

glycosuria and acidosis, and the rapidity with which they succumb to diabetes, renders such an explanation probable. It is conceivable also that during the period of growth the demand for carbohydrates for the histogenetic processes may be so great that the cells are left in partial carbohydrate hunger, and are unable to perform the "endo-catabolic" activities as perfectly as in later life.

Without question the metabolism of creatine is intimately associated with carbohydrate metabolism.

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The rate of tumor growth in underfed hosts.

By **PEYTON ROUS.**

[From the Laboratories of the Rockefeller Institute for Medical Research, New York.]

Workers with transmissible neoplasms have had frequent occasion to observe that sick or emaciated animals are relatively resistant as hosts for implanted tumor. It does not develop in them with the same readiness as in healthy individuals. A kindred phenomenon has been noted by Moreschi¹ in studying the relation of nutrition to tumor growth. He found that in mice losing weight on a low diet an engrafted sarcoma survived with less frequency and grew more slowly than in the well-fed controls. Indeed these controls died of their tumor sooner than did the fasting animals.

This being so might it not be possible to delay by food-restriction the course of inoperable tumors? And might not the development of metastasis after excision of a primary growth be hindered by the same means? In an attempt to answer these questions the author has performed a series of experiments with the Flexner-Jobling adeno-carcinoma of the rat. This neoplasm in its invasive spread and tendency to metastasize has a striking likeness to some of the cancers of human beings.

A bread compounded of oatmeal, rye-flour, corn-meal, milk and sugar, was baked in large quantity, dried, ground, and, with sufficient milk to moisten it, was used as the sole food of the

¹C. Moreschi, *Zeitschr. f. Immunitätsforsch.*, 1909, VI., 651.

experiment animals. Preliminary observations were made on several series of healthy rats to determine how little of the bread would sustain life while permitting of a gradual emaciation, and then 110 young, growing animals, carrying the Flexner-Jobling tumor, were submitted, half to food restriction, while the other half were fed full and used as controls. The food was carefully measured out, the exact size of the tumors charted each week, and the rats weighed twice a week. Moreschi observed the effect of food restriction from the time of the tumor's implantation or shortly thereafter until the host's death. For our purpose animals were mainly used in which the tumor had attained a large size before the restricted diet was begun. Contrary to expectation it was found that these large tumors continued to grow with the same rapidity in hosts emaciating on a restricted diet as in the controls, many of which were still gaining weight. With yet larger tumors and hosts already cachectic food-restriction had also no effect on the primary growth, and none on the frequency of metastasis formation.

Moreschi's findings were confirmed so far as regards the influence of poor nourishment of the host to hinder the development of tumor grafts. And when food restriction was begun a few days (four) after the introduction of the grafts it was noted that the tumors developed a little more slowly than in the controls. It is easy to understand how, given such a retarding influence on the tumors early in their career, the experiment animals might outlive the controls, as Moreschi found to be the case. The sarcoma he used was probably more susceptible than our carcinoma to changes in the host's nutrition.

The fact that large tumors take their course irrespective of the condition of nourishment of the host does not at present admit of direct explanation any more than does the phenomenon of regeneration in starving animals. It is to be correlated with the clinical observation on malignant disease that the tumor often grows with great rapidity despite a marked progressive emaciation of the patient. Our experiments have not yet answered the important question as to whether in animals from which the primary tumor has been removed the metastases will behave like tumor grafts in that their growth is slower in ill-nourished hosts; or

whether, as is the case with large primary tumors at this time, the growth will go on independently of the host's condition of nourishment.

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Preliminary report upon the transmission of haemolysins from mother to offspring.

By L. W. FAMULENER.

[From the Research Laboratory, Department of Health, New York City.]

In view of the fact that little work has been done upon the transmission of hæmolysins from mother to offspring, and that there is a lack of agreement between the reported results of the workers in this field, the subject was taken up for further investigation. The question is of practical importance, since a parallel relationship exists between hæmolysins and bacteriolytic bodies: the latter group of substances play a more or less important rôle in immunity against certain infections.

Goats were selected as the most suitable experimental animals for these studies. In each case the animal was actively immunized by repeated injections of washed sheep-corpuscles given subcutaneously. Serum and milk samples were collected, throughout each experiment, and stored in an ice-box. All were tested at the same time, under uniform conditions, after the given experiment was closed.

One series of animals were immunized immediately following the birth of their young. In all, excepting one case, the milk contained no demonstrable hæmolysins. As evident, the sucklings from the mothers which supplied the negative milk, gave negative sera. The suckling which received the mother's milk containing hæmolysins, showed no specific hæmolysins at any time in its serum. The hæmolysins did not appear (by test) in the milk in this case until about one week after birth of the young.

A second series of animals were immunized at different periods during the course of gestation. Before birth of the young the animal's nipples were sealed to prevent the young getting any