At the end of one hour, after each tube was filled, readings were taken and the haematocrit tubes centrifuged, together with some of the unmanipulated "Wintrobe" blood samples which were used to fill the 3-mm. tubes previously described. The results are given in Tables I and II.

Case 2

It was not possible, in this case, to make such a full investigation to show the practical effect of marked reduction in the M.C.H.C. on the sedimentation rate.

A man of 79, with a carcinoma of the colon, was found to have a very low corrected Wintrobe sedimentation rate, but the blood count showed a marked hypochromic anaemia. Suitable normochromic red cells were washed once in the patient's plasma and then used to perform a Wintrobe sedimentation test when suspended in the patient's plasma. The results are given in Table III.

TABLE III.—Results in Man of 79 With Carcinoma of Colon

R.B.C.	2.8 mil. per c.mm.	Sp. G. of R.B.C.	1075
Hb	4.6 g. %	Plasma proteins	7.2 g. %
C.V.	20 c.cm.	Albumin	4.8 "
M.C.V.	71 μ^3	Globulin	2.4 "
M.C.H.C.	23%	A/G ratio	2:1

Patient's plasma was cross-grouped with K.B.R.'s red cells in tube at 37° C. for one hour and was compatible.

Wintrobe Sedimentation Rate—Both Cells Suspended in Patient's Serum

	Patient's Cells	K.B.R.'s Cells
Fall in 1 hour	47 mm.	52 mm.
C.V.	20 c.cm.	34 c.cm.
Corrected rate (by Hynes and Whitby's graph)	5 mm.	28 mm.

In this experiment it was felt that a misleading "normal" corrected sedimentation rate was due to the low M.C.H.C. of the patient's red cells.

Discussion

A hypothesis that red cells with a reduced M.C.H.C. would have a lowered specific gravity has been found to be correct. Experiments showed that hypochromic red cells sedimented much more slowly than normochromic cells, suspended in the same plasma. In these experiments there was a correlation between both M.C.V. and M.C.H.C. and the sedimentation rate, which agrees with the findings of Ham and Curtis on the correlation between the sedimentation rate and the M.C.V., and with Neuberg and Snapper's correlation between it and the colour index. It does not agree with Ham and Curtis regarding the lack of correlation between sedimentation rate and M.C.H.C., or with Wintrobe's observations on the specific gravity of red cells and the sedimentation rate.

This work has provided an explanation of Terry's results, as all his cases had marked hypochromic anaemia, many with M.C.H.C. values far below those encountered in the present investigation. It does not substantiate Terry's suggestion that the plasma of such patients is deficient in rouleaux-forming powers.

Terry argued that his slowly sedimenting hypochromic anaemic bloods proved that the sedimentation rate was not increased by anaemia and therefore the observed rate had the same significance in anaemia as in normal blood states. It might be more correct to state that he showed that two factors—the slowing due to the red cells having a low specific gravity, and the accelerating effect of the lowered packed cell volume—may nearly cancel the influence each will have on this test. Terry's work does not prove that correction charts are fallacious in any other type of anaemia; but the fact that correction charts may be misleading in such hypochromic anaemias does not mean that the uncorrected rate is any more informative. Many workers would hesitate to state that the results Terry showed in his Table III (the Westergren sedimentation rates of cases with a slightly raised E.S.R.) were indications of any condition other than that of anaemia.

It is obvious that in cases with a very marked hypochromic anaemia the sedimentation rate may provide an inadequate indication of active disease.

Summary

Evidence has been given that the specific gravity of red blood cells falls very appreciably when the M.C.H.C. becomes low. This might explain the slow sedimentation of blood from some cases of "chronic anaemia," as it was shown that markedly hypochromic cells sediment more slowly than do normochromic cells, and these red cells with a very low M.C.H.C. and low specific gravity may not be good "indicators" in sedimentation rate estimations.

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TATTOOING AS POSSIBLE MEANS OF TRANSMITTING VIRAL HEPATITIS

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The object of this paper is to provide statistical evidence to show that tattooing should be regarded as an important means of dissemination of viral hepatitis among Service personnel in Hong Kong. This investigation was initiated after observing that the incidence of tattooed patients in the hepatitis wards appeared to be higher than in other wards.

The term "viral hepatitis" was proposed by Neefe *et al.* (1946) to describe those forms of hepatitis caused by filterable infectious agents which have not yet been routinely isolated and identified. Evidence arising from extensive experiments, using human volunteers, has shown that there are at least two virus-like agents concerned in the aetiology of viral hepatitis.

Transmission of Virus

These two agents have been called (a) virus IH and (b) virus SH (Neefe, 1949). Virus IH is present in the faeces and blood, and is concerned with infectious hepatitis (incubation period of 15–40 days), while virus SH is found only in the blood and is concerned with homologous serum hepatitis (incubation period of 50–150 days). It will be noticed that both viruses appear in the blood, and, according to Neefe, parenteral transmission of such blood may cause a hepatitis following an incubation period typical of virus IH—that is, 15–40 days—or of virus SH—that is, 50–150 days, according to the infecting virus.

By inoculation experiments it has been shown that the virus is present in the peripheral blood during the latter part of the incubation period (for a longer period in homologous serum hepatitis) and for about the first 14 days of the disease (Havens and Paul, 1948). Thus during this period it is possible for the virus to be transmitted to another host by transfusions of blood, serum, or plasma. Since, however, the virus may be present in the blood in such high concentration that as small a quantity as 0.001 ml. of serum can be shown to be infectious (Scheinberg *et al.*, 1947), transmission of the virus may occur through contaminated syringes and needles following their use on a patient with infected peripheral blood. Thus one would anticipate cross-infection if numerous injections were performed on consecutive patients without intervening reesterilization of the syringes and needles. This has occurred, for example, in V.D. clinics and in circumstances where parenteral therapy has been employed.

This danger of cross-infection is now well recognized and suitable precautions are taken. When one considers the technique of tattooing, it will be realized that a similar danger of cross-infection exists.

The technique of a local tattoo artist is as follows: The particular area of skin is shaved and then wiped rather perfunctorily with industrial spirit. The pattern transfer is pressed on the skin and then the pattern is traced with the mechanical needle. The needle is dipped in various bottles containing the coloured dyes and then transferred to the skin. During the needling a certain amount of blood oozes from the area. At the end of the process the skin is given a final wipe with the same cloth. Without the needle being cleaned, the next customer is attended to.

It will be realized that the tattoo needle can remain infected, and that the bottles of dye may become infected. It is known that the virus is very hardy and can withstand the normal measures suitable for bacterial neutralization. Service personnel often go in pairs to be tattooed, and so one is tattooed immediately after the other. If the first soldier should be incubating the disease there would be every chance that the tattoo needle would be contaminated with the virus and then the second soldier would be inoculated. According to Neefe (1949) the incubation period of homologous serum hepatitis is approximately 50–150 days, and thus one would anticipate that, if tattooing was a mode of transmission of virus SH, in any group of personnel of whom a large number had been tattooed the number adorned 50 to 150 days beforehand should be greater among cases of hepatitis than among others.

Investigation of a Series of Cases

An investigation was made on these lines among the cases of viral hepatitis which were admitted to this hospital during the period December, 1950, to June, 1951, and a comparison made with other patients in the hospital as a control. These other patients were exactly similar as regards units, living environment, liability to inoculations, tattooing, etc., and differed only in that they had been admitted to hospital for conditions other than that of viral hepatitis. The comparative figures are shown in the Table.

	Total No. of Cases	No. of Days Tattooed before Onset of Viral Hepatitis			Total No. Tattooed
		0–50	51–150	150+	
Hepatitis	143	5 (3.5%)	56 (39.1%)	38 (26.6%)	99 (69.2%)
		No. of Days Tattooed before Admission			
		0–50	51–150	150+	
Controls	152	7 (4.6%)	16 (10.5%)	56 (36.8%)	79 (51.9%)

* Standard error of difference. 0.050 = 5.0%.
† Actual difference. 39.1%–10.5% = 28.6%.

Discussion

It will be seen that the difference between the number of cases of viral hepatitis tattooed 51 to 150 days before the onset of symptoms, and the control cases (39.1% to 10.5%) is highly significant—the actual difference being 5.7 times the standard error of difference and the probability of the occurrence being that of chance being approximately 1 in 4×10^6 .

Robertson (1951) described how, in a British military hospital in Germany in 1947, a medical officer made a similar observation regarding the incidence of tattooing in cases of infective hepatitis, but circumstances prevented further statistical investigation. He did, however, mention that among 10 cases admitted during one week six were found to have been tattooed on the same day, and by the same artist, rather less than four months before.

Smith (1950) described how among American Service personnel he found that 18 out of 26 cases of infective hepatitis had been tattooed 49–154 days before the onset of symptoms whereas only 61 out of 200 non-hepatitis cases had been tattooed. He thought that the comparison of 69% among hepatitis cases with 30% among his controls represented a significant difference.

We believe our series shows that the higher incidence of tattooing in the hepatitis cases is mainly due to the greater number of cases which have been tattooed between 50 and 150 days beforehand and have become infected in that manner.

Summary

A record of the incidence of tattooing in 143 cases of viral hepatitis admitted to a military hospital in Hong Kong has shown that 56, or 39.1%, were tattooed 51 to 150 days beforehand, as against 16, or 10.5%, of 152 control cases in the same hospital.

It is thought that the difference is statistically significant, and that it proves that tattooing is a possible mode of transmission of the causative virus.

The technique of tattooing is discussed with reference to its facilitation of the transmission of the hepatitis virus from one subject to another.

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The 72nd Annual Congress of the Ophthalmological Society of the United Kingdom was held in Dublin at the Royal College of Surgeons in Ireland as guests of the Irish Ophthalmological Society in Ireland on April 17 to 19, and Mr. Maurice Whiting presided. On only one previous occasion—exactly 40 years ago—has the society journeyed to Ireland. More than 125 members were present this time, including several from the Continent. Two of the principal speakers—Professor Alan Woods and Professor Derrick Vail—came from the U.S.A.; the second giving the Montgomery Lecture on diffuse collagenous diseases with ocular complications, while the first opened a discussion on the value of cortisone and A.C.T.H. in ocular diseases. Among the short papers was one by Mr. T. Roche, who could find no evidence for the occurrence of retrolental fibroplasia in Dublin, and an outstanding exhibition of the value of angiography in ocular disease by Dr. Alan Mooney. The meeting was completed by a number of social functions, including the annual dinner of the Society at the Gresham Hotel, and a reception by the Eire Minister for Health.