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Laboratory safety guidelines no. 4-34/PR/26

For laboratories and research groups
of UT Institute of Molecular and Cell Biology

These guidelines are valid for the Riia 23/23b/23c building

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Introduction

The laboratory safety guidelines present the main requirements for ensuring safety when working in the laboratories of the Institute of Molecular and Cell Biology (IMCB). Employees of the institute who besides the IMCB laboratories also work in the shared-use facilities of the Institute of Genomics and Estonian Biobank must also observe the requirements of these guidelines while working in the latter facilities. These laboratory safety guidelines are mandatory for all IMCB employees, graduate students, students, visiting researchers, etc. who work in the laboratories. The safety guidelines are introduced to employees either in the course of the initial instruction or during a further instruction, the instruction is recorded in the register of occupational health and safety instructions or via the digital information system. Both the supervisor and the supervisee confirm the instruction by signature. The supervisor is in charge of the safety instruction of students and graduate students working in the laboratory and the risk assessment of the scheduled experiments. Work in the laboratory must not start before the safety instruction has been recorded and confirmed by the supervisee and the instructor.

I. General safety requirements

1.1. When working in the laboratory (to conduct experiments, supervise students, handle equipment, work in the safety cabinet, etc.), it is necessary to avoid the effect of working environment hazards (chemicals, radioactive radiation, biohazardous materials, etc.) on health and their spread into other rooms or the external environment.

1.2. Laboratory rooms are equipped with water supply, electrical or central heating and ventilation and sewage system; also, there are cleaning agents and disinfectants in the laboratory.

1.3. There must be fire-extinguishing equipment (fire blanket, fire extinguisher) in or close to the laboratory. All people who perform practical work in the laboratory must know the location of this equipment and they have to be able to use them, if necessary.

1.4. When working in the laboratory, it is necessary to strictly observe safety requirements; working must be safe both for the employee and other persons in the laboratory, as well as environmentally safe. If in addition to these laboratory safety guidelines, other safety guidelines have been established for performing certain work in the laboratory, the requirements of the such safety guidelines must be observed when performing such work. Only staff and students with appropriate instruction and in rooms covered by licences during the period of validity of such licences may work with **infectious material** (incl. potentially pathogenic microbes) as specified in the Communicable Diseases Prevention and Control Act (NETS), with **genetically modified microbes** (incl. tissue culture) as specified in the Contained Use of Genetically Modified Micro-organisms Act (GMMOKS), with **experimental animals** as

specified in the Animal Protection Act (LoKS) and with **radioactive substances** as specified in the Radiation Act.

1.5. Excessive rushing must be avoided in the laboratory to avoid falls, slipping or other hazardous situations (overturning of test tubes, chemicals, etc.).

1.6. The walkways in the laboratory must be free; it is not allowed to stack objects there that obstruct passage or working in the room or leaving the room in case of an accident.

1.7. It is strictly forbidden to eat, drink and use make-up, and store foodstuffs and drinks in the laboratories. In the case of other routine activities, the risk must be assessed according to the nature of the work performed in the laboratory. For example, during work in the laboratory, long hair must be tied back and it is forbidden to touch one's personal phone, door handles etc. with the gloved hand.

1.8. When working in the laboratory it is mandatory to wear protective clothing (lab coat) and personal protective equipment (protective glasses, mask, gloves, footwear, etc.) according to the specifics of the work, the working environment hazards or chemical safety data sheets. Personal protective equipment protects you against damage to health, burns, injuries etc. and protective clothing provides protection from droplets or splashes of chemicals.

1.9. When preparing for laboratory work, it is necessary to carefully read the work instructions, relevant literature and standards, and legal acts. Only experiments and laboratory works specified in research are performed.

1.10. While working in the laboratory, indoor footwear must be worn. Outdoor shoes must be avoided in the laboratory as these are the main sources of dust, dirt and biological contamination. It is recommended that closed-toe shoes that cover the whole foot are worn in the laboratory. It is mandatory to change footwear before entering tissue culture rooms.

1.11. Avoid placing personal objects on work surfaces in the laboratory, and do not touch personal items, face and spectacles with gloved hands.

1.12. Before making entries in the laboratory diary, using the computer, etc. always clean your hands (remove protective gloves). When taking worksheets and laboratory diaries from the laboratory room to the computer workplace or back, avoid possible cross-contamination, for example, by using worksheets in the laboratory room in a plastic sleeve or by photographing the worksheet instead of taking it into office rooms.

1.13. Before using the equipment for the first time, the user and safety manual of the equipment must be read. The manuals must be available for all equipment and they must be accessible for all employees.

1.14. Only employees who have undergone respective training may work with laboratory equipment.

1.15. In case of a technical failure of equipment or also, in case of a suspicion that the equipment is not working as intended, leave a written notice of this at the equipment with your contact details, and contact the person responsible for the equipment or in charge of the laboratory work for assistance.

1.16. When working with UV light, eyes must be protected with safety glasses or a visor. Never look directly into UV light source. Protective clothing and gloves should be worn to protect hands and other areas of skin. Use UV lamps as briefly as possible.

1.17. When working with chemicals, get acquainted with the safety data sheets of the chemicals used in the work, and strictly observe all precautions, incl. use of personal protective equipment, while handling. **Mouth pipetting is strictly forbidden!**

1.18. Particular care should be taken when working with radioactive isotopes, ethidium bromide, phenol, chloroform, acrylamide and SDS powder. These chemicals are very dangerous. All precautions must be taken when handling them.

1.19. Hazardous chemical waste is collected in appropriate waste containers; it must not be disposed of in the waste or poured into the sewer. When waste containers are full, inform the person responsible for emptying the containers. The collected chemical waste is transferred to a specialised waste management facility for further treatment. The same requirements apply for biological and radioactive waste. Liquid waste containing microbes, cultures, buffers, etc. must be inactivated before disposing into the sewer by autoclaving. Broken glassware and fragments must be collected and placed in a dedicated container.

1.20. When working in tissue culture rooms ensure that the used medium collection bottles are not too full. If at the end of work the bottles is more than 75% full, empty the bottle, add disinfectant in the empty bottle and connect it to the system again.

1.21. Where gas cylinders are used in the laboratory, they must be fixed securely to the wall and located in places that are out of the employees' walkways.

1.22. All work with hazardous and toxic chemicals must be performed using personal protective equipment and under a working hood.

1.23. When the safety cabinet is not used, the sash must be pulled down as far as possible.

1.24. After performing experiments, employees/students tidy their workplace, washes the containers and hands. The desk and other workplaces must always be carefully cleaned. When leaving a room where work is performed on microbes, it is always necessary to wash hands with water and soap to avoid the spread of microbes or possible cross-contamination.

1.25. In case of chemical spills on work surfaces (laboratory desk, worktop in the safety cabinet, etc.) or on the floor, it must be cleaned immediately. The same applies for any other contamination. In case of biological contamination, the contaminated liquid must be collected from the surface with tissue paper, collect the paper in the bag for collecting biological waste, and disinfect the contaminated surface with 70% ethanol.

1.26. All work equipment must be carefully cleaned after use so that others could use them. Equipment, buffers, chemicals, etc. must not be left anywhere else but in the intended place.

1.27. Used laboratory glassware must be cleaned of buffers and chemicals before washing. Reusable glassware that has been contaminated with microbes must be inactivated before washing either by soaking in diluted disinfectant or by autoclaving.

1.28. Used bottles, tubes, cell culture glassware, etc. must be labelled so that the biological and/or chemical hazard involved and the owner in charge of the glassware is clearly identified. For chemicals,

the formula must be provided, for buffers or media, the name, and for organisms, the name of the species and strain. Unlabelled containers must be treated as hazardous waste.

1.29. First aid equipment must be available in the laboratory and employees must be informed of their location.

1.30. All employees should know the first aid providers of the institute, to be called in for first aid, if necessary.

1.31. The employee/student who is the last to leave the laboratory must close all windows and doors and switch off ceiling and task lights.

II General guidelines in case of fire, major chemical accidents and other accidents

Fire safety activities at the university are governed by the University of Tartu Fire Safety Rules, established by the UT Rector's decree no. 9 of 3 April 2018. UT Fire Safety Rules lay down the general requirements for the fire safety of activities, processes or equipment in the buildings and facilities of the university and the requirements for ensuring fire safety by staff and students.

2.1. If fire or another accident (in connection with hazardous chemicals, etc.) is detected, immediately notify the emergency centre of the local rescue service at 112, the security service of the Estates Office at 737 5111 (24h) and the building manager at 737 5805 / 509 4929.

2.2. Employees must be informed of the location of fire extinguishing equipment and showers for decontamination and they must know how to use them in case of accident.

2.3. Employees must know the location of emergency exits that can be used to safely exit the building in case of fire, biological or radioactive contamination or other accident.

2.4. Employees must be familiar with the flammable or explosive properties of the substance and material used, processed, produced and stored, and the fire safety requirements for working with them.

2.5. Only working tools, equipment, etc. that are in good working order may be used in flammable or explosive activities or processes.

2.6. When using open flames, measures must be taken to prevent fire and avoid any action that may result in a fire or explosion. The use of open fire in biosafety cabinets, or laminar flow cabinets, should be avoided if possible.

2.7. Employees must know their responsibilities in the event of fire or accident, be able to use the available means of communication to report an accident and use rescue equipment to prevent a major accident.

2.8. In case of fire, ventilation must be switched off, if possible.

2.9. Combustible material is stored in the workroom in an amount that does not exceed the need for one working day or 24 hours.

2.10. Workplaces and rooms must be cleaned of flammable waste after the end of the working day. It is forbidden to leave doors, windows, and hatches open.

2.11. When handling the chemical, appropriate measures must be taken to prevent an accident that could result from the chemical, taking into account the amount of the chemical and the hazard.

2.12. A fire in a test tube, flask or container can be extinguished by closing the tube, flask or container with a lid or another item, cutting off oxygen supply to the fire.

2.13. Never pour water on burning liquid!

2.14. If clothes or papers or other work equipment has caught fire, you may use tap water, emergency shower or fire blanket to extinguish the fire.

2.15. If combustible liquid or another easily flammable substance is on the floor or another structure, it must be immediately removed.

2.16. Equipment on fire or fire on the floor can be extinguished using the fire extinguishing equipment available in the laboratory or in the corridor.

III Requirements for action in the event of fire

The requirements for action in the event of fire are governed by the fire operation plan in the buildings at Riia 23 and Riia 23b (approved, respectively, on 18 March 2013 00023/4-34-KV and 6 May 2013 00033/4-34-KV).

3.1. In case of fire, it is important to ensure the safety of people and their rapid evacuation or rescue from an unsafe area.

3.2. The person who discovers a fire must:

3.2.1. Immediately inform the emergency response centre at 112 and

3.2.1.1. Provide the precise address of the fire (city, street, building number, floor);

3.2.1.2. Say what is burning (electrical equipment, flammable liquids, or walls, ceilings, roof space of the building, etc.);

3.2.1.3. Say who reports the fire (name, position) and provide the phone number from which the rescue team was called;

3.2.1.4. Answer the questions asked by the coordinator of the emergency response centre;

3.2.2. Alert the people at risk;

3.2.3. If possible, close doors and windows, turn off the ventilation system and power supply at the site of fire, except for necessary equipment;

- 3.2.4. Evacuate the people at risk, and if possible, the assets;
- 3.2.5. Start to extinguish the fire with basic fire-fighting equipment, as far as possible;
- 3.2.6. Report the fire to the security centre of the Estates Office at 737 5111 (24 h) and inform of the measures taken;
- 3.2.7. When the rescue team arrive, direct them to the place of fire and inform them, as precisely as possible, of:
 - 3.2.7.1. The source and extent of the fire;
 - 3.2.7.2. Possible risk to people;
 - 3.2.7.3. Other hazards associated with the fire (explosions, hazardous chemicals, etc.).
- 3.3. If the person(s) who discover(s) the fire is able to put off the fire on their own, they should start extinguishing the fire and thereafter proceed, depending on the situation, according to p. 3.2.

IV Requirements for work with hazardous substances

The occupational safety and health requirements for using hazardous chemicals and materials containing hazardous chemicals are governed by Regulation no. 105 of the Government of Estonia of 20 March 2001: The occupational safety and health requirements for using hazardous chemicals and materials containing hazardous chemicals and the occupational exposure limits (version effective as of 1 March 2021). The handling of chemicals and the restriction of economic activities relating to the handling of chemicals for the purpose of protecting human life and health, property and the environment, and ensuring the free movement of goods is regulated by the Chemicals Act of the Republic of Estonia (RT I, 10 November 2015, 2., effective as of 1 December 2015).

To start work with extremely hazardous substances, a risk assessment must be previously conducted and a permission must be obtained from the director of institute.

Substances of very high concern (SVHC; [REACH regulation art. 57](#)) are chemicals that meet the following criteria:

- carcinogenic, mutagenic or toxic to reproduction (CMR) substances of category 1a and 1b (based on [CPL regulation Annex I part 3](#));
- persistent, bioaccumulative and toxic (PBT) or very persistent and very bioaccumulative (vPvB) substances according to the criteria in Annex XIII of the REACH regulation,
- substances identified, on a case-by-case basis, from scientific evidence as causing probable serious effects to human health or the environment of an equivalent level of concern as those above, e.g. endocrine disrupters.

4.1. If the concentration of hazardous chemicals in the air of the working environment exceeds the occupational exposure limit value and it cannot be reduced, the following precautions must be applied:

- 4.1.1. Use collective means of protection in the area of exposure to hazardous chemicals;

- 4.1.2. Use relevant personal protective equipment, if the impact of hazardous chemical cannot be avoided by applying means of collective protection.
- 4.2. The concentration of hazardous chemicals in the air in the working environment must not exceed the exposure limit values. If the concentration of chemicals in the room air is suspected to be higher than permitted, measurements must be carried out to check the room air.
- 4.3. The equipment, glassware and other tools used for handling hazardous chemicals must be marked accordingly or they must be clearly distinguishable.
- 4.4. In the event of a risk of accident, all employees likely to be at risk must be informed of the risk as soon as possible.
- 4.5. Employees may only be allowed to enter a contaminated site to clean the contaminated site and to carry out other essential works.
- 4.6. Employees must be aware of the following information concerning the chemicals used for work and the materials containing them:
- 4.6.1. Potential health effect;
 - 4.6.2. Appropriate personal protective equipment to reduce their effects;
 - 4.6.3. Results of the risk assessment;
 - 4.6.4. Data on the chemical safety data sheet;
 - 4.6.5. Results of the measurement of concentration in the working environment air and the exposure limits;
 - 4.6.6. Legislation regulating work when using the chemicals and materials.
- 4.7. Employees who work with hazardous chemicals or materials must have undergone training on the application of safe working techniques.
- 4.8. Periodic medical examinations are organised for employees who handle hazardous chemicals and materials containing hazardous chemicals. If, during the medical examination, an employee is diagnosed with an illness or a work-related disorder is detected, the employer must also arrange a medical examination for all other employees working in similar conditions.
- 4.9. Care should also be taken when working with very cold or very hot substances or materials. When working with such substances or materials, it is important that other employees working in the same room are aware of this.
- 4.10. When using an alcohol burner, care must be taken not to overturn it. If ethanol is burned under local suction, in the safety cabinet or laminar flow cabinet, and the alcohol burner turns over, the local suction, safety cabinet or laminar flow must be switched off immediately to prevent further spread of fire. The use of open fire in biosafety cabinets, or laminar flow cabinets, should be avoided if possible, and preference should be given to disposable tools.
- 4.11. Use protective gloves to lift very hot or very cold items.

4.15. Working with agar and agarose and rapid sterilisation often require heating. In the event of burns, flush the affected area with large quantities of cold water. Remove the clothing that has been in contact with the hot liquid.

4.16. Do not take dry ice or liquid nitrogen with bare hands, as this may cause severe burns.

4.17. Liquid nitrogen containers must not be sealed hermetically – liquid nitrogen evaporates and creates pressure in the container.

4.18. Dry ice must not be placed in small, unventilated rooms – when it evaporates, carbon dioxide is produced, which acts as a narcotic substance.

V Requirements for work with corrosive substances

5.1. When working with corrosive substances, always use protective gloves, glasses and special work clothes.

5.2. When a corrosive substance occurs on your skin, rinse the skin area with plenty of water.

5.3. Never store acids, alkali and corrosive chemicals on high shelves: accidents can happen when they are put or taken from there.

5.4. Never pour water in a strong acid or base!

5.5. If a chemical comes into contact with the eye:

5.5.1. Immediately go to the nearest eyewash bottle or water tap and rinse eyes with plenty of water.

5.5.2. For further help, go to the emergency room (of eye clinic) as quickly as possible.

VI Requirements for work with flammable and explosive compounds

6.1. All (organic) solutions are flammable to a greater or lesser extent (and also toxic to a greater or lesser extent).

6.2. Flammable solutions (flash point below 60 °C) may be stored on the shelves, maximum 10 litres per laboratory. Flammable liquids in up to 50-litre containers may be stored in ventilated rooms only.

6.3. If possible, avoid storing volatile and flammable substances in large containers, as a mixture of air and the volatile substance is formed in the space that is not filled with liquid, and the mixture can be very explosive.

6.4. There must be absorbent agent in the laboratory for collecting liquids from work surfaces or the floor. In the event of major leaks it is necessary to be very careful and if there is a risk of injury, the rescue board and the building manager must be informed of the accident and, if necessary, evacuate the building.

6.5. All works with flammable solutions must be performed under a working hood. Ether, dioxane, tetrahydrofuran and other compounds, in which explosive peroxides can form over time, require particular care. Open the bottles of these solutions with extreme care and always under the hood.

VII Requirements for work with carcinogenic and mutagenic compounds

Work with carcinogenic, mutagenic or toxic to reproduction (CMR) substances of category 1a and 1b (based on [CPL regulation Annex I part 3](#)) must be preceded by a risk assessment and obtaining a permission from the director of institute. Also, the Labour Inspectorate must be informed of starting work according to the procedure provided in the [Occupational health and safety requirements for handling carcinogenic and mutagenic chemicals](#).

7.1. When working with carcinogenic or mutagenic substances, the work area must be marked and the worktop must be covered – for example, with aluminium foil or Kaydry.

7.2. When handling such compounds, always wear personal protective equipment – protective gloves and protective glasses.

7.3. Never open doors, refrigerators, etc. with protective gloves that have been contaminated with the compounds.

7.4. Lifting the compound from storage container into a vessel for weighing must generally take place under a hood.

7.5. If the substance needs to be taken from one place to another within the laboratory, always use an airtight container.

7.6. Residues of the solution and other equipment exposed to the carcinogenic substance are treated as hazardous waste.

VIII Requirements for work with toxic substances

8.1. Substances classified as particularly toxic must be stored in specially labelled and locked rooms or cabinets.

8.2. Working with toxic substances and handling their waste is subject to similar requirements as working with carcinogenic and mutagenic compounds and handling their waste.

IX Requirements for work with X-ray equipment and radioactive compounds

Work with radioactive substances must be organised pursuant to safety guidelines PR-257 “Guidelines for working with radioactive substances at the University of Tartu Institute of Molecular and Cell Biology”.

9.1. Only persons licenced to work with X-ray equipment may work with such equipment in room 121, Riia 23, for which special requirements have been established for such work.

X Requirements in the event of exposure to non-ionising radiation

10.1. People working with UV light must protect their eyes with suitable protective glasses or a visor.

10.2. Never look directly into UV light source.

10.3. Protect hands and other skin areas with special clothes for work and protective gloves.

10.4. Use UV lamps as briefly as possible.

XI Requirements for work with biological material

11.1. The sources of biohazards are materials that contain bacteria, viruses, microfungi, cell cultures, human endoparasites, or other biologically active substances which may cause medical conditions, as well as GM microbes and animal or plant cell cultures. Sources of increased risk include, besides the microbes and GM microbes and cell cultures of risk group 2, also work with experimental animals, various material of human origin and cell cultures of mammals. When planning work with biological material, proceed from the risk assessment and the precautionary principle. In the event of issues not covered in these guidelines, work must be organised in accordance with current legislation, the [WHO Laboratory Biosafety Manual](#) and the [ECACC Laboratory Handbook on Fundamental Techniques in Cell Culture](#).

11.2. Work with infectious material (incl. risk group 2 microbes) as defined in NETS, genetically modified micro-organisms (incl. cell cultures) as defined in GMMOKS, and experimental animals as defined in LoKS may be conducted only by people with appropriate training in rooms specified in the respective activity licences issued by the Health Board, Labour Inspectorate and Agriculture and Food Board. Additional guidelines of safety and work are in place in such rooms; they must be strictly observed and introduced to employees/students together with these guidelines before starting work for the first time.

11.3. Using risk group 2 microbes (incl. e.g., *S. aureus*, *P. aeruginosa*, *S. typhimurium*, several strains of *E. coli* etc.) for research and making genetic modifications in the course of research, irrespective of the risk group of the donor and the recipient, must be preceded by a risk assessment, which must be documented and preserved for at least five years. The risk assessment of genetic modification of microbes and cell cultures must comply with the [The list of the data given in the risk assessment for GM microbes and the procedure for carrying out a risk assessment \(RTL 2002, 10, 103\)](#), established by the Regulation of the Minister of Social Affairs.

11.3. The hazard level of all work processes are calculated according to the highest level of hazard used in the laboratory room. If GM microbes and/or risk group 2 microbes are allowed to be handled in the room, all other work processes in the same room are treated according to the same logic, always taking the possibility of potential cross-contamination into account.

11.4. When working with genetically modified micro-organisms, regardless of the risk group, extreme care should be taken to avoid contamination of the experiment, exposure of employees to GM microbes or release of viable GM microbes into the environment.

11.5. It is forbidden to handle in any way, incl. preserve, pathogens of risk group 3 (as listed in Regulation no. 144 of the Government of Estonia of 5 May 2000 “Occupational health and safety requirements in working environment affected by biological hazards”, Annex 3, for example, *B. anthracis*, the verocytotoxigenic strains of *E. coli* (e.g. O157:H7; O103), *M. tuberculosis*, lyssaviruses, tick-borne encephalitis agents, hepatitis viruses, SARS-CoV-2, etc.).

11.6. Reusable containers and utensils (glassware, tubes and stoppers, tweezers, etc.) used for working with microbes and cell cultures must be completely inactivated by immersion in a working solution of disinfectant (e.g., Virkon) or autoclaving before washing.

11.7. Any liquid waste that has been in contact with microbes or cell cultures must be inactivated chemically or by autoclaving. Solid waste must be collected and handled as bio-hazardous waste which must not be disposed of as municipal waste.

11.8. The worktops of safety cabinets and the tools and devices there must be sterilised with UV light, if possible. It should be taken into account that UV-C radiation can only sterilise surfaces within the direct light of the lamp. Therefore, if possible, tools and devices should not be kept under the laminar. Recommendable, sterilisation should be turned on after you finish work, i.e. allowing min 15-minute sterilisation before the next user. General sterilisation of tissue culture rooms takes place during the night. If a room is UV-sterilised around the clock, the respective warning sign must be placed on the door of the room.

11.9. Processes that may cause splashes should be avoided or if that is not possible, these sections of work should be carried out under safety class 2 cabinets.

11.10. To wash possible splashes and clean surfaces after leaks or accidents, use a disinfectant or 70% ethanol.

XII Requirements for use of equipment and instruments

12.1. Laboratory equipment necessary for performing laboratory work must be used in compliance with the instructions provided by the manufacturer.

12.2. A person in charge is appointed for all equipment. The person must know how to use it and be able to perform basic maintenance works. Employees must be informed of who the persons in charge are.

12.3. To work with equipment, an employee must undergo respective instruction.

12.4. If equipment does not work properly, immediately contact the person in charge of equipment. The contact data of the employee who discovered the failure and a warning sign must be placed on the device that is not working or not working properly.

- 12.5. Microwave ovens must be handled with care. Never place metal objects or foil in microwave ovens.
- 12.6. Only vessels made of material intended for use in the microwave oven may be used in microwave ovens.
- 12.7. Care must also be taken when working with gases. When gas has been ignited for sterilisation, always extinguish it after the work has been completed. Never store flammable materials and substances near such equipment. At the end of the working day, the main gas valve must be turned off.
- 12.8. When working with sonicator, use hearing protection – earplugs or earmuffs. When the sonicator is working, also all other people in the room must use ear protection.
- 12.9. When you stop working with a device, it must be switched off (unless it is continuous operation). If possible, use a timer.
- 12.10. When using the suction system of the building, make sure that tubes and flasks are correctly positioned to avoid any leakage. When you have finished work, always shut off the suction valve.
- 12.11. When working with equipment, make sure that they are securely attached to the desk or positioned so that they cannot fall off the desk.
- 12.12. Do not enter work rooms while UV sterilisation of the room is performed (relevant warning sign must be on the work room door).
- 12.13. When using a transilluminator, it is important to avoid skin and eye damage, and therefore it is necessary to use protective glasses, a protective mask or shield. This requirement also applies to employees who wear spectacles (even glasses with UV protection, because the UV radiation used in the laboratory is more intense and of shorter wavelengths and can damage eyesight).

XIII Requirements for working with electrical equipment

- 13.1. When working with electrical equipment, the operating instructions and safety instructions issued by the manufacturer must be strictly observed.
- 13.2. Electrical equipment may only be operated by employees who have been trained in electrical safety or trained to work with the equipment.
- 13.3. In the event of accidental power failure, all electrical equipment must be switched off.
- 13.4. When working with equipment, overheating must be avoided.
- 13.5. At the end of the work, all electrical equipment must be switched off (excl. those that have to operate continuously).
- 13.6. When working with electrical equipment it is forbidden:
- 13.6.1. To work with faulty or broken electrical equipment, sockets and plugs, cables and switches;

- 13.6.2. To use ungrounded electrical equipment;
- 13.6.3. To touch electrical equipment with wet hands or metal objects;
- 13.6.4. To hang anything on wires, or to paint wires;
- 13.6.5. To use an electric stove with open coil or other heating elements;
- 13.6.6. To leave switched-on equipment unattended (excl. those that have to operate continuously).

XIV First aid in the laboratory

14.1. First aid for working with corrosives

14.1.1. If the skin comes in contact with acids, wash the affected area immediately with a large amount of water, if necessary, using the emergency shower in the corridor.

14.1.2. If the skin comes in contact with alkalis, wash the affected area immediately with a large amount of water, if necessary, using the emergency shower in the corridor.

14.1.3. If a corrosive substance gets into the eye, rinse the eye immediately with a large amount of running water (using the eyewash station in the lab) and seek medical advice without delay.

14.1.4. If strong acids and concentrated weak acids get into the mouth, rinse mouth with water.

14.1.5. If alkalis get into the mouth, rinse mouth with water.

14.2. First aid for burns

14.2.1. Cool the burn area quickly for at least 10 minutes with cool water (it is best to use water from the middle tap position). Cooling is more important than treating the burn area with foams and ointments!

14.2.2. Apply anti-burn gel (e.g. Burnshield) to the affected spot, but avoid rubbing it in.

14.2.3. While cooling the burn area, remove clothing from the burn before swelling occurs.

14.2.4. Do not touch the burn or pop the blisters. To prevent infection, cover the burn wound with sterile dressing.

14.2.5. When dressing hands and feet, wrap fingers and toes individually.

14.2.6. While dressing burn wounds, monitor the condition of the victim, and if the condition gets worse, call 112 for help.

14.2.7. In the case of a burnt arm, use a triangular sling to support the arm after dressing the wound.

14.3. First aid for poisoning

14.3.1. If you feel drowsy or dizzy (or have any other symptoms of poisoning) when working with toxic gases, go outside immediately to get fresh air and inform your immediate or academic supervisor and, if necessary, go to the emergency department without delay.

14.3.2. In the case of gas poisoning, immediately take the victim outside to get fresh air, release the airways, and remove any clothing that prevents breathing. Depending on the properties of the inhaled gas, contact the immediate or academic supervisor or take the victim to the emergency department without delay.

14.3.3. In the case of other chemical poisonings, first aid also depends on the specific substance. Therefore, make sure you know the properties, toxicological information and first aid of the substance before starting to work with a specific toxic substance (this information is available on the safety data sheet for the substance located in the lab).

14.4. First aid for cuts

14.4.1. Clean the wound with running water, saline or other suitable solution. If the cut has been caused by an object potentially contaminated with microbes or in a room where live microbes are handled, first disinfect the wound with a special solution or 70% ethanol.

14.4.2. In the case of a minor cut, clean it and cover it either with a plaster, Steri-Strip wound strip(s) or a sterile wound swab attached with a sterile pressure bandage.

14.4.3. In the case of severe bleeding, cover the wound with a pressure pad (e.g. a roller bandage) and attach the pressure pad with bandage.

14.4.4. Seal the wound so that blood flow is maintained. If bleeding does not stop, add a second bandage on the previous pressure pad and attach it with a roller bandage.

14.4.5. In the case of severe bleeding of an arm, elevate the arm, support it and take the victim to the emergency department.

14.5. First aid for electric shock

14.5.1. Immediately turn off power supply (electrical cabinets are located on wall in the corridor or the lab).

14.5.2. Release the victim from the circuit by using a non-conducting object.

14.5.3. If necessary, isolate yourself from the conductive surface (rubber soles, a dry board, books, etc.).

14.5.4. After assessing the condition of the victim and providing life-saving first aid (which the unit's first aid provider is trained for), call 112 immediately. If necessary, they will advise you on how to help the victim until the ambulance arrives.

XV Safety in waste management

15.1. Wastes containing dangerous substances and biological wastes

15.1.1. Any laboratory chemicals and biological material (except chemically or physically inactivated cultures, medium, buffers, etc.) are considered hazardous to health and collected as hazardous waste. Similarly, all acrylamide gels and other two-component polymers, gels with ethidium bromide as well as all materials containing chemicals belonging to the risk groups described above are collected as hazardous waste.

15.1.2. Pipette nozzles, plastic packaging, gloves and similar items used in working with biological materials and hazardous chemicals are also considered hazardous waste. Reusable packaging and work equipment potentially contaminated with biological material must be inactivated chemically (by fully submerging them in the disinfectant solution) or physically (by autoclaving) before washing.

15.1.3. Broken glass, needles, scalpel blades and other sharp objects that may cause injury are collected in plastic containers that can be sealed with a lid.

15.2. Solutions

15.2.1 Solutions that must not be poured into the sink (see Annex) must be collected in glass or plastic bottles with a screw cap and correspondingly labelled. This group includes several common organic solutions such as ether and formaldehyde; photo developers and fixers; solutions containing oils and heavy metals (e.g. silver, cobalt and copper) and other hazardous chemicals used in the appliances.

15.2.2. The contents of a container must be always written on the container and only one type of chemical must be collected in one container.

15.2.3. Given the possibility of expansion, containers must be never fully filled.

15.2.4. Until the bottles are taken away, they must be stored under the hood or in a ventilated cabinet.

XVI Waste management in labs

The plastic bags, zip ties and stickers necessary for handling hazardous waste can be obtained from the front desk of the Riia 23 building. More specific containers are ordered by the building manager or directly from the contractor for waste management.

16.1 Hazardous chemical wastes and biological wastes

Hazardous chemical and biological wastes must be collected at the site in dedicated containers. Disposable containers are used without bags. Reusable containers must be used with a plastic bag made of strong material and bearing the corresponding hazard marking; the container must be sealable or covered with a lid. The filled plastic bags must be closed with a zip tie. Then the waste bag or container must be marked with a sticker (see picture 1) bearing the following information:

- Waste type (Jäätmeliik): chemical or biological wastes
- Waste code (Jäätmekood):
 - Biological wastes, including wastes with potential microbial contamination – 180103
 - Laboratory chemicals, including mixtures of laboratory chemicals – 160506

- Inorganic wastes containing dangerous substances – 160303
- Organic wastes containing dangerous substances – 160305
- Waste producer (Jäätmetekitaja): Name of the UT unit
- Contains (Sisaldab): specification of the substance or other hazard, if necessary,

Jäätmeliik:	_____
Jäätmekood:	_____
Jäätmetekitaja:	TARTU ÜLIKOOL

	(struktuuriüksuse nimi)
	ETTEVAATUST!
Sisaldab:	_____
	(ohu nimetus)

Then, the plastic bags are taken to a restricted access waste facility and placed in the corresponding container. The container is emptied and the wastes properly disposed of by the contractor for the management of hazardous waste. The transport of disposable containers is organised separately by the building manager or ordered from the contractor for waste management.

16.2 Liquid wastes

Liquid chemicals (and mixtures) that must not be poured into the sewer are collected in a separate container. The filled container must be closed and labelled with a sticker using code 061002. The transport of the container is organised separately by the building manager or ordered directly from the contractor for waste management.

Liquid biological wastes, including microbial cultures, tissue culture aspiration waste, etc., must be inactivated by autoclaving or chemical means according to the instructions provided by the manufacturer of the disinfectant before pouring them into the sewer.

16.3 Glass waste

Broken glass and used microscopic slides are collected in different containers. The filled container must be closed and labelled with a sticker using code 191205 for broken glass and 170202 for microscopic slides. The transport of the container is organised separately by the building manager or ordered directly from the contractor for waste management.

16.4 Radioactive waste

Radioactive waste must be collected on the site in dedicated containers. They must be handled following the instructions for working with radioactive substances (PR-257).

16.5 Other wastes

Other wastes other than mixed municipal waste must be collected in separate containers. The filled containers must be closed and labelled with a sticker using code 061002. The transport of the container is organised separately by the building manager or ordered directly from the contractor for waste management.

Legislation and instructions:

[Occupational Health and Safety Act](#) (TTOS)

[Contained Use of Genetically Modified Micro-organisms Act](#) (GMMOKS)

[The list of the data given in the risk assessment for GM microbes and the procedure for carrying out a risk assessment](#) (in Estonian)

[Communicable Diseases Prevention and Control Act](#) (NETS)

[Animal Protection Act](#) (LoKS)

[Chemicals Act](#) (KemS; RT I, 10.11.2015, 2)

[REACH regulation](#). Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 on the registration, evaluation, authorisation and restriction of chemicals.

[CLP regulation](#). Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on the classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

[WHO Laboratory Biosafety Manual](#)

[ECACC Cell Culture Laboratory handbook](#)

ANNEX

Organic solutions that can be poured into the sewer in small quantities.

Small quantities of the following solutions may be disposed of in the sewer, in case there is no risk of ignition. These compounds decompose quickly and their toxicity is so low that in small quantities in a regular sewerage system, they do not pose any hazard to the environment

Acetone (2-propanone)
Acetonitrile
Dimethyl sulfoxide (DMSO)
Ethanol
Ethylene glycol (glycol)
Formaldehyde (formalin)
Methanol
N-Methylpyrrolidone
1,2-Propanediol (propylene glycol)
1-Propanole (propyl alcohol)
2-Propanole (isopropanole)

Do not pour more than 1 litre per 24 hours in the sewer!

Most common organic compounds that may be used under a hood:

Acetaldehyde
Acetone (2-propanone)
Acetonitrile
Benzene
Chloroform
Dimethyl sulfoxide (DMSO)
Ethanol (in larger amounts, < 10 ml)
Ethylene glycol (glycol)
Formaldehyde (formalin)
B-Mercaptoethanol
Methanol
N-Methylpyrrolidone
Phenol
1,2-Propanediol (propylene glycol)
1-Propanole (propyl alcohol)
2-Propanole (isopropanole)
Tetramethylethylenediamine (TEMED)

Please note that this list is not exhaustive. All organic compounds should be treated as potentially hazardous and must be handled strictly in accordance with the requirements of the chemical safety data sheet and these safety guidelines.