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Effects of Vector-derived Factors on Transcutaneous Infection with Trypanosoma cruzi (Chagas 1909), Parasitaemias in the Mouse and the Interaction of Murine Langerhans Cells with the Flagellate

Chagas' disease is an important tropical disease, which is widespread in Latin America and cannot be efficiently controlled. Humans and animals are infected by blood-sucking bugs, which transmit the parasite – Trypanosoma cruzi – through their faeces. The flagelate invades its new host through small lesions in the skin or mucous membranes.

In the present investigation a model was used for the transduction of the parasite through the bite lesion of the bugs mouthparts. As a parasite-vector-host-system we used a Chilean strain of T. cruzi, bugs originating from the same village, and low susceptible (C57/Bl6) or immunodeficient (Balb/c nu/nu) strains of mice. A drop of T. cruzi in different media was applied onto the piercing wound of the triatome on the back of the mouse. By comparing the resulting parasitaemias with those following intradermal or subcutaneous injection of the parasites indicate that 50-100 flagellates invade through the bite lesion of a bugs mouthparts into the skin of a vertebrate host.

This "natural transmission" of Trypanosomes is accompanied by different factors: while sucking, the bug places saliva in the site of the bite lesion and the bugs faeces carry intestinal symbionts as well as the parasites. The use of salivarectomised bugs, purified Trypanosomes, Trypanosomes in bug faeces and trypanosomes together with symbionts indicates that none of these factors influences the early stage of infection. Whereas Leishmania can hardly establish in the host's skin without the presence of saliva of the transmitting insect, saliva of Triatoma infestans had a slightly immunogenic effect in our experiments (but not the saliva of Dipetalogaster maximus); in addition, the injection of a large amount of faeces reduced the parasiteamias. Regarding these results, there will be no new possibility for vaccination against Chagas disease. Immunizing against the accompanying factors brought in by the vector would be ineffective (in contrary to Leishmaniasis).

In the infection-experiments the parasitaemias were influenced by the parasite, the dose and route of infection, the strain and sex of the mice, by the way the mice were kept and their

individual immunity status. Therefore the results cannot be transferred to other parasite-vector-host-systems.

The second part of the present investigation focussed on Langerhans cells. They are important cells of the immune system of the skin, can take up pathogens and parasites in the skin and transport them to the draining lymph node, where they initiate an effective immunological reaction. In the present investigation virtually no migration of Langerhans cells could be seen after in vivo infection of the skin, and freshly isolated Langerhans cells did not take up parasites in vitro. But, after in vivo infection and experimentally induced emigration, few cells (some Langerhans cells, probably some macrophages) with intracellular parasites could be found.

T. cruzi can establish in the vertebrate host without supporting accompanying factors, although different mechanisms – for example Langerhans cells – react to the parasite at the moment of its invasion and in the course of the infection. Regarding the variety of factors that influence the infection with T. cruzi and regarding the complex epidemiologic situation of the natural parasite-vector-host-systems it is unlikely, contrary to WHO reports, that Chagas‘ disease can be eliminated by the year 2000.