

# Biosafety Levels (BSL): Overview

	BSL 1	BSL 2	BSL 3	BSL 4
<b>Biological Samples</b>	<ul style="list-style-type: none"> <li>&gt; Nonpathogenic strain of <i>E. coli</i></li> <li>&gt; <i>Bacillus subtilis</i></li> <li>&gt; Yeast</li> </ul>	<ul style="list-style-type: none"> <li>&gt; <i>Chlamydia pneumoniae</i></li> <li>&gt; <i>Enterobacter spp.</i></li> <li>&gt; <i>Mycoplasma pneumoniae</i></li> <li>&gt; <i>Yersinia pseudotuberculosis</i></li> <li>&gt; <i>Herpes simplex virus</i></li> <li>&gt; HIV</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Tuberculosis</li> <li>&gt; <i>West Nile virus</i></li> </ul>	<ul style="list-style-type: none"> <li>&gt; Ebola</li> <li>&gt; Marburg viruses</li> </ul>
<b>Risk potential</b>	No or low risk to humans and the environment	Moderate risk potential for the laboratory staff and the environment	High individual risk, low community risk	High individual risk, and community risk
<b>Laboratory practices and precautions</b>	<ul style="list-style-type: none"> <li>&gt; GMP</li> <li>&gt; Standard microbiological practice</li> <li>&gt; Only trained personnel</li> </ul>	<ul style="list-style-type: none"> <li>&gt; BSL-1 standard</li> <li>+ Limited access</li> <li>+ Biohazard warning signs</li> <li>+ "Sharps" precautions</li> <li>+ Biosafety manual defining any needed waste decontamination or medical surveillance policies</li> </ul>	<ul style="list-style-type: none"> <li>&gt; BSL-2 standard</li> <li>+ Controlled access</li> <li>+ Decontamination of all waste</li> <li>+ Decontamination of laboratory clothing before laundering</li> </ul>	<ul style="list-style-type: none"> <li>&gt; BSL-3 standard</li> <li>+ Clothing change before entering</li> <li>+ Shower upon exit</li> <li>+ All material decontaminated upon exit from facility</li> </ul>
<b>Required safety equipment in the laboratory</b>	<ul style="list-style-type: none"> <li>&gt; Personal protective equipment, (lab coats, gloves, eye protection) are worn as needed</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Appropriate personal protective equipment is worn, including lab coats and gloves</li> <li>&gt; Eye protection and face shields can also be worn as needed</li> <li>&gt; All procedures that can cause infection from aerosols or splashes are performed within a biological safety cabinet</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Appropriate personal protection equipment must be worn</li> <li>&gt; Respirators might be required</li> <li>&gt; All work with microbes must be performed within an appropriate biological safety cabinet</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Full-body, air-supplied, positive pressure suit must be worn</li> </ul>
<b>Required installation inside the facility</b>	<ul style="list-style-type: none"> <li>&gt; Work on an open lab bench or table</li> <li>&gt; Ample space</li> <li>&gt; Basins to wash hands</li> <li>&gt; Laboratory trash</li> <li>&gt; Emergency shower</li> </ul>	<ul style="list-style-type: none"> <li>&gt; BSL-1 standard</li> <li>+ Autoclave</li> <li>+ Biological safety cabinet</li> </ul>	<ul style="list-style-type: none"> <li>&gt; BSL-2 standard</li> <li>+ Physical separation from access</li> <li>+ Corridors self-closing, double-door access</li> <li>+ Exhausted air not recirculated</li> <li>+ Negative airflow into laboratory</li> <li>+ Entry through airlock or anteroom</li> <li>+ Basin to wash hands near laboratory exit</li> </ul>	<ul style="list-style-type: none"> <li>&gt; BSL-3 standard</li> <li>+ Separate building or isolated zone</li> <li>+ Dedicated supply and exhaust, vacuum, and decontamination systems</li> <li>+ Suit laboratory</li> </ul>

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