

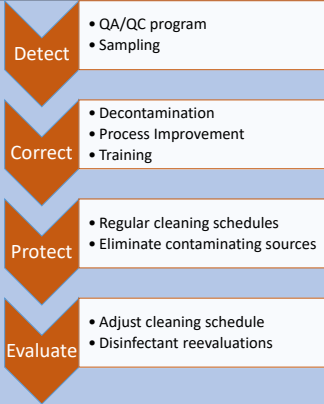
Pathogen Persistence in the Laboratory - Do You Know Your Environment?



Kristina Peterman, Kamil Gajewski, Rachel Gamble, Drew Fayram and Ryan C. Jochim. Science and Technology, Merrick & Company.

Abstract

High-containment laboratory cleaning strategies are typically focused on performing different levels of cleaning on a weekly, monthly, semi-annual, or annual basis based on the agents that have been handled in the laboratory. The cleaning strategies should extend beyond research pathogens in the laboratory to include environmental pathogens that are part of the larger laboratory space. The cleaning strategies for a high-containment laboratory should include: 1) chemicals for cleaning; 2) method for cleaning; and 3) time interval for cleaning. The chemicals used for cleaning are typically selected based on the agents that are being used in the laboratory, with the default selection often a cleaning agent that will destroy the hardiest of pathogens, spores. Methods for cleaning should include wiping and spraying, depending on the surfaces cleaned and will vary between laboratories. Cleaning should focus on equipment and the surfaces, walls, ceilings, and floors at specific intervals. Specific cleaning chemicals and methods may vary between labs, but cleaning schedules should be initially developed at specified time intervals like those above and then modified based on environmental testing. Environmental testing should be used to validate and verify not only the materials and methods for cleaning the laboratory environment, but also the appropriate cleaning schedule. Understanding the environmental persistence of specific organisms can help inform the development of strategies to maintain safe and clean high-containment facilities.



Cleaning Schedules

	Daily	Weekly	Monthly	Quarterly	Biannually	Annually
BSL-2						
BSL-3						
BSL-4						
GMP						
Dx						

Legend			
Mop Floors		Cold Storage Device Cleaning	
Full BSC Cleaning		Incubator Cleaning	
Full Bench Cleaning		Full Laboratory Decontamination	

Potential Contaminants

Mycoplasma

- *M. orale*
- *M. hyorhinis*
- *M. fermentans*
- *M. hominis*
- *M. arginini*

Bacteria

- *E. coli*
- *Enterococcus sp.*
- *Staphylococcus sp.*
- *Bacillus sp.*

Fungi

- *Candida sp.*
- *Penicillium sp.*
- *Aspergillus sp.*

Sampling Methods

Air

- Settling Plates
- Air Sampler

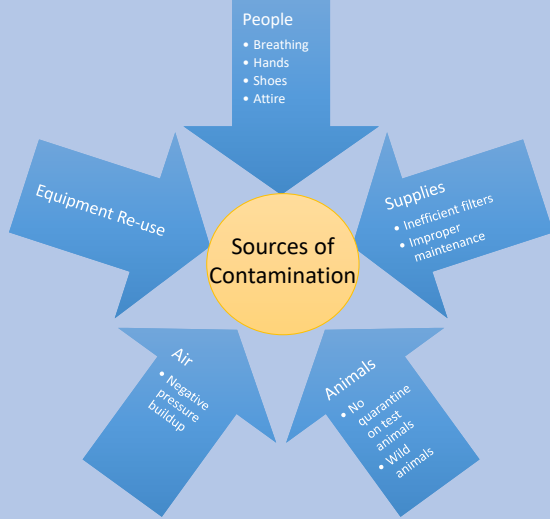
Surface

- Swab
- Wipe
- Touch Plates

Other

- *Sentinels*
- *Rodent/arthropod Traps*
- *Product Testing*

Sources of Contamination



Decontamination



ROTATE DECONTAMINATION SOLUTIONS



FOLLOW MANUFACTURER INSTRUCTIONS



ALLOW FOR APPROPRIATE CONTACT TIME



EXPAND DECONTAMINATION ZONE



USE DECONTAMINANTS TESTED AT PROPER TEMPERATURES



USE MATERIAL COMPATIBLE DECONTAMINANTS

Conclusion

While environmental contaminants and pathogens can, and should, be detected and the presence of these organisms be corrected through decontamination, developing a robust and timely cleaning schedule that suits the laboratory environment can prevent contaminating organisms from disrupting lab productivity.

REFERENCES

1. Biosafety in Microbiological and Biomedical Laboratories, sixth edition, 2021.
2. EPA Registered Disinfectants: <https://www.epa.gov/pesticide-registration/selected-epa-registered-disinfectants/pathogens>
3. Grayson, et al., Isolation and Identification of Common Contaminants Bacteria from Working Area in Microbiology Laboratory. J. Bio-Molecular Sciences, 2015.
4. Mahood, A., Ali, S., Microbial and viral contamination of animal and stem cell cultures: common contaminants, detection and elimination. J. Stem Cell Research & Therapeutics, 2017.

Contact: Ryan Jochim, Ph.D., Senior Scientist / Project Manager, Science and Technology, Merrick & Company. www.merrick.com, 301.785.7708. ryan.jochim@merrick.com.
 Kristina Peterman, Project Manager, Science and Technology, Merrick & Company. www.merrick.com, 703.615.2393. kristina.peterman@merrick.com.