erty could no longer be found in the red cells 4 months later, after which interval the original sensitive red cells presumably had been displaced from the circulation by a new supply.

The authors are indebted to Drs. Dolgopol and Kannerstein of the Willard Parker Hospital for the privilege of studying this blood.

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Correlation Between Blood Ascorbic Acid and the Dichlorophenolindophenol Intradermal Test.

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Rotter[1] suggested as a skin test the intradermal injection of a dilute solution of dichlorophenolindophenol as an index of the vitamin C saturation of the body tissues. Working on guinea pigs, he noted that the color of the dye injected intradermally decolorized much more rapidly in the normal than in the scorbutic animals. Similar results were also obtained in human beings. He concluded that if decolorization of the dye occurred in less than 5 minutes vitamin C "saturation" of the body tissues was present, whereas a decolorization time of 5-10 minutes was considered normal and more than 10 minutes indicated hypovitaminosis. Corroborative results were also obtained, in a study of 103 cases, by Portnoy and Wilkinson,[2] who, however, recognized that the decolorization of the dichlorophenolindophenol solution might not necessarily be due to specific reduction by ascorbic acid and that other substances such as glutathione might also have some part in the reaction. The advantages of a skin test as a rapid method for determining the degree of saturation of vitamin C in the body tissues are obvious. For this reason, it was thought advisable to evaluate the intradermal test on a series of 50 patients.

A series of 50 adult female patients, in all of whom active tuberculosis was present, were selected. All were on a diet rich in vitamin C. The technic employed was as follows: the fasting ascorbic acid content of whole blood was determined using the method of

1 Rotter, H., *Wein. Klin. Wochenschr.*, 1938, **51**, 205.

2 Portnoy, B., and Wilkinson, J. F., *Brit. Med. J.*, 1938, **1**, 328.

Farmer and Abt,[3] the analyses being performed within 2 hours after the taking of the sample. At the same time, the intradermal test was performed, according to the technic outlined by Rotter. Three intradermal wheals, approximately 2-3 mm in diameter, were made on the anterior surface of the forearms and the time required for the disappearance of the blue color noted. The dichlorophenolindophenol was freshly prepared and was approximately n/500 in strength, being sterilized by passage through a Seitz filter.

TABLE I.
Decolorization Time in Minutes of Dichlorophenolindophenol Injected Intradermally.

Mg % blood ascorbic acid	No. of cases	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
.40- .49	4	—	2	—	1	1	—	—	—	—
.50- .59	8	—	1	4	2	—	—	—	1	—
.60- .69	9	—	1	2	1	4	1	—	—	—
.70- .79	4	—	2	—	1	1	—	—	—	—
.80- .89	7	—	1	2	1	1	2	—	—	—
.90- .99	7	—	—	2	1	3	—	1	—	—
1.00-1.09	4	—	—	—	1	2	1	—	—	—
1.10-1.19	3	—	—	—	1	—	1	—	—	1
1.20-1.29	1	—	—	—	—	1	—	—	—	—
1.30-1.39	1	—	—	—	—	—	1	—	—	—
Above 1.39	2	—	—	—	1	—	—	1	—	—
Total	50	—	7	10	10	13	6	2	1	1

In Table I it will be noted that the blood ascorbic acid content of the 50 cases was below 1.39 mg % in all but 2 instances, the majority of the cases (35) falling into a bracket from 0.50 to 1.00 mg % ascorbic acid. Four cases were between 0.40 and 0.49 mg % while 7 cases were in a group between 1.10 and 1.19 mg %.

In 46 of the cases, decolorization of the dye injected intradermally occurred in from 2 to 7 minutes, while in 33 of the 46 cases decolorization occurred in from 3 to 6 minutes. The other 4 cases required from 7 to 10 minutes. No cases were encountered requiring less than 2 or more than 10 minutes. As seen in the table, no correlation could be made between the ascorbic acid content of the blood and the decolorization time of the intradermal test. Isolated examples illustrating further the discrepancy between the chemical and the intradermal test are: a moribund patient with a blood ascorbic acid content of 0.42 mg % showed by the intradermal test decolorization times of 1:30, 1:35, 1:55, 2:10, and 2:40 minutes; 2 cases with blood ascorbic levels above 1.39 mg % had an average decolorization time of 4-5 and 7-8 minutes respectively.

[3] Farmer, C. J., and Abt, A. F., PROC. SOC. EXP. BIOL. AND MED., 1935, **32**, 1625.

If one accepts values below 1.10 mg % ascorbic acid as indicative of hypovitaminosis C, then 43 of the 50 cases of this series must be included in this category. These data serve to corroborate previous findings as to the incidence of hypovitaminosis C in active tuberculosis.[4, 5] None of these 43 cases exhibited a prolongation in decolorization time in comparison with the group in which the blood ascorbic acid was normal. The average decolorization time was 4.7 minutes in the hypovitaminotic cases and 6.3 minutes in the group of 7 cases with normal blood ascorbic acid values. Although the difference in numbers between the 2 groups is rather great, it would appear that no possible correlation between chemical and intradermal tests was possible. Furthermore, the decolorization time of the entire group of 50 cases fell into the normal or saturated periods as stipulated by Rotter and corroborated by Portnoy and Wilkinson, although the blood ascorbic acid was below normal in 43 of the cases. It would seem, therefore, that some other reducing substance or substances other than vitamin C, for example, glutathione, may be responsible for the reduction of the dye in the skin.

Conclusion. No correlation between the fasting blood ascorbic acid and the decolorization time of the dichlorophenolindophenol intradermal test was noted in a series of 50 adult female patients with active tuberculosis, in 43 of whom hypovitaminosis C existed.

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Reaction of Fulminate with Methemoglobin.

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The addition of a few drops of saturated aqueous mercuric fulminate or of 2% sodium fulminate solution to about 5 cc of millimolar methemoglobin prepared by the action of ferricyanide on laked human erythrocytes, causes the formation of a scarlet pigment which shows a spectroscopic picture similar to that of cyanmethemoglobin. It differs from cyanmethemoglobin, however, in that the addition of alkali causes a change in the spectroscopic band to those of alkaline methemoglobin, in the case of the fulminate derivative, whereas when cyanmethemoglobin is treated with alkali its band

[4] Jetter, W. W., and Bumbalo, T. S., *Am. J. Med. Sc.*, 1938, **195**, 362.

[5] Bumbalo, T. S., and Jetter, W. W., *J. Ped.*, 1938, **13**, 334.