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Letters

Serum IgE Levels,
Helminth Infection and
Socioeconomic Change

The relationship that exists between helminth infection, conditions of hygiene and socioeconomic factors is widely recognized. Also well established is the fact that helminths can, independently of any allergic state, cause a polyclonal stimulation of the production of immunoglobulin E (IgE) in infected individuals^{1–3}, and that this is the main cause of the highly elevated serum IgE levels in tropical populations, where these infections are endemic^{4–6}.

We have, for a number of years, been evaluating the allergic reactivity of children in a well-defined slum area of Caracas, Venezuela (Barrio Los Erasos), where intestinal helminths are prevalent^{7,8}. During the course of a recent evaluation of a group of 80 of these children, aged between five and 15 years, we measured the serum IgE levels by the commercial PhadebasTM test (Pharmacia, Sweden), over a period of 22 months. As would be expected for children in such conditions, the IgE levels at the beginning of the study were very high. However, we were surprised to find that these increased dramatically during the course of the study (Table 1). This increase could not be attributed to age effects, because cohort analysis of the children has revealed no significant age-related

differences, for example, at the beginning of the study the IgE level for eight-year-olds (the mean age of the starting group) was 1412 IU per ml, and that for ten-year-olds (the mean final age) was 1659 IU per ml.

Examination of faeces showed that the prevalence of helminth infection in these children also increased substantially during the period of study, particularly for *Ascaris lumbricoides* (Table 1). This is the most probable cause of the increased IgE levels, because the elevation did not occur in a parallel group of children from the same slum who received regular antihelminth treatment (N.R. Lynch *et al.*, unpublished).

Our study coincided with the outbreak of the most violent and widespread social unrest in the recent history of Venezuela⁹. This was triggered by the imposition of economic measures that are part of the strategy to rationalize the economy and to consolidate the external debt of the country¹⁰. Owing to a number of factors, a general deterioration in the economic situation of Venezuela has occurred over the past years. This has resulted in the cost of living rapidly outstripping the earning capacity of a wide sector of the population^{10,11}. This change is reflected by our finding of a substantial increase in the degree of poverty in the slum area during the period of our study (Table 1). Thus, a significant proportion of the families who were classed as being in officially defined^{10–12} circumstances of 'poverty', that is, having incomes that are insufficient to cover the cost of basic goods and services for a

standard family, deteriorated to circumstances of 'critical poverty', where the incomes were below the cost of a minimum 'shopping basket' of basic food items^{10–12}.

This is in agreement with our general appreciation of a worsening of the conditions of hygiene in the slum, and the fact that antihelminth treatment can now represent a significant, and unfortunately dispensable, burden on family finances.

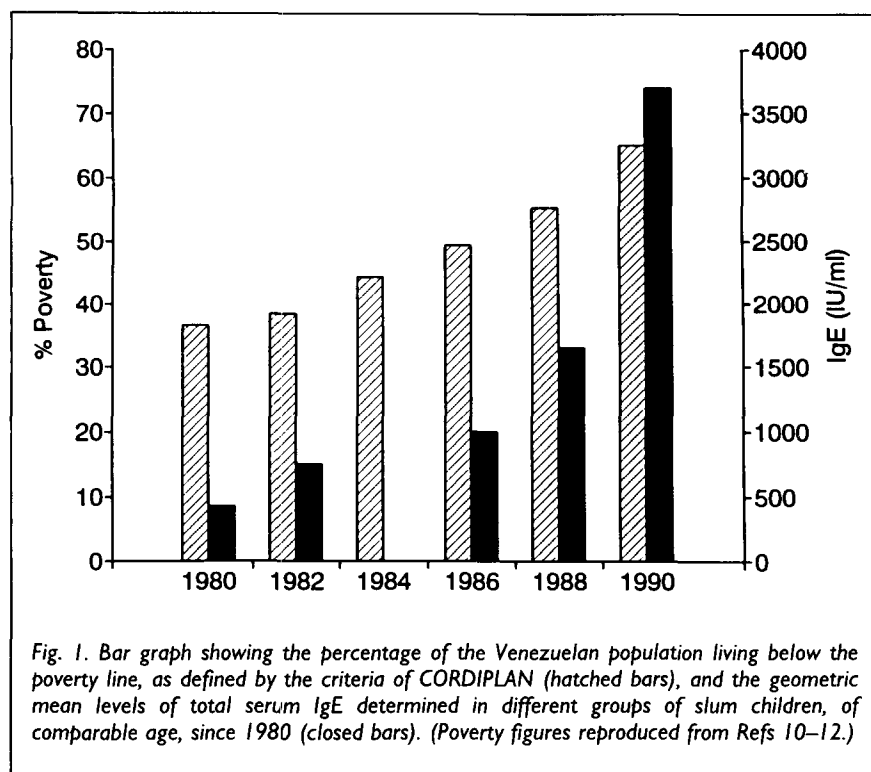
When we reviewed our data, obtained from slum children since the commencement of our studies in 1980, we found that the present results actually show an exacerbation of a tendency that is evident over the past decade, ie, a progressive increase in the levels of total serum IgE measured in different groups of children of the same age range (Fig. 1). We have not detected this change in children from higher socioeconomic levels^{8,13}. Interestingly, there is an almost perfect correlation ($r = 0.93$) between IgE levels in the slum children and the degree of poverty at the national level, as determined by the official figures^{10,11} of the Central Office of Coordination and Planning of the President of the Republic of Venezuela (CORDIPLAN).

While during the long-term this trend may be reversed by recent economic measures, the present circumstances are of deteriorating living conditions and increasing prevalence of parasitic infection. As IgE antibody is also related to the expression of allergic disease, these changes could ultimately influence the allergic reactivity of the affected children¹⁴.

Table 1. IgE levels, *Ascaris* infection and poverty in urban slum children over a 22-month period

Parameter	Beginning	End	Difference
IgE (IU per ml) ^a	1649 (4217)	3696 (7516)	$P < 0.001$
<i>Ascaris</i> infection (%)	26	66	$P < 0.001$
% in 'poverty' ^b	55	11	—
% in 'critical poverty'	45	89	$P < 0.001$

^a Geometric mean (+ 1 SD) calculated from log-transformed data.
^b % of children from families with incomes below the levels defined by CORDIPLAN^{10–12} for 'poverty' (formerly termed 'critical poverty') or 'critical poverty' (formerly 'extreme poverty'). The totality of the group was below the poverty line.



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Chronotherapy of Malaria

While attempting not to pour cold water on the science, I am apprehensive as to the applicability or utility of chronotherapy for malaria¹, especially for those of us working in the field in the tropics where malaria is hyperendemic. How suitable is it to use mice as models for humans in malaria therapy? Andreas Suhrbier and Jerome Vanderberg² have already commented on the problems associated with mismatched host–parasite models, I would therefore urge caution in the extrapolation of results from models to use in humans.

Although the augmentation of desired pharmacological effects and/or the diminution of undesirable effects by the timing of drug applications to achieve optimal therapeutic results is necessary, I remain skeptical about the usefulness of such

for malaria in the field in the tropics. Here, the integration of conventional malaria treatment and control into existing primary health care systems is fraught with logistic problems. At best, chronotherapy could be applied during hospital care where, hopefully, parasitaemia and paroxysmal periodicity can be monitored. Again, this can be difficult in rural hyperendemic areas in the underdeveloped world where there are continual electricity blackouts, shortages of stains for microscopy, inadequate drug supplies, an excess of expired and hence ineffective drugs, and rudimentary clinical and laboratory backup. Our colleagues working in advanced laboratories in the developed world need to be reminded of our socioeconomic plight in the developing countries.

There may be many well-trained indigenous personnel working in the tropics but how many of our clinicians and

paramedics, especially in Africa, are actually working or prepared to make the sacrifice to work in truly rural areas? How can such workers cope with malaria chronotherapy in rural Africa where it might be most usefully employed? How reliable is chronotherapy when plurality of infections is the norm?

These are just a few thoughts among a myriad. Until the problems that plague health care systems in rural Africa are overcome, chronotherapy remains a dream in the places that it is most needed.

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Reply

We agree with Alghali that malaria is a very serious disease and that emergency treatment is often indispensable, particularly in field conditions. However, we disagree with the rationale of his criticisms: (1) Data obtained with the rodent malaria models are

relevant to human malaria. It is common knowledge that all currently used drugs were screened with animal models. This is particularly well demonstrated in the case of chronotherapy with chloroquine, where responses of *Plasmodium falciparum* and *P. v. petterii* are very similar (I. Landau et al., unpublished). (2) Detailed information concerning the mode of action and the pharmacokinetics of any drug is important for the correct design of treatment

regimens, and clinicians should be aware of such information.

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