which did not succumb to tuberculin showed an appreciable degree of blackening in the adrenal. These observations suggested that tuberculin death was associated with depletion of vitamin C, whereas those animals that survived tuberculin shock always showed vitamin C in the adrenal.

Details of the autopsy findings will be reported elsewhere. We note here that in 6 of the 7 pairs of autopsies, the control animal showed more extensive tuberculosis than did the corresponding ascorbic acid treated animal. The precise mechanism for the observed effect of vitamin C on tuberculosis and tuberculin tolerance remains to be clarified. No evidence was obtained for a direct inactivation of tuberculin by vitamin C. Nevertheless, the results suggest that vitamin C may prove of value in tuberculosis by combatting the prolonged toxemia of the disease. We are at present testing this hypothesis in both clinical and animal experiments.

Summary. Daily injection of crystalline vitamin C increased the tolerance of tuberculous guinea pigs to repeated large doses of tuberculin.

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Effect of Ether Anesthesia and Amytal Anesthesia on the Erythrocytic Findings in Control and Splenectomized Dogs.

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In a study of the influence of ether anesthesia and amytal anesthesia on the blood of the dog it was shown by Searles and Essex[1] that following ether anesthesia there was usually a marked increase in the erythrocyte count, the value for the hemoglobin and the hematocrit determinations. When amytal was used as the anesthetic there was usually a decided decrease in the erythrocyte count, the value for the hemoglobin and the hematocrit readings when compared with these findings before the induction of anesthesia. Since it is a common observation that the spleen of the dog is usually markedly dilated following amytal anesthesia, the decrease in the

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1 Searles, P. W., and Essex, H. E., *Proc. Staff Meet. Mayo Clinic*, 1936, **11**, 481.

erythrocyte count, the value for the hemoglobin and the hematocrit values led to the conclusion that amytal anesthesia causes a sequestration of the erythrocytes in the spleen. In a small series of experiments the evidence was highly suggestive that such a phenomenon occurred since splenectomized dogs failed to show a marked change in the erythrocytes, the concentration of hemoglobin and the hematocrit values after amytal had been given.

Because of the fundamental nature of these observations it was thought advisable to study a larger series of animals from this point of view. Since the personal equation may be of considerable importance in an investigation involving a quantitative study of erythrocytes, we took particular care to eliminate such influences in these experiments. Sixteen dogs were selected and submitted to us for a critical study of the part played by the spleen in altering the number of erythrocytes in the peripheral blood when ether or sodium amytal was used as an anesthetic. The condition of the animals as far as the spleen was concerned was unknown to us until the study was completed. Some of the animals possessed spleens while others had been without spleens for varying lengths of time. If the spleen is largely responsible for the increase of erythrocytes in the peripheral blood following administration of ether and for the reduction in the number of circulating erythrocytes following amytal anesthesia, it should be possible to determine the normal and splenectomized dogs in the series by observing the changes in the erythrocyte count, the concentration of hemoglobin and alterations in the hematocrit values. To settle this question the experiments reported here were done.

In order to study the reaction of the animals to the 2 anesthetics, the animals were first studied while they were under ether anesthesia and a week later when amytal was used as the anesthetic.

In obtaining the control samples of the blood, care was taken to insure a minimum of excitement on the part of the animal during the process. The blood was withdrawn from the right or left saphenous vein. In the experiments with ether, immediately after the control samples of blood were taken, the animals were anesthetized in an ether chamber, after which surgical anesthesia was maintained for 30 minutes by the auto-inhalation method. The second sample of blood was taken at the end of a 30-minute period of anesthesia and the administration of ether was discontinued. An hour after the administration of ether was discontinued, a third sample of blood was taken.

When amytal was used, 50 mg. for each kilogram of body weight was injected into the saphenous vein immediately after removal of

the control sample of blood. The second and third samples of blood were removed 30 and 60 minutes later respectively.

In order to insure uniformity, the samples of blood for the 3 determinations were taken by the same individuals. All the data on the erythrocyte count were assembled by one group, the data on the value for the hemoglobin and the hematocrit readings were assembled by another group. The Sheard-Sanford hemoglobinometer was used for determining the values for the hemoglobin, and the hematocrit studies were made by the use of standard hematocrit tubes. For the hematocrit readings the blood was withdrawn into a solution of heparin and the tubes were centrifuged for 30 minutes at approximately 1500 revolutions per minute.

An analysis of the data on the series of 16 dogs indicated that 7 were normal and 6 had been splenectomized; one was listed as indefinite but probably normal. The remaining 2 were listed as indefinite and the studies on these dogs should be repeated. When our findings were checked with the histories of the animals used it was interesting to note that all the splenectomized dogs in the series had been so designated and all the normal dogs on which we had committed ourselves, had normal spleens. According to the records, the 3 indefinite animals each possessed a spleen.

The results with ether anesthesia were much less reliable for determining the presence or absence of the spleen than were the results with amytal anesthesia. This is not surprising since the state of the spleen at the time the control samples of blood were taken would probably vary considerably. If the spleen, as a result of excitement or other causes, was in a very contracted state, the effect of ether on the erythrocyte count and the concentration of hemoglobin and the hematrocrit readings would be much less marked than it would if the spleen were widely dilated. That is, an already partially contracted spleen could not pour into the circulating blood as many erythrocytes in response to ether anesthesia as could a fully dilated spleen.

Conclusions. Ether anesthesia causes profound constriction of the spleen and usually produces a marked increase in the erythrocyte count, the value for the hemoglobin and the hematocrit value while sodium amytal causes the spleen to dilate markedly, which removes a considerable percentage of erythrocytes from the circulation. Our results are in full agreement with those of Searles and Essex.