Pursuant to Article 30 of the Articles of association, and in accordance with Article 9 of the Rulebook on Occupational Safety and Health of the Institute for Biological Research "Siniša Stanković" - National Institute of the Republic of Serbia, University of Belgrade, and based on the favourable view that was taken at the 8th regular session of the Scientific Council held on September 30, 2022 of the proposed amendments to the General and Safety Code of conduct and practice applied to laboratories at the Institute for Biological Research "Siniša Stanković" - National Institute of the Republic of Serbia, University of Belgrade, prepared by the Working Group for amending the text of the General and Safety Code of conduct and practice applied to laboratories at the Institute, the Director of the Institute on 5 October, 2022 establishes

GENERAL AND SAFETY CODE OF CONDUCT AND PRACTICE APPLIED TO LABORATORIES AT THE INSTITUTE FOR BIOLOGICAL RESEARCH "SINIŠA STANKOVIĆ"- NATIONAL INSTITUTE OF THE REPUBLIC OF SERBIA, UNIVERSITY OF BELGRADE

I INTRODUCTION

This General and Safety Code of conduct and practice applied to laboratories at the Institute for Biological Research "Siniša Stanković" - National Institute of the Republic of Serbia, University of Belgrade, regulates working procedures in laboratories within the Institute for Biological Research "Siniša Stanković" - National Institute of the Republic of Serbia, University of Belgrade(hereinafter: "Institute") in terms of ensuring the safety in the workplace in accordance with provisions of the Occupational Safety and Health Law and regulations which were adopted on the basis of this law and general policy of the Institute, as well as the quality of laboratory work and working practices (based on good laboratory practice and appropriate standards and methods). All employees who carry out their scientific and research work within the laboratory are responsible for safe working conditions and for familiarising all co-workers with the content of these regulations and safety measures, including researchers from other research organisations and other associates outside the Institute who are staying at the Institute at that time.

They are also responsible for enforcing safety procedures and maintaining existing control measures in the laboratory, both for themselves and co-workers and visitors to the laboratory, and consequently everyone who works or is in the laboratory is responsible for their own safety and that of others.

Employees are required to report any equipment failure, breakdown or malfunction to a person in charge. Employees are also required to notify the Technical Services department as soon as possible in the event of faulty electrical installations.

All employees must be made aware of evacuation routes along with the location of fire extinguishers, sanitary blocks, lockers and first aid kits. It is the duty and responsibility of every employee who works in the laboratory to be aware of the safety code of practice, general guidelines and safety measures when performing working activities in the laboratory.

When working in the laboratory, health and safety in the workplace implies that employees actively participate in this area and take the initiative to further improve safety standards.

Different procedures that researchers carry out may have their own specific methods, and therefore researchers need to be made aware of the risks and familiar with the safety measures that are applied when performing these specific procedures. Before introducing new procedures, researchers have to do a risk assessment and determine which safety measures must be applied when carrying out these procedures.

Only those employees who are trained and/or authorised to work in the laboratory, i.e. to handle laboratory equipment/apparatus/instruments, can work in laboratories at the Institute and with its equipment/apparatus/instruments.

Students who are studying for Bachelor's degree, Master's degree and PhD degree, as well as associates from other research organisations are required to be trained to work with the given equipment or handle certain instruments, otherwise they shall be considered unauthorised personnel, especially because there is a risk of injury and potential material damage.

When signing an employment contract with the Institute, each researcher should be familiar with the General Code of Conduct and practice applied in the Institute's laboratories, sign a written statement that they are familiar with this Code and be aware of potential risks that can occur while working in the Institute's laboratories (Appendix 1). This written statement will be permanently kept in the employee's personnel file.

The afore-mentioned written statement is mandatory for all employees of the Institute who carry out scientific or research activities in laboratories at the Institute, as well as for researchers who are not employees of the Institute, but take part in those activities (Appendix 2).

II GENERAL LABORATORY SAFETY CODE OF PRACTICE

Occupational safety in the laboratory is based on procedures that ensure safety and protection of employees, visitors, the general population and the environment against physical, chemical and biological hazards.

1. GENERAL CODE OF PRACTICE – THE USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE POLICY)

When carrying out laboratory experiments, all researchers are required to wear personal protective equipment (PPE). PPE includes a lab coat or other protective clothing: gloves, safety glasses, safety goggles, shoe covers, protective masks and other face shields (visors). PPE is considered as the last line of defense for researchers against harmful substances and therefore it should always be used appropriately.

- Each employee should keep in mind that PPE cannot protect all parts
- of the body, so open-toed shoes, sandals and shorts should not ever be worn in the laboratory.
- Always use an appropriately selected set of PPE.
- PPE must be the correct size and fit the individual user.
- Before using PPE, users should inspect and check if there are any defects or damage to the PPE. Never use and wear damaged, defective or faulty PPE.
- Gloves and other disposable equipment should not be used more than once.

- On completion of work with biological hazards, gloves and other single-use protective equipment should be removed and disposed of in medical waste container.
- Do not wear PPE outside the laboratory.
- Do not clean or wash protective clothing at home.
- Clean surfaces must not be touched with gloved hands. If it is needed to use gloves when handling the equipment, those surfaces must be appropriately decontaminated. Alternatively, two pairs of gloves should be worn or a pair of gloves should be replaced with clean one.
- Before as well as after using PPE, hands should be always washed with soap and water.

1.1. Gloves

There are several types of gloves designed to suit different purposes and needs of researchers at the Institute. Disposable or single-use gloves are the most widely used type. These gloves can be sterile or non-sterile, resistant to temperature or sharp objects. They can also be of different materials where: latex, vinyl or nitrile gloves are the most commonly used. The choice of gloves depends on the procedures carried out by a researcher and potential hazards (biological, chemical, physical). It should be borne in mind that the majority of procedures also require a researcher's tactile sensitivity, so whenever such procedure allows, it is preferable to use thinner gloves.

The general requirements for gloves selection are:

- Use comfortable gloves.
- Use gloves that cover the wrists, so that when wearing a lab coat, the whole hand is protected.
- Use longer, thicker gloves for both high and low temperatures (e.g. when filling and emptying autoclaves or handling liquid nitrogen).
- Since they are worn frequently and wetted with disinfectants or other liquids, it leads to greater permeability of the gloves. That is the reason why gloves should be changed periodically if they had to be worn for extended period of time, especially after being contaminated by hazardous agents.
- If there are any skin injuries, in cases of working with biological hazards, the injured area needs to be covered with a plaster; wear two pairs of gloves during working activities until the injury is completely healed. If symptoms of latex allergy appear, gloves made of this material must no longer be used.
- Gloves should be removed using the aseptic procedure: by grasping the outside of the cuff of one glove without touching the skin and pulling the glove off turning it inside out. When one glove is in the gloved hand, place the free index finger inside the other glove and pull it off the same way, inside out, wrapping the first glove that was removed. At that point the gloves can be disposed of safely in medical or other waste container.
- For further safety and in order to ensure sterile conditions and aseptic work area, researchers may wear two pairs of gloves. Additionally, by removing the first pair, contamination of equipment and surfaces in their further work activities will be avoided.
- In case of working with chemical and biological hazards, it is necessary to use nitrile gloves which provide greater mechanical (cut resistance) and chemical resistance, as well as sufficiently reliable protection against viruses and bacteria.

1.2. Face protection

Face protection is a part of PPE designed to prevent or reduce the exposure of researchers when working in laboratory to adverse health effects associated with physical, chemical or biological hazards. In accordance with the requirements of the procedure, the face (mouth, nose, eyes) is protected by using a visor, mask and/or safety glasses. In that regard, researcher must do a risk assessment and use an adequate face protection. For example, it is necessary to use surgical or NP95 masks when measuring mass, as well as when working with powdered materials that create an aerosol, i.e. that rise easily up into the air. The use of a mask is also necessary when entering the area of the Animal Breeding facility. Wearing contact lenses in the laboratory poses a particular risk, therefore the use of safety glasses or goggles is always recommended.

1.3. Lab coats and other laboratory clothing

The use of laboratory coats at work is necessary and mandatory part of good laboratory practice. Along with selecting consciously and conscientiously other laboratory clothing (which covers all parts of the body), the lab coat serves to protect the skin from contamination.

Wearing loose or uncomfortable protective clothing also poses a risk that should be avoided. Clothing made of synthetic fibers should not be worn when working with flammable substances, or when there is a risk of fire, because these fabrics tend to melt and stick to the skin that has been exposed.

It is required to wear disposable shoe covers when entering the premises of the laboratory Animal Breeding facility. The use of surgical caps/hats is recommended according to the needs of each researcher.

2. GENERAL SAFETY CODE OF PRACTICE WHEN HANDLING LABORATORY EQUIPMENT

Most of the equipment and instruments are very sensitive and expensive, therefore all employees who use them in their work are required to familiarise themselves thoroughly with operating instructions and possible implications related to safe handling before using the equipment.

Incorrect use of equipment and instruments can lead to various types of injuries, as well as result in higher repair/overhaul costs.

2.1. Correct use of laboratory pressure vessels

It is important to know that laboratory pressure vessels can explode, for that reason sealed/closed vessels must not be heated up unless they are specially designed for that purpose.

Moreover, when filling a laboratory vessel with gas under pressure, it is necessary to make sure that pressure does not exceed the critical value for a given material the laboratory vessel is made of.

When operating an autoclave, it is necessary to make sure that:

- work is carried out only by a person who is qualified or trained for it.
- a person must wear personal protective equipment.

- autoclave should be properly filled and emptied.
- before opening an autoclave, it is checked that the pressure in autoclave has been returned to atmospheric.
- autoclave as well as the door opening/closing mechanism are working correctly.
- the door opening/closing mechanism, temperature and pressure regulators are checked periodically.
- laboratory glassware exclusively made of durable/resistant glass is used.
- glass containers holding chemicals must not be closed, in order to avoid the risk of splashing and breakage.
- in case of defect or failure, a licensed lab equipment maintenance and repair company should be contacted.

2.2. Correct use of heating equipment

Electric devices that release heat in the laboratory include: annealing furnaces, hot plates, Bunsen burners, water and oil baths, drying ovens, dry heat sterilisers, etc.

When using this type of equipment, it is necessary to:

- check if device has an automated shutdown mechanism in case of overheating, i.e. thermostat and temperature controller which turns off device immediately when it is overheated.
- inspect that power cables are in working order and call qualified technician to replace them, if necessary.
- check that a device is maintained in accordance with the manufacturer's requirements.
- never leave heating equipment unattended.
- check that all devices are switched off before leaving the laboratory.
- if the Bunsen burner is used for sterilising instruments, first place an instrument into the orange cone – cold part of the flame, and then into the blue cone - warmer part of the flame.
- if the Bunsen burner is being used for a longer time, always regulate the color of the flame (to become yellow – known as the safety flame).
- heat a substance/contents in the test tube gradually, whereby the open end of the tube must not be pointed towards yourself or people around you.
- after turning off the hot plate heater, allow metal and glass containers to cool down before storing them away.
- swirl the liquid gently, while heating it, to avoid splashing.
- place laboratory baths far from volatile and flammable materials.
- make sure that flammable solvents are not used in heated baths.
- move the lab bath only when the liquid filling it has cooled down to avoid the risk of burns and scalds.
- set the thermostat well below the liquid level in the laboratory bath and
- immerse the thermometer in the liquid whenever the bath is being used in order to control the current temperature.
- allow the surgical instruments to cool down after sterilisation before taking them out of an autoclave or take them out by using auxiliary tongs.

2.3. Correct use of cooling equipment

- lab refrigerators, freezers, chambers containing solid carbon dioxide (dry ice) and ice machines should be defrosted and cleaned periodically.
- face protection and protective gloves should be worn during cleaning.
- after cleaning, the internal surfaces should be disinfected.
- all chemicals stored in coolers must be clearly labeled (chemical name of contents, date of storage and name of the person who stored them).
- unlabelled materials and those which are stored for a long time should be properly disposed of
- keep records of the freezer contents.
- it is necessary to maintain hygiene and to use space rationally in lab cold rooms.
- wash and clean liquid nitrogen canisters periodically.
- canisters for long-term storage of samples in liquid nitrogen are serviced periodically by licensed maintenance company.

2.4. Correct use of centrifuge and ultracentrifuge

The basic rule regarding the correct use of centrifuge and ultracentrifuge is to operate the centrifuge according to the manufacturer's instructions.

- the centrifuge must be placed safely on the laboratory table, and the ultracentrifuge on a solid level surface.
- the rotor, test tube rack (holder)and test tubes should be inspected for the possible occurrence of corrosion and small cracks before their use.
- keep the centrifuge lid closed.
- do not leave the centrifuge running unattended until you are sure that it has been started safely without vibration.
- test tubes and centrifuge vessels in the holders must be loaded and balanced, i.e. put two at the same time, one opposite the other, in the appropriate place, if the centrifuge vibrates, stop it, open it and check the balance of the placed cuvettes.
- never open the centrifuge lid until the rotor is completely stopped.
- never attempt to mechanically slow down or stop the rotor.
- incorrect handling may result in test tube breaking and splashing of content.
- test tubes used in centrifuges must be made of toughened glass or plastic and should be checked for damage before use.
- distilled water or alcohol (isopropanol 70%) should be used for balancing empty test tubes; saline or sodium hypochlorite solutions should not be used because they lead to metal corrosion.
- when using centrifuges with fixed-angle rotors, be careful not to overfill the test tube because the tube content may leak out.
- the inside of the centrifuge drum, rotor and the tube and rotor holders should be wiped after each use and
- the test tubes should be emptied, washed and dried after use.

2.5. Correct use of the digester

- before starting an experiment, check that the ventilation is working properly.
- clean the work surface of the digester before and after use.
- always work in digester when handling hazardous and volatile substances.
- keep the sliding doors and windows of the digester closed during work.
- never put your head in the digester, and keep your hands outside the digester as much as possible.
- chemicals and equipment should not be stored in the digester, but in the rooms intended for that purpose.
- Place devices and potential sources of radiation deeper into the chapel, at least 15 cm from the opening.
- ventilation openings must be completely unblocked.
- pay attention that external ventilation in the room (open doors, windows, heating or cooling) does not interfere with the air flow in the digester and
- when not in use, sliding doors of the digester must be closed.

2.6. Correct use of electrical equipment

- check regularly all electrical equipment and installations, including the earthing/grounding system.
- electric cables must not be positioned on the floor, or in the immediate vicinity of a sanitary block and sources of heat.
- any damage that is observed must be reported to the person in charge.
- handling liquids inappropriately or spilling them on the electrical equipment must be reported immediately to the person in charge.
- volatile chemicals must be kept away from the electrical equipment that may create sparks.

2.7. Correct use of ultraviolet lamps (UV lamps)

- when working with a UV lamp, wear eye protection (safety glasses with UV protection) and gloves.
- before starting work, check if the UV lamp works by placing white paper under the lamp.
- never look directly at the source of UV radiation and
- avoid exposure to UV radiation and protect the skin from possible burns.

2.8. Working safely with sharp instruments

- The use of sharp instruments should be minimised and avoided in all cases where there is an alternative (for example, replace glassware with plastic when the procedure allows).
- Do not dispose of used sharp instruments in ordinary waste bins, but only in the designated containers.
- When handling single-use sharps, the disposal container should be positioned so that a researcher can dispose of sharps quickly and safely.

- Needles should never be recapped.
- Needles should not be manipulated by hand, in the sense of bending or breaking them, etc.
- Needle and syringe should be disposed of immediately after use.
- Do not overfill the container for sharps disposal and close it when it is 2/3 full.
- Never pick up sharp instruments or broken glass with your hands.

3. SAFETY CODE OF PRACTICE WHEN WORKING WITH CHEMICALS

Acids, bases, corrosive agents and solvents are very dangerous substances and if used incorrectly, these chemicals can cause serious damage to the tissue and organs, such as burns, suffocation and genetic damage. It is everyone's duty to take all protective measures when working with any of these chemicals by following instructions in accordance with safety procedures.

The work surface should be resistant to water, chemicals and disinfectants that are used as well as resistant to moderately high temperature. Only objects and reagents used in everyday work should be kept on the work surface.

Laboratories should store only chemicals that are necessary for daily work, whilst other chemicals should be placed in safety cabinets, outside the Institute’s building.

Chemical waste generated while carrying out work activities in the laboratory should be temporarily disposed of in laboratory, in the place designated for waste disposal. It is necessary to keep chemical waste in the suitable packaging which is clearly labelled with full details of the contents, amount of waste, date when the waste was generated and the name of the person who is responsible for carrying out the specific research. The Head of the Department has a duty to hand over the chemical waste and the list of submitted chemical waste to the Head of Technical Service department on the first day of each month.

3.1. Hazardous substances

All hazardous substances/chemicals can be classified into following groups: highly toxic, toxic, harmful, corrosive, irritant, explosive, oxidising, flammable, and combustible.

3.1.1. Highly toxic substances

Highly toxic chemicals include the following substances used in chemical laboratories: AsCl3, As2O3, aluminium phosphide, allyl chloride, acrylic aldehyde, acrolein, ammonium dichromate, beryllium and its compounds, boron halides, $Cd(CN)_2$, KCN, mercury, lead, benzyl chloride, etc.

3.1.2. Toxic chemicals

Toxic chemicals include the following inorganic and organic compounds: Inorganic compounds include: most bases (NaOH, KOH, $Ba(OH)_2$, NH3...), acids (HCl, HClO4, H_2SO_4, H_3PO_4, HNO_3...), divalent mercury salts (nitrates, chlorides, iodides ...), cadmium salts, copper salts (nitrates, chlorides), chromium compounds (oxides, chromates, dichromates), calcium salts, fluoride compounds, lead salts, antimony and its oxides, hydroxylamine hydrochloride, thorium salts, iodine, thiocyanates, NH_4Br, $CoBr_2$, silver salts (oxides, sulphates), some sodium salts

(nitrites, nitrates, borates, sulphide), $BaCl_2$, nitrates, zinc sulphates, thionyl chloride, potassium hexacyanoferrate (II) and (III), asbestos and others.

Organic compounds include: acetonitrile, allyl alcohol, aniline, formaldehyde, benzene and most of its compounds, benzidine, nitrobenzene, benzyl chloride, trichloroethylene, pyridine, phenol and its compounds, concentrated acetic acid, acetanhydride, hexamethylenetetramine, ethylene glycol, methanol, oxalic acid, picric acid, sulfanilic acid, thioacetamide, carbon tetrachloride, dimethyl sulfoxide, butadiene and other organic compounds.

3.1.3. Harmful chemicals

Harmful chemicals include a large number of substances used in chemical laboratories: acetaldehyde, acetamide, acetone, acetyl acetone, amino ethanol, aminophenol, amyl alcohol, azobenzene, benzyl-benzoate, benzyl-alcohol, butanol, benzoic acid, diethyl ether, phenylacetic acid, toluene, copper salts (acetates, sulphate, oxide), barium salts, sodium salts (sulfite, thiosulfate, carbonate, chlorate), antimony compounds, tin, ammonium halides, chlorides (lithium, lanthanum, tin, iron, copper, cobalt, strontium, manganese, magnesium...) nitrates (aluminium , barium, calcium, zinc, strontium, silver, iron, cobalt...), boric acid, dimethylglyoxime, quinhydrone, caffeine, potassium iodide, EDTA, ammonium.

3.1.4. Corrosive substances

A great number of chemicals have corrosive properties, e.g. sulphuric, nitric, phosphoric and hydrochloric acid, as well as organic carboxylic and sulphonic acids. Phenol is particularly dangerous, because it is poisonous and penetrates rapidly through the skin. Alkalis, such as sodium and potassium hydroxide, ammonia and organic bases, also have corrosive properties. Damage to the skin and respiratory organs can also be caused by hydrogen chloride, bromine, thionyl chloride, anhydrous aluminum chloride (knows as aluminum trichloride), etc. Dangerous and corrosive chemicals also include oxidants, such as: a mixture of nitric and sulphuric acid, a mixture of sulphuric acid and potassium dichromate, ozone, hypochlorites, hydrogen peroxide, peracids, chromium trioxide, potassium permanganate and similar substances.

3.1.5. Irritant substances

Irritant substances are those dangerous substances which through immediate, prolonged or repeated contact with the skin or mucous membrane cause inflammation or irritation. Irritation is often a milder form of the effects that corrosive substances have because they can also cause damage to the skin and mucous membrane through direct contact or to the respiratory tract and internal organs in case of swallowing or inhaling fumes. Therefore, as a rule, diluted solutions of corrosive substances have an irritating effect.

3.1.6. Explosive substances

Explosive substances are substances that undergo a very rapid chemical transformation, releasing a large amount of gases and heat. Explosive substances include a great number of organic nitroso and nitro compounds, nitric acid esters, diazo compounds, azide acid and its salts and

esters, isocyanic acid salts, acetylene and its derivatives, heavy metal perchlorates, organic peroxides and peroxy acids. Mixtures of oxidising compounds, e.g. nitrate, chromate, chlorate, perchlorate, fuming nitric acid, concentrated perchloric acid and hydrogen peroxide solution (>30%) with flammable compounds or reducing agents may have explosive properties. Given that explosive substances can explode due to mechanical impact, high temperature and chemical reaction, while releasing a large quantity of gases, heat, and often toxic fumes, they must be handled with extreme care.

3.1.7. Oxidising substances (agents)

Oxidising substances are agents which spontaneously release oxygen at room or slightly elevated temperature, or which accelerate the burning rate of flammable substances. They can form explosive mixtures with flammable and organic substances or substances that are easily oxidised.

Oxidising substances pose a serious fire and explosion hazard.

Based on the level of their effect, they are divided into four classes:

Class 1: slightly accelerate, but do not cause spontaneous combustion of flammable substances when they come into contact with them (nitrates of aluminium, silver, magnesium, alkaline and alkaline earth peroxides, perchloric acid, dichromates of alkali metals);

Class 2: moderately accelerate or cause spontaneous combustion of flammable substances when they come into contact with them (perchlorates, chlorates, hypochlorites, nitric acid, potassium permanganate, bromine);

Class 3: greatly accelerate the combustion rate of flammable substances when they come into contact with them and cause violent decomposition of flammable substances if exposed to sufficient temperature (ammonium dichromate, concentrated hydrogen peroxide, potassium bromate);

Class 4: they can explode if exposed to some contaminants, slightly high temperature, impact or friction, they also increase the burning rate of flammable substances and can cause them to spontaneously ignite (ammonium perchlorate and ammonium permanganate, tetranitromethane). In addition to oxidising properties, these substances can be corrosive and toxic or can release irritating, toxic or corrosive gases in a chemical reaction. They can cause harmful effects depending on the type of substance and the way they entered the body (inhalation, skin or eye contact, swallowing (ingestion)). They can cause irritation of respiratory tract, burns to the skin or the ocular mucous membrane and injuries to the digestive system.

3.1.8. Flammable and combustible substances

Flammable substances are substances which can ignite more easily, lead to a fire, and can be gases, liquids or solids.

Combustible substances (liable to spontaneous combustion) are substances which are spontaneously flammable and can be prone to self-heating under normal conditions or can be liable to heating up (in contact with air) to the point of ignition, emit flammable gases or become spontaneously flammable when in contact with water or steam.

Flammable/combustible substances include: gases - natural gas, propane, butane, methane, acetylene, carbon monoxide, hydrogen sulphide, etc.; flammable gases have an explosive limit in the air generally higher than 13%; liquids: solvents such as acetone and alcohol, ether,

paints and thinners, gasoline, glues, etc. Flammable liquids have a flash point below 37.8°C, and combustible liquids usually above 37.8°C but bellow 93.3°C.

3.2. General safety measures when working with chemicals

Before using any chemical, researchers must pay attention to the labels on the packaging (Globally Harmonised System of Classification and Labelling of Chemicals (GHS)) and familiarise themselves with information on safe handling (given for each chemical in the Material Safety Data Sheet - MSDS). Chemicals of unknown toxicity must be treated as if they were highly toxic. Unmarked/unlabelled chemicals of unknown composition must not be used.

When working with chemicals, there is a possibility that a dangerous substance can enter the body in different ways (inhalation, skin or eye contact, swallowing (ingestion)), and general safety measures in the afore mentioned cases are:

1. If there is a possibility that a hazardous substance could enter the body by inhalation:

- do not inhale gas/smoke/vapours/aerosol emitted from harmful substance.
- do not inhale dust.
- store it in well-sealed containers.
- store it in a well-ventilated area.
- avoid inhaling vapors of these chemicals and work with them in a digester or in well-ventilated rooms.
- in case of insufficient ventilation, wear respiratory protective equipment and
- do not carry or transport chemicals in open-topped containers.

2. If there is a possibility that a hazardous substance could enter the body by swallowing:

- do not eat or drink when handling and
- use three-way pipette bulb for pipetting chemicals, mouth pipetting is prohibited!

3. If there is a possibility that a hazardous substance could affect the body through the skin:

- prevent or avoid skin contact.
- do not eat or drink when handling and
- wear appropriate protective clothing and protective gloves.

4. If there is a possibility that a hazardous substance could affect the eyes:

- it is mandatory to wear safety glasses.
- store it in well-sealed containers.
- store it in a well-ventilated area.
- due to the risk of chemicals coming into contact with eyes, the working area should be equipped with a suitable device for rapid eye, face or body wash
- it is necessary to carry out experiments in a digester.

A general note regarding handling chemicals is that upon completion of work where these chemicals were used, the chemical container should be wiped if spillage occurred while

transferring chemical from one container to another. Also, after working with chemicals, hands must be washed with soap and water. If potentially hazardous chemicals are spilled, the packaging and chemical itself should be picked up carefully, in accordance with the procedure provided in the instructions for safe handling of a given chemical.

3.3. Safe disposal of chemical waste

Chemical waste should be temporarily disposed of in the laboratory, in the place designated for waste disposal. It is necessary to keep chemical waste in a suitable packaging which is clearly labelled with full details of the contents, amount of waste, date when the waste was generated and the name of the person who is responsible for carrying out the specific research. The Head of Department hands over chemical waste to the Head of Technical Service on the first day of each month, along with a list and detailed description of the waste that is handed over; if necessary, chemical waste is handed over to the Head of Technical Service more frequently, followed by a previous notification from the Head of Department. Waste is stored in a space that meets the standards for temporary storage. Waste analysis is carried out by licensed and accredited laboratory which issues a Certificate of waste classification. Chemical waste is collected and stored according to previously obtained document on waste classification issued by accredited laboratories. Waste is collected by licensed operator where the frequency of collection depends on the amount of waste being generated.

4. GENERAL SAFETY CODE OF PRACTICE WHEN WORKING WITH GASES

Some of compressed gases that are used may be toxic, corrosive, flammable or explosive. When using gases, hazards can be significantly reduced by ensuring their safe storage and use of suitable equipment, ventilation, safety valves, etc., as well as by controlling safety procedures. Before starting any laboratory work, it is everyone's responsibility to thoroughly study and follow the instructions on the safe handling of gases, bearing in mind that the consequences they cause can be catastrophic.

4.1. Basic requirements related to the transport, use and storage of compressed gas cylinders

- cylinders should be transported with protective valve caps in place and carried by gas cylinder trolley.
- cylinders should be stored in a suitable storage area within a lockable room placed far away from the laboratory.
- rooms where flammable gas cylinders are used or stored must be clearly marked with safety warning signs posted on the doors.
- high-pressure gas steel cylinders must be stored vertically in an upright position and attached to the wall (secured with chains) or to solid stands so that they cannot be easily toppled over in case of negligent behaviour.
- the main valve must be closed when the equipment is not in use and
- cylinders should not be stored near any sources of heat such as radiators, open flames, sparks (of electrical equipment), or in a place directly exposed to sunlight.

- high-pressure cylinders are maintained and serviced by licensed maintenance and repair company.

4.2. General guidelines when working with cryogenic liquids (liquefied gases)

- cryogenic gloves designed for extremely cold temperatures and a face mask must be used when handling liquefied gas (liquid nitrogen) because severe burns can occur and
- never stick the head into a dry-ice chest (due to the lack of oxygen).

5. GENERAL SAFETY CODE OF PRACTICE WHEN EXPOSED TO BIOLOGICAL HAZARDS

The term biological hazard refers to biological agents defined as any micro-organism, cell culture and human endoparasite including those genetically modified which may cause infection, allergy or toxicity. Biological hazards are classified into four different hazard groups, according to the risk of infection.

Hazard Group 1 includes agents that are unlikely to cause human disease (i.e. cell cultures obtained from tissue of laboratory animals).

Hazard Group 2 includes agents that can cause human disease and may pose a hazard to employees but are unlikely to spread to the community and there is usually effective prophylaxis or treatment available.

Hazard Group 3 includes agents that can cause severe human disease and may be a serious hazard to employees. In addition, they may spread to the community, but there is usually effective prophylaxis or treatment available.

Hazard Group 4 includes agents that can cause severe human disease and are a serious hazard to employees. In addition, they are likely to spread to the community and there is usually no effective prophylaxis or treatment available.

In that sense, depending on the biological agent risk assessment, the Rulebook on application of preventative measures for occupational health and safety when exposed to biological hazards (Official Gazette of the RS, no. 96/2010 and 115/2020), also provides safety precautions to be applied regarding biological safety (Biological safety level-BSL), given in Table 1.

Biological safety level	**Type of laboratory**	**Laboratory practice**	**Examples**
Basic BSL-1	Educational-research laboratories	Good laboratory practice (GLP), PPE (lab coat, gloves and the rest of equipment is worn as per need), work can be performed on an open lab bench or table, laboratory waste management is regulated	Working with body fluids, tissues and cell cultures derived from laboratory animals, working with cell cultures of determined origin. Working with non-pathogenic strain of *E. coli*
Basic BSL-2	Research laboratories, institutions providing healthcare and diagnostic services	GLP, PPE (lab coat, gloves, the rest of equipment as per need), biological hazard is indicated by biohazard warning sign, access to the laboratory is	Working with body fluids, tissues and cell cultures of insufficiently determined origin: patients, wild or feral animals.

		controlled, laboratory waste management and disposal is regulated, biological safety cabinet (BSC) is used for performing all procedures involving agents that can generate aerosols	Working with Staphylococcus aureus
Moderate control measures, BSL-3	Research laboratories, laboratories providing specialist diagnostic services	GLP, appropriate and specialist PPE must be worn, all work with microbes must be performed within BSC, training programmes for working safely with infectious agents are provided, laboratory must have sustained directional airflow	*West Nile* virus
Maximum containment measures, BSL-4	Special lab units for performing work with dangerous pathogens. The laboratory is in a separate building or in an isolated and restricted zone of the building.	BSL-3 lab practices, a full body, air-supplied suits must be worn, laboratory has dedicated supply and exhaust air, with air decontamination chamber at the entrance and decontamination shower at the exit, special waste management procedure is applied.	*Ebola* virus

Table 1. Recommended Biosafety levels. Abbreviations: GLP- Good laboratory practice, BSC – Biological safety cabinet.

It is the duty of each researcher to do a risk assessment before starting work with a new biological agent, bearing in mind that research activities including biological agents which belong to the 1st and 2nd category of biological hazards, i.e., require biological safety level 1 and/or 2 may be carried out at the Institute.

5.1. General guidelines for biological safety

- no eating, drinking or smoking is allowed in the laboratory.
- storage areas, i.e. laboratory refrigeration units (fridges) in which organisms posing biological hazard are stored should be clearly labelled using the biohazard warning sign.
- avoid touching the eyes, nose, or mouth with gloved hands.
- do not pipette by mouth.
- wear appropriate PPE, in accordance with the risk assessment.
- reduce or eliminate the use of sharp instruments, and if their use is necessary, handle them carefully.
- use BSC in case there is a risk of generating aerosols.
- disinfect all work surfaces before and after use.
- wash hands after removing PPE, touching contaminated material, and before leaving the laboratory area.
- in the event of spill, splash and other accidents while handling biological hazards, immediately decontaminate the surface with suitable disinfectants.

- biological waste that has been generated during work in the laboratory must be disposed of in accordance with the current Waste Management Plan, i.e. the Medical Waste Management Plan of the Institute. The waste is disposed of in the suitable packaging which is clearly labelled with full details of the contents, amount of waste, date when the waste was generated and the name of the person who is responsible for carrying out the specific research.

5.2. General Code of practice applied to Clean rooms

- it is mandatory to wear coat intended for working only in a clean room, as well as other PPE in accordance with the risk assessment.
- when entering a clean room, turn off the central UV lamp.
- before starting work, disinfect your hands with sanitising products intended for disinfection.
- clean the working surface of BSC with 70% ethanol before starting work.
- while carrying out work in BSC, use only the intended equipment which is already in the BSC.
- dispose of all liquid waste in a special container holding a disinfectant.
- during work, dispose of solid waste in places clearly marked for solid waste disposal.
- after finishing work in the laminar flow cabinet, clean the work surface with 70% ethanol.
- close the lid on the BSC and turn on the UV lamp in the BSC.
- clean all work surfaces outside the BSC with 70% ethanol.
- check that the incubator door is well closed.
- check that microscope illuminator is switched off and
- store the coat in the designated place.

5.3. General Code of practice applied to microbiology laboratory

- wear a clean, white coat while working in the laboratory.
- do not touch your eyes, nose and mouth during work.
- when entering and leaving the laboratory premises, hands must be washed with soap and disinfected.
- do not put already used instruments and glass material on the work surface, but in previously prepared and labelled containers holding disinfectant preparation.
- Pass the mouth of test tubes, neck of Erlenmeyer flasks and Petri dishes through the flame to sterilise them before handling any bacterial material.
- disinfect work surfaces before and after the experiment and
- all material that came into contact with microorganisms must be decontaminated; after use, store it in tubs with disinfectant, leave it for several hours and after rinsing with tap water and then with distilled water sterilise it.

5.4. General safety Code of practice when working with genetically modified organisms (GMOs)

In comparison to the classification of biological hazards, genetically modified organisms (GMOs) are also classified according to the levels of risk to human health, animals, plants and the environment as follows:

I - Risk class 1 (low risk to the researcher and the community) - GMOs containing the DNA/and RNA of the donor organism are unlikely to cause human or animal disease and have no adverse effects on plants and the environment.

II - Risk class 2 (moderate risk to the researcher and low risk to the community) - GMOs containing DNA/and RNA of the donor organism pose a moderate risk to human and animal health, but the risk of dissemination and adverse effects on plants and the environment is low.

III - Risk class 3 (high risk to the researcher and moderate risk to the community) - GMOs containing DNA/and RNA of the donor organism pose a high risk to human and animal health, while the risk of dissemination and adverse effects on plants and the environment is moderate.

IV - Risk class 4 (high risk to the researcher and high risk to the community) - GMOs containing DNA/and RNA of the donor organism pose a high risk to human and animal health, and there is a high risk of dissemination and adverse effects on plants and the environment.

It is the duty of each researcher to do a risk assessment before start working with a new GMO, bearing in mind that research can only be carried out at the Institute with GMOs that require the 1st or 2nd level of biological safety, and must not be taken outside the area of the Institute's laboratories.

When working with GMOs, it is essential to comply with general biological safety guidelines and procedures, as well as to apply additional lab practices as follows:

- access to the laboratory during procedures involving GMOs is restricted
- or prohibited.
- researchers should keep records of when GMOs were created, how they are stored and how they propagate, as well as of details related to the genetic modification procedure itself.
- GM plants and other organisms must be visibly labelled so that researchers would be able to identify them.
- if grown in a greenhouse, transgenic plants must be separated from non-transgenic plants in an appropriate manner, in order to prevent pollen dispersal.
- bacterial culture and stocks, as well as other biological waste should be immersed in a sodium hypochlorite solution (bleach or similar products containing active chlorine), or decontaminated by the usual autoclave procedure, for at least 30 min at 121 °C, and 0.1 MPa. After this procedure, biological waste can be treated the same way as municipal waste.
- plant material (transgenic plants) that needs to be destroyed and laboratory solid waste (nutrient and culture media, laboratory dishes) should be placed in autoclave bags together with indicator strips and then transferred to the autoclave and sterilised in it for at least 30 min at 121 ° C and 0.1 MPa. After this procedure, biological waste is treated the same way as municipal waste.
- the soil on which transgenic plants were grown needs to be sterilised in the autoclave in the same manner, in order to eliminate any residual pathogens, seeds, or plant material.
- pots, honeycomb pots and other plastic items should be thoroughly cleaned and washed.

5.5. General safety Code of practice when working with insects

5.5.1. Safety guidelines when working in the Drosophila/Fly facility

- all researchers working in the Drosophila/Fly facility are responsible for the safety and maintenance of the Drosophila/Fly facility and its equipment at all times.
- when working in the Drosophila/Fly facility, wearing a lab coat is advised.
- at each use, check the temperature of the room itself and devices that are in it.
- it is preferable to have a mobile phone with you while using the Drosophila facility and
- check that the door is properly closed.

5.5.2. Safety guidelines when working in the Insect rearing chamber

- use appropriate laboratory clothing and footwear in the Insect rearing chamber.
- check that the safety door is properly closed.
- check the stability of the monitored parameters (temperature, light regime, humidity) in the Insect rearing chamber and
- check that consistent level of hygiene is being maintained in the Insect rearing chamber.

5.6. Safety Code of practice when working with laboratory animals

The procedures related to working with animals that are used in experiments and testing at the Institute have been regulated more closely by Institute's general policy, taking into account the following: bringing newly arrived laboratory animals into the housing area within the Institute's building, defining health parameters for laboratory animals, microbiological monitoring and surveillance programme, planning procedures to be applied when laboratory animal health and welfare problems occur (e.g. deterioration in animal's physical health) as well as procedures that must be followed by researchers, other lab users working with laboratory animals and employees in the Animal Breeding facility when performing experiments on animals.

Medical waste generated during laboratory work should be disposed of in appropriately labelled waste bins placed in the operating room.

III THE MOST COMMON LABORATORY INJURIES AND PROCEDURES FOR ADMINISTERING FIRST AID

1. TYPES OF INJURIES THAT COMMONLY OCCUR WHEN WORKING IN THE LABORATORY

Injuries that may occur while working in the laboratory can be divided into the following groups: mechanical, thermal, electrical, chemical and poisoning.

In the event of an injury, it is of the utmost importance to remain calm and provide assistance to an injured person. Sustaining any injury can lead to loss of consciousness preceded by symptoms including skin pallor, cold sweat and shaking. The basic rule is that an injured person should be laid down with their head positioned lower than the body (except when an injured person sustained a head injury that is bleeding), wrapped in a blanket to keep them warm, given stimulants in the form of tea, coffee, etc., and given to inhale smelling salt, acetic acid, alcohol, aromatic substances.

1.1. Mechanical injuries

Mechanical injuries most often occur when working with glassware and are manifested as cuts and bleeding. There are three different types of bleeding depending on which blood vessel is injured: capillary, venous and arterial.

1. capillary bleeding - it occurs when small blood vessels, capillaries, are injured. This bleeding usually stops on its own or by applying direct pressure over the injured area. The wound should be cleaned with alcohol or iodine solution, having all foreign material removed unless it is deeply embedded and covered with sterile gauze.

2. venous bleeding - it occurs when the veins, blood vessels that carry blood back to the heart, are injured. It is recognisable by the fact that the blood is dark red or purple in color and flows out steadily from the wound. Do not wash the wound, but stop the bleeding as quickly as possible by applying direct pressure over the wound with sterile gauze or by using a compression bandage, rubber tube tourniquet, scarf, necktie... The bandage should be tied 10 cm below the cut and it must not be too tight for longer than 15 minutes. Then it must be loosened to restore blood flow and after a few seconds tightened again.

3. arterial bleeding – this type of bleeding is much more severe than venous bleeding. The blood is bright red in color and comes out from the wound in rapid pulsing spurts. This bleeding can be stopped by tying a compression bandage above the cut, 10 cm below the armpit or below the groin. The same rule applies here regarding the way how to tighten the bandage.

If the injuries are sustained in body areas where bandage cannot be tied (head, neck) or in case of deep puncture wounds, then the bleeding should be stopped only by using sterile gauze to press over the wound. Due to possible subsequent wound infection, make sure that procedure of administering first aid is performed in the conditions which are as sterile as possible.

1.2. Thermal injuries

Thermal injuries occur when handling fire, hot water, boiling solutions, heated lab glassware, etc. These injuries are manifested as burns which can be of different category degree. If part of the clothing sticks to the burned area, it must not be removed by force, but cut of around the wound.

Burns are divided into four categories depending on their depth and severity:

1. First-degree burns appear red, the skin is easily swollen, painful and warm; there is erythema occurrence without blisters and other damage, and painful area should be bandaged with gauze soaked in tannin or boric ointment while bandage should not be too tight.
2. second-degree burns appear much alike to first degree burn, but in some skin areas burn blisters may be formed which should not be burst, instead gauze pad soaked with NaCl or $NaHCO_3$ solution should be placed over the painful area.
3. third-degree burns cause severe damage to deeper layers of the skin resulting in necrosis of certain skin parts and sometimes of subcutaneous and muscle tissue, necrotic tissue can be dry and leathery or soft and wet in texture.
4. Fourth degree burns are the deepest and the most severe that result in charred skin and tissue. For third and fourth degree burns, seek immediate medical attention.

1.3. Electrical injuries

Electrical injuries are caused by an electric shock. Electric shock often results in the respiratory system failure, cardiac arrest, seizures and muscle spasms. In these cases, immediately turn off the electric power supply and separate an injured person from the source of electricity as quickly as possible, but by using an insulator (rubber gloves, a wooden stick, a dry towel or by standing on a dry insulating board). Then begin performing CPR, after which the injured person should be warmed and occasionally given a large amount of salty water (1 teaspoon of NaCl per 1 liter of water).

1.4. Chemical injuries

Chemical injuries occur while conducting lab experiments involving chemicals. In this case, they result in eye or skin injuries.

If base or acid splashes into the eye, it is necessary to rinse it immediately with a vast amount of clean water and then with a 5% $NaHCO_3$ solution. Seek medical attention.

If the skin is damaged, first aid depends on the type of chemical that have caused damage to the skin:

- injuries caused by concentrated acids (H2SO4, HNO3, HCl, HBr, HF) should be washed immediately with plenty of cold water and then with a saturated solution of $NaHCO_3$ or with a rubbing alcohol or a 3% $KMnO_4$ solution. If concentrated HNO_3 get spilled on the skin, a saturated picric acid solution can be used, while injuries from concentrated H_2SO_4 should be rinsed with water and then with a diluted NaOH solution. Wash the HF injuries (caused by hydrogen fluoride) with water and apply a paste obtained by mixing glycerol and MgO on the wound. Finally, apply burn ointment if necessary.
- injuries caused by concentrated alkalis (bases - NaOH, KOH), sodium peroxide (Na_2O_2) should also be rinsed first with a large amount of cold water and then with a diluted solution, i.e. 5% CH_3COOH or lemon juice or H_3BO_3.
- in case of injuries occurred due to skin exposure to bromine and chlorine (DO NOT RINSE OR WASH WITH WATER!!!), it is necessary to wash the skin with gasoline and then with $NaHCO_3$ solution and finally apply boric or tannic ointment.
- injuries caused by phenol should be washed with ethyl alcohol and then with water and saturated $NaHCO_3$ solution.
- due to exposure to white phosphorus and its effect, skin burns occur which should be moistened with a 2% $CuSO_4$ solution.
- injuries caused by organic substances should be flushed first with an adequate solvent - alcohol, acetone, gasoline, chloroform, etc., and then washed with soap and finally covered with a burn ointment.

1.5. Poisoning

Poisoning can occur if a chemical is being touched or swallowed or if poisonous vapors are inhaled. In cases like that you must take an injured person outside to get fresh air, give them appropriate antidote, assist them to induce vomiting if allowed, prevent possible collapse or loss of consciousness and call a doctor or seek medical assistance immediately.

2. ADMINISTERING FIRST AID

2.1. First aid kit

Within each Department at the Institute there is a first aid kit, which must contain: 10 g of iodine tincture, 20 g of Lugol's iodine solution, 1 l of 0.25% $KMnO_4$ solution, 1.5% H_2O_2 solution, pepsin tablets, oxycyanate ointment 10 g and a broad-spectrum antibiotic.

In case of unintended event (incident), general safety procedure is to inform all employees immediately about the accident.

2.2. Risks that may arise when working with laboratory animals and administering first aid treatment

Laboratory animals (zebrafish, mice and rats) are bred in the Institute's breeding facilities within procedures set in full compliance with the provisions of the Institute's general policy (Rulebook on working with laboratory animals). Animal health and welfare is evaluated by a person trained to work with laboratory animals, a veterinary professional.

Risks that may arise when working with laboratory animals can be divided into three different groups: allergies, infections and injuries.

2.2.1. Allergies

Close direct contact with laboratory animals and their products causes allergies or allergic reactions in some people. Allergies can have severe consequences on human health, and most of them are developed during the first two years of working with laboratory animals. The use of protective face masks, glasses, gloves, protective clothing and regular maintenance of hygiene standards in the laboratory animal facility reduces the incidence of allergies in people. A medical examination and allergy tests are recommended.

2.2.2. Infections

Laboratory animals are bred in the breeding facility under controlled conditions (by applying control measures related to disinfection, sterilisation, asepsis and antisepsis), so the possibility of infection is minimal. Possible infections are prevented by proper breeding of animals under the supervision of an expert who analyses and evaluates their health status.

2.2.3. Injuries

The animals used in lab experiments often have negative or evasive response when trying to capture them, which can result in human injuries (scratches and bites). Wounds caused in this way should be treated immediately, otherwise infections may develop at the injured area.

DIRECTOR

Dr. Mirjana Mihailović

APPENDIX 1

Institute for Biological Research "Siniša Stanković"-
National Institute of the Republic of Serbia
University of Belgrade
Bulevar despota Stefana no.142
11000 Belgrade

STATEMENT

I am fully familiar with the General and Safety Code of conduct and practice applied to laboratories at the Institute for Biological Research "Siniša Stanković" - National Institute of the Republic of Serbia, University of Belgrade, and I am aware of possible risks that may arise while carrying out work activities in laboratories of the Institute.

In Belgrade, on _____

_____
(Name and surname of employee in block capitals)

_____
(Signature of employee and UPIN)*

***UPIN - unique personal identification number**

APPENDIX 2

Institute for Biological Research "Siniša Stanković"-
National Institute of the Republic of Serbia
University of Belgrade
Bulevar despota Stefana no.142
11000 Belgrade

Under full moral and material responsibility, I give the following

STATEMENT

1. That I am fully informed of the General and Safety Code of conduct and practice applied to laboratories at the Institute for Biological Research "Siniša Stanković" - National Institute of the Republic of Serbia, University of Belgrade.
2. That I am fully aware of possible risks that may arise while working in the laboratories of the Institute and that I am familiar with the requirement to wear protective equipment (coat/glasses/gloves, etc.) which I will be using while staying and working in the laboratories at the Institute.
3. I agree to conduct myself in accordance with the instructions given by the competent researchers during my stay and work at the Institute, as well as to comply with working procedures at the Institute, otherwise I accept to bear responsibility for all consequences that may arise as a result of any negligent and inappropriate acts on my part.
4. I take full responsibility for the material and non-material damage that will be caused by any violation of laws, by-laws and general policy of the Institute on my part, and in relation to staying and working at the Institute
5. In the event of any damage to the Institute's inventory or the Institute's facility itself on my part, caused either intentionally or as a result of extreme negligence, I commit and oblige to compensate the damage in full amount.

In Belgrade, _____

Name and Surname

_____

I am staying at the Institute in the capacity of:

_____
(Student – Transcript number and Faculty)

I am staying at the Institute in other capacity:

_____
(ID Card number and issuing authority)

Signature

_____