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THE EFFECT OF NEUTRAL AND ACIDIC POLYSACCHARIDES ON  
NATURAL RESISTANCE OF MICE TO BACTERIAL CHALLENGE\*

PETER F. BONVENTRE† AND BERNARD BLACK-SCHAFER

From the Department of Microbiology and the Department of Pathology, University of Cincinnati College of Medicine, Cincinnati, Ohio 45219

A multitude of complex polysaccharides are known to alter host resistance to bacterial infection. These include bacterial endotoxins (lipopolysaccharides), bacterial capsules, yeast cell walls (zymosan), and other chemically complex substances of microbial or botanical origin. At times it is possible to demonstrate either an increased susceptibility to infection or an elevated resistance following the administration of the same compound. This has been accomplished by manipulating the dosage, route of injection, and regimen of inoculation of the material before bacterial challenge. These complexes induce changes in the physiologic state of the host and not in the virulence of the infecting agent. Although the mechanisms for altered host resistance are not clear, the functional capacity of the reticuloendothelial system has often been cited as an important factor (Benacerraf and Sebestyen, 1957; Biozzi et al, 1955). That many other factors of both a cellular and humoral nature are operative is evident from the extensive literature published within the recent past on the subject

of natural resistance to infections (Shilo, 1959; McDermott and Kiser, 1956).

A major difficulty in the interpretation of data on the relationship between bacterial lipopolysaccharides and altered host resistance is the chemical complexity of endotoxins. Hestrin (1956) has emphasized that a detailed and systematic study of simple polysaccharides and how they impinge upon natural resistance might provide a sound basis for explanation of the biological properties exhibited by chemically undefined bacterial somatic antigens. Simple polysaccharides like dextrans and levans are compounds of uniform structure which yield 1 hexose residue on hydrolysis and which differ only in molecular weight and degree of branching. Purified levans have been reported to affect adversely intradermal and intraperitoneal infections with a number of bacterial agents. The infection-promoting ability of these polysaccharides was attributed to a suppression of inflammation and an inhibition of antibacterial substances moving from the circulation to local areas of infection in the skin or peritoneal cavity (Shilo et al, 1956; Shilo and Wolman, 1958). However, the effect of neutral dextrans and their acidic derivatives on host resistance has not been studied as extensively. Since these compounds and their sulfated derivatives can be obtained in relatively pure form and in a variety of molecular weights, they lend themselves readily to studies concerning natural resistance.

This communication describes the effect of several dextrans and dextran

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