The Health Field: Beginning to Realize the Potential

The health field is one of the most important areas of application for biotechnology, and the products of this technology are now starting to be introduced on the market. These include alpha interferon, the human growth hormone, human insulin, a vaccine against hepatitis B and a monoclonal antibody that can be used to prevent the rejection of organ transplants (OKT 3).

Canada has always been particularly active in this field: Canadian researchers discovered insulin and were the first to clone human proinsulin.

According to the strategic plan published in 1984 by the Biotechnology Research Institute, the market for pharmaceutical, diagnostic and biological products in Canada will reach a commercial value of over two billion dollars in 1995.

Monoclonal antibodies: Diagnostic and therapeutic tools

Diagnostic tests for the detection of pregnancy, the monitoring of diabetes, the detection of some sexually transmitted diseases (STDs), the detection of cancer of the colon and of cancer of the breast and lungs in particular, and the diagnosis of allergies and viral hepatitis have undergone considerable expansion. Such rapid development is based on a fundamental discovery: monoclonal antibodies.

Antibodies are naturally produced by blood lymphocytes when foreign substances, or antigens, penetrate the organism. However, these antibodies cannot reproduce indefinitely. In 1975, the English researchers Köhler and Milstein found the solution. For the first time they were able to obtain, from a single mouse cellular strain, an unlimited quantity of antibodies that were all identical and extremely specific. These were the first monoclonal antibodies.

By fusing two different cells, researchers could obtain a "hybrid" cell, known as a hybridoma, which has the genetic characteristics of the two parent cells. In order to produce a specific antibody, that is, one capable of recognizing a very precise substance, all that is necessary is the fusion of a cell that can manufacture this antibody with a cancerous cell that has the capacity to reproduce indefinitely. The hybridoma multiplies by producing genetically identical cells, or clones, and the antibody is thus said to be monoclonal.

Until recently, antibodies were obtained by immunizing an animal and extracting the antibodies from its blood. However, the product always contained impurities. The discovery of monoclonal antibodies has solved this problem. The high specificity and purity of monoclonal antibodies, and the fact that they are relatively easy to obtain, makes them first-line tools for the preparation of "diagnostic kits."

Quadra Logic Technologies Inc. of Vancouver, British Columbia, is involved in the development and marketing of immunological diagnostic products for people and animals. The company has been able to develop diagnostic kits on the basis of monoclonal antibodies for the early detection of leukemia, lung cancer and German measles.

In Edmonton, Alberta, Chembiomed Ltd. was one of the first firms in the world to market a series of reagents, in particular the Syntype typing reagent, for the determination of blood type using monoclonal antibodies.

The Institut Armand-Frappier, located in Laval near Montreal, Quebec, is a leader in marketing diagnostic kits. Specifically, the company has marketed kits for the diagnosis of herpes 1 and 2 and the cytomegalovirus.

Medicorp Inc., a young firm located in Montreal, Quebec, has recently marketed a new product called Quadroma, a bispecific monoclonal antibody produced on the basis of a hybrid hybridoma. Such "bispecificity" allows it to recognize two different molecules, and because of their great specificity and sensitivity, these bispecific antibodies are invaluable tools for immunodiagnostic tests.

The monoclonal antibody technique has also been used for the early detection of cancerous cells, through the radioimmunodiagnostic method. Before being injected into the patients, antibodies that are specific to certain tumour tracers are joined with radioactive isotopes. Subsequently, these antibodies attach themselves to the tumours and can be localized by scintigraphy. Thus, it is possible to detect a certain number of cancers at a very early stage.

At present, researchers are attempting to meld these anticancer antibodies with a substance that can destroy the marked cells. This would make feasible an actual anti-tumour missile, or immunotoxin, capable