement was an actual increase in liver substance by nitrogen(2), moisture contents(3) and increased mitotic activity(4). Yeakel(5) suggested that this hypertrophy may be due to increased protein anabolism necessary for neoplastic tissue synthesis. Since liver enlargement occurred when dietary intake was inadequate to furnish the needs of the neoplasm, various tissues relinquished nitrogen to the metabolic pool(2). If these suggestions are correct, partial removal of liver during this period might be expected to inhibit tumor growth and affect changes in carcass weight. In the present experiments, animals were partially hepatectomized during period of rapid tumor growth and changes in body weight as well as tumor growth were followed.

Methods. Female Holtzman rats received intramuscular injections(6) of a suspension of Walker carcinosarcoma 256. Initial weight of animals was 170-190 g. They were fed Purina laboratory chow and water *ad lib.* Partial hepatectomies (70% of liver removed) were performed by the method of Higgins and Anderson(7) on 7th day of tumor growth when tumors weighed 0.5-2. g. Our preliminary experiments had shown that splenectomy, as well as partial hepatectomy, resulted in larger final liver mass in rats bearing Walker tumor. A splenectomized group was therefore included in the experiments. This operation was performed 2 days before tumor implantation.

Results. Prior to studies on partial hepatectomy, liver weights and carcass weights (total body weight minus tumor weight) were determined in 62 tumor bearers. Animals were sacrificed after 19 days of tumor growth when tumor weights ranged 40-60 g. Fig. 1 shows relation of liver weight to carcass weight changes. Rats with large livers gained carcass weight while those with small livers lost weight and there was a close correlation between those two factors ($r = 0.92$).

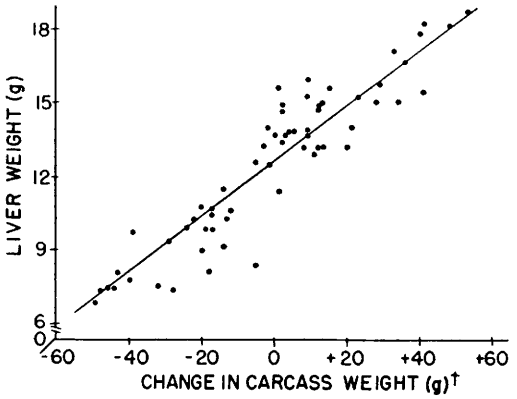

FIG. 1. Relationship of liver wt and carcass wt gains in tumor-bearing rats.*

* Walker carcinosarcoma 256 weighing 40-60 g.
† Carcass wt is total body wt minus wt of tumors.

Generally liver moisture contents of tumor bearers are higher than those of normal animals, but there was no appreciable difference in moisture content of tumor bearers with large and small livers. For example, moisture content of livers of tumor bearers was 76.2 ± .1% as compared to 71.7 ± .2% for normal animals of similar size, but percent liver moisture of tumor bearers with large and small livers was 76.2 ± .2 and 76.1 ± .2 respectively.

Table I shows relationship of splenectomy and partial hepatectomy to tumor and carcass weight changes. All animals were sacrificed after 14 days of tumor growth. Apparently splenectomy and partial hepatectomy had no effect on final tumor weights. Final liver weights of both splenectomized and hepatectomized groups were significantly higher than control groups. Nevertheless, the only treatment resulting in carcass weight gain was partial hepatectomy which was associated with an average weight gain 22 g more than any other group. Our unpublished experiments on 30 normal animals showed no difference in 16-day weight gains between partially hepatectomized (48 ± 5 g) and sham operated animals (45 ± 6 g).

Discussion. Results of initial experiments indicated at least 2 possible relations between liver and carcass weight changes in tumor bearers, *i.e.*, (A) A larger final liver mass enhanced carcass weight gains, or (B) A greater growth rate of liver during period of rapid tumor growth enhanced carcass weight gains. The first possibility must be eliminated since the splenectomized group had final liver weights equivalent to partially hepatectomized animals but exhibited a loss in carcass weight. The second possibility was reasonable assuming splenectomy did not inhibit carcass weight gains. Unpublished experiments on 14 normal animals indicated that splenectomy had no effect on changes in carcass weight over a 16-day period. Therefore, increased carcass weight appeared to be related to growth rate of liver in partially hepatectomized group rather than final liver mass.

Splenectomy and partial hepatectomy had no effect on final tumor weights. These latter results may appear to be in contrast to those of Paschkis, *et al.*(8) who reported that partial hepatectomy accelerated tumor growth. However, partial liver removal was performed at time of tumor transplantation and not at time of rapid tumor growth. Partial hepatectomy therefore probably decreased the period

TABLE I. Effect of Partial Hepatectomy and Splenectomy upon Carcass Weight Gains in Tumor-Bearing Rats.*

Treatment	No. rats	Tumor wt (g)	Liver wt (g)	Change in carcass wt (g)
Control	13	34 ± 2§	9.0 ± .4	−16 ± 6
Sham splenectomy†	12	36 ± 2	9.1 ± .3	−19 ± 6
Splenectomy†	12	40 ± 2	11.5 ± .4‖	−15 ± 7
Sham hepatectomy‡	13	35 ± 2	9.8 ± .3	−12 ± 8
Partial " ‡	13	36 ± 2	11.8 ± .4‖	+10 ± 1‖

* 14-day-old Walker carcinosarcoma 256.
† 2 days before tumor implantation.
‡ On 7th day of tumor growth.
§ Mean ± stand. error.
‖ Significantly different from sham ($P < .01$).

of "tumor take," which would result in larger final tumor weight.

Since Miller, Fancher and Bale(9) reported that complete removal of liver would inhibit incorporation of lysine-C^{14} into Walker tumor, and in view of our studies it seemed a small amount of liver tissue could provide the necessary nutrients for neoplasm even during period of rapid tumor growth. Under these conditions, partial hepatectomy did not affect final tumor weight but did enhance carcass weight gains.

Summary. Liver weights of rats bearing 40-60 g Walker carcinosarcoma 256 tumors were directly correlated with changes in carcass weight of host. Removal of 70% of liver during rapid growth of tumor resulted in a gain in carcass weight without affecting growth of the tumor.

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Antigenicity of Connective Tissue Extracts. (24999)

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The immunologic concept of pathogenesis of "collagen diseases" has stimulated interest in studies of antigenicity of connective tissue and its components. Such investigations resulted only rarely in successful production of specific antibodies. Watson, Rothbard and Vanamee(1) induced complement fixing antibodies to acetic acid extracts of rat collagen and concluded that these antibodies were specific to collagen. Attempts to demonstrate antigenicity of hyaluronic acid(2) and chondroitin sulphate(3) have not been successful. In previous experiments, reported in abstract only(4), injection of saline extracts from rabbit tendons into guinea pigs did not elicit anticonnective tissue antibodies, but in serum of injected guinea pigs high levels of complement fixing antibodies to saline extracts of rabbit and human leukocytes were demonstrated. This apparent experimental immunologic relationship of connective tissue and leukocyte extracts was of great interest in view of immunologic abnormalities in acute disseminated lupus erythematosus. When other batches of tendon extracts failed to stimulate generation of such antileukocytic antibodies a search was made for the cause of this variability in antigenic behavior of saline extracts from rabbit tendons. Results of the present study indicate that neutral salt extracts from leg tendons of aged rabbits, combined with Freund's adjuvant, elicit a greater antibody response in guinea pigs than such extracts from tendons of young animals. In contrast to previous experiments anticonnective tissue antibodies were demonstrable. These anticonnective tissue sera also crossreacted with the cytoplasmic fraction of rabbit leukocytes.

Methods. Extracts of connective tissue were prepared as follows: Tendons from small muscles of lower extremities of 7-day-old and aged rabbits (older than 1 year) were carefully separated from muscle tissue, washed in running tap water, soaked in cold tap water over-