

Review

Evaluation of Whole-Cell and Acellular Pertussis Vaccines in the Context of Long-Term Herd Immunity

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Abstract: After the pertussis vaccine had been introduced in the 1940s and was shown to be very successful in reducing the morbidity and mortality associated with the disease, the possibility of improving both vaccine composition and vaccination schedules has become the subject of continuous interest. As a result, we are witnessing a considerable heterogeneity in pertussis vaccination policies, which remains beyond universal consensus. Many pertussis-related deaths still occur in low- and middle-income countries; however, these deaths are attributable to gaps in vaccination coverage and limited access to healthcare in these countries, rather than to the poor efficacy of the first generation of pertussis vaccine consisting in inactivated and detoxified whole cell pathogen (wP). In many, particularly high-income countries, a switch was made in the 1990s to the use of acellular pertussis (aP) vaccine, to reduce the rate of post-vaccination adverse events and thereby achieve a higher percentage of children vaccinated. However the epidemiological data collected over the past few decades, even in those high-income countries, show an increase in pertussis prevalence and morbidity rates, triggering a wide-ranging debate on the causes of pertussis resurgence and the effectiveness of current pertussis prevention strategies, as well as on the efficacy of available pertussis vaccines and immunization schedules. The current article presents a systematic review of scientific reports on the evaluation of the use of whole-cell and acellular pertussis vaccines, in the context of long-term immunity and vaccines efficacy.

Keywords: pertussis; *Bordetella pertussis*; acellular pertussis vaccine; whole cell pertussis vaccine; DTaP; Tdap; DTwP

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1. Introduction

Pertussis, also known as whooping cough, is a highly contagious respiratory disease mainly caused by gram-negative bacteria named *Bordetella pertussis*. This is a disease that causes uncontrollable violent coughing, most commonly affects infants and young children, and can be fatal, especially in babies less than 1 year of age. However, it is important to note that pertussis can affect people of any age [1]. Several underlying medical conditions, such as asthma and chronic obstructive pulmonary disease, were reported as risk factors for pertussis [2–4]. The best way to prevent pertussis is to get vaccinated. The types of pertussis vaccines and schedules used in the national immunization programs have evolved since the development of the first generation of pertussis vaccine consisting of a suspension of detoxified and heat-killed bacteria (whole-cell pertussis, wP) [5–9]. In the late 1940s, Pearl Kendrick, Grace Eldering, and Loney Gordon developed a combined

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Pertubis Evaluation And Research On Acellular Pertubis Vaccines:

International Symposium on Pertussis, Evaluation, and Research on Acellular Pertussis Vaccines ,1991 **Cumulated Index Medicus** ,1992 **Biomedical Index to PHS-supported Research** ,1991 Biomedical Index to PHS-supported Research: pt. A. Subject access A-H ,1992 **Animal Sera, Animal Sera Derivatives and Substitutes Used in the Manufacture of Pharmaceuticals** Fred Brown,1999 This publication provides an up to the minute account of current practices and policies concerning the use of animal derived products in the manufacture of biopharmaceuticals For the first time different views and concerns of pharmaceutical industries academic experts suppliers of serum and other animal products and the relevant regulatory agencies are described in one single volume It mainly focuses on current perceptions of the risks posed by contamination of biopharmaceuticals with viruses or other infectious agents from animals and how these risks can be managed Issues covered include all aspects of the supply chain from animal management through sourcing collection and processing of animal products to the latest technology for the detection and inactivation of contaminating agents Approaches to the elimination of animal products from the manufacturing process are also examined This book succeeds in clarifying many of the technical and regulatory questions surrounding the use of animal products Professionals concerned with sourcing raw materials process development quality assurance and control and regulatory affairs will find it a valuable reference and a great help in dealing with the special challenges posed by these materials *Deutsche Nationalbibliographie und Bibliographie der im Ausland erschienenen deutschsprachigen Veröffentlichungen* ,1995 *WHO Expert Committee on Biological Standardization* WHO Expert Committee on Biological Standardization,WHO Expert Committee on Biological Standardization. Meeting,World Health Organization,2012 This report presents the recommendations of a WHO Expert Committee commissioned to coordinate activities leading to the adoption of international recommendations for the production and control of vaccines and other biologicals and the establishment of international biological reference materials The report starts with a discussion of general issues brought to the attention of the Committee and provides information on the status and development of reference materials for various antibodies antigens blood products and related substances cytokines growth factors endocrinological substances and in vitro diagnostic devices The second part of the report of particular relevance to manufacturers and national regulatory authorities contains WHO Guidelines for the production control and regulation of snake antivenom immunoglobulins and also an addendum to the WHO Recommendations for yellow fever vaccine Also included are a list of recommendations guidelines and other documents for biological substances uses in medicine and of international standards and reference reagent for biological substances

Fish Vaccinology Roar Gudding,1997 This is the first book to give complete coverage of the field of fish vaccinology Written by acknowledged experts from 15 different countries the reviews in this volume not only provide the theoretical basis for the vaccination of fish but also present a wealth of practical aspects The main topics covered include the immune system

of fish methods of vaccine delivery immunization with bacterial viral and parasite antigens antigen production methods of vaccine evaluation regulatory aspects licensing of fish vaccines in Europe and America environmental effects vaccination strategies Compiling the most up to date and comprehensive information on how to protect fish from infectious diseases this book will become the Bible of fish vaccinology It will be of great value to veterinarians fish biologists fish pathologists manufacturers of fish vaccines and anyone concerned with fish health Advances in Transfusion Safety Girish N.

Vyas,Fred Brown,University of California School of Medicine, San Francisco,2000 Our current understanding of the molecular mechanisms underlying host parasite interaction in the establishment of persistent infections transmitted through blood transfusion permits us to develop strategies for their prevention Because of rigorous screening to prevent transmission of blood borne infections the transfusion of blood and blood products has already achieved an unprecedented level of safety The window period viraemia can be further reduced by screening donated blood with nucleic acid testing NAT technology now being introduced in Europe and the U S A Both immunological and virological risks of transfusion can be reduced by photodecontamination and universal leukofiltration performed at the blood processing facilities Unquestionably progressive improvements in transfusion safety leads to an escalation in the cost of our blood supply therefore cost effectiveness quality control and regulatory issues have become topics of considerable importance in responding to our society s expectation of risk free hemotherapy **Development of Specifications for Biotechnology Pharmaceutical Products** Fred

Brown,James Fernandez,1997 This volume contains the proceedings of a two day symposium on Development of Specifications for Biotechnology Pharmaceutical Products held in May 1996 Speakers and panelists from industry and regulatory agencies discussed specifications and the degree to which they are appropriately applied during the various stages of drug development Presentations evaluating raw material in process and final product specification development throughout the drug development timeline for biotechnology pharmaceutical products were given Specifications for identity purity and activity at various stages of drug development were also considered Further contributions examined assay and process validations and their effects on specification setting stressing that the quality of the validation directly effects the setting of a suitable specification Finally standards and reference materials and their selection for in house use and as the basis for setting future global standards were discussed As a result it was emphasized that the development of specifications evolves with the product through a continuum of improved processes and characterizations leading to superior product quality Bringing together the world s leading experts in the field this book will be a valuable reference for pharmaceutical development professionals involved in research development and commercialization including members of quality control quality assurance regulatory affairs process development analytical development validation and regulatory compliance groups **The Cumulative Book Index** ,1992 A world list of books in the English language Vaccines Stanley A.

Plotkin,1994 This classic resource examines every aspect of vaccination from development to use in reducing disease

Completely revised and updated it provides authoritative information on vaccine production available preparations efficacy and safety recommendations for vaccine use with rationales data on the impact of vaccination programs on morbidity and mortality and more **proceedings of the sixth international symposium on pertussis 3,1990** **Advancing Science and Elimination of the Use of Laboratory Animals for the Development and Control of Vaccines and Hormones** Fred Brown,2002 Animal experimentation plays a major role in the development and control of biological products and large numbers of animals are used for routine batch control During the past few years considerable attention has been paid to the concept of replacing reducing and refining the three Rs the use of animals for this purpose This volume contains the proceedings of an international meeting held in Utrecht in November 2001 in which the problems associated with applying the three Rs were discussed Particular emphasis was given to the validation and regulatory acceptance of in vitro methods and new concepts of quality control Those issues are important for the scientific community at large as well as manufacturers regulatory authorities and everyone concerned with animal welfare **Alternatives to Animals in the Development and Control of Biological Products for Human and Veterinary Use** Fred Brown,Coenraad F. M. Hendriksen,Dorothea Sesardic,National Institute for Biological Standards and Control (Great Britain),Rijksinstituut voor Volksgezondheid en Milieuhygiëne (Netherlands),1999 Interest in the use of alternative in vitro reduction and refinement methods in the development and control of biological products has increased considerably in the last few years The issues raised are of concern to the scientific community as well as to manufacturers regulatory authorities and those involved in animal ethics and welfare A large number of physicochemical immunochemical biochemical and cell biological methods have been proposed for the replacement reduction and refining of animal tests in the development and control of human and veterinary vaccines and other biological products However the implementation validation and ultimate regulatory acceptance of these procedures are still at a very early stage This volume contains the proceedings of a meeting which brought together research scientists manufacturers and regulators with the aim of promoting an exchange of scientific knowledge and increasing awareness of the importance of validation studies Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriations for Fiscal Year 1993: Department of Education United States. Congress. Senate. Committee on Appropriations. Subcommittee on Departments of Labor, Health and Human Services, Education, and Related Agencies,1993 NIH almanac 1993/94 ,1991 **The Annals of Pharmacotherapy** ,1994-07 New Approaches to Stabilisation of Vaccines Potency Fred Brown,1996 Immunization is one of the most important tools in public health and according to the World Bank the most cost effective intervention in medicine Vaccines have to be developed field tested licensed produced quality controlled regulated purchased transported stored and delivered Vaccine stability is a crucial factor to ensure that the vaccine delivered to the child is safe and effective This book reports the proceedings of an international conference organized by the International Association of Biological Standardization and representatives of

WHO's Global Programme for Vaccines and Immunization to discuss technical and regulatory aspects of vaccine stability and ways to improve collaboration. Topics under consideration include vaccine transport and storage problems with maintaining the cold chain especially in developing countries, reasons for instability of existing vaccines and recent developments in the design of viral, bacterial and parasite vaccines. The factors affecting vaccine stability are evaluated and a large number of new approaches for vaccine stabilisation are presented. Comprehensive and up to date, this publication will be appreciated by anyone concerned with the development, production and distribution of vaccines. **Microbiology**, 1996-11

Pertubis Evaluation And Research On Acellular Pertubis Vaccines Book Review: Unveiling the Power of Words

In a global driven by information and connectivity, the energy of words has become more evident than ever. They have the ability to inspire, provoke, and ignite change. Such may be the essence of the book **Pertubis Evaluation And Research On Acellular Pertubis Vaccines**, a literary masterpiece that delves deep in to the significance of words and their impact on our lives. Compiled by a renowned author, this captivating work takes readers on a transformative journey, unraveling the secrets and potential behind every word. In this review, we shall explore the book is key themes, examine its writing style, and analyze its overall effect on readers.

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