gradually reduced to 100 mg. In order to establish prolonged maintenance, the mother was later allowed, instead of the dehydrated yeast, a daily dosage of 20 mg. of one of our less potent yeast concentrates. The pathological condition of the young was then produced on a prolonged maintenance level.

The total blood sugar of the control group showed a definite increase during the nursing period, rising from approximately 100 mg. on the 15th day of lactation to approximately 130 mg. at weaning. In the pathological group there was a decrease in blood sugar, during the prolonged maintenance period, as follows: 19, 40, 24, 20, 22 and 24% respectively of total blood sugar for each animal.

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On the Pathological Relations Between Cancer and Tuberculosis.

RAYMOND PEARL.

From the Institute for Biological Research of the Johns Hopkins University, and the Statistical Department of the Johns Hopkins Hospital.

For some time past we have been engaged in a biometrical and experimental investigation of the relation between cancer and tuberculosis.* In the biometrical study there was first set up, by a critically adequate procedure, a case-for-case control series of autopsied patients, each one of whom was of the same sex, age and color (race) as one of the 816 persons autopsied in the Johns Hopkins Hospital and found to have carcinoma, sarcoma, or some other form of malignant tumor. The individuals in the control series did not have cancer or any other malignant tumor. With these malignant and non-malignant series of cases it was then shown that:

1. Active tuberculous lesions were found at autopsy in only 6.6% of 816 persons having malignant growths. On the other hand such tuberculous lesions were found in 16.3% of 816 persons without malignant tumors, but of the same race, sex, and age as the former group. Active tuberculous lesions therefore occurred over twice as frequently in the controls as they did in the malignant group in the present material taken as a whole.

2. Active tuberculous lesions occur 2.2 times more frequently among the controls of the carcinomatous than among those having carcinoma; whereas active tuberculous lesions occur 3.3 times more

* The biometrical results will be published in full in the *Am. J. of Hygiene.*

frequently among the controls of the sarcomatous than among those having sarcoma.

3. Healed tuberculous lesions (apical scars, calcified tubercles in glands, etc.) occur with equal frequency in the malignancy and control groups, whether they are taken as wholes, or when carcinoma and sarcoma (and other) are separately treated.

4. In each decade of age, and in each sex and race division of the material, the percentage of persons showing active tuberculous lesions at autopsy is markedly higher in the control group than in the malignancy group.

5. Looking at the matter from the reverse aspect, it was found that, in this autopsy experience, persons who had tuberculous lesions of any degree of activity whatever, showed a relative incidence of cancer and other malignant tumors, only a little more than half as great as that exhibited either by persons with no tuberculosis discoverable at autopsy, or by those who have only old, healed tuberculous lesions.

6. In each decade of age, over the whole life span, cancer or other malignant tumors occur less frequently in those with active tuberculosis than in either the non-tuberculous or those with old healed lesions.

7. In 886 persons of both sexes and races compared, *who had a great deal of florid, active tuberculosis* (acute, ulcerative tuberculosis of the lungs or intestines, tuberculous meningitis, caries of the vertebrae, etc.) there were but 11 cases of malignant tumors, or 1.2% of the total number. On the other hand, in 886 persons with no recorded lesions of tuberculosis at autopsy, having the same age, sex, and racial distribution, case for case, as the very active tuberculous, there were 82 cases of malignant tumors, or 9.3%. Among the females, both white and colored, there was not a single case of malignant growth in those with much active tuberculosis. This general result is confined in each separate age, sex, and color group, save for a few cases where the numbers are too small to give any reliable indications whatever.

8. There is no significant difference in this material between groups of persons with cancer or other malignant tumors, and groups of persons without any malignant neoplasms, in respect of the incidence of either pleural adhesions or emphysema, all of the persons in both groups having no lesions of tuberculosis.

9. Five general classes of facts derived from official mortality statistics from the general population are in agreement, in principle, with the conclusions reached above from autopsy material. The

same is true of the results of a study of the correlation of age specific death rates in connection with this problem.

10. In general, it must be concluded that there is a definite and marked incompatibility or antagonism between the 2 diseases, cancer and tuberculosis, of such sort that both occur together at the same time in florid activity in the same individual only with great rarity.

Some years ago a Scandinavian clinician, Isager,[1] was so impressed with the antagonism between cancer and tuberculosis in his clinical experience that he made the suggestion that the experiment should be tried of using tuberculin to test the progress of cancerous disease. Another obvious suggestion is to try the experiment of treating inoperable cases of cancer with tuberculin. The ideal case for a trial would be one in which, first, a cancer had been removed surgically, and the malignant character of the tumor definitely proven from sections of the surgical specimen; in which, second, there had been at some later date an extensive, inoperable recurrence of the same tumor, confirmed by biopsy. If in such a case the tumor retrogressed or disappeared, following tuberculin treatment alone, the evidence would have real significance.

[1] Isager, *Hospitalstid*, 1922, lxv, 481.