THE ROLE OF HUMORAL AND CELLULAR IMMUNITY IN THE EXPRESSION OF ACQUIRED ANTI-MICROBIAL RESISTANCE IN THE MOUSE

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ABSTRACT

The immunochemistry and antigenicity of Pseudomonas and Salmonella cell walls and their antigens are discussed, together with the effect of serum treatment on the growth of Salmonella enteritidis in normal mice. The immunogenicity of live vs killed vaccines is assessed in terms of humoral and cellular responses and the levels of specific delayed type hypersensitivity and cell-mediated immunity expressed against a subsequent challenge infection. Studies of cross-protection between different strains of Salmonellae and Mycobacteria and the serial enumeration of drug resistant bacterial populations in the livers and spleens of intravenously and intragastrically challenged CD-1 and C57Bl mice established the parameters of the fully effective vaccinating regimen. Subsequent studies using live and killed Salmonellae indicate that only those preparations which are capable of sensitizing the host to one or more protein antigens in the bacterial cell are also able to induce a fully protective immune response equal to that seen in actively infected animals. The infection pathway in orally infected mice involved only the ileal Peyer's patches and their draining mesenteric lymph node. Prior vaccination could not prevent the passage of the virulent Salmonellae across the gut barrier but did later induce an accelerated immune response to the developing liver and spleen infections.

A corresponding study of antituberculous immunity was carried out. Protection by vaccines consisting of attenuated or virulent tubercle bacilli

was about equal and depended upon the ability of the organism to persist in the tissues for a period of several weeks. Non-persisting organisms could be rendered immunogenic by suspending them in a sensitizing vehicle (Freund's adjuvant). A temporal relationship was demonstrated between the development of tuberculin hypersensitivity and acquired antituberculous resistance to both homologous and heterologous challenge organisms. Antituberculous immunity was depressed in T-cell depleted mice whether the host was subjected to an intravenous, aerogenic or subcutaneous infection. Tuberculin sensitivity and splenic proliferation were also strongly inhibited.

Finally, the role of the monocyte in the expression of hypersensitivity and acquired resistance was examined in Salmonella-infected mice, guinea pigs and rats exposed to increasing doses of whole body irradiation. There was a need for both specifically sensitized lymphocytes and blood monocytes in the expression of delayed hypersensitivity and acquired resistance. The effect of several reagents known to affect T-cell reactivity and monocyte production was examined in both intravenously and orally infected mice and the results summarized in a final review paper in which the significance of the host-parasite relationships which develop in the actively immunized host is discussed.
