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Production of anti-rejection drugs by the mould to control autoimmune disease

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The microbial world has contributed continuously to improving the health and wellbeing of human beings. Through the process of primary and secondary metabolism, natural products are produced by microbes that have a broad range of therapeutic applications. The fungi play an important role in the production of antibiotics and other drugs for treating non-infectious diseases. There are a lot of beneficial uses of newly synthesised secondary metabolites for humans. Several secondary metabolites are produced by fungi so that the pharmaceutical industries and medical sciences focus their efforts on screening of compounds to indicate the anti-infectives. The treatment of non-infectious diseases confides in synthetic compounds. But nowadays, it is difficult to identify synthetic compounds. As a result of this, microbial compounds play a vital role. For example, cyclosporine is a toxic or poor antibiotic produced by fungi. This fungal product is used as an immunosuppressive agent. The agents which can suppress the immune system are known as anti-rejection drugs. Anti-rejection drugs are produced when the body's immune system shows a defence mechanism against foreign antigens and several pathogenic microorganisms. It is very important to recognise native antigens in order to avoid launching an immune response by the immune system.

In the regulation of the normal immune response, the suppressor cells are critical in order to control autoimmune diseases (autoimmune conditions develop when the body's immune system mistakenly attacks its own healthy cells or tissues of our body) or to prevent graft rejection or transplants. The suppression of immune response is performed by drugs or radiation. Secondary metabolites are produced by fungi that act as immunosuppressants. As an example, cyclosporin, a narrow antifungal peptide, is produced by the mould Tolypocladium nivenum in the process of aerobic fermentation. Cyclosporine binds to the cytosolic protein and cyclophilin of immunocompetent lymphocytes, especially T lymphocytes to form a complex to inhibit calcineurin which is responsible for activating interleukin-2. Lymphokine production and interleukin release are also inhibited by cyclosporine. Cyclosporine prevents the immune system from attacking the healthy tissue. The immunosuppressive activity of the secondary metabolite is also used in kidney, liver and heart transplants. Fungal products provide a significant contribution in various fields, such as animal industry, medicine, agriculture, etc. They play a vital role by saving millions of lives and increasing human life expectancy. Some pathogenic agents have become resistant to many antibiotics. Therefore, the production of new and effective antibiotics is necessary. Bacteria or fungi whose antimicrobial properties are still unknown should be cultured to get a better understanding of their ability to produce antibiotics. Thus, the production of secondary metabolites utilising fungal species acts as a novel field of research to characterise several immunosuppressants.

Keywords: Secondary metabolites, Mould, Anti-rejection drugs, Immunosuppressant, Autoimmune disease, Antifungal peptide, Cyclosporine

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