Streptococcal research: new challenges ahead

Streptococci have been the focus of research interest all over the world for the last many decades. These microorganisms continue to puzzle clinicians, scientists and the public health personnel. Streptococci can cause a wide spectrum of diseases in humans and animals. The pathogenesis of streptococci is so perplexing that the infections caused by these organisms have never been completely understood. The strategy of streptococci to outwit their host is absolutely genial. They evade host immune defence by appearing in hundreds of different serotypes; they bind and exploit host proteins for their own advantage and for establishing themselves in the host; they trigger their own internalization by host cells so that they can persist and evade the antibiotic reaction; they express surface proteins with similarity to host protein, which leads to autoimmune reactions; they are capable of transferring the genetic material horizontally to other streptococcal serotypes and species, making the epidemiological analysis very difficult; some of them are real artists in developing antibiotic resistance. And this list of perplexing properties is far from complete. Streptococci therefore remain a big health hazard and a challenge for scientists and clinicians.

A lot of progress has been made in the last few years in the field of streptococcal research. The group A streptococcal genome has been sequenced and a number of molecular epidemiological studies have been carried out. A variety of streptococcal pathogenic factors have been identified and the mechanisms of adherence and invasion have been elucidated. A lot of effort has been put into research to understand the mechanisms of streptococcal invasive diseases and rheumatic heart disease and to develop vaccines. Since antibiotics alone have not been able to control these infections, the development of an effective vaccine and other control strategies should be the focus of the future research. A prerequisite is the precise understanding of the pathogenesis of streptococcal infections. An important starting point is the understanding of the pathogenesis of rheumatic fever, the mechanisms of the association of group C and group G streptococci in rheumatic heart disease and the understanding of the process by which pneumococci convert themselves from harmless commensals to highly virulent pathogens. These results can contribute towards the development of a suitable streptococcal vaccine and an improved pneumococcal vaccine. In the last few years, alternative therapeutic strategies, which target the critical infection mechanisms, are gaining interest. To control streptococcal infections, it will also be essential to study the genetic susceptibility and identify the genetic markers. The sequencing of human and streptococcal genomes will make it easier to identify the genes involved in pathogenesis and susceptibility and to study their regulation. A bottleneck will be the lack of suitable animal models. The use of susceptible mouse strains may solve the problem of invasive infections models, but the development of a model for rheumatic heart diseases remains a challenge. For this, transgenic and knock-out mice may be helpful. In spite of great expectations, a lot more research efforts will be required to develop effective vaccines and alternative control strategies and to bring them into the clinical trial phases.

All the above mentioned aspects of streptococcal research were the focus of the presentations of the XV Lancefield International Symposium on Streptococci and Streptococcal Diseases, held at Goa, India from October 6-11, 2002. Good science and open discussion were, as usual, in the forefront of Lancefield meetings. This is the only meeting of its kind where all streptococcal researchers get together and discuss honestly and openly the current and the future development in the field of streptococci. It is therefore a great pleasure for me to act as a guest editor of this issue of Indian Journal of Medical Research and to put together the papers presented at that meeting. This issue should not be considered as pure proceedings, because all the
manuscripts submitted were subjected to peer review. Few were rejected, and many were sent back for revisions. This issue, therefore, represents a comprehensive collection, depicting latest advances in the field of streptococci and streptococcal diseases. I would like to express my thanks to Dr N.K. Ganguly, Director-General of Indian Council of Medical Research and Dr N. Medappa, then Editor, IJMR for giving me an opportunity to be the guest editor of this issue. I am also grateful to all the reviewers, who reviewed the papers in a very short time, and to Ms Helga Brink for putting all the manuscripts into a uniform format.

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Guest Editor