The Relationship Between Autoimmunity and Chagas’ Disease: Causal or Coincidental?

L. HUDSON and P.J. HINDMARSH

1 Introduction

Trypanosoma cruzi infection or South American trypanosomiasis is a major public health problem in Latin America, where it affects in the order of 10–12 million individuals. The distribution of the parasite in animal reservoir hosts extends far beyond that of human infection to include, for example, the Amazonian basin of Brazil and even the southernmost states of the United States. Although fully infectious to a human host, the parasite is not usually transmitted from wild animal reservoir hosts to the human population in these areas because of the lack of suitable vectors. However, recent studies have shown an incursion of sylvatic cycles of transmission into the peridomicaly habitat because of changes in farming practice or socioeconomic conditions. Similarly, the geographical range of human infection and vector distribution has also changed because of population migration. In this way, T. cruzi infection is not diminishing but shows every indication of a future increase. One contributory factor to this likely increase is the growing number of cases of infection via blood transfusion (BRENER 1979). For economic reasons, blood donations in Latin America tend to ascend the social scale, from donor to recipient, and as a consequence so does blood-borne infection. This change in the pattern of infection has produced a growing awareness of T. cruzi and Chagas’ disease among relatively well-developed urban populations, and thus even greater pressure for
its control and elimination by chemotherapy, vaccination or public health measures.

In limited areas of Brazil effective control of transmission has been achieved by insecticide treatment (MAGUIRE et al. 1981) and improved living conditions (SCHOFIELD and WHITE 1984), but control programmes are rare and, because of financial or political constraints, tend to be of short duration. The success of chemotherapy is similarly poor with great regional variability both in the availability and success of treatment. Control of \textit{T. cruzi} infection by vaccination seems, therefore, to be the natural alternative and, in common with other major parasitic diseases, is being actively researched by several national and international agencies. However, experience to date has been chastening; not only has effective immunity not been achieved but also it now seems that the immune response itself might be involved in some or all of the manifestations of Chagas’ disease.

2 Infection and Disease

In a naive host, the flagellated, non-dividing trypomastigote becomes intracellular at or near the portal of entry and proliferates as a non-motile amastigote stage. Successive cycles of trypomastigote-mediated dissemination and amastigote proliferation serve to spread the infection to virtually every organ in the body (for detail of life cycle see WILLIAMS, this volume). Both clinically and experimentally, the natural history of \textit{T. cruzi} infection follows that of any infectious agent susceptible to immune control, during a brief parasitaemic phase (of 2–3 months in man or 2–3 weeks in mouse) the organisms proliferate without check but then their numbers diminish dramatically in the face of a vigorous immune response involving both cellular and humoral components (BRENER 1980). Although sterile immunity has never been described, the number of circulating parasites remains at an undetectable level for the remainder of the life of the patient even with repeated challenge. Experimental studies suggest that the number of tissue parasites follows a similar course. In summary, the clinical course of \textit{T. cruzi} infection shows an initial acute phase lasting a few months followed by a chronic sub-patent infection which may remain in check for 4 or more decades, provided the patient’s immune response remains intact (BAROUSSE et al. 1980).

During the acute phase, the type and degree of pathology is clearly related to the distribution of parasite forms and intensity of parasitisation. Although cardiac pathology seems to predominate, this may reflect the relative ease with which the structure and function of this organ may be monitored, for death at this stage of the disease is uncommon. If parasitisation is intense, then structure and function may be altered due to a parasite-induced inflammatory response producing necrosis of myocardial contractile fibres and conducting tissue (ANDRADE et al. 1978). In more than 90% of patients, parasite numbers decline at the end of the acute phase and normal cardiac structure and function return. The infection may then enter a quiescent stage with no apparent disease progression, often termed the indeterminate form of Chagas’ disease (ANDRADE 1983),