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Title:	**Biological Containment Levels**		
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Introduction

Containment levels provide the description of the minimum containment required for handling organisms safely in a laboratory setting. The containment system includes the engineering, operational, technical and physical requirements for manipulating a particular pathogen. In the Keenan Research Centre, the maximum containment level is **Containment Level 2 (CL2)**.

Associated Procedure

The classification of pathogens into Risk Groups does not provide instructions on how to actually handle the organism in the laboratory. The concept of the **Containment Level** has been devised to provide the worker with a description of the minimum engineering, operational, technical and physical requirements for handling a pathogen safely within the laboratory setting. Four containment levels exist and are described as follows:

Containment Level 1 (CL1)

This applies to a basic laboratory handling organisms requiring CL1. It requires no special design elements beyond those required in a functional laboratory. Work can be carried out on open bench tops, with containment being achieved though good laboratory practice

Containment Level 2 (CL2)

This applies to a laboratory handling organisms requiring CL2. Primarily, the routes of exposure of pathogens requiring CL2 is via ingestion, inoculation or mucosal membranes. Although not generally transmitted via airborne routes, care must be taken with CL2 pathogens to avoid the formation of bioaerosols, which after contact with the workers hands (can become an ingestion risk) or splashes. Primary containment is through Biological Safety Cabinets (BSCs) and aerosol-proof centrifugation, as well as the wearing of appropriate Personal Protective Equipment (PPE). Contamination of the environment is kept to a minimum by employing specified hand washing sinks and the use of autoclaves and other decontamination methods.

All wet bench areas in the KRCBS are certified and registered as CL-2.

Containment Level 3 (CL3)

This applies to a laboratory handling organisms requiring CL3. Pathogens can cause serious or life threatening disease at low doses and may be transmitted via the airborne route. Primary and secondary are required to prevent transmission of the pathogen into the laboratory and environment e.g. work on infectious material is conducted inside a CL3-complient BSC with the worker wearing appropriate respiratory protection.

Containment Level 4 (CL4)

Maximum containment available and is used by facilities handling pathogens requiring containment level 4. Pathogens have a high risk of being transmitted via aerosols, have a very low dose of infection and often produce lethal diseases, with little or no effective treatment. CL4 emphasizes maximal containment, within an isolated unit, with researchers working in positive containment suits, in a CL4-compliant BSC. Air, as well as waste, leaving the facility is decontaminated.

References

Public Health Agency of Canada (PHAC), Canadian Biosafety Standards and Guidelines 1st ed. 2014

National Institutes of Health (NIH), Guidelines for Recombinant DNA and Gene Transfer, 2002

U.S. Centers for Disease Control (CDC . NIH), Biosafety in Microbiological and Biomedical Laboratories, 5th edition, 2009

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