A Suggestion for the Prevention of Severe Clinical Forms of Schistosomiasis Mansoni*

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In an area of Brazil hyperendemic for schistosomiasis mansoni it has been noted that the hepatosplenic form of the disease is associated with high faecal egg-counts.[a, b] This correlation is particularly true in the 10-15-year age-group which shows the peak in schistosome egg output. After that age the count decreases sharply, reaching levels similar to those found in patients with benign forms of the disease, where no egg/age correlation exists.

Data from an area of hypoendemicity now being studied by the author seem to confirm the view that a high egg output is necessary if severe schistosomiasis is to develop. The hypothesis is therefore advanced that the pattern of disease due to *Schistosoma mansoni* infections is a function of the worm burden, though we are as yet unable to furnish convincing proof of a direct relationship between the number of mature female flukes and the egg output in the faeces. Perfusion studies in human cadavers at present being carried out in Baía, Brazil,[c] however, appear to lend support to the view that worm burden and the clinical severity of schistosomiasis mansoni are interrelated.

The best index for severe schistosomiasis in field studies is spleen enlargement, since determinations of portal pressure or splenography cannot be performed under these conditions. Splenomegaly in chronic schistosomiasis ordinarily heralds the hepatosplenic phase of the disease. Our surveys [a] indicate that this physical sign is exceptional before the age of 10, but commonest in the 10-15-year age-group. In some patients investigated over a period of years the appearance of splenomegaly has coincided with a sudden decrease in the stool egg-count.

The pathogenesis of hepatosplenic schistosomiasis is in many respects still unknown. We undertook a limited field trial on the effect of chemotherapy on the prophylaxis of schistosomal splenomegaly among children below the age of 10 years and with unusually high faecal egg-counts. Even in the absence of a radical cure by the drug, and considering that reinfection was to be anticipated, it was hoped that a decrease in worm burden would prove useful in the prevention of the severe forms of the disease.

The trial was carried out in Gameleira, Brazil, where previous surveys had been made. In September 1961, a group of 112 children was submitted to a course of treatment with Astiban (antimony-III-meso-2,3-dimercapto-sodium succinate) in a total dose of 25 mg/kg of body-weight, administered intramuscularly on 6 alternate days. In 3 cases the last injection had to be called off, but otherwise no severe intolerance was observed.

Physical examination as well as egg-counts by a modified Stoll-Hausheer method were carried out (*a*) before treatment began, (*b*) 6 and 11 months after the last injection, and (*c*) again in September 1965. By this time the original group had decreased to 83. Careful checks revealed that the persons who had dropped out of the series had moved to other localities and were in good health when last seen by neighbours or relatives. We are convinced that this group of 29 children is in every respect similar to the group that was followed up.

It will be seen from the following results of the stool examinations that reinfection indeed took place:

	Before treatment	*After treatment*		
		6 months	*11 months*	*4 years*
Prevalence	95%	47%	55%	83%
Median eggs/g	415	32	75	135

However, no inferences as to transmission should be drawn from these data since the subjects, at present with an average age of 14.6 years, are in the age-group in which spontaneous reduction in egg-counts is bound to occur. Furthermore, the results back our contention that a quantitative approach to schistosomiasis affords a better insight into epidemiological conditions than do mere prevalence data.[b, d]

Physical examinations over 4 years revealed no instances of splenomegaly developing in the 60

* This investigation was supported in part by a grant from the World Health Organization.

[a] Kloetzel, K. (1962) *Amer. J. trop. Med. Hyg.*, **11**, 472.

[b] Kloetzel, K. (1963) *Amer. J. trop. Med. Hyg.*, **12**, 334.

[c] Cheever, A. W., personal communication.

[d] Kloetzel, K. (1963) *Rev. Inst. Med. trop. S. Paulo*, **5**, 106.

children who did not already present a palpable spleen at the first examination. Of the 23 children exhibiting splenomegaly in 1961, the spleen enlargement disappeared in 11 cases (unlikely to have occurred spontaneously), diminished in size in 10, and increased in 2.

The small size of the town where the experiment was carried out and the fact that a significant drop-out rate had been anticipated precluded the selection of a comparable control group for this pilot experiment. Nevertheless, other data strongly suggest that the above results are meaningful: thus spleen enlargement was found in 35.8% of the siblings 3-4 years older, and in 38.7% of the parents of the patients composing our group. Egg-counts performed on untreated patients during the same 4 years indicated that the transmission of schistosomiasis had not decreased in Gameleira. Since all the treated children are at present older than 10 years —and therefore past the age in which schistosomal splenomegaly is initiated—the results suggest that chemotherapy can prevent the severe complications of *S. mansoni* infection, provided the treatment is started at an early age.

These data are presented in the sense of a progress report and not as conclusive evidence that prophylactic treatment against severe clinical forms of schistosomiasis mansoni has been achieved. It is hoped that other groups will try to verify these findings. On the basis of present knowledge it is submitted that all children with more than 500 eggs of *S. mansoni* per gram of feaces, and in the 7-10-year age-group, should receive a course of chemotherapy even in the absence of signs and symptoms of infection. Since the eradication of schistosomal infections is still a hopeless undertaking in the developing countries, we believe that the next best approach is an attempt at preventing hepatosplenic schistosomiasis, a form of the disease which results in a substantial decrease in life expectancy.

Formulation Analysis: the Effect of Different Storage Treatments on the Suspensibility, Agglomeration and Deterioration of Surfactants of DDT Water-dispersible Powders

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The continued introduction of new pesticide formulations in recent years has been accompanied by an increasing appreciation of the value of specifications. The purchaser may order and obtain supplies of a water-dispersible powder having acceptable wetting or suspension properties but which may deteriorate rapidly during shipment, or during storage in tropical regions. This can be due to the tendency of the powder particles to aggregate or agglomerate or to a loss in activity of the surfactants. Spraying operations can thus be hampered by failure of the powders to suspend properly.

In a report on the physical properties of pesticides, Gooden & Ringel[b] stated that the International Cooperation Administration (ICA)—the principal American purchaser of water-dispersible insecticides of high suspensibility—was using a testing procedure for DDT adapted from the 1956 WHO specifications. Pearce et al.[c] in 1955 discussed the ICA procedure, while the following year WHO switched to a new testing method in which a 250-ml graduated container (Erlenmeyer flask) was recommended for the preparation of the suspension.[d, e] The new procedure was recommended not only for DDT but also for wettable powders in general.

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[b] Gooden, E. L. & Ringel, S. J. (1956) *J. agric. Fd Chem.*, 4, 244.

[c] Pearce, G. W., Gooden, E. L. & Johnson, D. R. (1955) unpublished paper presented to the meeting of the American Chemical Society, Minneapolis, 12-16 September 1955.

[d] Roth, W., Kocher, C. & Treboux, J. (1957) In: *Proceedings of the Fourth International Congress on Crop Protection, Hamburg*, p. 1199.

[e] World Health Organization (1956) *Specifications for pesticides*, Geneva, p. 105.