



Australian Government

MSL974011 Prepare tissue and cell cultures

Release: 1

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Modification History

Release 1. Supersedes and is equivalent to MSL974011A Prepare tissue and cell cultures

Application

This unit of competency covers the ability to prepare primary tissue cultures for applications, such as maintenance of animal cell lines and propagation of plants by tissue culture, and basic subculture procedures. Personnel are required to manipulate equipment and materials and samples to prevent contamination at all preparation stages. They will have ready access to workplace procedures and will work under direct supervision.

This unit of competency is applicable to technical assistants 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

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.

1	Work safely according to the legal and regulatory framework	1.1	Ensure work practices and personal actions conform to regulations, codes, guidelines and workplace quality assurance procedures
		1.2	Identify hazards and workplace controls associated with the sample, preparation methods, reagents and equipment

- 1.3 Select, fit and use personal protective equipment (PPE)
 - 1.4 Address hazards and incidents as they arise
 - 1.5 Maintain a chain of custody, traceable to the worker, for all cells and tissues
- 2 **Prepare and test cell and tissue culture media**
 - 2.1 Select and confirm media specifications and processes/methods
 - 2.2 Prepare culture media to suit the application
 - 2.3 Sterilise culture media and check for sterility
 - 2.4 Perform quality control checks to ensure that culture media is fit for purpose
 - 2.5 Store culture media in accordance with specifications
- 3 **Prepare tissue or cell cultures**
 - 3.1 Select tissue/cell sample to optimise growth and prepare it for culture
 - 3.2 Add specified growth agents and/or nutrients
 - 3.3 Inoculate culture medium using aseptic techniques
- 4 **Monitor tissue or cell culture**
 - 4.1 Incubate culture in specified conditions
 - 4.2 Monitor growth of culture and record appearance and characteristics
 - 4.3 Report presence or absence of contamination
 - 4.4 Subculture the culture to continue the cell line
 - 4.5 Dispose of biohazardous and other laboratory waste safely
- 5 **Maintain records**
 - 5.1 Maintain records of batches of media and test data
 - 5.2 Ensure records of tissue cultures are retrievable, legible and accurate

5.3 Ensure records conform to information management, records, quality system and legal requirements

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, quality management 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), 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

- workplace procedures and standard methods for preparing culture media, and operation and maintenance manuals for automated media preparation equipment

Applications of plant tissue/cell culture Applications of plant tissue/cell culture include, but are not limited to, one or more of:

- mass propagation of commercial species
- production of disease-free plants by meristem tip culture
- conservation of rare plants
- haploid plant production by anther/pollen culture
- 'sports' produced by somaclonal variation
- development of resistant plants by directed cell selection
- protoplast fusion to produce novel plant hybrids

Applications of animal tissue/cell culture Applications of animal tissue/cell culture include, but are not limited to, one or more of:

- establishment and maintenance of animal cell lines, such as liver, epidermal and fibroblastic
- maintenance of continuous cell lines
- preparation of cell cultures for commercial sale
- growth and enumeration of viruses
- extraction of DNA
- extraction of antigens for use in diagnostic tests
- research of cell structure and function, cancer and tumour biology
- immunofluorescent techniques
- testing of media efficacy
- production of monoclonal antibodies
- production of genetically modified cell cultures
- secondary metabolite production

Sterilisation and disposal of biohazardous wastes Sterilisation and disposal of biohazardous wastes includes, but is not limited to, one or more of:

- steam and high pressure air or steam
- boiling, microwaving and autoclaving
- filtration
- gas, chemical and radiation

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

- plant tissue, such as petioles, leaves, stems and petals
- meristem tissue
- special tissue, such as fern stolon, seed embryos and somatic embryoids
- tissue for callus development to initiate cell suspension cultures

Animal tissues and cells

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

- primary cells from animal tissue, such as heart, liver, kidney and epidermal
- secondary cells, such as epithelial, endothelial and fibroblast
- continuous cell lines, such as tumour lines, hybridomers and transformed lines (Epstein-Barr virus)

Preparing a primary culture

Preparing a primary culture 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
- disinfestation of explants using hypochlorite and water

Suitable culture conditions

Suitable culture conditions include, but are not limited to, one or more of:

- specified temperature and light intensity
- appropriate atmosphere, such as carbon dioxide
- shaking of cell suspensions or roller bottles
- conditions for establishment, multiplication or planting out
- special conditions for protoplast culture

Subculture

Subculture includes, but is not limited to, one or more of:

- treatment of callus to multiply or regenerate shoots
- treatment to encourage adventitious bud
- treatment to encourage rooting
- subculture of embryoids
- cell suspensions
- preparation of protoplasts

Safety procedures

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 PPE, such as gloves, safety glasses, coveralls and gowns
- 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
- following established manual handling procedures
- reporting abnormal emissions, discharges and airborne contaminants, such as noise, light, solids, liquids, water/waste water, 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 MSL974011A Prepare tissue and cell cultures

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 MSL974011 Prepare tissue and cell cultures

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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 at least three (3) different primary tissue cultures that are free of contamination using tissue culture and basic subculture procedures
- manipulating equipment and materials and samples to prevent contamination at all preparation stages
- preparing, diluting and sterilising reagents and culture media that are fit for purpose
- performing routine maintenance and checks on raw materials and consumables, including use-by-date, possible contamination and storage conditions
- growing cell lines and tissue to specifications without contaminating the original sample and the environment
- monitoring cell growth, checking growth rates and recognising problems, such as contamination of media by bacteria (e.g. Mycoplasma), fungi and other plant or animal tissue
- identifying expected cell types and recognising normal and abnormal cells using an inverted microscope
- accurately counting total and viable cells
- maintaining chain of custody and traceability to the worker, of all cell lines, tissues, logs of work completed and procedures/methods used
- working safely and satisfying all legal and regulatory requirements, including the use and care of biohazard cabinets.

Knowledge Evidence

Must provide evidence that demonstrates knowledge of:

- basic classes and classification of culturable material, such as organisms, plants, animals, bacteria, viruses, tissues, cells and prions
- structure and function of cells and organelles
- cell structure, physiology and processes, including simple and facilitated diffusion, plasmolysis, osmosis, tonicity, active transport, energy production, mitosis, motility, phagocytosis and pinocytosis
- concepts and principles of cell growth, including the need for nutrients, the role of growth regulators and the removal of wastes
- types and sources of contamination
- importance of strict aseptic techniques and cleaning procedures

- quality control checks and quality assurance procedures
- workplace and/or legal traceability requirements
- hazards and risks in biological laboratories and relevant 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
 - MSL973003 Prepare culture media
 - MSL973007 Perform microscopic examination
- Holistic assessment methods include:
 - examination of tissue and cell cultures prepared by the candidate
 - review of work records and results obtained by candidate
 - feedback from supervisors and peers on adherence to workplace/technical procedures
 - observation of the candidate preparing a range of tissue and cell cultures
 - oral and/or written questioning covering workplace procedures and technical aspects of preparing tissue and cell cultures,
- Access is required to instruments, equipment, materials, workplace documentation, procedures and specifications associated with this unit including, but not limited to:
 - a laboratory equipped with appropriate equipment, samples, cell lines and reagents
 - tissue culture equipment and facilities, including:
 - growth cabinets
 - culture vessels, growth chambers, sterile containers, culture plates, flasks and bottles
 - autoclaves
 - positive filtration apparatus
 - auto pipettes and pipette pumps

- cell counting chambers and a haemocytometer
- incubators, including specialised atmosphere carbon dioxide
- binocular light inverted microscopes
- centrifuges
- workplace procedures and standard methods.
- 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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