Microbial Contamination

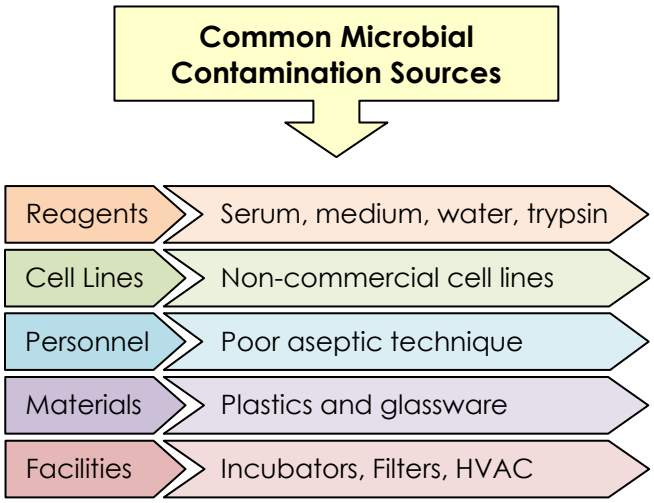
Microbial contamination is the most frequent challenge in cell culture labs and can cause unreliable data, unsafe biologics, and wasted resources. Contaminants are either easily detected (bacteria, yeast, fungi) or harder to identify (mycoplasma, nanobacteria). While contamination cannot be eliminated completely, its impact can be minimized through understanding common sources and practicing strict aseptic technique.

Mycoplasma Contamination

Mycoplasmas are among the most troublesome contaminants in mammalian cell culture because they lack a cell wall, making them resistant to many common antibiotics. Their small size allows them to pass through standard filtration systems, so contamination often goes unnoticed. Infected cultures may show subtle changes such as altered metabolism, reduced growth rates, or inconsistent experimental results. Because mycoplasmas rarely cause visible turbidity, specialized detection methods, such as PCR, DNA staining, or enzymatic assays, are necessary to confirm their presence. Preventing mycoplasma entry into the lab, and routine screening of valuable cell lines, are critical steps for maintaining culture integrity.

Bacterial Contamination

Bacterial contamination is one of the most common problems encountered in cell culture. Unlike mycoplasmas, most bacteria grow rapidly, producing visible turbidity in media and altering pH through metabolic byproducts. These contaminants typically enter through improper aseptic handling, contaminated reagents, or compromised incubators. Because bacteria replicate quickly, they can overwhelm cultures within hours, leading to cell death and loss of experiments. Prevention relies heavily on good aseptic practices, validated sterile reagents, and routine disinfection of workspaces and incubators.



Fungal Contamination

Fungal spores are widespread in the environment and can readily establish contamination in culture labs. Once introduced, fungi typically appear as floating particles or filamentous mats in culture vessels. They often outcompete mammalian cells by depleting nutrients and altering pH, rendering cultures unusable. Common sources include airborne spores, contaminated media, or poorly maintained incubators. Since fungal growth is usually visible, early detection is possible, but complete eradication from a culture is rare. Preventative strategies, including proper lab hygiene, routine filter checks, and minimizing exposure of cultures to open air are advised.

Nanobacterial Contamination

Nanobacteria (or "nanobacteria-like particles") are ultra-small agents reported to be capable of self-propagation under certain conditions and implicated in interference with certain cell culture assays, though their biological status remains controversial. Nanobacterial contamination may come from water, serum, or reagents that pass standard sterilization but retain submicron particulates. In vitro, nanobacterial contamination may affect cellular processes, potentially altering mineralization, interfering with microscopy, or skewing quantification assays. Because traditional filtration and sterilization may not remove all species, careful sourcing of ultra-filtered reagents, routine monitoring of reagents and water, and possible treatment protocols (e.g drugs or specialized filtration) are recommended.

abm's Antimicrobial Toolbox to Keep Cells Safe

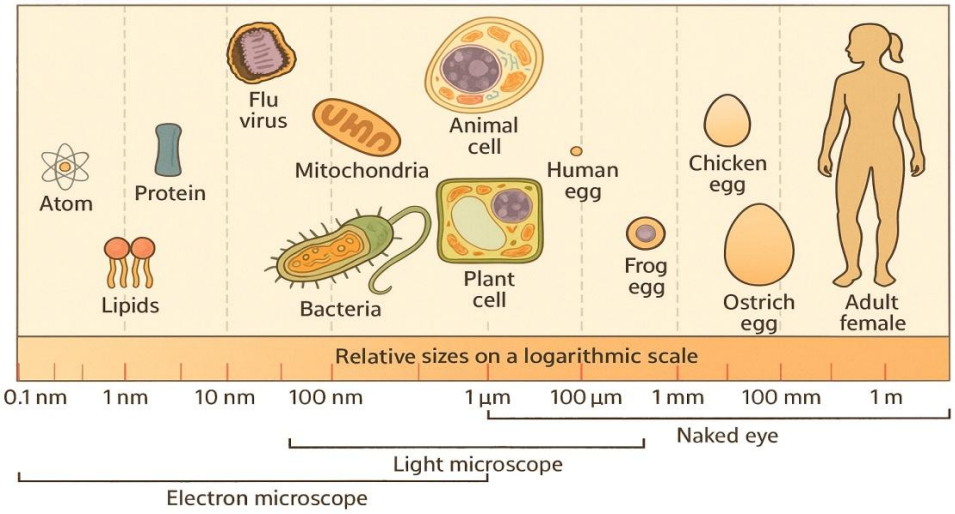
Detection

Mycoplasma PCR Detection Kit
Mycoplasma Pro PCR Detection Kit
Mycoplasma qPCR Detection Kit

Prevention and Elimination

MycOut™ - For most mycoplasma species
MycoAway™ - For MycOut™-resistant mycoplasma
NanOut™ - For nanobacterial contamination
BacOut™ - For bacterial contamination
Amphotericin B (Fungizone) - For fungal species
Antibiotic/Antimycotic - For bacteria and fungi
Gentamicin - For routine bacterial prevention

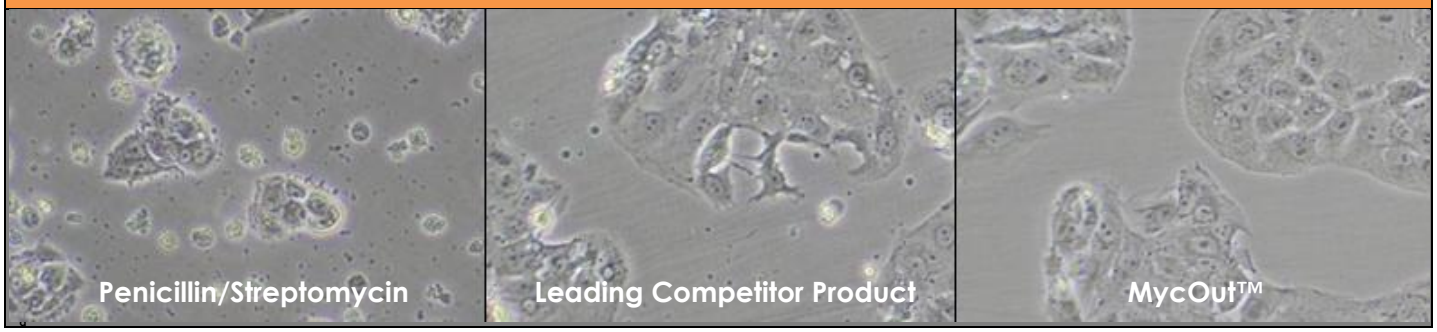
Microbial Contamination



Microbial Contamination is Often Undetected in Cell Culture

Microbial contaminants in cell culture such as fungi, bacteria, mycoplasma, and viruses fall within the nanometer (nm) to micrometer (µm) range. They are far too small to detect with the naked eye, and often remain invisible under routine observation and propagation, compromising experiments or cell health.

Treatment of Mycoplasma Contamination in Cell Culture by Various Antimicrobial Agents for 2 Weeks



Optimal antimicrobial protection safeguards cells while delivering reliable, reproducible experimental results.

Application	Product	Cat.No.	Mycoplasma	Bacteria	Yeast	Fungi	Quantity
Prevention	MycoAway™	G398	✔	✔			1 x 1 ml (for 2 L culture)
	MycOut™	G7001	✔	✔			1 x 1 ml (for 2 L culture)
	BacOut™	G7000		✔	✔	✔	2 x 1 ml (for 400 ml culture)
	NanOut™	G7002	✔	✔	✔	✔	1 x 1 ml (for 2 L culture)
Detection	Mycoplasma PCR Detection Kit	G238	✔				1 Kit (100 rxn)
	Mycoplasma Pro PCR Detection Kit	G239	✔				1 Kit (100 rxn)
	Mycoplasma qPCR Detection Kit	G240	✔				1 Kit (100 rxn)
Elimination	MycoAway™	G398	✔	✔			1 x 1 ml (for 1 L culture)
	MycOut™	G7001	✔	✔			1 x 1 ml (for 1 L culture)
	BacOut™	G7000		✔	✔	✔	2 x 1 ml (for 100 ml culture)
	NanOut™	G7002	✔	✔	✔	✔	1 x 1 ml (for 1 L culture)

abm's antimicrobial agents can be used as a prophylactic and elimination treatment against contamination.