provides information on protection mechanisms provided by AT inhibition and supports AT as a promising target for immune prophylaxis or adjuvant therapy against *S. aureus* pneumonia.

19.3 Immunomodulators

The human immune system has mechanisms preventing the entry and colonization of our body by pathogen microorganisms. However, since these bacterial pathogens escape cell defense system, these may extensively colonize the patient, resulting in severe symptoms and even death in the absence of a medical intervention. One of the possibilities to avoid it is to modulate patient's immune response as to reverse disease progression and, thus, remove pathogens from the system. Currently there is growing evidence showing that immune responses designed to diseased tissues can dramatically reverse the progression of disease. Immune therapy is a type of treatment aimed at using the immune system so that it may fight infections and other diseases, such as cancer. One of the possibilities, for instance, the use of small molecules to graft immunogenic epitopes onto target cells, is particularly attractive due to its versatility and the ability to mimic native immune responses.

A diverse range of recombinant, synthetic, and natural immunomodulatory preparations for the treatment and prophylaxis of several infections are available today. Substances such as granulocyte colony-stimulating factor, interferons, imiquimod, and bacterial-derived preparations are licensed for use in patients. Others including IL-12, chemokines, and phosphate-guanine-cytosine and synthetic oligodeoxynucleotides are being studied in clinical and/or preclinical phase.

19.3.1 Antibodies plus Polymyxins

Immunomodulators offer an attractive approach as an adjunctive therapy to control microbial diseases in the era of antibiotic resistance. Pires and colleagues developed a potent model to engage immune system components so as to induce an immune response to Gram-negative bacteria. A structure has been established for the use of small molecules to activate the recruitment of endogenous antibodies to the bacterial cell surface. Specifically, conjugates were assembled using polymyxin B (an antibiotic inherently binding to Gram-negative pathogens) and antigenic epitopes recruiting antibodies found in human serum. The compound has been shown to be effective, resulting in specific bacterial killing by the human serum. The potential of these molecules paves the way for a new type of antimicrobials.