

Rajiv Gandhi Centre for Biotechnology



Safety Manual

**Prepared by the
Institutional Biosafety Committee**

2010

GENERAL SAFETY

Welcome to Rajiv Gandhi Centre for Biotechnology. Your safety is of paramount importance to us. We do our best to provide you with a safe environment to carry out your research activities. However it is your responsibility as well to maintain a safe environment around you.

Accidents are neither planned nor desired. They are just that – accidents. But most accidents can be prevented if we take appropriate precautions, more so in our laboratories.

So always:

Keep a tidy work area - clutter leads to confusion and errors, and then to accidents. Clean up as you proceed, and always at the end of a working period.

The corridors should be kept free of obstruction. They should not be used for storage of hazardous and combustible materials, and for laboratory activities.

Deal with spilled liquids immediately, disinfecting or neutralizing as needed. Wet floors can be slippery, and corrosive liquids can damage surfaces, thus leading to other hazards.

Transport materials safely. Hot materials such as autoclaved media and glassware, corrosive acids, organic solvents etc should be transported using a tray or trolley depending on the amount and weight.

Never store heavy items or hazardous substances on high shelves. Use a stepladder or stool to reach high shelves. Do not stand on swivel chairs or stools.

Support carbon dioxide and liquid nitrogen cylinders (empty or full) using a proper stand or by securing to a wall or bench. Unsupported cylinders are potentially lethal. Always use a cylinder trolley to transport cylinders.

Children and pets are not permitted in the workplace. When accompanied by an adult they may be permitted in reception areas, library, conference rooms, and toilet facilities which are outside of the main laboratory area. Only in unusual circumstances may this policy be waived, with the prior approval.

PERSONAL SAFETY

Eating, chewing and drinking, and application of cosmetics in laboratory working areas are strictly forbidden. Food and drinks should not be stored in refrigerators that are not exclusively meant for that purpose. Alcoholic drinks will interfere with your fair judgment and may lead to accidents. Consumption of alcohol and smoking are banned in all internal areas of the Institute's premises.

Avoid touching the mouth or eyes while working. Do not lick labels. Never pipette by mouth. If you have to use glass pipettes, always use a rubber bulb or aspirator.

Never use broken/cracked glassware. Attend promptly to

cuts and burns, however minor. Viruses, bacteria, fungi and harmful chemicals can enter your body through unprotected wounds.

Do not attempt to handle heavy or awkward loads on your own without the use of appropriate mechanical aids.

Pregnant women should not be exposed to hazardous substances, radiations or undertake hazardous activities. Talk to the supervisor if you are uncertain of the safety of a material or protocol.

Never work alone in the lab, especially in the night and on holidays.

Personal Protective Equipment (PPE)

Personal protective equipment (PPE) is special gear used to protect the wearer from specific hazards of a hazardous substance. PPE does not reduce or eliminate the hazard; protects only the wearer, and does not protect anyone else. PPE includes protective clothing, gloves, respiratory protection, eye protection etc. The need for PPE depends on the type of operations and the nature of the materials in use. You must understand the functioning, proper use, and limitations of the PPE used. The institute stores would provide you with a lab coat of appropriate size which you should wear over your normal dress while working in the laboratory. All other components of the PPE are decided by your specific work.

Loose clothing (such as dhoti, saree), skimpy clothing

(such as mini skirts, shorts), torn clothing and unrestrained hair may pose a hazard in the laboratory. Long hair must be kept tied back to avoid its becoming entangled in mechanical devices, touching gels and culture plates, obstructing microscopical examinations, and to keep it from catching fire.

Many chemicals cause skin irritation or burns. Absorption through the skin can be a significant route of exposure to certain chemicals. Many solvents such as dimethyl sulfoxide (DMSO), nitrobenzene, etc. can be readily absorbed through the skin into the bloodstream and may cause harmful effects.

Open sandals offer only limited protection from spillages, needles and broken glass. High-heeled footwear is risky. Flat, closed shoes are most suitable in the laboratory.

An appropriate mask/respiratory protection gear must be worn when handling chemicals such as SDS or when working with infectious agents that are transmitted through air. Safeguard your eyes. Suitable safety spectacles or a face shield must be worn when carrying out procedures which involve a risk of splash or impact by harmful materials or risk of exposure to UV radiation. Protect them when carrying out work with glass apparatus at pressures other than normal, or when handling corrosive liquids, liquid nitrogen or materials stored in liquid nitrogen.

Phone calls are always distracting. Refrain from using your mobile phone while working in the lab, especially while you're working in the hood, handling

human/animal tissues or doing experiments with hazardous, toxic chemicals and radioactivity.

Do not touch door handles, elevator buttons or phones with gloved hands.

Leave your PPE behind in the lab and wash your hands with soap and water when leaving the laboratory working area. Never go to meetings or canteen wearing your lab coat.

EQUIPMENT AND APPARATUS

Any new equipment must be installed and tested by the Engineering section before it becomes operational. Do not do it yourself as soon as a machine lands in your lab.

Any apparatus can be dangerous if misused, and this is most likely to happen if the manufacturer's operational instructions are not adhered to. Do read the operation manual before using an equipment. Do not operate machines that you are not familiar with. Always ask someone who knows to show you how to operate it before trying it on your own, however familiar you are with the equipment.

Never interfere with safety devices, or operate equipment contrary to the manufacturer's advice.

Never leave machinery running unattended without first ensuring that it is safe to do so.

Never try to repair any equipment. Report defects to the supervisor without delay. All electrical repairs, including the replacement of tubes, fuses, should be carried out by

the Electrical Section staff.

Ensure that all safety equipment such as goggles and visors, radiation monitors, fire extinguishers, microbiological safety cabinets, fume cupboards are maintained in full working order.

BIOLOGICAL SAFETY

You need to take appropriate precautions before embarking on a specific work and these depend on the materials you handle. Talk to your supervisor about the risks involved and the ways to minimize them. Use appropriate containment facility and follow the safety regulations.

HUMAN TISSUES AND BODY FLUIDS

Exercise caution while handling clinical specimens as they may contain pathogenic viruses, bacteria or fungi. Never let them come into direct contact with skin. Cuts or even invisible abrasions are an easy way into the blood stream. Take care not to handle them without wearing gloves of appropriate grade. Those who handle human blood are required to get vaccinated against Hepatitis B.

GENETIC MODIFICATION

All work involving genetic manipulations of microorganisms, plants and animals should be carried out as per Department of Biotechnology (DBT), Government of India, regulations and should be approved by the Institutional Biosafety Committee

(IBSC) which meets twice a year.

MICROORGANISMS

Under no circumstances must viable human or animal pathogens be deliberately imported into the Institute without first obtaining the written permission of the Chairman, IBSC.

The course work for fresh PhD students includes classes on genetically modified organisms and biosafety regulations in India.

Any question? Talk to the IBSC Chairman.

Dr. Sathish Mundayoor

☎ 2529 512

CHEMICAL SAFETY

Consider all chemicals potentially hazardous. Care must therefore always be taken to prevent them coming into contact with mouth, skin or eyes. Face and hand protection must always be worn when working with liquefied gases, acids, alkalis and other corrosive liquids.

A fume cupboard must always be used for work involving toxic, fuming, or unpleasant smelling chemicals. Before handling them in the hood, always check that there is an inflow of air in the hood. If you suspect that it is not functioning properly, report it to the supervisor.

Spillage: Report all spills to your supervisor. Strong

acids, alkali, phenol etc can cause severe burns if spilled on to the body. Be very cautious while handling them. Don't try to neutralise acid with alkali or vice versa. Contaminated clothing must be removed immediately and the skin flushed with water for fifteen minutes. If spilled on benches and floor, use suitable absorbents (eg. vermiculite) to soak up the spillage, use brush and scoop to place materials in an appropriate polyethylene bag for disposal by suitable means. Decontaminate the surface where the spill occurred using a mild detergent and water, when appropriate. If a volatile, flammable material is spilled, immediately warn everyone, ventilate the area, don't operate electric switches.

Phenol is seldom used in molecular biology labs these days. Work in a chemical fume hood. Use absorbent bench towel/paper. Wear appropriate PPE (lab coat, gloves, eye protection, shoes).

In the event of skin contact, immediately wash with soap or mild detergent and large amounts of water until no evidence of chemical remains (15-20 minutes). Remove contaminated clothing and shoes immediately if necessary. Dilution of phenol in water enhances dermal absorption of phenol. Therefore it has been recommended that PEG (polyethylene glycol), glycerol, or any vegetable oil be used to remove dermal contamination with phenol, if immediately available. After this, wash exposed areas with large quantities of water.

In case of contact with eyes, immediately flush eyes with copious amounts of water for at least 15 minutes (lifting upper and lower eyelids occasionally) and obtain

medical attention. If inhaled, move to fresh air immediately and seek medical attention. In the event of ingestion, if victim is conscious and there is no corrosive injury, remove poison by gastric lavage or vomiting. Activated charcoal (1g/kg) is useful. Follow with a glass (~250 ml) of milk. Seek medical attention immediately.

The PhD course work of RGCB includes a two-hour lecture on chemical safety.

Any question? Talk to the Chemical Safety Officer.

Dr. GS Vinod Kumar

☎ 2529 526

LIQUID NITROGEN

Take great care when moving containers of liquid nitrogen.

Always handle liquid nitrogen in well ventilated area to avoid displacement of oxygen from air.

Never dispose of liquid nitrogen in or into a confined area, or by pouring down a sink. Allow to evaporate in a well ventilated area.

Always protect your face with a face shield. Always wear protective cryo gloves.

Filling a container, or inserting objects into liquid nitrogen, should always be done slowly, in order to minimise boiling and splashing.

Always use plastic vials in preference to glass. Never touch liquid nitrogen or materials frozen in it with bare hands.

Use forceps to withdraw objects immersed in the liquid.

Never store objects in the liquid phase if the vapour phase will suffice. Vials withdrawn from the liquid phase may shatter explosively and should be placed in a secondary container to prevent dissemination of materials.

RADIATION SAFETY

Experiments involving radioactivity should be handled only in the room specified for the purpose. RGCB facility is a type II category. Only authorized personnel are allowed to enter the facility.

Every person who wishes to use radioactive substances must register with the Radiation Safety Officer. You should apply for and obtain a dosimetry badge (used for monitoring exposure to radiation) from the RSO before you can start your work involving radioactive substances.

Purchase of all radioactive biomolecules is done through the RSO. Once the material is received, it is stored under lock and key in a deep-freezer. The issuance of radioactive molecules to the user is recorded.

RGCB has a radioactive waste storage facility. Solid and liquid wastes are segregated in appropriate containers. Once full, the containers are shifted to the storage facility and stored for a minimum of 20 half-lives.

The RGCB radiation protection plan involves appropriate shielding, minimizes time required in the facility, maximizes distance from radiation source and contamination control (protective clothing, post-work surveys & segregating & minimizing radioactive waste) so as to follow the principles of ALARA (As Low as Reasonably Achievable).

The PhD course work of RGCB includes a two-hour lecture on radiation safety.

Any concern/question? Please talk to the Radiation Safety Officer.

Dr. Malini Laloraya

☎ 2529 462

ULTRAVIOLET RADIATION

Ultraviolet radiation is an electromagnetic radiation similar to visible light but with wavelengths in the region from about 100nm to 400nm. The most biologically active region lies between 200 and 320nm but exposure to radiation at other wavelengths can also be hazardous.

Ultraviolet radiation has relatively low penetrating power and hence affects only the eyes and skin. Gross overexposure to UV can cause severe 'sunburn' and may even cause skin cancer. Early effects on the eye include inflammation of the surface conjunctiva and cornea. In some cases of the damage to the cornea becomes irreversible.

The most frequently encountered sources of ultraviolet radiation in RGCB are germicidal lamps housed inside laminar air flow cabinets, trans-illuminators and hand-held UV torches.

While using trans-illuminators and UV torches, use vinyl gloves, UV-opaque goggles and screens to prevent exposure. Extreme care must be taken to avoid accidental exposure of other persons.

FIRE:

Always be careful while using instruments generating high temperatures. Bunsen burner in the biosafety hood, hot plate, incubator, hot air oven, microwave oven are all potential sources of fire in the lab. While some of them have automatic regulatory switches, some others such as Bunsen burner, hot plates may not. Use them only when you are around. Switch them off if you want to attend to something else. Learn how to use the fire extinguisher that is placed outside the lab (there will be regular demonstration on how to use the extinguisher by the Security officer).

WASTE DISPOSAL

All wastes generated in the lab (except radioactive waste which are treated differently) must be kept securely that it does not leak, spill or blow away and is protected against scavenging by people or animals. RGCB has tied up with Indian Medical Association (IMA) which will collect and dispose of the wastes.

Every lab is provided with differently colored bins and

plastic bags (labeled to indicate biohazard) to collect wastes resulting from experiments. Hypodermic needles should be burned with a syringe destroyer. Sharps should be collected in bins meant for that purpose.

REMEMBER...

No one is really safe in a work area that contains *one* careless worker.

If you think that your colleagues are careless - explain the dangers to them.

If this does not help, do not hesitate to bring the matter to the attention of your supervisor. Discuss safety openly with your colleagues. A safe laboratory is a nice place to be in!

HAZARD WARNING SIGNS

These are some of the symbols that are used on signs and tapes in the Institute.



Toxic



Corrosive



Harmful



Flammable



Explosive



Oxidising



Caution



Biohazard



Laser



Ionising radiation



Risk of electric shock

Important Telephone numbers

Fire Station: 101, 2333101
Police Station: 2350266 (Poojappura),
2326543 (Thampanoor)

Medical consultant: Dr. Pratapa Chandran
At RGCB: (2529) **508**, (Monday & Friday 2:00 - 5:00
PM)
Res: 23566661, 9447245790 (Any day after 6:00 PM)

Kerala **Emergency** Medical Services Project (KEMP):
108

PRS: 2344443
SK: 2356256
Chelsa: 2342252
Medical College: 2528386

Director: 2349303, 2346333 (O); 2733819 (Res)
Security Officer (Maj. Sanjeev K P): 2529 **420** (O),
2357669 (Res)

Biosafety Officer: Dr Sathish Mundayoor - 2529 512

Chemical Safety Officer: Dr Vinod Kumar - 2529 526

Radiation Safety Officer: Dr Malini Laloraya - 2529 462

Fingertips (to find tel. numbers): 2722722