

AVOIDING CELL CULTURE CONTAMINATION USING THE ASEPTIC TECHNIQUE



The Bioquell Qube isolator M-1 configuration with integrated Bioquell Hydrogen Peroxide Vapor decontamination technology

Avoiding cell culture contamination; Using the aseptic technique

Cell cultures can provide a nutritious environment to unwanted biological microorganisms. Such contamination can have a serious and deadly effect on production and harvesting of valuable biological material. This paper questions some of the current accepted processes when using laminar flow cabinets and seeks to offer a modern alternative - the aseptic workstation.



Avoiding cell culture contamination

The term 'aseptic technique' is widely used in instructions regarding procedures where biocontamination must be avoided. A good example is cell culture, where animal or plant cells are grown in media outside the cells' natural environment. Microorganisms grow much faster than both animal and plant cells and are more tolerant to variations in conditions such as temperature and pH. Therefore, cells are most vulnerable to contamination when aseptic technique is poor.

So, it is clear that cell culture contamination is very difficult to avoid unless aseptic technique is adhered to. The use of an aseptic working area will significantly mitigate the risks. Laboratory personnel are generally trained to a high level of proficiency in conducting and supporting sterile procedures; and isolators (or safety cabinets) are usually validated for use. But it is crucial that good laboratory design is also applied to the aseptic handling of cell cultures, with both protection of laboratory workers and sterile manipulation/processing of cells being of equal importance.

“ The use of an aseptic working area will significantly mitigate the risks. ”



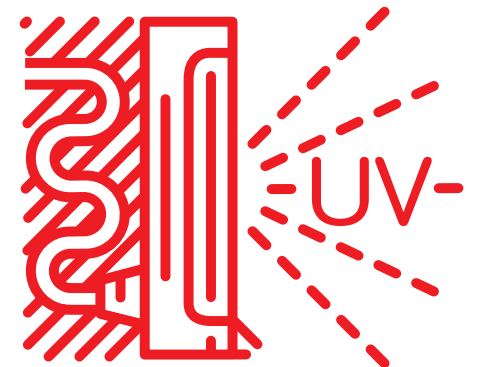
“ It is crucial that good laboratory design is applied. ”

The challenge of maintaining aseptic conditions

Although cell culture is sometimes conducted on an open bench, where personnel traffic is minimized, most cell culture work is carried out in laminar flow cabinets using aseptic technique. However, maintaining aseptic conditions can be challenging. For example, a typical aseptic technique regime for cell culture work in a laminar flow cabinet would be:

1. Laminar flow cabinets should be on permanently (i.e. not powered down when unused).
2. Before and after each process, work surfaces should be wiped down with a suitable disinfectant (e.g. 70% ethanol should be employed for routine wiping down during work and to clean up any spillage).
3. Bottles and flasks should be wiped down with disinfectant before use in the cabinet.
4. Surrounding areas and equipment should be routinely wiped down.
5. A clean lab coat specifically for working in the cabinet should be used. Other lab coats must be worn when elsewhere in the laboratory.
6. As talking (or coughing) generates microbial contamination, a mask should be used.
7. Materials should not be moved in or out of the cabinet while work is in progress.
8. Doors in the immediate area should not be opened while using the cabinet as drafts can disrupt the laminar flow.

“ Maintaining aseptic conditions can be challenging. ”

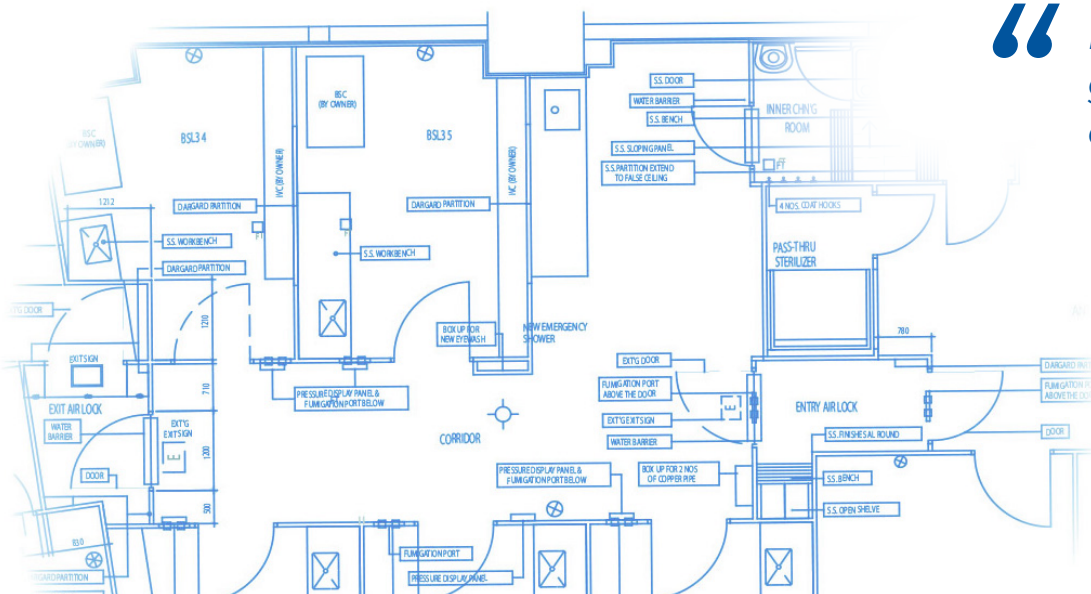


Some lamps can radiate UV light which is damaging to the eyes and skin.

The alternatives to using laminar flow cabinets

An alternative to using laminar flow cabinets would be a biosafety cabinet with UV system for decontaminating work surfaces. Caution is recommended if considering this option for aseptic technique, as to operate efficiently, microorganisms must be exposed directly to UV radiation. Any shadowing will prevent biodecontamination. Also, as UV lamps deteriorate with time, UV output and biocidal capacity can drop off without warning. And from a H&S perspective, exposure to UV light is damaging to the eyes and skin, so the UV light should be off while work is carried out in the cabinet. It should also be taken into consideration that, even working at full efficiency, the efficacy of UV lamps is questionable, particularly against spore forming organisms.

“ Any shadowing will prevent biodecontamination. ”



Use an aseptic, closed working environment

It is logical that aseptic processing best practice would be to use a totally aseptic, closed working environment, with integrated biodecontamination systems to give high efficacy and 6-log kill. One option is to use an isolator. However, isolators are expensive, typically have long delivery and validation lead times and may not use high efficiency biodecontamination regimes.

Another option is an isolator like the Bioquell Qube. This ISO 5 / EU Grade A modular system is integrated with residue-free Hydrogen Peroxide Vapor technology to ensure rapid aseptic processing of all equipment, bottles, plates etc. From a simple, single chamber to three chambers/two material transfer hatches, the Bioquell Qube can be configured for your needs now and can be upgraded to grow with your requirements. A Bioquell Qube system can be delivered and validated within three months of order, at a much lower cost than a conventional isolator and can be placed in a normal laboratory environment for cell culture. Using a Bioquell Qube means there is no need for special clothing measures and no lengthy, complicated decontamination protocols to follow.

“ The Bioquell Qube can be configured for your needs. ”



Bioquell Qube - M-1 Single chamber with built-in biodecontamination



“ Delivered and validated within three months. ”

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