Antibodies Responsible for Allergic Reactions and the Difficulties Involved in Studying Them

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While a body of reliable quantitative data on the amounts of antibody needed passively to elicit systemic anaphylaxis, cutaneous anaphylaxis and the Arthus phenomenon has been accumulated, efforts to make quantitative measurements and to characterize the antibodies responsible for wheal and erythema reactions in human skin with homologous or heterologous antibodies have been fraught with difficulties. One of these has been the problem of preparing antisera containing antibody only to the major antigen present and the exclusion of antibody to trace impurities. In studies on passive transfer of the Prausnitz-Küstner reaction to human skin with rabbit antisera to crystalline ovalbumin and with human diphtheria antitoxin prepared by anamnestic stimulation of Schick negative individuals, the available evidence indicates that antibody to impurities present in trace amounts is responsible for the passive transfer and that antibody to the major antigen is not involved.

While it has been clearly established that immunization of humans with pneumococcal polysaccharides or dextrans leads to the production of wheal and erythema-type sensitivity which correlates roughly with the circulating precipitin level, the failure as yet to transfer skin sensitivity with such antibodies constitutes a very serious obstacle to further studies.

When these problems are ultimately solved and when one has identified the antigens and antibodies associated with the Prausnitz-Küstner reaction and measured the quantities of antibody necessary to produce them, further analysis will become necessary in terms of the heterogeneity of antibodies. Thus, in addition, to variation in physical and chemical properties, antibodies to a single antigen are known to be made up of populations of antibody molecules

2 K a b a t , Antibodies Responsible for Allergic Reactions

directed toward various antigenic groups. Moreover even with antigens of sufficiently simple structure such as dextran

in which the antibody formed is directed toward a single antigenic grouping

it has been shown that all of the antibody molecules are not alike; they still consist of populations of antibody molecules with specific combining sites which vary in size and are directed against terminal sequences of a 1,6 linked glucose residues of varying length. How these differences among antibody molecules affect their capacity to induce passive sensitization remains to the future.