



Australian Government

MSL975013 Perform tissue and cell culture techniques

Release: 1

MSL975013 Perform tissue and cell culture techniques

Modification History

Release 1. Supersedes and is equivalent to MSL975013A Perform tissue and cell culture techniques

Application

This unit of competency covers the ability to prepare, maintain and preserve cells and cell lines for a variety of applications, such as large scale culture, production of monoclonal antibodies, production of viral vaccines and amniocentesis studies. Personnel are required to optimise equipment set-up, media and growth techniques. They are required to detect and investigate contamination and take preventative and/or corrective actions under supervision.

This unit of competency is applicable to laboratory technicians and technical officers working in laboratories in the biomedical, environmental, biotechnology and education industry sectors.

While no specific licensing or certification requirements apply to this unit at the time of publication, laboratory operations are governed by relevant legislation, regulations and/or external accreditation requirements. Local requirements should be checked.

Pre-requisite Unit

MSL973007 Perform microscopic examination

MSL973004 Perform aseptic techniques

Competency Field

Testing

Unit Sector

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

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| 1 Interpret and schedule production | 1.1 Review client request and confirm quantity and nature of cells, tissue or products |
| | 1.2 Select appropriate media, materials, equipment and |

requirements		methods
		1.3 Plan parallel work sequences to optimise production
		1.4 Maintain a chain of custody, traceable to the worker, for all cells and tissues
2	Work safely according to the legal and regulatory framework	2.1 Ensure work practices and personal actions conform to regulations, codes, guidelines and workplace quality assurance procedures
		2.2 Identify hazards and workplace control measures associated with the sample, preparation methods, reagents and equipment
		2.3 Select, fit and use personal protective equipment (PPE)
		2.4 Address hazards and incidents as they arise
		2.5 Ensure the safe disposal of biohazardous materials and other laboratory waste
3	Assemble and maintain tissue culture equipment	3.1 Assemble, sterilise or decontaminate equipment according to workplace procedures
		3.2 Perform pre-use and safety checks in accordance with relevant workplace and operating procedures
		3.3 Identify faulty or unsafe components and equipment and report to appropriate personnel
		3.4 Decontaminate area and equipment after use
4	Prepare and test cell and tissue culture media	4.1 Confirm media specifications and processes/methods
		4.2 Prepare culture media to suit client request
		4.3 Sterilise culture media and check for sterility
		4.4 Perform quality control checks to ensure that culture media is fit for purpose
		4.5 Store culture media in accordance with specifications

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| 5 | Obtain, monitor and maintain tissue and cell lines | <table border="0"><tr><td style="vertical-align: top; padding-right: 20px;">5.1</td><td>Retrieve/obtain the cell lines or tissue sample from fresh or preserved sources and prepare a culture</td></tr><tr><td style="vertical-align: top; padding-right: 20px;">5.2</td><td>Select specified culture media and add any necessary growth agents or nutrients</td></tr><tr><td style="vertical-align: top; padding-right: 20px;">5.3</td><td>Incubate cells/tissue in specified conditions</td></tr><tr><td style="vertical-align: top; padding-right: 20px;">5.4</td><td>Inoculate the media with the specified amount of sample</td></tr><tr><td style="vertical-align: top; padding-right: 20px;">5.5</td><td>Monitor growth of tissue and cell lines and products</td></tr><tr><td style="vertical-align: top; padding-right: 20px;">5.6</td><td>Detect contamination and troubleshoot materials, equipment and techniques</td></tr><tr><td style="vertical-align: top; padding-right: 20px;">5.7</td><td>Passage samples by subculturing to preserve or grow the line</td></tr><tr><td style="vertical-align: top; padding-right: 20px;">5.8</td><td>Harvest cells or cell products to optimise yields</td></tr></table> | 5.1 | Retrieve/obtain the cell lines or tissue sample from fresh or preserved sources and prepare a culture | 5.2 | Select specified culture media and add any necessary growth agents or nutrients | 5.3 | Incubate cells/tissue in specified conditions | 5.4 | Inoculate the media with the specified amount of sample | 5.5 | Monitor growth of tissue and cell lines and products | 5.6 | Detect contamination and troubleshoot materials, equipment and techniques | 5.7 | Passage samples by subculturing to preserve or grow the line | 5.8 | Harvest cells or cell products to optimise yields |
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Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Standards, codes, procedures and/or workplace requirements

Standards, codes, procedures and/or workplace requirements include the latest version of one or more of:

- Australian and international standards covering the requirements for the competence of testing and calibration laboratories, laboratory safety, and quality and environmental management
- Australian standards covering the requirements for cleaning, disinfecting and sterilising reusable medical and surgical instruments and equipment and maintenance of associated environments in health care facilities
- national work health and safety (WHS) standards and codes of practice, national environmental protection measures, and national measurement regulations and guidelines
- specific codes, guidelines and procedures, such as National Association of Testing Authorities (NATA) accreditation requirements, principles of good laboratory practice (GLP), Australia New Zealand Food Standards (ANZFS) Code, Australian code of good manufacturing practice for medicinal products (GMP), Therapeutic Goods Regulations, Australian Dangerous Goods Code, gene technology regulations, and Guide to physical containment levels and facility types
- workplace documents, such as standard operating procedures (SOPs); quality and equipment manuals; calibration and maintenance schedules; material safety data sheets (MSDS) and safety procedures; material, client and product specifications; production and laboratory schedules; workplace recording and reporting procedures; and waste minimisation and safe disposal procedures
- procedures and standard methods for preparing culture media, operation and maintenance manuals for automated media preparation equipment, and verified test methods

Cells and tissues

Cells and tissues include, but are not limited to, one or more of:

- animal cell lines, such as hybridoma, liver, epidermal, lymphoblastic and fibroblastic
- plant cell line,s such as tobacco, arabidopsis, soya bean, tomato, roses and meristomatic tissue
- yeasts
- fungi
- sperm, ova and embryos
- adherent and suspension cultures

Pre-use checks

Pre-use checks include:

- performing routine maintenance
- checks on raw materials and consumables, including use-by-date, and possible contamination and storage conditions

Preparing primary cultures

Preparing primary cultures includes, but is not limited to, one or more of:

- thawing of cryopreserved cells and monitoring of cell recovery
- enzymatic disaggregation from tissue
- mechanical disaggregation from tissue
- primary explant technique
- pre-treatment
- selection techniques, such as cloning, micromanipulation, use of selective media, density gradient centrifugation, selective adhesion techniques and selective detachment

Monitoring growth of tissue and cell lines

Monitoring growth of tissue and cell lines includes, but is not limited to, one or more of:

- identification of normal and abnormal cells viewed using an inverted stereo microscope
- recognition of contamination by cytopathic changes to cells, biochemical tests, gene detection and microbiological culture
- testing for products, such as insulin
- checking growth rates
- performing viable cell counts, such as the dye exclusion test, and Trypan Blue viability stain to determine percentage viability and total cell concentration
- staining and assessment of morphology (e.g. by Giemsa)
- karyotype analysis

Workplace safety procedures

Workplace safety procedures include, but are not limited to, one or more of:

- ensuring access to service shut-off points
- recognising and observing hazard warnings and safety signs
- labelling of samples, reagents, aliquoted samples and hazardous materials
- handling and storage of hazardous materials and equipment in accordance with labelling, MSDS and manufacturer instructions
- identifying and reporting operating problems or equipment malfunctions
- cleaning and decontaminating equipment and work areas regularly using workplace procedures
- using PPE, such as gloves, safety glasses, coveralls, gowns, body suits and respirators
- using containment facilities (PCII, PCIII and PCIV physical containment laboratories), containment equipment (biohazard containers, laminar flow cabinets, Class I, II and III biohazard cabinets) and containment procedures
- reporting abnormal emissions, discharges and airborne contaminants, such as noise, light, solids, liquids, water/wastewater, gases, smoke, vapour, fumes, odour and particulates, to appropriate personnel

WHS and environmental management requirements

WHS and environmental management requirements include:

- complying with WHS and environmental management requirements at all times, which may be imposed through state/territory or federal legislation. These requirements must not be compromised at any time
- applying standard precautions relating to the potentially hazardous nature of samples
- accessing and applying current industry understanding of infection control issued by the National Health and Medical Research Council (NHMRC) and State and Territory Departments of Health, where relevant

Unit Mapping Information

Release 1. Supersedes and is equivalent to MSL975013A Perform tissue and cell culture techniques

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5c63a03b-4a6b-4ae5-9560-1e3c5f462baa>

Assessment Requirements for MSL975013 Perform tissue and cell culture techniques

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Performance Evidence

Evidence of competence in this unit must satisfy all of the requirements of the elements and performance criteria, and include demonstration of:

- safely preparing, maintaining and preserving cells and cell lines that are fit for purpose on at least three (3) different occasions
- performing pre-use checks
- preparing, diluting, sterilising and storing reagents and culture media that are fit for purpose
- choosing and justifying appropriate media and substrate material based on cost, cleaning, sterilising and maintenance of cell growth
- optimising equipment set-up, media and growth techniques
- preparing primary cultures
- passaging cell cultures by subculturing
- growing and harvesting cell lines and tissue to specifications without contaminating the original sample or the environment
- counting cells, identifying a wide range of cell types and contaminants and recognising normal and abnormal cells
- monitoring growth of cells, tissue and cell lines
- detecting and investigating contamination and taking preventative and corrective actions
- storing cells so that they remain viable
- preserving cell lines, including by freezing and cryopreservation (e.g. dry ice and liquid nitrogen)
- maintaining accurate, traceable records of cell lines and tissues and logs of procedures and work completed
- demonstrating chain of custody for all cells, cell lines and tissues
- working safely and satisfying all legal and regulatory requirements, including the use and care of safety cabinets.

Knowledge Evidence

Must provide evidence that demonstrates knowledge of:

- terminology, including cell lines, growth media, primary culture, passaging, passage number, subculture, anchorage dependent cells, suspension culture, monolayer, confluent, cell line, cell strain, contact inhibition, diploid and viability

- cell biology, including structure, physiology, function, physiological cell growth requirements, nutrient requirements, respiration, temperature and growth cycle
- purposes of cell lines
- normal and abnormal cell morphology
- critical components of the cell environment and their effects on cell growth, including pH, temperature, buffering, osmotic pressure, osmolarity, viscosity and foaming
- types of tissue used as source material, including embryonic, adult or malignant tissue
- techniques for characterising a cell line
- selection criteria for media, materials and equipment, including:
 - costs
 - ease of cleaning or sterilisation
 - maintenance of cell growth
- the differences between finite and continuous cell lines
- characteristics of cell culture media and substrates
- nature of substrates (e.g. solid, semi-solid, gel or sponge, glass, disposable plastics and three-dimensional matrices)
- techniques for pre-treating substrates (e.g. feeder layers, chemical treatments, such as poly D-lysine, collagen, gelatine and fibronectin)
- role of ingredients in media (e.g. salts, carbohydrates, amino acids, vitamins, hormones, growth factors, serum and antibiotics)
- contaminants, including endotoxins, bacteria, yeast, fungi and Mycoplasma
- typical requirements, problems and procedures associated with the production of specific cell lines
- relevant hazards, work health and safety (WHS) and environment requirements.

Assessment Conditions

- Judgment of competence must be based on holistic assessment of the evidence. Assessment methods must confirm consistency of performance over time, rather than a single assessment event.
- This unit of competency is to be assessed in the workplace or a simulated workplace environment. A simulated workplace environment must reflect realistic operational workplace conditions that cover all aspects of workplace performance, including the environment, task skills, task management skills, contingency management skills and job role environment skills.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
- Knowledge evidence may be collected concurrently with performance evidence or through an independent process, such as workbooks, written assessments or interviews (provided a record is kept in each case).
- This unit of competency may be assessed with:
 - MSL933001 Maintain the laboratory/field workplace fit for purpose

- Holistic assessment methods include:
 - review of records of cell lines and tissues produced by the candidate
 - feedback from peers and supervisors to confirm that workplace procedures are consistently followed and that results meet workplace requirements
 - observation of the candidate establishing and maintaining viable cell lines over time
 - oral and/or written questioning covering workplace procedures and technical aspects of preparing, maintaining and preserving cells and cell lines for applications relevant to job role.
- Access is required to instruments, equipment, materials, workplace documentation, procedures and specifications associated with this unit, including, but not limited to:
 - laboratory equipped with appropriate tissue culture equipment and facilities, test equipment, instruments, standards and reagents
 - workplace procedures and standard methods, test results and records.
- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- The assessor must demonstrate both technical competence and currency.
- Technical competence can be demonstrated through:
 - relevant VET or other qualification/Statement of Attainment AND/OR
 - relevant workplace experience.
- Currency can be demonstrated through:
 - performing the competency being assessed as part of current employment OR
 - having consulted with a laboratory about performing the competency being assessed within the last twelve months.

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