In this issue

‘If the importance of a disease for mankind is measured by the number of fatalities it causes, then tuberculosis must be considered much more important than those most feared infectious diseases, plague, cholera and the like. One in seven of all human beings dies from tuberculosis. If one only considers the productive middle-age groups, tuberculosis carries away one-third, and often more.’

Robert Koch, 24 March 1882

Unfortunately, even today this quotation is true, if not a kind of under-statement as nearly one-third of the world’s population is infected with tuberculosis in its latent form, an estimated 8.3 million new cases of tuberculosis and 2 million deaths were attributed to this disease in 2000. WHO declared global emergency in tuberculosis and in spite of the availability of a vaccine Mycobacterium bovis BCG, no treatment is yet sufficiently convincing. The problem is compounded by the fact that all the frontline antibiotics effective against M. tuberculosis are either not available in every part of the world or there is emergence of drug-resistant strains.

However, research in tuberculosis also suffers from a long lag period, typical for the growth of the bacteria, mainly due to the notion that the disease is primarily a problem of the Third World. This is, no more true, however, as the growth of HIV in the developed world manifests into the upward trend of tuberculosis infection.

In our country, tuberculosis research is being practised since several decades. There are many hospital-based research centres as well as basic research activities, now well funded by different government agencies. In this perspective, a special section on “Tuberculosis” in this journal appears to be timely.

When we planned this issue, it was in our mind to emphasize on certain new dimensions on current tuberculosis research, reviews on basic biology of the bacteria, cell surface, and finally towards attempts for vaccine and drug development.

Bishai and his group have been working on persistent tuberculosis for several years now. They have focused their attention on disease transmission, particularly in the economically less developed world (page 74). It is now known that patients harboring cavitary lung lesions are a major source of disease transmission. In this article, cavitary pulmonary tuberculosis and a model of the pathogenesis of cavitary lesions are discussed.

A good model to study mycobacterial pathogenesis is always in demand. Although many researchers in our country and abroad try to use M. smegmatis as a model for M. tuberculosis, it fails in one aspect that M. smegmatis is non-pathogenic. M. marinum, which causes tuberculosis-like infection in frogs and fish, generates tremendous interest in this aspect. Lalita Ramakrishnan in collaboration with Stanley Falkow originated this system of choice to study mycobacterial pathogenesis, and in a review (page 82) Ramakrishnan describes biology of M. marinum.

Jaya Tyagi and Deepak Sharma (page 93) describe in detail their recent interest on the two-component system (DevR-DevS). They have elaborated on signal transduction machinery in M. tuberculosis and its role in the hypoxia response of pathogenic and non-pathogenic mycobacteria.

In order to effectively deal with any bacterial infection, one must understand all the key players involved in host–pathogen interaction and the biology of cell-surface molecules in M. tuberculosis, therefore, needs special attention. Thus, the abundant components of the cell wall of mycobacteria, LAM and their role in immunity and glycopeptidolipid (GPL) biosynthesis are discussed by Basu (page 103) and Billman-Jacobe (page 111) respectively. A comprehensive review on the biochemistry and genetics of GPL synthesis presented here will be useful.

As the bacterial infections can be controlled by targeting different metabolic pathways which are either absent or different in the host, a detailed knowledge on different metabolic steps as well as control of gene expression are important. Issar Smith and his group (page 122) have dealt with transcriptional regulation, stress control and virulence in mycobacteria. They have written extensively on various other two-component systems and sigma factors, the all important transcription regulators in prokaryotes.

Basic biology of M. tuberculosis has been covered in two articles, regulation of DNA topology by Nagaraja (page 135) and recombination in mycobacteria by Muniyappa et al. (page 141). Both these articles tell us about some unique features of DNA biology of this Gram-positive organism.

Lastly, protection against tuberculosis and DNA vaccines, host genetics and tuberculosis susceptibility are covered in two articles (page 154 and page 115). Balkrishan et al. (page 167) from AstraZeneca, one of the big pharmaceuticals in tuberculosis research, present its perspective on the path and road blocks for a new drug discovery.

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