*Erythrocyte Transketolase Activity and Anaemia

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THE ENZYME transketolase in the haemolysate of red blood cells is associated with the glucose oxidative pathway and requires the co-enzyme thiamine pyrophoshate for its function. In thiamine deficiency, the activity of transketolase is depressed but the addition of the co-enzyme thiamine pyrophosphate, in vitro, produces a stimulatory effect on the transketolase activity. This effect (TPP effect) has therefore been widely used for the assessment of thiamine nutrition and we have previously reported on the thiamine status of Malaysian healthy adults, pregnant women (Chong & Ho, 1970) and the Orang Asli (Burns-Cox, Chong et al 1972) by the application of the above method.

In a study on the Orang Asli and those of a group of children with heavy trichuris infections conducted during 1968-1969, we noted amongst other things, an inverse relation between their haematocrit values and erythrocyte transketolase activity ($r = -0.51$; $p < 0.001$) — (Fig. 1). Subsequently, we came across three reports describing this phenomenon (Wells, 1968, Schouten et al. 1971 and Wells et al. 1972).

We therefore felt the need for further study and have since examined the red cell transketolase of 49 patients admitted to hospital for investigation of anemia. We have found a similar inverse relationship between their transketolase activity and haematocrit ($r = -0.38$; $p < 0.01$) and between the former and haemoglobin concentration ($r = -0.33$; $p < 0.02$), thus confirming our earlier observation (Figs. 2 & 3).

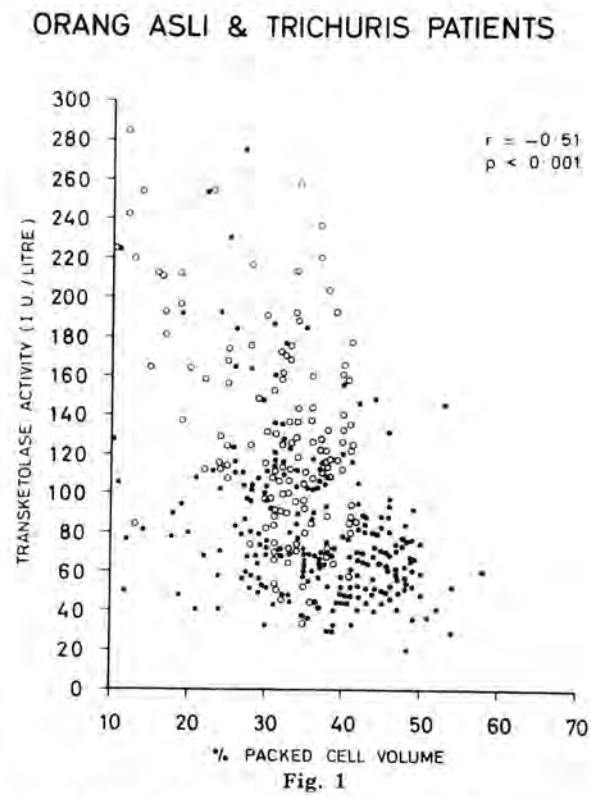

Fig. 1

The mean transketolase activity of the patients was 83 ± 42 I.U./litre (mean p.c.v. = 25%; mean Hb. = 7.5 g%), compared to a mean of 50 ± 11 I.U./

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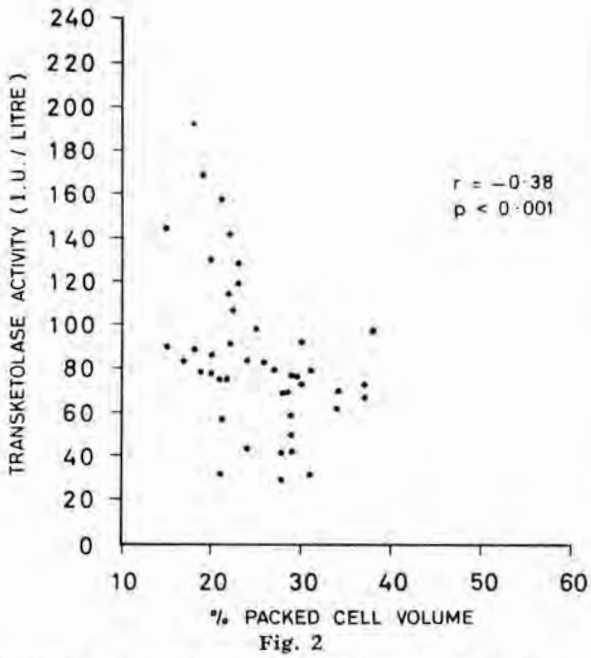

Fig. 2

litre in 37 healthly control subjects whose red cell transketolase was determined at the same time (mean p.c.v. = 46%; mean Hb. = 15.1 g%). The difference between their transketolase activities was statistically significant ($t = 2.85$; $p < 0.01$). But no such difference was found between their thiamine pyrophosphate effect ($t = 1.16$; not significant).

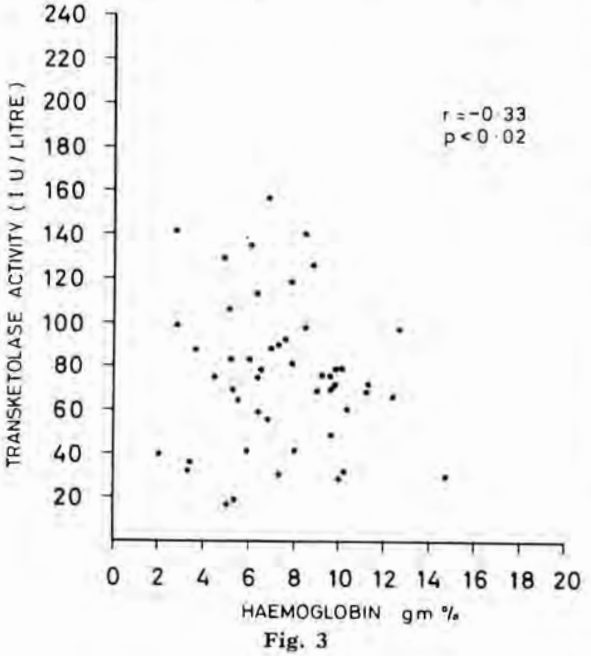

Fig. 3

The mean transketolase activity of 16 patients in whom reticulocytosis was present (reticulocyte counts greater than 2.5%) was 88 I.U./litre which was higher than the overall mean of 83 I.U./litre observed for all patients.

When the transketolase activities of these patients and control subjects were plotted against their reticulocyte counts, a significant positive correlation was obtained ($r = 0.44$; $p < 0.001$) — (Fig. 4).

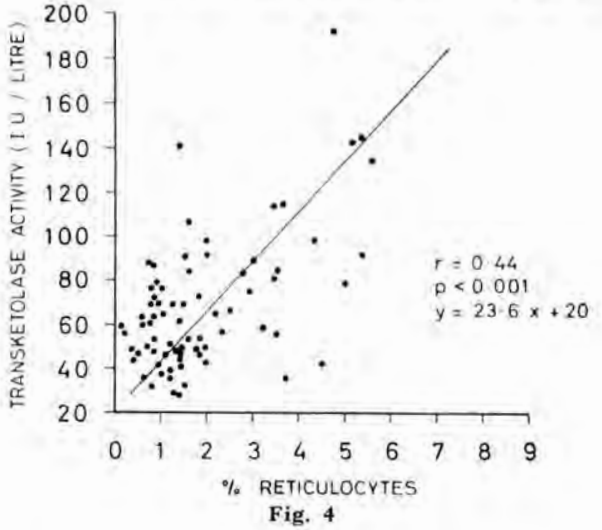

Fig. 4

Our observation is therefore in agreement with the current knowledge concerning the increased activity of several red blood cell enzymes, including transketolase, in the presence of a young red blood cell population.

We would like to stress that this observation in no way invalidates the usefulness of this test for assessing thiamine status since the increased transketolase activity was not related to the stimulatory effect of added thiamine pyrophosphate (TPP effect).

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