

**BMS\_RA1 Risk Assessment**

|  |
| --- |
| CRISPR gene editing workshop: risk assessment for all the preparatory and intermediary steps of the CRISPR workshop (run only by CRISPR instructors and in some cases guests who will be supervised to learn specific techniques, e.g. autoclave training or media preparation.) This risk assessment covers preparation of yeast media, preparation of chemicals for transformation, E coli culturing and minipreps to prepare plasmid DNA, DNA quantification, yeast culturing and testing of transformation protocol, assessment of DNA digest success using agarose gels, and use of an NEB Monarch DNA extraction kit to prepare DNA for sequencing. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| List the significant hazard(s).1 | Describe what could go wrong – that is, say who might be hurt and how.2 | Is the risk high, medium or low?3 | Please list the existing and/or intended control measures which will reduce the likelihood of all this happening.4 | Who will carry these measures out? Is the residual risk high, medium or low?. |
| *Yeast culturing and testing transformation*: Biological Containment | Non-pathogenic yeast containing a gene for kanamycin resistance or that have been gene edited may be touched and removed from the laboratory. | Low | All instructors are safety inducted and aware of the presence of a GM organism that requires containment measures.  All instructors will wear full PPE as appropriate (lab coat, goggles, gloves).  The yeast will be handled using standard pipetting and aseptic techniques.  All liquid waste will be disposed of into 5%+ ChemGene; all non-liquid waste will be handled using the standard Biomakespace BioBin and autoclave waste routes.  Handling of any spills will be handled by the instructor. | Lab user  Low |
| *Testing yeast transformation:* Chemical | Ingestion or skin contact with chemicals used in testing the yeast transformation | Low | All instructors are safety inducted. All instructors will wear full PPE as appropriate (lab coat, goggles, gloves).  All chemicals will be handled using standard pipetting techniques, which will be practiced by participants beforehand using water, dyes and parafilm.  Any minor injury will be treated using the standard first aid procedure using the first aid kits in the main lab. Any major injury can be referred to the nearby A&E. All spillages will be handled according to the BMS08 Accident at Work Emergency Plan. The chemicals handled during the transformation do not have COSHH warnings for hazards, with the exception of 70% ethanol (covered separately in this risk assessment). | Lab user  Low |
| *Testing yeast transformation:* Heat | Hot block heatedto 37’C, 65’C and 100’C; Water bath heated to 42’C. | Medium | Hot block is well contained, the instructor will explain risks associated with use and will ensure it is turned off after use.  A sign placed in front of the device will be used to indicate when the hot block is too warm. | Lab user  Low |
| *Preparing chemicals and yeast media:* Heat | Use of autoclave; contact with insufficiently sterilised materials. | Medium | All solutions will be prepared and autoclaved by trained instructors wearing silicon gloves at all point when exposed to the autoclave hot surfaces or load, in accordance with the Biomakespace autoclaving training sheet and policies. Completion of a successful run with appropriate sterilisation will be assessed using an indicator strip and recorded in the autoclave log. Any problems will be reported; all load items will be handled using PPE. | Lab user  Low |
| *Testing yeast transformation:* Sharps | Needle used to pierce the lid of the tube heated to 100’C, in order to prevent pressure build-up and lid popping; risk of stabbing hand whilst piercing plastic. | Low | Instructor will handle the piercing of the tube lid(s) with a sterilised needle, and will ensure it is kept in safe casing (e.g. a needle wallet) when not in use.  First aid precautions will be followed if any unintentional piercing occurs. | Lab user  Low |
| *Exposure to hazardous bacteria:* Biological hazard/ Genetically modified organisms | Throughout the workflow, accidents or careless handling could expose the user and other people in the lab to bacteria and cause infections. | Medium | Only defined, pre-transformed and non-pathogenic strains are used in experiments. The residual risk of infection by opportunistic pathogens is minimised through the use of PPE (nitrile gloves and lab coat). See separate GMO form for further details. | Lab user  Low |
| *Handling of bacteria:* Contamination hazard | Throughout the workflow, accidents or careless handling could cause contamination of equipment and working surfaces. | Medium | Wear PPE (lab coat, nitrile gloves). Use disposable equipment where possible (e.g. disposable plates, inoculation loops). Solutions are only handled using disposable loops or pipettes. Any contaminated waste (e.g pipette tips, plates, inoculation loops, glass substrates) is deactivated with Virkon and autoclaved before disposal. Wipe benches and lab equipment subject to potential contamination with Virkon disinfectant post use. | Lab user  Low |
| *Burns and spillages from hot liquid agar:* High temperature / Electricity | Hot liquid agar could be dropped and burn the user as well as damage nearby electronic equipment. | Medium | Do not fill beakers for agar preparation more than half. If agar has boiled over in the microwave, allow it to cool down for a few minutes before wiping up spillages with cleanroom wipes. Dispose wipes in bin. Transport agar-containing beakers from microwave to biological safety hood in second container to prevent spillages. | Lab user  Low |
| *Handling of ampicillin:* Chemical hazard | Exposure to ampicillin during the preparation of spiked growth media could harm the user. | Low | Use only small quantities of ampicillin (no more than 100mg in 50mL DI water per run). Prepare spiked growth media in the biosafety cabinet to prevent accidents in transport. Refer to COSHH for handling of ampicillin. | Lab user  Low |
| *Operating equipment:* Electricity | Operation of faulty electronic equipment could result in severe or fatal injury to the user. | High | All equipment at Biomakespace is PAT tested at regular intervals. In addition, check equipment for recent PAT test sticker and give cursory inspection to leads and housing before operation. | Lab user and Safety Officer  Low |
| *Operating centrifuge, shaking incubator:* Mechanical hazard | Incorrect use could result in personal injury caused by moving mechanical parts. | Medium | Switch off centrifuge / orbital shaker before loading / unloading samples. Follow local rules for operation of equipment. | Lab user  Low |
| *Using -80C freezer:* Low temperature hazard | Handling samples or touching surfaces inside the -80C freezer can result in severe burns to the user’s skin. | Medium | Wear appropriate PPE including designated gloves when using the freezer. Follow local rules for equipment operation. | Lab user  Low |
| *Testing success of DNA Digest*: Burns risk from agarose | Sputtering boiling agarose on skin and eyes. | Medium | Wear appropriate PPE including designated gloves and glasses.  Care to be taken when boiling agarose. Periodic agitation of solution. GLP. | Lab user  Low |
| *Testing success of DNA Digest*: Ethidium bromide vapour | Ingesting ethidium bromide vapours by touch or breathing. | Medium | Wear appropriate PPE including designated gloves and glasses.  Care to be taken when boiling agarose. Periodic agitation of solution. Hold flask of molten agarose away from face. GLP. | Lab user  Low |
| *Testing success of DNA Digest*: Electric shocks during electrophoresis | Electrical shocks from poor connections or spillages. | Medium | Take care that leads are connected properly.  Do not touch spillages during electrophoresis. Turn off power supply and dry up spillage. GLP. | Lab user  Low |
| *Testing success of DNA Digest*: Trailing electrical leads. | Trips or falls due to loose leads. | Medium | Ensure leads are well inside the besnch space. GLP. | Lab user  Low |

|  |  |
| --- | --- |
| Important! It is essential to check regularly that control measures specified in this risk assessment document are actually being used in practice. Any specialist emergency or first aid procedures should be specified here. | |
| If any Standard Operating Procedure (SOP) is required, please specify it here or attach it to this form. Any specialist training required should also be specified here | |
| Are any lone working or out of hours restrictions required for this project?  Operations addressed in this RA are not to be carried out on weekends or during evening hours unless at least two people are present in the lab. Lone work during daytime hours (8am-6pm) is permitted as long as an additional member of staff of Lightcast Discovery is aware of it. | |
| Is special monitoring (e.g. hearing test, eye test, health surveillance) required? If so, please enter details and also contact the Safety Officer for advice.  No. | What personal protective equipment (PPE) is required (e.g. overalls, gloves, respiratory protection, eye protection)? You must ensure that any PPE specified is suitable for the purpose.  Lab coat and nitrile gloves at all times, safety goggles where appropriate, thick insulating gloves for handling -80C freezer. |

|  |  |
| --- | --- |
| Important! It is essential to check regularly that control measures specified in this risk assessment document are actually being used in practice. Any specialist emergency or first aid procedures should be specified here. | |
| If any Standard Operating Procedure (SOP) is required, please specify it here or attach it to this form. Any specialist training required should also be specified here | |
| Are any lone working or out of hours restrictions required for this project? | |
| Is special monitoring (e.g. hearing test, eye test, health surveillance) required? If so, please enter details and also contact the Safety Officer for advice. | What personal protective equipment (PPE) is required (e.g. overalls, gloves, respiratory protection, eye protection)? You must ensure that any PPE specified is suitable for the purpose. |

Please complete this section to confirm that this constitutes a suitable and sufficient assessment of risk.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name of assessor: | Signature: | Date: | Name of Biomakespace Safety Team member: | Signature: | Date: |

This assessment should be reviewed regularly (usually every 12 months), or earlier if there is a material change to the process, the equipment, location or relevant safety technologies. It should also be reviewed when new people are involved, or after an accident or incident has taken place.

|  |  |  |  |
| --- | --- | --- | --- |
| Reviewed by (name) | Signature | Date | Indicate changes here5 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

1 A list of hazards is provided below to help you, but this may not be exhaustive. If any of these hazards can be eliminated altogether, or can be reduced at source by making an inherent change then we must consider doing so. Hazards in **bold** will also need an additional, more technical assessment on a specialist form - please ask the Safety Officer for further advice.

High or low temperatures High pressures **Chemical hazards** **Biological hazards Genetically Modified Organisms**

**Ionising radiations** **Lasers**  Sharp objects **Dusts** Work at heights **Animal houses**

Magnetic fields Machinery hazards Electricity **Manual Handling** Noise Vibration

Falling objects Collapsing structures Flooding Slips, trips and falls Asphyxiant gases **Flammable gases**

2 Please explain how an accident, incident or health condition could arise. We must consider all events which are *reasonably foreseeable*.

3 Please see the health and safety risk assessment handbook for further guidance on levels of risk.

4 When deciding on suitable control measures, you should ensure that you are complying with all relevant University policy and guidance documents, and that you have considered the hierarchy of control measures. In order to comply with legislation, we must also take all steps which are ‘reasonably practicable’ to reduce risk. This means that we should take all steps which are (in terms of time, cost and trouble) reasonable in relation to the reduction of risk achieved.

5 If changes are extensive, you will need to complete a whole new form, or attach a written amendment. If there are no changes say so.