Biological Agents Laboratory Safety

Developed by Servizio di Prevenzione e Protezione

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UNIVERSITÀ DI PAVIA

Biological Agents: how work in safety?

Workers can be exposed to biological agents when living elements need to be used to test new production processes, substances or materials.
D. Lgs. 81/08 described biological work risk in titolo X, and here are some important definitions:

Biological agent: any micro-organism, including genetically modified ones, cellular culture and human endoparasite apt to cause infections, allergies or poisonig; therefore, bacteria, funghi, parasites and viruses.
Microorganism: any microbiological unit cellular type or otherwise, able to reproducing itself or transmit genetic material.
MOGM: microorganism with an alterated genetic material, according to an artificial method not natural one.
Cell culture: cells growing in vitro medium, derived from a pluricellular organism.
Biosafety levels: technical and structural characteristics of the workplace, even of instrumentations, to operate in safety and security conditions (even for people and environment) with biological agents.

The classification system of biological agents is based on whether:

- The agent is pathogenic to humans.
- The agent is a hazard to employees.
- The agent is transmissible to the community.
- There is effective treatment or prophylaxis available.

Under this classification system, Group 1 agents are the least hazardous whilst Group 4 are the most hazardous. We have also to remember that the categorisation system gives an indication of the inherent hazard of the biological agent, but it does not take account of the work that may be carried out with the agent or the exposure of sensitive groups, for example, pregnant employees to the agents. Then, if the agent you are working with is not on the list, the categorisation will need to be determined by assessment based on the criteria above. Biological agents should not be automatically categorised into hazard group 1.

N. Group	Features	Containment level
1	Biological agents which are unlikely to cause disease in an individual.	Basically hygienic procedures
2	Biological agents which can cause a disease in an individual and could pose a hazard to employees; spreading in the community is unlikely; effective prevention or treatment is usually possible.	2nd
3	Biological agents which can cause a serious disease in an individual and could pose a hazard to employees; spreading in the community is possible; effective prevention or treatment is usually possible, however.	3rd
4	Biological agents which can cause a serious disease in an individual and pose a serious hazard to employees; spreading in the community may be considerable; in normal situations, effective prevention or treatment is not possible	4th

General procedures

While you're operating with biological agents/materials, you'll have to:

- Work with biological agents/materials as they are potencially danger.
- Clean workplace during the operations and avoid external material.
- Sanitize carefully workplace at the end of the day with a specific product not to contaminate surfaces.
- NOT smoking, NOT eating or drinking, NOT use lipstick or similarities, NOT apply lens, NOT touch your mouth.
- Use correctly PPE (personal protective equipment).
- Handle biological agent/material avoiding aerosol/moisture.
- Reduce needle and sharp objects use, NOT enclose needles and throw them in the specific boxes.
- Handle biological agent/material according to the specific group under the specific biological hood.
- Store biological agent in watertight boxes.
- Sanitize and throw correctly potentially infect wastes (solid and liquid ones) not to be danger to workers
- Sanitize laboratory instrumentation before manteinance.

If biological material was falling down:

- Cover surface with disinfectant soaked absorbent paper.
- Clean according to the specific procedures.
- Disinfect another time all the surface
- Notify to the supervisor

Washing Hands Procedure :

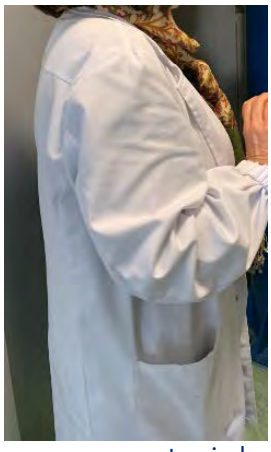
You have to wash your hands:

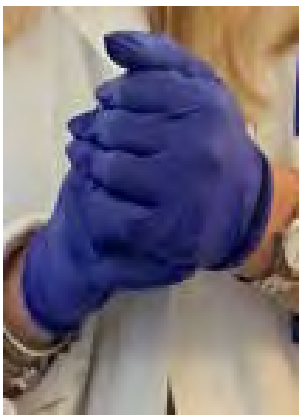
- If a biological liquid or material squirt on your skin or eyes
- After put off your gloves
- Before eating, drinking, touch personal objects, put on lens, put on lipstick and so on,
- After toilet use
- At the end of the work day
- If you work with patients, between one another.

You can find the procedure attached and at the link: http://rspp.unipv.it/

PERSONAL PROTECTIVE EQUIPMENT (PEE)

Minimal PPE in a biological laboratory to work in safety and security (according to the particular biological activity) is formed by:





1. Lab coat with long sleeve, better with tight cuff.
2. Glasses.
3. Face shield protection from splash and aerosol.
4. Protective masks.
5. Disposable hypoallergenic material gloves.

How put on and off gloves and laboratory coat is in the attached description and at the link: http://rspp.unipv.it/.

BIOLOGICAL HOODS

Here are some specific procedures to correctly use biological hoods.

- Verify biological hood according to the biological sample you have to analyze and that it is really operating
- Put on laminar flow at least 15' before starting activities.
- Use minimal quantity biological agent/material
- Not introduce new biological material during the operations (so planning activities correctly)
- Avoid using Bunsen burner
- Avoid sharping movements of the forearm
- Operate in the middle or near the posterior end of the hood surface
- Put potentially infectant material in closed recipients
- Cleaning and sanitizing operations at the end of the activities
- Laminar flow after the end of the activities for at least 15'

DISINFECTION AND STERILIZATION

Skin disinfectants:

COMPOUND	USES AND WARNINGS
Ethyl alcohol, 70% ethanol	Useful on whole skin. Apply on washed hands for at least 2'. Not appliable on injury skin. It causes dryness and irritation. It is infiammable.
Chlorine derivatives	Useful on superficial injuries and burns. At high levels it is toxic.
4% Chlorhexidine	Useful on injuries, burns and to hands disinfection. Not appliable on eyes. It's possible to use it also with alcohol.
Iodine and Iodophores	Useful on little injuries. They are potentially skin irritant.

Objects, instrumentation and work areas disinfectants:

COMPOUND	USES AND WARNINGS
Activated Glutaraldehyde 2%	Acts on organic materials, not realizes metal corrosion. Operative on plastic, rubber, lens, optical fibres and laboratory materials. Not appliable on work plans and areas. It is toxic: PEE are gloves and glasses.
Phenolic derivatives	Acts on floors, surfaces, furnitures, objects. Not useful on rubber, plastic and silicon materials. It is irritant: PEE are gloves and glasses

Chlorohydrates: Chloramine T; Sodium hypochlorite (bleach)	Useful on objects and even on contaminated biological material surfaces (concentration 5000-10000 ppm). Corrosive for metal objects. Avoid use in presence of acid compounds. They are toxic: PEE are gloves and glasses.

SAFETY SIGN

There is specific colour and form.

Biological risk: black and yellow triangle sign contains black biological symbol.

Useful LINKS:

Website INAIL: valutazione del rischio biologico
Website ILO: nuove linee guida per la valutazione del rischio biologico
Ministero della salute (MOGM)

CONTATTI E INFORMAZIONI

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