



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **MSL973008A Perform histological procedures**

**Revision Number: 1**

## MSL973008A Perform histological procedures

### Modification History

Not applicable.

### Unit Descriptor

<b>Unit descriptor</b>	This unit of competency covers the ability to perform straightforward histological procedures involving processing and sectioning (by hand or rotary microtome) of plant and animal tissues in paraffin wax.
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### Application of the Unit

<b>Application of the unit</b>	<p>This unit of competency is applicable to laboratory assistants working in biomedical, biotechnology, environmental and education sectors. Personnel will work under direct supervision and have ready access to enterprise procedures.</p> <p>Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section 'This competency in practice'.</p>
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### Licensing/Regulatory Information

Not applicable.

### Pre-Requisites

<b>Prerequisite units</b>		

<b>Prerequisite units</b>		

## Employability Skills Information

<b>Employability skills</b>	This unit contains employability skills.
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## Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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## Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Assemble equipment and materials	1.1. Confirm the number and type of sections required 1.2. Collect equipment and arrange the workspace so that equipment can be used safely and efficiently 1.3. Perform pre-use and safety checks to ensure equipment is fit for purpose 1.4. Report faulty or unsafe equipment to appropriate personnel 1.5. Inspect processor reagents for deterioration and adequate volume and report any items requiring replacement
2. Process and embed plant and animal tissue	2.1. Select program and reagents for processing 2.2. Monitor processor regularly during processing sequence to ensure dehydration, clearing and infiltration are complete 2.3. Check that temperature of wax is suitable for embedding process 2.4. Check that volume of wax is sufficient for uninterrupted embedding of processor load 2.5. Embed tissue in correct orientation 2.6. Allow block to solidify evenly according to wax requirements
3. Cut sections of plant and animal tissue	3.1. Place and secure block and knife in microtome strictly in accordance with safety directions 3.2. Label required number of microscope slides in accordance with enterprise traceability requirements 3.3. Cut ribbons of representative sections at the required thickness observing prescribed safety measures 3.4. Float sections onto water bath to flatten tissues 3.5. Pick up sections onto microscope slides ensuring identification on slides matches that on block 3.6. Apply procedures to prevent cross-contamination between samples 3.7. Cut free hand sections of plant tissue as required 3.8. Inspect sections and reject items that do not meet specifications
4. Stain sections	4.1. Select reagents specified in the method 4.2. Stain sections according to the method 4.3. Examine sections microscopically to ensure expected staining outcomes have been achieved

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
	4.4. Mount sections to ensure long term preservation 4.5. Attach permanent labels giving specimen details according to enterprise traceability requirements
5. Maintain a safe work environment	5.1. Ensure personal safety and minimise cross-contamination through the use of personal protective equipment 5.2. Handle all specimens and equipment in accordance with enterprise safety protocols/procedures 5.3. Clean up spills using appropriate techniques to protect personnel, work area and environment 5.4. Minimise generation of waste and environmental impacts 5.5. Collect and dispose of all wastes safely 5.6. Report hazards and incidents to designated personnel using enterprise procedures

## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

#### Required skills

Required skills include:

- processing and embedding of plant and animal tissue
- cutting of sections free of wrinkles, scores and folds and at the specified thickness to demonstrate tissue and cellular structures, granules, inclusions and organelles
- regressive haematoxylin and eosin staining
- cover slipping slides, ensuring that no air bubbles are formed and material is preserved for the life of the slide
- labelling slides clearly with case number, specimen and stain details
- maintaining equipment and recording and reporting malfunctions appropriately
- maintaining traceability through all steps from receiving a specimen through to completion of a procedure

#### Required knowledge

Required knowledge includes:

- functions of the components of a rotary microtome
- safety precautions relevant to tissue processing, embedding and microtomy
- importance and appropriate use of certified reference materials
- relationship of the anatomy and morphology of tissue types and the macroscopic and microscopic appearance of stained sections
- correlation between poorly maintained processing reagents and resultant tissue blocks being difficult to cut or unsuitable for cutting
- relationship between correct orientation of the tissue during embedding and ability to cut sections from surface required for subsequent microscopic examination
- occupational health and safety (OHS) procedures related to micrometry and handling irritating, volatile, flammable and potentially carcinogenic substances, such as formaldehyde, xylene, histoclear, ethanol and chloroform
- safe and environmentally responsible disposal of wastes
- enterprise and/or legal traceability requirements
- relevant health, safety and environment requirements

## Evidence Guide

<b>EVIDENCE GUIDE</b>	
<p>The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
<b>Overview of assessment</b>	
<b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b>	<p>Assessors should ensure that candidates can:</p> <ul style="list-style-type: none"> <li>• process, embed and cut tissue safely to enterprise procedures</li> <li>• stain sections according to enterprise procedures</li> <li>• manage tasks and organise work to ensure the timely completion of tasks</li> <li>• use specimens, reagents and materials economically and dispose of wastes safely</li> <li>• maintain equipment, recording and reporting malfunctions appropriately</li> <li>• minimise cross-contamination between specimens</li> <li>• maintain traceability through all steps from receiving a specimen through to completion of a procedure</li> <li>• work safely.</li> </ul>
<b>Context of and specific resources for assessment</b>	<p>This unit of competency is to be assessed in the workplace or simulated workplace environment.</p> <p>This unit of competency may be assessed with:</p> <ul style="list-style-type: none"> <li>• <i>MSL973007A Perform microscopic examination.</i></li> </ul> <p>Resources may include:</p> <ul style="list-style-type: none"> <li>• standard laboratory equipped with appropriate equipment and materials, such as microtomes, stains, animal and plant tissues</li> <li>• processing system for paraffin blocks</li> <li>• associated OHS equipment, such as extractor systems</li> <li>• enterprise procedures and standard methods.</li> </ul>
<b>Method of assessment</b>	<p>The following assessment methods are suggested:</p> <ul style="list-style-type: none"> <li>• observation of the candidate performing tissue processing, embedding, cutting, pickup and mounting</li> <li>• inspection of sections and slides prepared by the candidate</li> <li>• review of quality control records for sections and slides prepared by the candidate</li> <li>• feedback from supervisors and peers on adherence to</li> </ul>

<b>EVIDENCE GUIDE</b>	
	<p>enterprise/technical procedures</p> <ul style="list-style-type: none"> <li>questioning to assess underpinning knowledge.</li> </ul> <p>In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly.</p> <p>Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.</p> <p>Access must be provided to appropriate learning and/or assessment support when required.</p> <p>The language, literacy and numeracy demands of assessment should not be greater than those required to undertake the unit of competency in a work like environment.</p>
<b>This competency in practice</b>	<p>Industry representatives have provided the case studies below to illustrate the practical application of this unit of competency and show its relevance in a workplace setting.</p> <p><b>Biomedical</b></p> <p>A laboratory assistant is asked to prepare a series of 5 (m or less, sections of rats' livers as part of a team's work to investigate a new treatment for Hepatitis C. She/he retrieves the liver samples from the cut-up bench for processing. The assistant checks that the processor is warmed up and that all the reagents are topped up. She/he chooses a program to suit the 1cm square liver samples and loads the cassettes into the processor. As processing continues, the assistant regularly checks that the system is working correctly. The next day, the assistant embeds the tissue into paraffin wax and cuts sections from each block using a rotary microtome. She/he checks that each section is smooth, flat and free of artefacts, taking care to ensure that there is no contamination between specimens and that traceability of all specimens and documentation is maintained. The assistant stains the tissue with a routine Haematoxylin and Eosin stain and passes the tray of prepared slides to the researcher for further analysis.</p> <p><b>Education</b></p> <p>A laboratory assistant in a high school was asked to</p>



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prepare sections of plant tissue using a hand microtome in preparation for a practical class where the students will stain and examine the slides in order to consolidate their knowledge about plant tissue structure and function. He/she was also asked by the supervising teacher to prepare a brief written outline for the students of the procedures used to prepare the plant tissue sections and to demonstrate the procedures to the student group under the control of the teacher. The laboratory assistant emphasised the importance of setup, pre-use checks of the equipment and appropriate disposal of the sections at the end of the practical class.

## Range Statement

### RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

#### Codes of practice

Where reference is made to industry codes of practice, and/or Australian/international standards, it is expected the latest version will be used

#### Standards, codes, procedures and/or enterprise requirements

Standards, codes, procedures and/or enterprise requirements may include:

- Australian and international standards, such as:
  - AS ISO 17025-2005 General requirements for the competence of testing and calibration laboratories
  - AS/NZS ISO 9000 Set:2008 Quality management systems set
  - AS/NZS 2243 Set:2006 Safety in laboratories set
- principles of good laboratory practice (GLP)
- Australian code of good manufacturing practice for medicinal products (GMP)
- safety manuals
- quality manuals and equipment and procedure manuals
- material safety data sheets (MSDS)
- enterprise recording and reporting procedures
- production and laboratory schedules
- material, production and product specifications
- standard operating procedures (SOPs) describing personal protective equipment requirements, indications for use of biohazard and laminar flow cabinets, containment and cleanup of spillages and disposal of wastes
- instructions to comply with legislation, standards, guidelines and codes
- stock records and inventory

<b>RANGE STATEMENT</b>	
	<ul style="list-style-type: none"> <li>waste minimisation and disposal protocols</li> </ul>
<b>Equipment, reagents, specimens and systems</b>	<p>Equipment, reagents, specimens and systems may include:</p> <ul style="list-style-type: none"> <li>tissue processors</li> <li>microtomes and microtome knives (non-disposable or disposable)</li> <li>embedding centres</li> <li>flotation baths and drying ovens</li> <li>microtome knife sharpeners</li> <li>reagents, such as formaldehyde, ethanol, xylene, paraffin and stains</li> <li>reference material for automated and manual quality control and quality assurance systems</li> <li>fresh and fixed specimens</li> <li>computer information systems, databases, record and filing systems, including specimen accessioning</li> </ul>
<b>Histological procedures</b>	<p>Histological procedures may include:</p> <ul style="list-style-type: none"> <li>cutting paraffin sections of organs, such as kidney, liver, small intestine, stomach and tongue</li> <li>cutting paraffin sections of dicotyledon and monocotyledon stems</li> <li>staining tissue sections with Haematoxylin and Eosin (human and animal tissue) and Safranin and Fast Green (plant tissue)</li> </ul>
<b>Pre-use checks</b>	<p>Pre-use checks may include:</p> <ul style="list-style-type: none"> <li>safety/serviceability</li> <li>cleanliness</li> <li>routine maintenance</li> </ul>
<b>Hazards</b>	<p>Hazards may include:</p> <ul style="list-style-type: none"> <li>micro-organisms and agents associated with soil, air, water, blood and blood products, and human or animal tissue and fluids</li> <li>chemicals and stains</li> <li>aerosols</li> <li>sharps and broken glassware</li> </ul>
<b>Safety protocols/practices</b>	<p>Safety protocols/practices may include:</p>

<b>RANGE STATEMENT</b>	
	<ul style="list-style-type: none"> <li>• use of MSDS</li> <li>• use of personal protective equipment, such as gloves, safety glasses, goggles, faceguards, coveralls and gowns</li> <li>• use of biohazard containers and laminar flow cabinets</li> <li>• correct labelling of reagents and hazardous materials</li> <li>• handling and storing hazardous materials and equipment in accordance with labels, MSDS, manufacturer's instructions, and enterprise procedures and regulations</li> <li>• regular cleaning and/or decontamination of equipment and work areas</li> </ul>
<b>Occupational health and safety (OHS) and environmental management requirements</b>	<p>OHS and environmental management requirements:</p> <ul style="list-style-type: none"> <li>• all operations must comply with enterprise OHS and environmental management requirements, which may be imposed through state/territory or federal legislation - these requirements must not be compromised at any time</li> <li>• all operations assume the potentially hazardous nature of samples and require standard precautions to be applied</li> <li>• where relevant, users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council (NHMRC) and State and Territory Departments of Health</li> </ul>

## Unit Sector(s)

<b>Unit sector</b>	Testing
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## Competency field

<b>Competency field</b>	
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## Co-requisite units

<b>Co-requisite units</b>		