Australian Government

Department of Education, Employment and Workplace Relations

MSL975003A Perform histological tests

Revision Number: 1

MSL975003A Perform histological tests

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit of competency covers the ability to perform tests and procedures associated with processing and staining tissues for examination of tissue structure and abnormalities by pathologists and scientists to assist with disease diagnosis. The unit covers tests and procedures that are associated with anatomical pathology (including frozen sections), and may involve the use of automated processors and staining machines.

Application of the Unit

Application of the unit	This unit of competency is applicable to laboratory technicians and technical officers in the biomedical sector. The unit principally refers to techniques performed on human tissues, but many aspects may be relevant to animal and plant tissues. This unit of competency assumes that the technical officer would perform tests and procedures under the close supervision of scientific and/or medical staff. Although a supervisor may not always be present, the technician will follow standard operating procedures (SOPs) that will clearly describe the scope of permitted practice in modifying testing procedures, interpretation of data and for communicating test results to people outside the laboratory. Technical workers may need to interrupt their routine work in order to assist with or perform frozen sections or special staining procedures to facilitate rapid diagnosis of specimens from patients in the operating theatre. The involvement of the technical officer in mortuary work will be determined by the enterprise. Work of this nature will always be closely supervised by scientific/medical staff. 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 can be found at the end of this unit of competency under the section 'This competency in practice'.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		
	MSL974006A	*Perform biological procedures*
	MSL973007A	*Perform microscopic examination*
	MSL973004A	*Perform aseptic techniques*

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.

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.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Process specimens and associated request forms	1.1. Check and match specimens and request forms before they are accepted 1.2. Return specimens and request forms that do not comply with requirements to their source with reasons for non-acceptance 1.3. Process routine and non-routine specimens according to enterprise protocols 1.4. Log acceptable specimens, applying required document tracking mechanisms 1.5. Dispatch specimens to referral laboratories as required 1.6. Store specimens appropriately until required for testing
2. Prepare specimens for cut-up	2.1. Arrange tissues and request forms in cut-up area 2.2. Label tissue cassettes as required to maintain identity during subsequent procedures 2.3. Prepare containers for transport of tissues to processor 2.4. Select tissue fixative to prepare tissue for subsequent procedures 2.5. Weigh organs and count tissue chips and shavings 2.6. Take notes of gross features of specimens during cut-up if required
3. Process tissue	3.1. Select processor program and reagents 3.2. Inspect processor reagents for deterioration and adequate volume 3.3. Follow processing requirements for non-routine techniques, including histochemistry 3.4. Monitor processor regularly during processing sequence where appropriate
4. Embed tissue	4.1. Select embedding medium that is compatible with infiltrating agent 4.2. Check that temperature of embedding medium is suitable for embedding process 4.3. Check that volume of embedding medium is sufficient for uninterrupted embedding of processor load 4.4. Embed tissue in correct orientation 4.5. Apply procedures to prevent cross-contamination

ELEMENT	PERFORMANCE CRITERIA
	between patient tissues 4.6. Allow block to solidify according to requirements of embedding medium
5. Cut tissue sections	5.1. Check that flotation bath is ready and satisfactory for use 5.2. Prepare microtome and associated equipment to accommodate requirements of tissue batch 5.3. Secure block in microtome following specified safety procedures 5.4. Label required number of microscope slides with patient identification as prescribed by enterprise 5.5. Cut tissue sections according to needs of subsequent procedures 5.6. Float sections onto water bath to flatten tissues 5.7. Pick up sections onto microscope slides ensuring patient identification on slides matches that on block 5.8. Apply procedures to prevent cross-contamination between patient tissues 5.9. Maintain tissue sections in conditions compatible with intended subsequent procedures
6. Stain tissue sections	6.1. Apply staining procedures to demonstrate required morphological features 6.2. Prepare labile reagents for immediate use 6.3. Select reagents for specified technique, ensuring reagent sequence matches standard procedure 6.4. Stain sections according to method accommodating any authorised variations and applying required quality control 6.5. Mount slides using medium compatible with staining technique 6.6. Examine sections microscopically to ensure expected staining outcomes are achieved and procedural artefacts are detected 6.7. Confirm macroscopically or microscopically that tissue type conforms with labelling and pathologist specifications 6.8. Participate in final check to establish that the number of slides tallies with the worksheet 6.9. Attach permanent label giving specimen details as required by enterprise
7. Contribute to	7.1. Monitor and maintain resources for pathologists in

ELEMENT	PERFORMANCE CRITERIA
efficient provision of histological services	cut-up area 7.2. Liaise with clinical and nursing staff if required by enterprise regarding tissue fixative requirements in areas, such as wards, theatres and mortuary 7.3. Monitor and maintain volumes of fixatives in areas, such as wards, theatres and mortuary 7.4. Store slides and blocks according to legal and enterprise requirements under conditions that prevent degeneration
8. Maintain a safe environment	8.1. Use established safe work practices and personal protective equipment to ensure personal safety and that of other laboratory personnel 8.2. Handle non-fixed tissues safely to minimise cross-infection and contamination of personnel and environment 8.3. Store fixed tissues as specified to minimise exposure of personnel to dangerous fumes and vapours 8.4. Clean up spills using appropriate techniques to protect personnel, work area and environment from contamination 8.5. Minimise the generation of wastes 8.6. Ensure the safe disposal of biohazardous materials and other laboratory wastes in accordance with enterprise procedures
9. Maintain laboratory records	9.1. Make entries on report forms or into computer systems, accurately calculating, recording or transcribing data as required 9.2. File and store tissue sections to facilitate efficient retrieval as required 9.3. Maintain instrument logs as required by accreditation checks 9.4. Maintain confidentiality and security of all clinical information, and laboratory data and records

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

Required skills include:

- manual and automated histological tests and procedures
- preparing, storing and disposing of stains and reagents
- cutting paraffin embedded sections
- cutting and staining frozen sections
- staining paraffin embedded sections to demonstrate normal and abnormal tissue structure
- specialised staining(e.g. to demonstrate connective tissue)
- histochemical staining(e.g. to demonstrate carbohydrates)
- polarising microscopy
- fluorescent staining
- immunohistochemical staining
- recognising problems in systems and documentation, and troubleshooting under direction and/or where appropriate
- using the enterprise information system
- preparing documentation that is accurate, concise and in accordance with enterprise requirements
- managing tasks and organising work to ensure the timely completion of tasks
- using samples, reagents and materials economically and disposing of wastes safely
- working safely
- maintaining equipment

Required knowledge

Required knowledge includes:

- terminology used to communicate issues that relate to underpinning normal and abnormal anatomy, physiology, biochemistry and immunology
- relationship between strict adherence to enterprise procedures during each step and the maintenance of specimen integrity
- relevant health, safety and environment requirements, particularly those related to handling irritating, volatile, flammable and potentially carcinogenic substances, such as formaldehyde, xylene, histoclear, ethanol and chloroform
- importance of recognising the uniqueness of patient histological tissues (a non-renewable resource)
- relationship of the anatomy and morphology of tissue types and the macroscopic and microscopic appearance of stained sections
- chemistry of fixatives and their role in retaining size and spatial relationships in

REQUIRED SKILLS AND KNOWLEDGE
tissues and in preventing autolysis and putrefaction • relationship between the tissue components to be demonstrated and the choice of fixatives and fixation procedures, such as microwave fixation, processing and staining techniques • chemistry of dehydration and rehydration of tissues during processing and staining • relationship between correct orientation of the tissue during embedding and ability to cut sections from surface required for subsequent microscopic examination • correlation between poorly maintained processing reagents and resultant tissue blocks being difficult to cut or unsuitable for cutting • properties of the embedding medium • labile nature and chemistry of stains and the importance of correct preparation and storage to ensure required staining outcome • chemical interaction between the tissues and the various staining procedures implemented, including histochemical and immunohistochemical procedures (that is, reasons why the stains work) • effects of the presence of artefacts in sections on microscopic examination of tissues

Evidence Guide

EVIDENCE GUIDE	
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.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors should ensure that candidates can: • perform manual and automated histological tests and procedures • prepare, safely store and dispose of stains and reagents • cut paraffin embedded sections, free of wrinkles, scores and folds, at the specified thickness to demonstrate tissue and cellular structures, granules, inclusions and organelles,as required • cut and stain frozen sections at the specified thickness to demonstrate tissue and cellular structures and inclusions as required • stain paraffin embedded sections to demonstrate normal and abnormal tissue structure • perform specialised staining, for example, to demonstrate connective tissue, musclestriations, central nervous system, glands, basement membrane, micro-organisms, pigments and deposits • perform histochemical stains, for example to demonstrate carbohydrates, amyloid and mucins • perform specialised techniques, such as polarising microscopy, fluorescent staining and use of microwave ovens in histopathology • perform basic immunohistochemical staining • cover slip slides, ensuring that no air bubbles are formed and material is preserved for the life of the slide • label slides clearly with case, specimen and stain details • recognise problems in systems and documentation, and troubleshoot under direction and/or where appropriate • use the enterprise information system efficiently • critically analyse information in enterprise documents • prepare documentation that is accurate, concise and

EVIDENCE GUIDE	
	in accordance with enterprise requirements • manage tasks and organise work to ensure the timely completion of tasks • use samples, reagents and materials economically and disposes of wastes safely • use equipment safely • maintain equipment, recording and reporting malfunctions appropriately.
Context of and specific resources for assessment	This unit of competency is to be assessed in the workplace or simulated workplace environment. This unit of competency may be assessed with: • *MSL934002A Apply quality systems and continuous improvement processes*. Resources may include: • standard histology/laboratory with relevant equipment, samples and reagents • enterprise procedures, test methods and equipment manuals. Under duty of care requirements, off-the-job training providers will only use samples and organisms of a risk category compatible with their laboratory as defined in AS/NZS 2243.3.

Method of assessment	The following assessment methods are suggested:
	• inspection of stained tissue sections/slides prepared by the candidate
	• feedback from peers and supervisors
	• observation of candidate performing tests and procedures, such as:
	  • preparation of microtome for cutting, cutting blemish free sections, successful flotation and pickup of section
	  • staining tissues to demonstrate tissue structures and cell components as required
	  • morphological identification of tissues, such as epithelial, muscle, central nervous and glandular
	• oral and/or written tests and paper problems associated with test methods and laboratory processes, such as equipment calibration and maintenance.

EVIDENCE GUIDE	
This competency in practice	Industry representatives have provided the case study below to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. **Biomedical** In preparation for cutting some sections, a technical officer followed standard procedures. This involved checking the flotation bath temperature, checking the surface of the bath for cleanliness, inserting the microtome knife and checking the angle of the knife. They referred to the worksheet to confirm the number of slides required per patient and then labelled slides accordingly. They then proceeded with section cutting, carefully observing the safety protocols. They ensured that as the sections were picked up from the flotation bath, the patient identification on the slides and the block matched. They then cleaned the surface of the bath to prevent cross-contamination of samples between patients. The technical officer's care and diligence in performing these procedures ensured that specimen integrity was maintained.

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 2252 Biological safety cabinets
	  • AS ISO 17025-2005 General requirements for the competence of testing and calibration laboratories
	  • AS/NZS 2243 Set:2006 Safety in laboratories set
	  • AS/NZS 2982.1:1997 Laboratory design and construction - General requirements
	  • AS/NZS ISO 14000 Set:2005 Environmental management standards set
	  • AS/NZS ISO 9000 Set:2008 Quality management systems set
	• cleaning, hygiene and personal hygiene requirements
	• enterprise procedures, SOPs and operating manuals
	• incident and accident/injury reports
	• instructions to comply with legislation, standards, guidelines and codes
	• material data safety sheets (MSDS)
	• medico-legal and laboratory accreditation requirements for traceability of specimens and records
	• quality system and continued improvement processes
	• safety requirements for equipment, materials or products

RANGE STATEMENT	
	• sampling procedures (labelling, preparation, storage, transport and disposal) • schematics, work flows and laboratory layouts • statutory and enterprise occupational health and safety (OHS) requirements • stock records and inventory • test procedures (validated and authorised) • training program contents • waste minimisation, containment, processing and disposal procedures
Equipment, **reagents**, **specimens and systems**	Equipment, reagents, specimens and systems may include: • microtomes and microtome knives (non-disposable or disposable) • cryostats for frozen sections • microtome knife sharpeners • embedding centres • flotation baths, drying ovens and microwave ovens • tissue processors • staining and cover slipping machines • microscopes for bright field, phase contrast and fluorescence examinations • volumetric glassware and measuring devices • general laboratory glassware and equipment identified with an anatomical pathology laboratory • reagents, such as formaldehyde, ethanol, xylene, paraffin, picric acid and mercuric chloride • reference material for automated and manual quality control and quality assurance systems • fresh and fixed specimens • computer information systems, databases, record and filing systems, including specimen accessioning
Communication	Communication may involve: • supervisors and managers (laboratory, quality and customer service) • other laboratory or clinical personnel (pathologists, nursing staff, pathology

RANGE STATEMENT	
	registrars, other medical staff and clerical staff) • clients • external auditors and accreditation agencies (e.g. National Association of Testing Authorities (NATA))
Occupational health and safety (OHS) and environmental management requirements	OHS and environmental management requirements: • 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 • all operations assume the potentially hazardous nature of samples and require standard precautions to be applied • 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

Unit Sector(s)

Unit sector	Testing

Competency field

Competency field	

Co-requisite units

Co-requisite units		

Co-requisite units		