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# GOOD MICROBIOLOGY LABORATORY PRACTICE

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## Abstract

All laboratories using biological material must adhere to this code of practice


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## Introduction

Working safely in the laboratory and producing quality research are key principles of any research program. Good microbiological laboratory practices (GMLP) are designed to protect both workers (i.e., lab staff, non-lab staff and students) and research material (i.e., organisms and equipment).

Laboratory biosafety is primarily achieved through a basic level of operational practices that include good microbiological laboratory practices and physical design features of a functional well designed laboratory.

The principles of GMLP is a code of practice that should be applied to **all** types of work involving microorganisms such as direct culturing, recombinant DNA, genetic modification and tissue culture regardless of risk group (RG) or containment level (CL).

An important aspect of GMLP that often gets overlooked by the non-specialist is that experienced microbiologists handle all microorganisms and cultures as if they are pathogenic (even if they are working with RG 1 organisms) by routine use of aseptic techniques and other good microbiological practices.

It is worth noting that while organisms classified as RG 1 will not cause disease, many have the potential to cause opportunistic infections and pathogenic potential may be altered under laboratory growth conditions.

## Good Microbiology Laboratory Practices:

1. A documented procedural (safety) manual must be available for all staff, and its requirements followed; it must be reviewed and updated regularly. This manual should include laboratory spill and emergency procedures.

2. Personnel must receive training on the potential hazards associated with the work involved and the necessary precautions to prevent exposure to biological agents and release of contained material; personnel must show evidence that they understood the training provided; training must be documented and signed by both the employee and supervisor; retraining programs should also be implemented.

3. Eating, drinking, smoking, storing of either food, personal belongings, or utensils, applying cosmetics, and inserting or removing contact lenses are not permitted in any laboratory; the wearing of contact lenses is permitted only when other forms of corrective eyewear are not suitable; wearing jewelry or having long fingernails is not recommended in the laboratory.

4. Open wounds, cuts, scratches and grazes should be covered with waterproof dressings.

5. Oral pipetting of any substance is prohibited in any laboratory.

6. Long hair is to be tied back or restrained so that it cannot come into contact with hands, specimens, containers or equipment.

7. Access to laboratory and support areas is limited to authorized personnel.

8. Doors to laboratories must not be left open (this does not apply to an open area within a laboratory).

9. Open wounds, cuts, scratches and grazes should be covered with waterproof dressings.

10. Laboratories are to be kept clean and tidy. Storage of materials that are not pertinent to the work and cannot be easily decontaminated (e.g., journals, books, correspondence) should be minimized; paperwork and report writing should be kept separate from laboratory work areas.

11. Ensure engineering controls (e.g., BSC's, eyewash units, sinks, and safety showers) are functional and properly maintained and inspected.

12. Personal protective laboratory clothing, properly fastened, must be worn by all personnel, including visitors, trainees and others entering or working in the laboratory; suitable footwear with closed toes and heels must be worn in all laboratory areas.

13. Protective laboratory clothing must not be worn in non-laboratory areas; laboratory clothing must not be stored in contact with street clothing.

14. If a known or suspected exposure occurs, contaminated clothing must be decontaminated before laundering (unless laundering facilities are within the containment laboratory and have been proven to be effective in decontamination).

15. Wear approved safety glasses and/or goggles. Whether during routine operations or under unusual circumstances (e.g., spill clean-up), eye and face protection must be used. Careful consideration should be given to the identification of procedures requiring eye and face protection, and selection should be appropriate to the hazard.

16. Basic hand hygiene: hands must be washed after gloves have been removed, before leaving the laboratory and at any time after handling materials known or suspected to be contaminated.

17. Gloves (e.g., latex, nitrile) must be worn for all procedures that might involve direct skin contact with biological material. Gloves are to be removed when leaving the laboratory and decontaminated with other laboratory waste before disposal; **Hands must be washed after removing gloves**.

18. The use of needles, syringes and other sharp objects should be strictly limit. It is recommended to use safety-engineered medical sharps whenever possible (Alberta OHS Code, Part 35 section 525.2). Caution should be used when handling needles and syringes to avoid auto-inoculation and the generation of aerosols during use and disposal; where appropriate, procedures should be performed in a BSC; needles should not be bent, sheared, recapped or removed from the syringe; they should be promptly placed in a puncture-resistant sharps container (in accordance with Canadian Standards Association [CSA] standard Z316.6-07 before disposal. For disposal of sharps consult Risk and Safety Services website.

19. Avoid the use of aerosol-generating procedures when working with biohazardous materials. Needle clipping, pipetting, mixing, sonication, and centrifugation can produce substantial aerosols. If you must perform an aerosol generating procedure, utilize proper containment devices and good work practice controls to mitigate potential exposures; tightly cap tubes prior to centrifuging or vortexing; allow aerosols to settle prior to opening tubes, equipment; open tubes or equipment inside a containment device (i.e., biosafety cabinet) whenever feasible; shield instruments or activities that can emit splash or splatter.

20. Use disinfectant traps and in-line filters on vacuum lines to protect vacuum lines from potential contamination.

21. Work surfaces must be cleaned and decontaminated in accordance with biological material in use at the end of the day and after any spill of potentially biohazardous material; work surfaces that have become permeable (i.e., cracked, chipped, loose) must be replaced or repaired.

22. Contaminated materials and equipment leaving the laboratory for servicing or disposal must be appropriately decontaminated and labelled or tagged out as such.

23. Autoclaves used for decontamination need to have regular efficacy monitoring with biological indicators (i.e., consider weekly, depending on the frequency of use of the autoclave), and the records of these results and cycle logs (i.e., time, temperature and pressure) must also be kept on file.

24. All biological materials (cultures, recombinant DNA), solid or liquid, must be decontaminated before disposal or reuse; the material must be contained in such a way as to prevent the release of the contaminated contents during removal.

25. Disinfectants effective against the agents in use must be available at all times within the areas where the biological material is handled or stored.

26. Leak-proof containers are to be used for the transport of biological materials within facilities (e.g., between laboratories in the same facility).

27. Spills, accidents or exposures to biohazardous materials and losses of containment must be reported immediately to the laboratory supervisor and a Campus Accident-Incident Report (CAIR) must be submitted; written records of such incidents must be maintained, and the results of incident investigations should be used for continuing education.

28. An effective rodent and insect control program must be maintained.

## References


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