Immunization against bacterial diseases

This collection of ten reviews by 17 contributors can be recommended. In each topic selected the editors have with success met their intention of bridging “the gap between the clinical and the experimental”. The reference lists are generally comprehensive, and include many 1982 papers and a few from 1983. Traditional bacterial vaccines, such as those against cholera, typhoid and whooping cough, consist essentially of inactivated whole-cell cultures. Although widely used, they have unpleasant side-effects and have not proved highly protective. The application of newer analytical and immunological techniques, more recently supplemented by monoclonal antibody and recombinant-DNA technologies, is giving a growing understanding of the structure of pathogenic bacteria and the nature of their protective antigens. Novel, purified antigens and live vaccines are consequently under study, and in some instances licensed for use. These experimental and clinical advances are considered in this book.

Immunological adjuvants are needed to take full advantage of highly purified and synthetic peptide protective antigens, which can be poorly immunogenic alone. The various adjuvants of bacterial origin, and their active fractions and biological effects, are comprehensively reviewed by D. E. S. Stewart-Tull in the first chapter, in which attention is also given to non-bacterial adjuvants and to the practical problems of ensuring safety for use in man.

The value of BCG in protecting against tuberculosis and leprosy is affected by exposure to free-living mycobacteria, which may be found in large numbers in certain natural environments, such as Sphagnum bogs. Although the mechanisms of immunity and hypersensitivity to mycobacteria are incompletely understood, skin and intestinal contact with such saprophytic species may sensitise to, or immunise against, pathogenic species. The excellent chapter by J. L. Stanford and G. A. W. Rook reviews these effects, which are being unravelled with the help of new, specific tuberculins which may distinguish immune from potentially adverse sensitisation responses. It seems clear that environmental mycobacteria may enhance the value of BCG or reduce it—depending upon the timing of vaccination in relation to exposure.

The complexities of the cell walls and surfaces of enterobacteria, and their various biological effects, have been much studied in the past 20 years. At the same time, the clinical importance of these organisms as opportunistic pathogens has increased. Against this background, S. H. Zinner and G. Peter authoritatively review the laboratory and clinical studies that suggest that shared “core” antigens of cell-wall lipopolysaccharides can be used as protective vaccines against a range of different enterobacteria. The main place of gram-negative bacillary vaccines may be to immunise volunteer donors to obtain immunoglobulins for passive immunisation. A similar role could be important for pseudomonas vaccines, which are considered in a separate review by R. J. Jones. Active immunisation with monovalent and polyvalent, whole-cell and sub-unit pseudomonas vaccines has been found to be protective in trials in burned patients, in whom Pseudomonas aeruginosa is an important pathogen.

Capsular polysaccharide meningococcal vaccines are licensed in a number of countries, but their value is limited by the poor response of young infants, and because the serotype-B polysaccharide has proved to be non-immunogenic at all ages. C. E. Frasch reviews the work designed to overcome these drawbacks by exploiting the vaccine potential of outer membrane protein antigens, and by linking polysaccharide antigens to protein carriers. The chapter on the meningococcus is preceded by an equally comprehensive one by P. J. Watt and J. E. Heckels on gonococcal vaccines. These have proved difficult to make because of the complexity and variability of the antigenic structure of the organism. A pilus vaccine has protected volunteers against homologous but not heterologous challenge, and a range of shared, potentially protective antigens has now been identified; these may need to be combined for an effective vaccine.
Pneumococcal polysaccharide vaccines are licensed in many countries but their value in high-risk groups, such as patients with Hodgkin’s disease and the elderly, remains uncertain. Field trials of efficacy in such groups can be difficult, and a short review by G. Schiffman describes how the problem is being addressed by studies of the antibody response, and by attempts to establish the concentration of serum antibody associated with specific immunity in different disease states.

Despite growing understanding of the pathogenic processes of cholera, a really effective vaccine has yet to be prepared. J. La Brooy and D. Rowley review the great amount of research that may eventually lead to success. Inactivated sub-unit vaccines are being explored, but the use of live vaccines, prepared, for example, by recombinant-DNA techniques that introduce protective cholera antigens into Escherichia coli, may offer the best prospects for intestinal immunity. Progress is hampered by the practical difficulties of conducting field trials of cholera vaccines and of measuring intestinal secretory immunity.

The complex pathogenic factors of Bordetella pertussis are also now being characterised by the application of modern techniques of physicochemical analysis and purification. These developments are considered in a valuable chapter by A. C. Wardlaw and R. Parton in relation to the clinical problems of vaccine safety and efficacy. The successful development of purified, non-toxic vaccines is now very likely, and indeed Japanese workers have introduced an acellular vaccine that may be safe and efficacious.

The final review by B. Cohen, S. L. Peach and R. R. B. Russell concerns the use of protein antigens of Streptococcus mutans to vaccinate against dental caries. Experimental studies suggest that significant protection can be secured, and the rationale and potential problems of evaluating, in children, a vaccine against this non-fatal but unpleasant condition are authoritatively considered.

The main topics of current interest not examined are Haemophilus influenzae and live Salmonella typhi vaccines, which have now been licensed in a number of countries, and research on possible shigella vaccines. The toxoids are not reviewed, nor is attention given to anthrax, plague, staphylococcal and streptococcal vaccines; but these topics probably attract less research interest at present, which may justify their omission. This book will be of help to microbiologists, clinicians and others seeking a clear and comprehensive picture of the up-to-date position on the topics covered.

**Antibiotics and infection**


I could not understand at first why the publishers of Garrod, Lambert and O’Grady’s excellent summary of the European antibiotic scene—“Antibiotic and Chemotherapy”—should produce this book at the same time. It is a multi-author text “presented in telegraphic outline format to facilitate rapid location of important data”. The material is certainly easy to find and concise. Perhaps it is too concise and easier to read than to do, e.g., on herpes simplex encephalitis, “After confirmation of the diagnosis by brain biopsy the patient is given adenosine arabinoside (ara-A) 15 mgm/kg/day as a 12 hour infusion”. The trouble with short concise statements is that they tend to oversimplify. A further example is a table of “major pharmacokinetic parameters” which has half life and dosage intervals only. The dosage interval is very simple—4, 6, 8, 12 or 24 hours.

There is also some variation about recommendations for similar compounds. For example, the nalidixic acid/oxolinic acid contraindications given are (1) renal insufficiency (2) nursing mothers and (3) infants under 3 months, whereas for cinoxacin (an almost identical compound) they are (1) pregnancy (2) nursing mothers and (3) prepubertal children. I wonder what certainty underlies these different recommendations. The problem of unevenness of multi-author books comes out clearly in this book. In the antibiotics lists, gentamicin gets 16 lines, amikacin 6 and spectinomycin 52. Schistosomiasis gets two pages, bacterial meningitis only one.

From the title, one would assume that the book was mainly about antibiotics but information not relevant to antibiotics is often more prominent. Seven pages are devoted to
bacteraemia, septicaemia and septic shock; only two of these are concerned with antibiotics, the others with concise statements on pathophysiology or long lists of organisms causing septicaemia.

Finally it dawned on me. This is a book by clinicians for clinicians. It is not meant to be picked over and criticised by microbiologists. This is an “On-the-spot guide for health care workers”—reminding them to catch that dog and section his hippocampus, to continue decongestants for 7 days after completing the antibiotic, and that antibody-coated bacteria may be found in the urine by fluorescence microscopy. It is mostly trite but true. For this purpose it has a valuable place. I hope that lots of clinicians will buy the book because it will encourage them to learn more about the management of infectious diseases. There is little in it for the laboratory worker although microbiologists with a lot of clinical duties may find it useful.

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