



# Microbial Cell Culture Technology

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## DESCRIPTION

Cell culture is the process by which cells are grown under controlled conditions, generally outside their natural environment. After the cells of interest are isolated from living tissue, they will subsequently be maintained under precisely controlled conditions. These conditions vary for every cell type, but generally contains an appropriate vessel with a substrate or medium that supplies the essential nutrients (amino acids, carbohydrates, vitamins, minerals), growth factors, hormones, and gases (CO<sub>2</sub>, O<sub>2</sub>), and regulates the Physio-Chemical environment (pH buffer, pressure, temperature). Most cells need a surface or an artificial substrate to make an adherent culture as a monolayer (one single-cell thick), whereas others are frequently grown free floating during a medium as a suspension culture. The lifespan of utmost cells is genetically determined, but some cell culturing cells are converted into immortal cells which can reproduce indefinitely if the optimal conditions are provided.

A microbiological culture, or microbial culture, is a system of growing microbial organisms by letting them reproduce in predetermined culture medium under controlled laboratory conditions. Microbial cultures are foundational and basic diagnostic methods used as an exploration tool in molecular biology.

Microbial cultures are used to determine the type of organism, its abundance in the sample being tested, or both. It's one of the primary diagnostic methods of microbiology and used as an application to determine the cause of contagious disease by letting the agent multiply in a predetermined medium. For example, a throat culture is taken by scraping the lining of tissue in the reverse of the throat and blotting the sample into a medium to be suitable to screen for dangerous microorganisms, similar as *Streptococcus pyogenes*, the causative agent of strep throat. Likewise, the term culture is more generally used informally to refer to selectively growing a specific kind of microorganism in the lab.

It's frequently essential to isolate a pure culture of microorganisms. A pure culture is a population of cells or multicellular organisms growing in the absence of other species. A pure culture may appear

from a single cell or single organism, in which case the cells are inheritable clones of one another. For the purpose of gelling the microbial culture, the medium of agar gel is used. Agar is a gelatinous substance derived from seaweed. A cheap substitute for agar is guar gum, which can be used for the isolation and maintenance of thermophiles.

## APPLICATIONS

A microbial culture has great potential for production of very useful compounds. Once the microbial culture is established, depending on its metabolic activity it can be used for the production of numerous compounds. In general, microbial cultures can be exploited primarily in six main ways for the production of metabolites. They're listed below

- Production of whole microbial cells (food, vaccines).
- Production of primary metabolites (acids, alcohols).
- Production of secondary metabolites (antibiotics).
- Biotransformation responses (enzymes, steroids).
- Exploitation of metabolism (microbial filtering, biodegradable waste treatment).
- Synthesis of recombinant proteins (therapeutic proteins).

The most ancient use of microbial cultures is in the production of fermented foods like curd and cheese where the entire bacteria are used as starter cultures. The whole microorganisms also are used for medications like bacterial vaccines, e.g. vaccines for typhoid and tuberculosis. Single Cell Protein (SCP) is another example where the entire microorganisms are used a source of protein. Production of alcohol and acids are examples of primary metabolic products, whereas antibiotics are examples of secondary metabolites produced by different microorganisms. Microbial metabolism has also been exploited for the microbial production of vitamins. Extraction of metals from ores and treating effluents are also examples where microbial metabolism is used to convert inappropriate substrates into useful products.

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**Received:** 07-Feb-2022, Manuscript No. JMBT-22-16072; **Editor assigned:** 09-Feb-2022, Pre QC No. JMBT-22-16072 (PQ); **Reviewed:** 23-Feb-2022, QC No. JMBT-22-16072; **Revised:** 28-Feb-2022, Manuscript No. JMBT-22-16072(R); **Published:** 07-Mar-2022, DOI: 10.35248/1948-5948.22.14.482.

**Citation:** Katherine S (2022) Microbial Cell Culture Technology. J Microb Biochem Technol. 14:482.

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