

## ANAPHYLACTIC SENSITIVITY AND IMMUNITY TO *SCHISTOSOMA MANSONI* IN MICE

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Concomitant immunity to experimental *Schistosoma mansoni* infection in mice may be severely hindered by pretreatment with either potent antihistamines (ciproheptadine) or compound 48-80, a mast cell degranulator (Gerken et al., *Brazilian J. Med. Biol. Res.*, 17: 201-207, 1984; Dean et al., *Fed. Proc.*, 35: 116, 1976). This strongly suggests the participation of anaphylactic mast cell degranulation in the mechanism of concomitant immunity. In addition, infected mice respond to cercarial penetration with plasma extravasation in the skin; their mast cells release histamine *in vitro* and degranulate *in vivo* upon exposure to *S. mansoni* antigens and, further, contain more histamine per cell than normal mast cells (Gerken, S. E., PhD Thesis, Belo Horizonte, 1986; Mota-Santos et al., *Rev. Inst. Med. trop. S. Paulo*, 27: 179-185, 1985).

Local anaphylactic reactions at the points of cercarial penetration might be important to promote the local accumulation of molecules (antibodies, complement) and cells (eosinophils, polymorphs) from the circulation, which might then promote cytotoxic actions upon the invading worms (Murrel et al., *Am. J. Trop. Med. Hyg.*, 24: 955-962, 1977; Kay, *J. Allergy Clin. Immunol.*, 54: 90-104, 1979).

On the other hand, local inflammation might not be associated with a direct cytotoxic effect upon the worms. Intravenous injection of 48-80 shortly after or shortly before the penetration of cercariae in the skin of normal, non-immunized mice, markedly reduces the number of parasites retrievable from skin slices; this effect is inhibited by pretreatment with anti-histamines (Gerken, PhD Thesis); conversely, injection of 48-80 2 or 4 days before the infection, increased the number of live parasites (Gerken, PhD

Thesis); the latter observations have been recently confirmed in normal rats (Ford et al., *Parasitology*, 94: 313-326, 1987).

Decomplementation *in vivo*, by injection of cobra venom factor (CoVF) significantly affects concomitant immunity in mice (Tavares et al., *Exp. Parasitol.*, 46: 145-151, 1978; Gerken, PhD Thesis), and in rats (Góes, PhD Thesis, Belo Horizonte, 1984). We found, however, that this treatment also promotes decrease in the histamine content of mouse mast cells (Gerken, PhD Thesis) and thus the effect might be unrelated to the inactivation of complement by CoVF injection. In line with this reasoning is the observation that rats decomplement by CoVF cannot be passively protected by the transfer of immune sera (Góes & Ramalho-Pinto, *Ciência e Cultura*, 32: 613, 1980).

Cercarial penetration, or the intradermal injection of parasite antigens, are known to promote the local accumulation of eosinophils (Colley et al., *Am. J. Trop. Med. Hyg.*, 21: 558-562, 1972; Lichtenberg et al., *Am. J. Pathol.*, 84: 482-509, 1976; Savage & Colley, *Am. J. Trop. Med. Hyg.*, 29: 1268-1278, 1980), which is also a feature of local allergic reactions (Speirs & Wenck, *Acta Haematol.*, 17: 217-219, 1957).

In addition to the increase in venular permeability (Majno et al., *J. Cell Biol.*, 42: 647-672, 1969), local inflammation involves a significant increase in the lymphatic drainage of the inflamed area (Pullinger & Florey, *Brit. J. Exp. Pathol.*, 16: 49-64, 1935). This increase in lymph flux might drain schistosomes to the interior of lymphatics and thus block the further progression of the parasite cycle. We have recently detected a large number

of damaged schistosomula, and a smaller number of intact schistosomula, in lymph nodes of infected mice which were draining an area of cercarial penetration in our system, the ears.

These observations are consistent with the operation of a simple mechanism of deviation of the invading worms from their natural routes, as a significant factor in the production of concomitant immunity.

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