LEPTOSPIRA INTERROGANS SEROTYPE *POMONA* INFECTION :

A STUDY IN HOST-PARASITE RELATIONSHIPS

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SUMMARY

A study has been made of the host-parasite relationship that exists between Leptospira interrogans serotype pomona and a mammalian host as exemplified by the sheep. Tissue culture studies provide evidence that serotype pomona is capable of elaborating a cytotoxin at a low level. Surprisingly there is no indication that the organism produces either lecithinase or hyaluronidase and it appears that the organism enters and migrates within host tissue mainly by direct mechanical insinuation. The organism does not appear to commonly penetrate cells either in tissue culture or the host and thus avoids exposure to lysosomal enzymes. Migration is mainly between cells and the organism is capable of passing between tight junctions. Although exotoxin production does not appear to be of major importance in the migration of the organism, ultrastructural studies of the kidney in both mice and sheep indicate that tubular epithelial changes result from toxic rather than mechanical damage. Limited experimental studies into the possible roles of delayed type hypersensitivity and allergy in the pathogenesis of leptospirosis gave no indication that these are of any importance.

Haemolytic anaemia is a characteristic clinical feature of leptospirosis caused by serotype pomona. This is due to a haemolysin of large molecular weight which is not a lecithinase and acts independently of complement and specific antibody.

After the organism enters the animal body there is a period of rapid multiplication within the blood stream; the so called leptospiraemic phase. During this time the animal experiences a variable pyrexia. Serotype pomona can be observed in renal capillaries and renal interstitium quite early in the leptospiraemic phase. It is not clear whether there is

a specific tropism for renal tissue but there is no doubt that once the organism reaches the tubular lumen that it is free to multiply in a prolific manner. In this situation it appears to be protected from circulating antibody and organisms are passed out into the urine in large numbers for prolonged periods at a time when the animal may have a high level of circulating antibody.

Detailed investigations have been carried out into the nature of humoral antibody activity. It has been shown that there is a distinct, specific leptospiracidal antibody which is independent of agglutinating antibody. Leptospiracidal antibody is produced by certain immunogenic fractions of pomona cultures which can be separated by chromotographic methods.

Ultrastructural studies have revealed that leptospiracidal antibody strips the outer sheath from the organism. It acts independently of complement and is an IgG class antibody. The discovery of leptospiracidal antibody has provided a new concept in the study of immunity in leptospirosis. It is likely that it is the major factor in the termination of the leptospiraemic phase of the disease and it also should be expected to play a major role in preventing infection.

The application of this knowledge to the elaboration and evaluation of new vaccination procedures appears to hold great promise.

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TABLE OF CONTENTS

LIST OF ILLUSTRATIONS