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Correlation Between Vitamin C Content and Complement Titer of Human Blood Plasma.

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Reports concerning the relationship between serum complement and the state of nutrition with regard to Vitamin C have been few and conflicting. Zilva[1, 2] showed that depletion of Vitamin C in guinea pigs had no influence on the complement content of their serum. The same conclusion was reached by Chakraborty[3] who studied the changes of serum complement in Vitamin C deficiency in relation to sex and to the state of pregnancy of guinea pigs. On the other hand, Marsh[4] reported that the serum complement of guinea pigs decreased when Vitamin C was withdrawn from their diet. The original complement concentration was restored or even exceeded by the consumption of a diet rich in Vitamin C.

We became interested in this problem following the demonstration of reducing property of a component in complement,[5] which is also a characteristic feature of Vitamin C. Furthermore it is possible that complement content might be related to resistance against infections. Therefore it is of clinical interest to see whether we can increase the serum complement of human subjects by the administration of Vitamin C which seems to play an important rôle in combating infections.

In this communication we shall report our observations on the relationship between complement and reduced Vitamin C contents of the human blood plasma. Vitamin C was determined according to Pijoan and Klemperer's modification of Farmer and Abt's Method.[6] In the determination of complement by the biological method, we have standardized our hemolysin and sheep cell suspension, so that the complement titers obtained over a long period of time may still be comparable.[7] The observations were made on 2 groups of subjects. In the first group which consists of 2 children and one

1 Zilva, S. S., *Biochem. J.*, 1919, **13**, 172.

2 Zilva, S. S., *Biochem. J.*, 1936, **30**, 1419.

3 Chakraborty, R. K., *Indian Med. Gaz.*, 1937, **72**, 23.

4 Marsh, F., *Nature*, 1936, **137**, 618.

5 Chow, B. F., and Wong, S. C., PROC. SOC. EXP. BIOL. AND MED., 1938, **38**, 120.

6 Pijoan, M., and Klemperer, F., *J. Clin. Invest.*, 1937, **16**, 443.

7 Chow, B. F., to be published.

woman, simultaneous determinations of reduced Vitamin C and complement were made over extended periods in which the Vitamin C intake was raised or lowered by the addition of ascorbic acid to, or its withdrawal from, a constant basal diet. During the period of study these subjects were not suffering from febrile, diarrheal, or other diseases which may also influence the metabolism of Vitamin C.

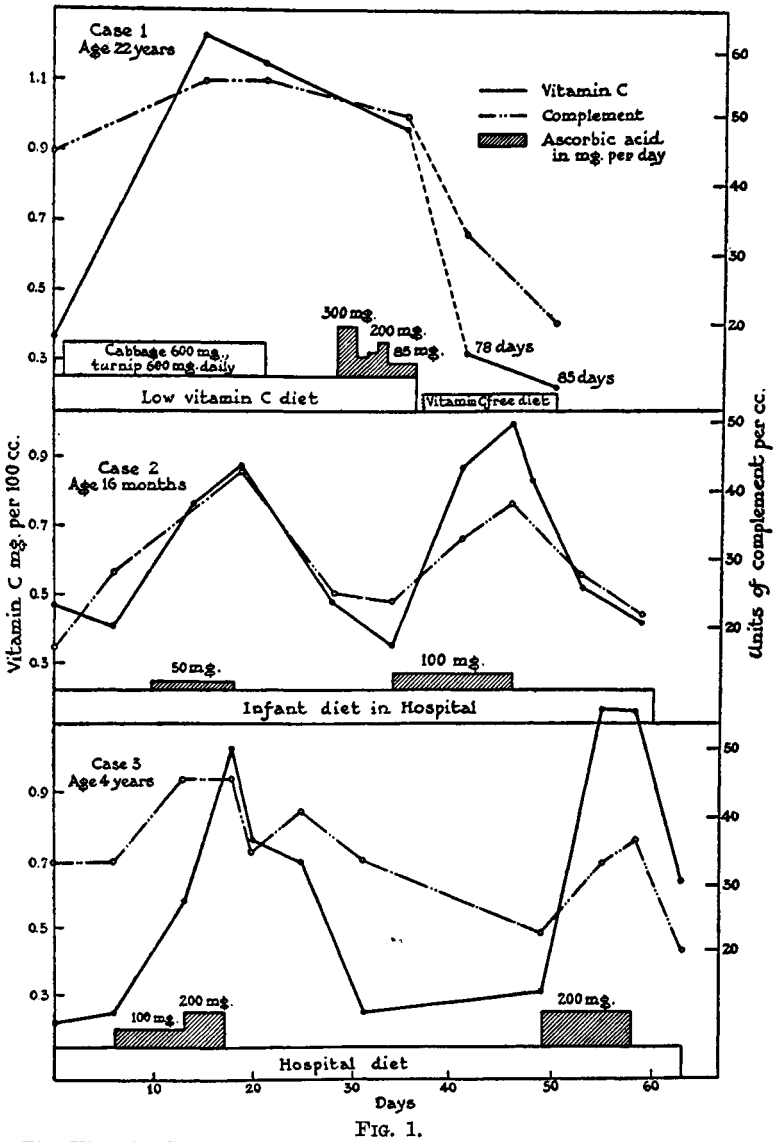

FIG. 1.

The Vitamin C content and complement titer in three normal subjects.

Results given in Fig. 1 show that in all of the 3 cases the oral administration of ascorbic acid or vegetables rich in antiscorbutic vitamin was followed by a rise in the complement as well as the Vitamin C content of the plasma, whereas their withdrawal was followed by a decrease. The range of fluctuation, however, seems to be smaller for complement than for Vitamin C. In the second group we have chosen 38 patients of different ages, suffering from different diseases and with a wide range of Vitamin C contents in their blood plasma. From Fig. 2 it may be seen that when the values of Vitamin C concentrations are divided into 3 groups of "deficiency," "presaturation" and "saturation",[8] the low Vitamin C content is in majority

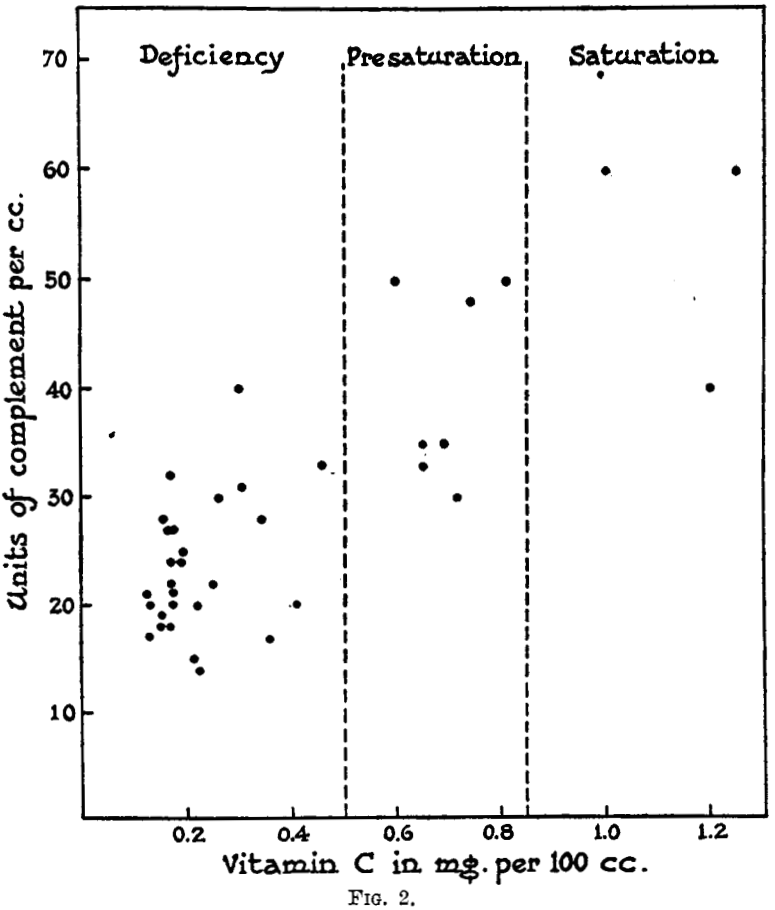

FIG. 2.

Showing the correlation of 38 simultaneous determinations of complement and Vitamin C in 30 patients.

[8] Chu, F. T., and Sung, C., *Chinese M. J.*, 1937, **52**, 791.

of cases accompanied by a low complement titer and practically all the high Vitamin C figures are associated with high values of complement.

Conclusion. From these observations one may conclude that there is a qualitative relationship between Vitamin C intake and complement titer in the human plasma, although an adequate explanation of the phenomenon is not clear at present.

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Serological Studies on Subjects Vaccinated Against Typhus Fever.

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Since the introduction of louse vaccine by Weigl[1] for active immunization against epidemic typhus, the effectiveness of the vaccine in protecting experimental animals and human beings has been demonstrated. This has been summarized by Biraud and Deutschman.[2] In the last few years, doctors, nurses, and attendants in the Peiping Union Medical College who are likely to be exposed to typhus fever were inoculated with a louse vaccine.* This vaccine, comprising a total amount of material from 100 infected lice, was administered in 3 doses. They were given subcutaneously at weekly intervals. It was thought that it might be of interest to study the serological response of individuals after vaccination, especially in view of the scanty information of such kind in the literature. For this purpose, specimens of blood were taken by venapuncture from the vaccinated subjects at different intervals of time after the last injection. The sera so obtained were then used for agglutination against typhus Rickettsiæ and Proteus X_{19}. The agglutination test against the latter was done by the macroscopic technic of Dreyer, in which a formalinized suspension of bacteria was used as antigen. The rickettsiæ agglutination test was performed by the macroscopic technic

1 Weigl, R., *Med. Klin.*, 1924, **20**, 1046.

2 Biraud, Y., and Deutschman, S., League of Nations, Epidemiological Report R. E. 183, p. 138, 1936.

* Typhus vaccine was supplied by the microbiological laboratory of Catholic University of Peking.