sible beneficial effects on the tumor. Additional studies on the radiation toxicity of S-35 are needed in order to evaluate whether any therapeutic benefit could be hoped for from the administration of radioactive sulfur in selected cases of chondrosarcoma.

Summary. Two patients with chondrosarcomas received respectively 6.7 and 2.9 millicuries of S-35 as sodium sulfate. Tissue samples were obtained at operations and at necropsy several days after the injection and were analyzed for S-35 content. The highest concentrations of isotope were found in the chondrosarcomas. Progressively smaller amounts were found in other tissues in the sequence: cartilage, bone marrow, spleen, kidney, skin, liver, bone, adipose tissue, and muscle. Radioautographs indicated maximum concentration in the growing portions of the chondrosarcoma and in those containing abundant ground substance. The findings are discussed in relation to the possibility of diagnostic or therapeutic applications.

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Serum Citric Acid in Hodgkin's Disease, Lymphoma and Carcinoma.* (19616)

ANTONIO ROTTINO, GEORGE T. HOFFMANN, AND BARBARA BRONDOLO.

From the Hodgkin's Disease Research Laboratory, St. Vincent's Hospital, New York City.

Thunberg(1) published an enzymatic method for quantitating serum citric acid. Benni, Schersten and Ostberg(2), employing this method, reported normal serum values of 1.5 to 3.75 mg per 100 ml of serum. Schersten (3) noted hypocitricemia in some patients with cancer. Ostberg(4) tested sera for citric acid in 8 patients with malignant disease and found values to be normal, below normal, or above normal.

Since we were unable to find any values on citric acid levels in persons with Hodgkin's disease, we undertook to make determinations of serum citric acid in 50 patients with this disease and, in addition, in 19 patients with cancer, 10 with lymphosarcoma, and in 7 with leukemia. The control group embraced 37 normal persons and 60 patients with various non-malignant diseases. In the 67 patients with Hodgkin's disease, lymphosarcoma, and leukemia 137 serum determinations were made. In 34 subjects single determinations were done, and in each of the remaining 33 persons, 2 to 5 determinations were made over a period of 4 months. The study covered a period of one year. In the Hodgkin's group data were obtained on patients during relapse and remission, in the early and terminal stages of the disease, and in mild and severe forms

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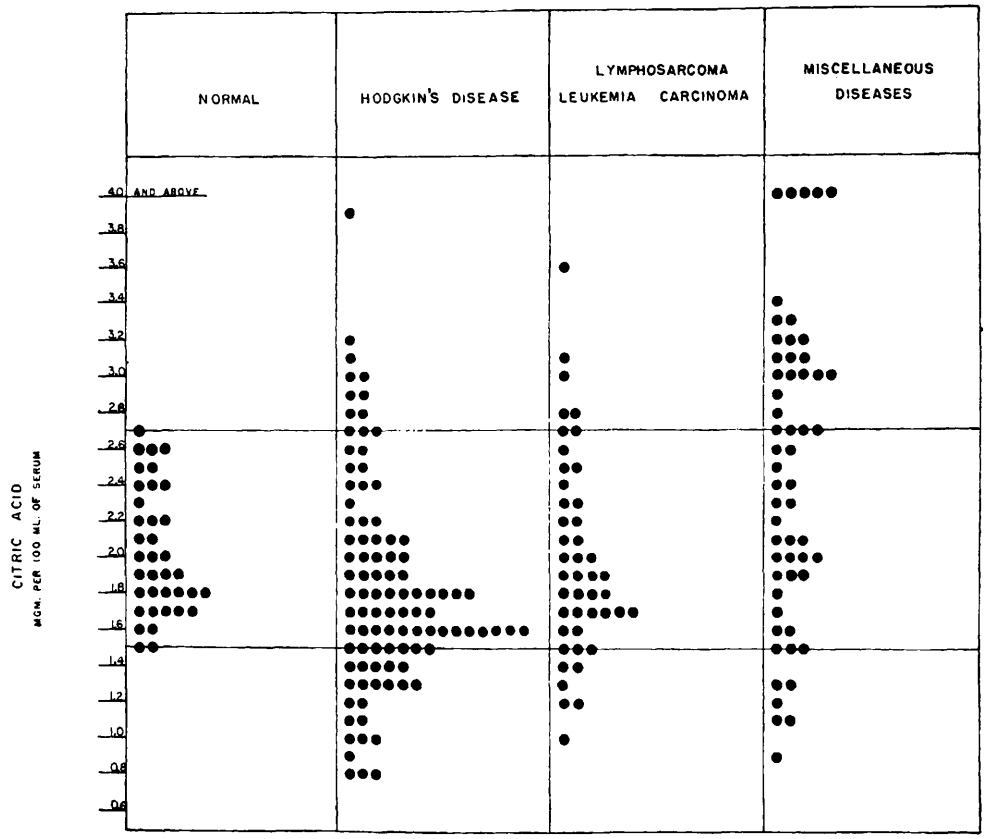

FIG. 1. Serum citric acid in normal persons and patients with a variety of disease. Each dot along the coordinate axes represents a single citric acid determination.

of the disease. In most instances blood was taken after an overnight fast and tested the same day. The procedure employed was a pentabromoacetone method as modified by Natelson and associates(5). Readings were made on the Model DU Beckman spectrophotometer.

Results. Values (Fig. 1) for the presumably healthy persons were found to range from 1.5 to 2.7 mg per 100 cc of serum; the median value was 1.95, and the mean value was 2 $\pm$ .04. Values for persons with disease varied, but no disease, whether malignant or nonmalignant, was associated with a characteristic level; levels were obtained within, above, and below the normal range, the deviation being from .8 to 9.20 mg per 100 ml. The levels may vary at different times. They may be within normal, below normal to normal, persistently high or persistently low, for the same patient.

Discussion. Our studies confirm the findings of earlier workers concerning the small quantity and narrow range of fluctuation of citric acid in the blood serum of normal persons. Values obtained by the pentabromoacetone method are approximately 75% of those obtained by the Thunberg method. This is due to the fact, as pointed out by Martensson(6), that the chemical method quantitates citric acid alone, whereas the enzymatic method quantitates three acids in equilibrium: citric, isocitric and cisaconitic.

Like Ostberg(7) and predecessors, we found that in disease citric acid in the serum may rise above or fall below the normal range, and that these changes are not connected with any specific disease or type of disease but seem, rather, to be a manifestation of deranged basic physiological mechanisms (disturbed acid base balance, renal and liver dysfunction). Ostberg, for example, demonstrated that altera-

tion in the acid base balance of the blood produced a deviation from normal in the citric acid of the serum. Martensson(6) showed that citric acid is normally oxidized by the kidneys and, therefore, any change in kidney function from whatever cause could affect the level of citric acid in the serum. Thunberg (8) and Sjöström(9) found elevated levels of citric acid during hepatitis. We, however, did not do plasma electrolyte studies nor liver or kidney function tests on our subjects, and hence cannot relate abnormal serum citric acid levels to dysfunction of these organs.

Summary. The level of citric acid in the serum was determined in 50 patients with Hodgkin's disease, 10 with lymphosarcoma, 7 with leukemia, and in 19 with various forms of carcinoma. Sixty patients with a variety of non-malignant disease and 37 normal persons served as controls. No disease, malignant or non-malignant, was associated with a characteristic value, though variations from normal occurred in all disease categories.

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Cortisone Effect on Pneumonitis Produced in Mice by Exposure to a High Oxygen Atmosphere.* (19617)

LEON J. WARSHAW, NORMAN MOLOMUT, AND DAVID M. SPAIN.

From the Waldemar Medical Research Foundation, Brooklyn, N. Y., and Department of Laboratories and Research, Westchester County, Valhalla, N. Y.

Application of cortisone and adrenocorticotropic hormones to the treatment of such pulmonary diseases as pneumonia(1) and bronchial asthma has focussed interest upon its effect on the inflammatory responses of the lung. The adverse effects of cortisone on experimental tuberculous disease have been reported(2) and have since been confirmed by reports of similar effects in clinical cases(3). However, since the pulmonary responses to tuberculous infection differ so markedly from those induced by other inflammatory diseases, it seemed desirable to investigate the effects of cortisone on acute pneumonitis.

Bacterial pneumonia was avoided in this study in order to eliminate the complicating factors of inhibition by cortisone of the usual host responses to infections(4). A fatal acute pneumonitis has been induced regularly in animals by prolonged continuous residence in atmospheres of 100% oxygen(5,6).

Materials and methods. In all experiments, the mice used were of a heterologous albino and Bartonella free strain, examined bacteriologically for freedom from enteric and respiratory infections. They were 8 to 10 weeks of age and averaged about 25 g in weight. Each group contained an equal number of males and females. For continuous maintenance of a 100% oxygen atmosphere, a special chamber was constructed. The bottom of the chamber was divided into compartments to permit the separation of the groups of mice. One compartment was used for the storage of the drugs and instruments needed for the experiment. The top was made of a transparent plastic material to permit observation of the animals, and was provided with a gasket so that airtight closure was possible. Two tubes were inserted into opposite ends of the chamber, one

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