

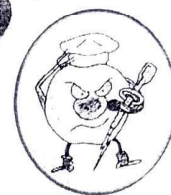
MONOCLONAL ANTIBODY PRODUCTION

The antibody heterogeneity that increases immune protection *in vivo* often reduces the efficacy of an antiserum for various *in vitro* uses. For most research, **diagnostic, and therapeutic purposes**, monoclonal antibodies, derived from a single clone and thus specific for a single epitope, are preferable.

In 1975, **Georges Köhler and Cesar Milstein** devised a method for preparing monoclonal antibody, which quickly became one of immunology's key technologies. By fusing a normal activated, antibody-producing B cell with a **myeloma cell** (a cancerous plasma cell), they were able to generate a hybrid cell, called a **hybridoma**, that possessed the **immortal growth properties** of the myeloma cell and secreted the antibody produced by the B cell (**Figure 1**). The resulting clones of hybridoma cells, which secrete large quantities of monoclonal antibody, can be cultured indefinitely. The development of techniques for producing monoclonal antibodies, gave immunologists a powerful and versatile research tool. The significance of the work by **Köhler and Milstein** was acknowledged when each was awarded a Nobel Prize.



Georges Köhler and Cesar Milstein



Q. Make a brief note on clinical uses of monoclonal antibody.

- i) Monoclonal antibodies are proving to be very useful as diagnostic, imaging, and therapeutic reagents in clinical medicine.
- ii) Initially, monoclonal antibodies were used primarily as *in vitro* diagnostic reagents. Among the many monoclonal antibody diagnostic reagents now available are products for detecting pregnancy, diagnosing numerous pathogenic microorganisms, measuring the blood levels of various drugs, matching histocompatibility antigens, and detecting antigens shed by certain tumors.
- iii) Radiolabeled monoclonal antibodies can also be used *in vivo* for detecting or locating tumor antigens, permitting earlier diagnosis of some primary or metastatic tumors in patients. For example, monoclonal antibody to breast-cancer cells is labeled with **iodine-131** and introduced into the blood to detect the spread of a tumor to regional lymph nodes. This monoclonal imaging technique can reveal breast-cancer metastases that would be undetected by other, less sensitive scanning techniques.

Q. What is the purpose of cell culture?

A variety of cells can be cultured, including primary lymphoid cells, cloned lymphoid cell lines, and hybrid cells. Cell-culture techniques have also been used to identify numerous cytokines involved in the activation, growth, and differentiation of various cells involved in the immune response.

(A) Primary Lymphoid Cell Cultures

Primary lymphoid cell cultures can be obtained by isolating lymphocytes directly from blood or lymph or from various lymphoid organs by tissue dispersion. The lymphocytes can then be grown in a chemically defined basal medium (containing saline, sugars, amino acids, vitamins, trace elements, and other nutrients) to which various serum supplements are added. For some experiments, serum-free culture conditions are employed.

(B) Cloned Lymphoid Cell Lines

- i) A primary lymphoid cell culture comprises a heterogeneous group of cells that can be propagated only for a limited time.