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Editorial

Cell Culture & Bioreactors: An Overview

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EDITORIAL

A bioreactor is a vessel that conducts a biological reaction and is widely used to culture aerobic cells for cellular or enzymatic immobilization. A bioreactor is a system that enables organisms (such as yeast, bacteria, or animal cells) to expand under controlled conditions. Used in the manufacture of pharmaceuticals, vaccines, and antibodies in industrial processes. Often used in the bioconversion of corn into ethanol to turn raw materials into usable by-products.

The bioreactor is a device that provides an ideal external environment to meet the needs of the biological reaction system, resulting in a high bioprocess yield. Obviously, the biological system and the physical and chemical elements of this process have complicated interactions. Intensive studies on the biological system, such as cell growth and metabolism, genetic modification, and protein or other product expression, are needed to understand the cells' requirements on their physical and chemical environment in order to develop an appropriate bioreactor for a specific bioprocess. With advances in our understanding of biological systems, a number of bioreactor types and configurations have been exploited and developed. Furthermore, the operating parameters of the bioreactor must be regulated in order to favour the desired functions of the living cells or enzymes. The concentration of dissolved oxygen, pH, temperature, mixing, and nutrient supplementation must all be monitored and optimised.

Since molecular biology and process engineering are involved, and the bioreactor is at the centre of the bioprocess, a systematic science-based approach to studying bioreactors is needed, and the word "bioreactor engineering" was coined. becomes more fitting than the words "bioreactor" or "fermentor," which were commonly used. Figure 1 portrays a simplified schematic representation of the bioreactor engineering method and scope.

Cell culture is the method of growing cells in a controlled environment, normally outside of their natural environment. Following the separation of the cells of interest from living tissue, they can be preserved under carefully monitored conditions. These requirements differ depending on the cell type, but they usually require a suitable vessel with a substrate or medium that provides vital nutrients (amino acids, carbohydrates, vitamins, minerals), growth factors, hormones, and gases (CO2, O2), as well as regulates the physio-chemical setting (pH buffer, osmotic pressure, temperature).

Cell culture now refers to the culturing of cells derived from multicellular eukaryotes, especially animal cells, as opposed to other forms of culture that also grow cells, such as plant tissue culture, fungal culture, and microbiological culture (of microbes).

The history and methods of cell culture are inextricably connected to those of tissue culture and organ culture. Viral culture, which uses cells as hosts for viruses, is also related. In the middle of the twentieth century, the laboratory technique of preserving live cell lines (a population of cells descended from a single cell with the same genetic makeup) isolated from their original tissue source became more robust. In the 1940s and 1950s, cell culture methods progressed greatly to support virology research. Using cell cultures to grow viruses allowed purified viruses to be prepared for vaccine development.

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