non-conducting property of the red blood cell for the determination by electrical methods of the numbers of erythrocytes per unit volume of whole blood.

The specific conductivity of physiologic saline solutions containing various concentrations of washed red blood cells has been measured on an alternating current bridge and the results plotted against actual red blood cell counts of the samples using the standard technique.

The electrical circuit used employed a variable frequency oscillator which supplied an alternating current to a modified wheatstone bridge with an incorporated Wagner ground. A cathode ray tube was employed as the null indicator. Provision was also incorporated for the use of a cathode ray oscilloscope as a null indicator. The experiments were run at a frequency of 5000 cycles per minute since it was determined experimentally that minimal polarization effects were present under these circumstances. The conductivity cell was of a standard U type employing platinum electrodes.

The empirical results of these experiments revealed the probable existence of a mathematical relationship. This was evolved and appears to be:

$$g = C \times \frac{K_0 - K}{K_0 + K}$$

when

$g$ = concentration of r.b.c. in millions per cu. millimeter.

$C$ = a constant which has a value of $9.62 \times 10^6$.

$K_0$ = the specific conductance of plasma.

$K$ = the specific conductance of whole blood.

The accumulation of experimental data indicates that the formula is valid. By using it we have been able to make satisfactory red cell counts on both saline cell suspensions and heparinized whole blood samples with reasonable accuracy.

It has been found that patients with normocytic anemias have bloods of a higher specific conductivity than do normal people; it also has been shown that patients with polycythemia have blood of a lower specific conductivity than do normals. It has been possible to satisfactorily calculate the red blood cell count on these patients using the specific conductivity as the basis for calculation.

Work is at present in progress to design a satisfactory electronic circuit which will make possible red blood cell counts of a greater accuracy, and with less tedious work than is now possible using present techniques.*

* The opinions expressed are the personal ones of the authors and may not be construed as official, or as representing the views of the Navy Department as a whole.

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# *The Disappearance of Edema Through Diuresis Following Artificial Elevation of Plasma Sodium and Bicarbonate*

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Edema, ascites and oliguria are usually associated with decreased plasma sodium and acidosis (Atchley, J.C.I., 1930, *9,* 265). Extracellular water then migrates into cells (Peters, Phys. Rev., 1944, *24,* 491; Gamble, Extracellular Fluid, Boston, 1942), resulting in reduction in plasma volume (Darrow, J.C.I., 1935, *19,* 419; Winkler, J.C.I., 1944, *23,* 111). Impaired excretion of water follows (McCance, Proc. Roy. Soc. B. 1935-6,

*119,* 245). These abnormalities prevailed in one patient during anuria after diabetic acidosis; in one example of Chiari's syndrome after operation to produce portacaval shunt followed by numerous taps of the peritoneum and pleura; and in 14 patients with the nephrotic syndrome.

Correction of low plasma sodium and bicarbonate might be hoped to augment plasma volume and subsequently increase output of urine and chloride, thereby removing anasarca. Accordingly, sodium lactate and subsequently sodium and potassium acetate were administered orally. Initially body weight increased. Plasma sodiums rose from 120-135 mEq per liter to above normal; plasma bicarbonates from 9-20 mEq per liter to normal or above. Plasma volumes estimated from falling hematocrit expanded as much as 40 per cent. Daily clearances of sodium, bicarbonate and endogenous creatinine increased several fold. Daily urine flow rose from 0.05 to over 4.0 cc. per minute as urine chloride concentration increased from 0.1 to 1.5 times the plasma value. Anasarca then disappeared.

In the balance studies the recovery of sodium approximated that anticipated from the volume of edema fluid eliminated but the chloride jettisoned was in marked excess.

Although there are other procedures for the relief of anuria (artificial kidney, peritoneal lavage) the relative simplicity of correcting the biochemical and physiologic abnormalities in anuria suggests that this procedure receive more extensive trial. Likewise in the nephrotic syndrome, the results to date warrant further study of the significance of the electrolyte abnormalities.

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## *Evaluation of Pentaquine as a Cure of Relapsing Vivax Malaria**

### *A Controlled Study of Ninety-five Cases*

BERNARD STRAUS and JOSEPH GENNIS

Investigations reported by the Board for the Coordination of Malarial Studies indicated that pentaquine (SN 13,276) 6-methoxy - 8 - (5 - isopropylaminoamylamino) - quinoline, when combined with quinine is effective in the eradication of relapsing P. vivax malaria.

The present investigation was designed to test the efficacy of pentaquine when combined with quinine in the definitive therapy of the naturally acquired P. vivax infection in man.

*Methods:* The patients studied were all veterans of World War II who were hospitalized at the Veterans Administration Hospital, Bronx, New York. Because of progressive development of immunity and the unpredictability of the relapse rate it was decided to employ a control series. Chloroquine (SN 7618), 7-chloro-4 (4-diethylamino - 1 - methylbutylamino) quinoline, was selected for the control series because it is a highly effective agent in the treatment of the immediate attack and has little, if any, effect on the relapse rate. Chloroquine diphosphate was administered in a dosage of 0.6 gm. of chloroquine base followed in six hours by 0.3 grams and 0.3 grams on the second and third days. Pentaquine was employed as the mono-phosphate in a daily dose of 30 mgms of pentaquine base, 10 mgms being given every 8 hours together with 0.6 grams of quinine sulphate. This regimen was maintained for 14 days. Pentaquine was given in one-half of the recommended daily dosage of 60 mgms of base in an attempt to reduce toxicity. This was feasible because there was reason to believe that some degree of immunity had been developed by most of the veterans who would undergo therapy.

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