

LUNG CANCER
STRUCTURED REPORTING
PROTOCOL
(1st Edition 2010)

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Contents

Scope	5
Abbreviations.....	6
Definitions	7
Introduction	9
Authority and development	11
1 Clinical information and surgical handling	14
2 Specimen handling and macroscopic findings.....	17
3 Microscopic findings.....	21
4 Ancillary studies findings	26
5 Synthesis	29
6 Structured checklist	32
7 Formatting of pathology reports.....	40
Appendix 1 Pathology request form for lung cancer	41
Appendix 2 Guidelines for formatting of a pathology report	43
Appendix 3 Example of a pathology report for lung cancer.....	44
Appendix 4 WHO Classification of lung Neoplasms	38
Appendix 5 Staging of lung cancer	48
References.....	51

Scope

This protocol contains standards and guidelines for the preparation of structured reports for resection specimens of lung cancer. It is not applicable for endoscopic biopsy specimens.

Structured reporting aims to improve the completeness and usability of pathology reports for clinicians, and improve decision support for cancer treatment. The protocol provides the framework for the reporting of any lung cancer, whether as a minimum dataset or fully comprehensive report.

Abbreviations

AJCC	American Joint Committee on Cancer
CK	cytokeratin
EGFR	epidermal growth factor receptor
ERCC1	Excision repair cross-complementation group 1 protein
FISH	fluorescence in-situ hybridization
IASLC	International Association for the Study of Lung Cancer
KRAS	v-Ki-ras2 Kirsten rat sarcoma viral oncogene homolog
NSCLC	non-small cell lung cancer
LIS	laboratory information system
PBS	Pharmaceutical Benefits Scheme
PL	pleura
R	residual tumour
RCPA	Royal College of Pathologists of Australasia
RRM	RNA recognition motif
TTF-1	thyroid transcription factor-1
TNM	tumour–node–metastasis (a staging system)
TS	thymidylate synthase
UICC	Union Internationale Contre le Cancer (International Union Against Cancer)
VPI	visceral pleural invasion
WHO	World Health Organization

Definitions

The table below provides definitions for general or technical terms used in this protocol. Readers should take particular note of the definitions for 'standard', 'guideline' and 'commentary', because these form the basis of the protocol.

Ancillary study	An ancillary study is any pathology investigation that may form part of a cancer pathology report but is not part of routine histological assessment.
Clinical information	Patient information required to inform pathological assessment, usually provided with the specimen request form. Also referred to as 'pretest information'.
Commentary	<p>Commentary is text, diagrams or photographs that clarify the standards (see below) and guidelines (see below), provide examples and help with interpretation, where necessary (not every standard or guideline has commentary).</p> <p>Commentary is used to:</p> <ul style="list-style-type: none">• define the way an item should be reported, to foster reproducibility• explain why an item is included (eg how does the item assist with clinical management or prognosis of the specific cancer).• cite published evidence in support of the standard or guideline• clearly state any exceptions to a standard or guideline.• In this document, commentary is prefixed with 'CS' (for commentary on a standard) or 'CG' (for commentary on a guideline), numbered to be consistent with the relevant standard or guideline, and with sequential alphabetic lettering within each set of commentaries (eg CS1.01a, CG2.05b).
General commentary	<p>General commentary is text that is not associated with a specific standard or guideline. It is used:</p> <ul style="list-style-type: none">• to provide a brief introduction to a chapter, if necessary• for items that are not standards or guidelines but are included in the protocol as items of potential importance, for which there is currently insufficient evidence to recommend their inclusion. (Note: in future reviews of protocols, such items may be reclassified as either standards or guidelines, in line with diagnostic and prognostic advances, following evidentiary review).

Guideline	<p>Guidelines are recommendations; they are not mandatory, as indicated by the use of the word 'should'. Guidelines cover items that are not essential for clinical management, staging or prognosis of a cancer, but are recommended.</p> <p>Guidelines include key observational and interpretative findings that are fundamental to the diagnosis and conclusion. Such findings are essential from a clinical governance perspective, because they provide a clear, evidentiary decision-making trail.</p> <p>Guidelines are not used for research items.</p> <p>In this document, guidelines are prefixed with 'G' and numbered consecutively within each chapter (eg G1.10).</p>
Macroscopic findings	Measurements, or assessment of a biopsy specimen made by the unaided eye.
Microscopic findings	In this document, the term 'microscopic findings' refers to histological or morphological assessment.
Standard	<p>Standards are mandatory, as indicated by the use of the term 'must'. Their use is reserved for core items essential for the clinical management, staging or prognosis of the cancer.</p> <p>The summation of all standards represents the minimum dataset for the cancer.</p> <p>In this document, standards are prefixed with 'S' and numbered consecutively within each chapter (eg S1.02).</p>
Structured report	A report format which utilizes standard headings, definitions and nomenclature with required information.
Synoptic report	A structured report in condensed form (as a synopsis or precis).
Synthesis	Synthesis is the process in which two or more pre-existing elements are combined, resulting in the formation of something new. In the context of structured pathology reporting, synthesis represents the integration and interpretation of information from two or more chapters to derive new information.

Introduction

Lung cancer

Lung cancer has a high mortality rate and is the commonest cause of cancer death in Australia, accounting for 19.4% of cancer-related deaths.¹⁻² While lung cancer accounts for most deaths, it is only the fifth most common cancer in Australia after colorectal cancer, breast cancer, prostate cancer and melanoma.¹ The incidence and mortality from lung cancer has increased in Australian females over the last decade but decreased in males, similar to trends observed in the USA.³ These variations have been attributed to alterations in smoking habits between the sexes over time.⁴

The average 5-year relative survival rate for non-small cell lung cancer (NSCLC) in Australia is only 12% for males and 16% for females and the 1-year relative survival rate is 36–38%.⁵ While the overall survival rate for lung cancer is low, early stage NSCLC has 5 year survival rates of about 60–70% for Stage I disease and 40-55% for Stage II disease⁶ and for those patients who survive 3 years from the time of diagnosis, the 5-year relative survival rate rises to 75%.⁷ The treatment of choice and foremost potential for cure of Stage I–II (and some Stage IIIA) NSCLC is complete surgical resection.⁸ In addition, there is evidence of a survival benefit in patients receiving adjuvant chemotherapy if they have Stage II disease or higher.⁹⁻¹⁰

Pathological reporting

Pathological assessment of resection specimens provides important information on the salient features of lung cancer such as tumour type, size, local extent, lymph node status and stage. This diagnostic and prognostic information forms the basis of clinical decision making by multidisciplinary management teams. Tumour typing, especially the distinction between small cell carcinoma and non-small cell carcinoma¹¹ is crucial in directing appropriate management. More recently, subtyping of histological types of NSCLC has also been demonstrated to play a role in determining which tumours are likely to respond to different chemotherapeutic agents. For example, adenocarcinomas are more likely to harbour genetic mutations amenable to treatment with targeted molecules.¹² Pathological staging of tumours assists in directing appropriate clinical management by helping to determine which patients are suitable for adjuvant treatment.⁹ This data also provides a prediction of prognosis and a means of evaluating the outcome of different therapies among comparable groups of patients in clinical trials.¹³

Benefits of structured reporting

Given the integral role of pathology in helping to determine best management of lung cancer patients, it is imperative that the relevant information is provided in all pathology reports of lung cancer cases. Best practice requires consistent reporting of key elements in pathological assessment of tumours in a clear and comprehensive manner, to enable fully informed clinical decision making. The use of standardised structured/synoptic pathology reports assists in achieving consistency in pathology reporting, which facilitates optimal patient care. Synoptic reporting of tumours has proved to be of benefit in ensuring relevant information is included in pathology reports of numerous tumour types¹⁴⁻¹⁸ and it is anticipated that this approach will also be of benefit in lung cancer.

In this document, standards and guidelines for pathology reporting of lung cancer have been devised based on best available evidence and input of consensus expert opinion from a multidisciplinary group. The aim is to provide a checklist to help pathologists to include all important data required by the treating clinician in an organised format. The

synoptic report also provides easily extractible information for cancer registries and clinical audit as well as for research purposes. Importantly, free text can be used to provide additional information in the synoptic report. This is particularly important when a pathologist needs to communicate complex or unusual findings.

Our ultimate goal is to achieve the highest standards of care for patients with lung cancer. A nationally accepted system of pathology reporting will be a vital step towards this goal.

Design of this protocol

This protocol defines the relevant information to be assessed and recorded in a pathology report for lung cancer. Mandatory elements (standards) are differentiated from those that are not mandatory but are recommended (guidelines). Also, items suited to tick boxes are distinguished from more complex elements requiring free text or narrative. The structure provided by the following chapters, headings and subheadings describes the elements of information and their groupings, but does not necessarily represent the format of either a pathology report (Chapter 7) or checklist (Chapter 6). These, and the structured pathology request form (Appendix 1) are templates that represent information from this protocol, organised and formatted differently to suit different purposes.

It should be noted that if the resection specimen contains two or more primary carcinomas (as indicated by the term 'synchronous carcinomas' on the reporting checklist) then a separate reporting checklist must be completed for each primary carcinoma.

Key documents

- *Guidelines for Authors of Structured Cancer Pathology Reporting Protocol*, Royal College of Pathologists of Australasia, 2009.¹⁹
- *The Pathology Request-Test-Report Cycle — Guidelines for Requesters and Pathology Providers*, Royal College of Pathologists of Australasia, 2004.²⁰
- *AJCC Cancer Staging Manual*, 6th and 7th editions, American Joint Committee on Cancer 2002 and 2010.^{13,21}
- *Pathology and Genetics of Tumours of the Lung, Pleura, Thymus and Heart*, World Health Organization Classification of Tumours, Volume 10, 2004.¹¹

Updates since last edition

Not applicable

Authority and development

This section provides details of the committee involved in developing this protocol and the process by which it was developed.

Protocol developers

This protocol was developed by an expert committee, with assistance from relevant stakeholders.

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Stakeholders

ACT Health

Anatomical Pathology Advisory Committee (APAC)

Australasian Lung Cancer Trials Group (ALTG)

Australasian Society of Cardiac & Thoracic Surgeons (ASCTS)

Australian Association of Pathology Practices Inc (AAPP)

Australian Cancer Network

Australian Commission on Safety and Quality in Health Care

Australian Lung Foundation Lung Cancer Consultative Group

Cancer Australia

Cancer Council ACT

Cancer Council NSW

Cancer Council Queensland

Cancer Council SA

Cancer Council Tasmania
Cancer Council Victoria
Cancer Council Western Australia
Cancer Institute NSW
Cancer Services Advisory Committee (CanSAC)
Cancer specific expert groups – engaged in the development of the protocols
Cancer Voices
Clinical Oncology Society of Australia (COSA)
Colorectal Cancer Research Consortium
Department of Health and Ageing
Grampians Integrated Cancer Services (GICS)
Health Informatics Society of Australia (HISA)
Medical Software Industry Association (MSIA)
National Breast and Ovarian Cancer Centre (NBOCC)
National Coalition of Public Pathology (NCOPP)
National E-Health Transition Authority (NEHTA)
National Pathology Accreditation Advisory Council (NPAAC)
National Round Table Working Party for Structured Pathology Reporting of Cancer.
New Zealand Guidelines Group (NZGG)
NSW Department of Health
Peter MacCallum Cancer Institute
Queensland Cooperative Oncology Group (QCOG)
Representatives from laboratories specialising in anatomical pathology across Australia
Royal Australasian College of Physicians (RACP)
Southern Cancer Network, Christchurch, New Zealand
Southern Melbourne Integrated Cancer Service (SMICS)
Standards Australia
The Medical Oncology Group of Australia
The Royal Australasian College of Surgeons (RACS)
The Royal Australian and New Zealand College of Radiologists (RANZCR)
The Royal Australian College of General Practitioners (RACGP)
The Royal College of Pathologists of Australasia (RCPA)
The Thoracic Society of Australia & New Zealand (TSANZ)
Victoria Cancer Council
Victorian Cooperative Oncology Group (VCOG)
Western Australia Clinical Oncology Group (WACOG)

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Development process

This protocol has been developed following the seven-step process set out in *Guidelines for Authors of Structured Cancer Pathology Reporting Protocols*.¹⁹

Where no reference is provided, the authority is the consensus of the expert group.

1 Clinical information and surgical handling

This chapter relates to information that should be collected before the pathology test, and procedures that are required before handover of specimens to the laboratory.

Surgeons and other clinicians should be aware that the information provided in the request form is necessary to assist pathologists to make an accurate and comprehensive assessment of the specimen. The standards and guidelines below specify the particular information and specimens required for lung cancer. Some of this information can be collected on generic pathology request forms; any additional information required specifically for the reporting of lung cancer may be recorded on a separate datasheet. A standardised request form for lung cancer specimens may assist in obtaining all relevant information (Appendix 1).

Clinical information

S1.01 The Royal College of Pathologists of Australasia (RCPA) *The Pathology Request-Test-Report Cycle – Guidelines for Requesters and Pathology Providers must be adhered to.*²⁰

CS1.01a The RCPA guidelines specify the minimum information to be provided by the requesting clinician for any pathology test.

Items relevant to cancer reporting protocols include:

- patient name
- date of birth and sex
- identification and contact details of requesting doctor
- type of specimen
- date of request
- clinical information relevant to the investigations requested.

G1.01 The patient's health identifiers should be recorded where provided.

CG1.01a The patient's health identifiers may include the patient's Medical Record Number as well as a national health number such as a NHI or UHI.

G1.02 The pathology accession number of the specimen should be recorded.

G1.03 The principal clinician involved in the patient's care and responsible for investigating the patient must be identified.

CG1.03a The requesting clinician (identified under S1.01) may not be the person with overall responsibility for investigating and managing the patient. Identification of the principal clinician involved in the patient's care is important to ensure effective communication of clinical information.

S1.02 The nature of the resection must be recorded.

- CS1.02a Examples include wedge resection, lobectomy or pneumonectomy.
- CS1.02b If additional extrapulmonary tissue has been resected due to possible involvement by tumour (eg pericardium, adherent parietal pleura), this should be stated to assist in appropriate pathological examination of relevant areas and pathological staging.

S1.03 The site and laterality of the tumour must be recorded

- CS1.03a If multiple lobes are involved this must be stated.
- G1.04 The result(s) of previous cytological investigations or biopsy of the tumour should be recorded.
 - CG1.04a Previous biopsy or cytology results may include bronchial biopsy, fine needle aspiration biopsy, positive sputum cytology, bronchial brushings or washings. If possible, details of the laboratory that reported on these cases should also be provided.
 - CG1.04b The results of these investigations may affect the handling of the specimen (eg sampling for ancillary studies may be indicated in the case of an unusual tumour with uncertain biopsy/cytology diagnosis). Sampling for microbiology may be indicated if the differential diagnosis includes infection.
 - CG1.04c The results of previous investigations may also affect tumour staging; for example, cytological diagnosis of malignant pleural effusion in a lung cancer is categorised as M1a (2010 revision of the TNM staging system – see Appendix 5).
- G1.05 The details of any previous treatment of the current tumour should be recorded.
 - CG1.05a Information about previous neoadjuvant chemotherapy and/or radiotherapy may assist in morphological interpretation of the current pathology specimen. More extensive sampling of the specimen may also be necessary to identify any residual viable tumour.
- G1.06 Relevant details of previous cancer diagnosis should be recorded.
 - CS1.06a Information regarding previous malignancies (pulmonary or extrapulmonary) and, if necessary, review of previous specimens may assist in reaching the correct diagnosis on the current pathology specimen. If possible, details of the laboratory that reported on the potentially relevant malignancies should also be provided.
- G1.07 Any risk factors should be recorded.
 - CG1.07a Risk factors for lung cancer include a history of smoking, asbestos exposure and interstitial lung disease. Information regarding a patient's smoking history can be important to the pathologist as some types of lung cancer rarely occur in life-long nonsmokers. Ethnicity should be recorded where relevant. Some forms of lung cancer are more common in certain ethnic groups (please see G4.01b). A history of significant asbestos exposure would be useful

to ensure adequate sampling of non-neoplastic lung tissue for asbestos bodies or fibres.

G1.08 The clinical tumour stage should be recorded.

CG1.08a Details of the surgeon's opinion of tumour stage based on radiological and surgical findings (see Appendix 5) will assist in accurate pathological staging. For instance, invasion of adjacent structures such as parietal pleura or mediastinum are important determinants of tumour stage.

G1.09 Any other relevant information and comments should be recorded.

Surgical handling

G1.10 The specimen should be sent to the laboratory in the fresh state without delay.

CG1.10a The laboratory should be informed if the specimen is likely to arrive out of normal working hours.

2 Specimen handling and macroscopic findings

This chapter relates to the procedures required after the information has been handed over from the requesting clinician and the specimen has been received in the laboratory.

Specimen handling

G2.01 Tissue banking.

Pathologists may be asked to provide tissue samples from fresh lung specimens for tissue banking or other research purposes. The decision to provide tissue should only be made when the pathologist is sure that the diagnostic process and pathological evaluation will not be compromised. As a safeguard, research use of the specimen may be put on hold until the diagnostic process is complete so that the specimen can be retrieved.

S2.01 Fixation – adequate fixation is required to ensure high quality pathological assessment.

CS2.01a The resection specimen must be inflated with formalin and fixed, preferably overnight via cannulation of the bronchus at the medial resection line.²²⁻²⁴

CS2.01b For wedge resection specimens, the lung can be inflation-fixed by injection through the visceral pleura. This technique can also be used for lobectomy and pneumonectomy specimens where occlusion of the relevant bronchus by tumour prevents inflation through the bronchial lumen.

S2.02 Specimen inspection - the specimen must be handled in a systematic and thorough fashion to ensure completeness and accuracy of pathological data.

CS2.02a Basic aspects of the cut-up procedures and macroscopic assessment of lung cancer are described in standard texts, particularly Westra et al.²²

CS2.02b Assessment of tumour location.

The relevant main, lobar or segmental bronchi (if present in the specimen) must be opened seeking evidence of bronchial origin.

Although bronchial metastases can occur, identification of a bronchial origin for the tumour is important in discriminating between a primary bronchopulmonary carcinoma and metastatic disease.

If necessary, a metal probe can be inserted along the lumen of the bronchial system, directed towards the segment(s) where the cancer is located, and then slicing along the probe using a long-bladed knife.^{22,25}

CS2.02c Marking of resection margins.

Resection margins must be inked when this may aid in assessing

possible microscopic tumour involvement of surgical margins. It may be necessary to ink the hilar soft tissue surgical margin, chest wall margin or wedge biopsy surgical margin in relevant specimens with tumours close to margins. It may be useful to ink the pleural surface in areas of pleural puckering overlying the tumour.

S2.03 The following areas must be examined and thoroughly sampled for microscopic examination:

- a. **tumour tissue**
- b. **central scar if present**
- c. **visceral pleura overlying a peripheral tumour (and parietal pleura/chest wall if present)**
- d. **bronchial resection margin**
- e. **vascular resection margin**
- f. **all lymph nodes**
- g. **non-neoplastic lung.**

CS2.03a In view of the well recognized heterogeneity of lung cancers, the tumour should be adequately sampled to identify the different tumour types within a single macroscopic tumour.

Macroscopic findings

S2.04 The specimen type must be recorded.

CS2.04a Types of specimens include wedge resection, segmentectomy, lobectomy, pneumonectomy; with or without chest wall tissue.

S2.05 The nature and sites of all blocks must be recorded.

S2.06 The tumour site must be recorded.

CS2.06a For example, right upper lobe, right middle lobe, right lower lobe, left upper lobe, left lower lobe, main bronchus.

G2.02 The tumour location (central or peripheral) should be recorded.

CG2.02a For a central tumour, state whether it involves mainstem, lobar or segmental bronchus.

S2.07 The number of tumours must be recorded.

CS2.07a Synchronous tumours of different histological types are considered separate primaries and are staged independently. A tumour of any size with separate tumour nodules (of the same histological type) in the same lobe is classified as T3 (see appendix 5).

CS2.07b If the specimen contains two or more primary carcinomas (as indicated by the term 'synchronous carcinomas' on the reporting checklist) then a separate reporting checklist must be completed

for each primary carcinoma.

S2.08 The tumour size must be recorded.

CS2.08a The maximum tumour diameter is recorded. This and all other measurements in this protocol should be made in millimetres.

CS2.08b The size of all tumours is essential information for staging purposes.

S2.09 The extent of direct spread of the primary tumour must be recorded.

CS2.09a Evaluation of the lung cancer specimen for visceral pleural invasion (VPI) requires careful assessment of the relationship of the tumour to the overlying pleura.

CS2.09b In the case of a peripheral tumour which is close to, or abuts, the visceral pleura, with or without pleural puckering, adequate sampling of the pleura overlying the tumour is important for accurate staging.

CS2.09c Other tissues (eg hilar soft tissues, parietal pleura, chest wall, mediastinal tissue, pericardium, diaphragm) must also be assessed and sampled if they are present.

S2.10 The distance of the tumour from the bronchial resection margin must be recorded.

CS2.10a The distance from the bronchial resection margin is useful information for surgical audit and for assessing the completeness of surgical resection of the tumour.

CS2.10b The prognostic significance of a close resection margin is unknown.

S2.11 The site of all lymph nodes must be recorded and they must be assessed for possible involvement by tumour.

CS2.11a Lymph node involvement is essential for staging. Therefore, all lymph nodes must be submitted for microscopic examination.

CS2.11b Lymph nodes included in the N1 category of TNM staging may be identified by pathologists (peribronchial, hilar, intrapulmonary lymph nodes — see Appendix 5). However, N2 (and more distal) lymph nodes from specific mediastinal and subcarinal lymph node stations²⁶ require separate specimen identification by the referring surgeon.

S2.12 The non-neoplastic lung must be described.

CS2.12a Examination of lung tissue away from the tumour may reveal lymphatic spread of tumour, satellite nodules and other conditions (eg emphysema, fibrosis).

CS2.12b If atelectasis/obstructive pneumonitis is present distal to the tumour, its extent should be recorded and tissue sampled for

microscopic examination.

CS2.12c Tumours with partial involvement of the lung by atelectasis/obstructive pneumonitis are designated T2; involvement of the entire lung is designated T3. Small central tumours may be 'upstaged' by the presence of total atelectasis/obstructive pneumonitis into the T3 category.

G2.03 Any additional relevant comments should be recorded.

A descriptive or narrative field should be provided to record any macroscopic information that is not recorded in the above standards and guidelines, and that would normally form part of the macroscopic description.

CG2.03a The traditional macroscopic narrative recorded at the time of specimen dissection is often reported separately from the cancer dataset. Although this remains an option, it is recommended that macroscopic information be recorded within the overall structure of this protocol.

CG2.03b Much of the information recorded in a traditional macroscopic narrative is covered in the standards and guidelines above and in many cases, no further description is required.

3 Microscopic findings

Microscopic findings relates to purely histological assessment. Information derived from multiple investigational modalities, or from two or more chapters, are described in Chapter 5.

S3.01 The histological tumour type must be recorded.

- CS3.01a The tumour must be classified according to the World Health Organization (WHO) classification of lung neoplasms (2004).¹¹ See Appendix 4.
- CS3.01b In an adenocarcinoma of mixed subtypes (e.g. acinar and papillary), the individual subtypes should be stated.

S3.02 The histological grade must be recorded.

- CS3.02a The tumour should be classified as well differentiated, moderately differentiated, poorly differentiated or undifferentiated according to the WHO classification.
- CS3.02b If there are variations of grade within the tumour, grading should be classified on the least differentiated area.¹¹
- CS3.02c Although the stage of disease and the performance status at diagnosis are the most powerful prognostic indicators for survival, histological grading is also an independent prognostic indicator in some studies.²⁷
- CS3.02d Grading may not be applicable for some lung neoplasms.¹¹ Carcinoid tumours are classified as typical or atypical, according to criteria outlined in the WHO classification of lung neoplasms.

S3.03 Visceral pleural invasion must be recorded as present or absent.

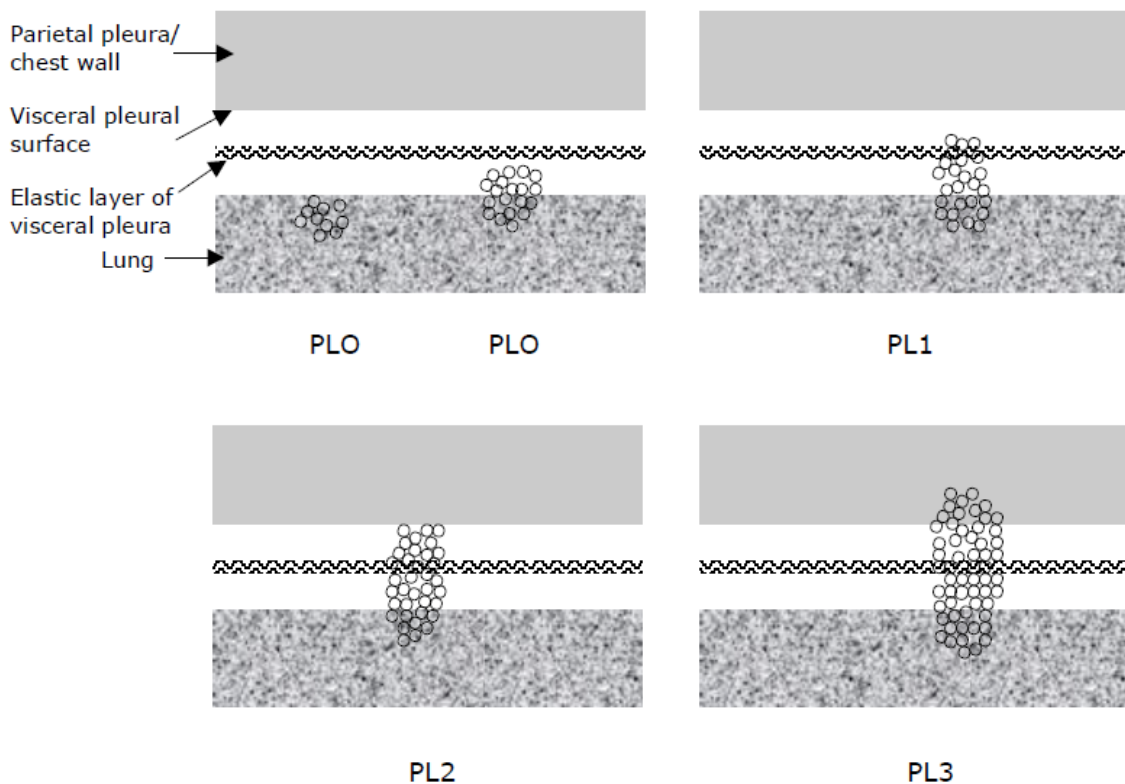
- CS3.03a Visceral pleural invasion (VPI) is an important determinant of staging and a significant independent adverse prognostic factor.²⁸⁻³⁰
- CS3.03b Evaluation of the lung cancer specimen for VPI requires careful microscopic assessment of the relationship of the tumour to the overlying pleura, particularly in areas of pleural puckering.
- CS3.03c An elastic stain must be performed for all blocks where the tumour is close to the pleura and when the presence of pleural invasion is indeterminate by examination of H&E sections alone. For example, when the distinction between PL0 and PL1 is unclear.³⁰⁻³² It may be necessary to perform the elastic stain on multiple blocks, especially in areas of pleural puckering. Assessment of the elastic stain may be difficult in some cases where there is reduplication or alteration of the elastic layers resulting from local fibroinflammatory changes.
- CS3.03d In the 7th edition of the TNM Staging system AJCC Classification for Lung Cancer^{21,26}, visceral pleural invasion (VPI) is defined as invasion **beyond** the elastic layer (PL1) including invasion to the visceral pleural surface (PL2). See Table S3.03d, Figure S3.03d and Appendix 5.

Table S3.03d Definition of visceral pleural invasion and corresponding T category^a

PL status	Explanation	T category
<i>Visceral pleural invasion (VPI) absent</i>		
PL0	Tumour confined to subpleural lung parenchyma <i>or</i> Tumour invades superficially into connective tissue or intermingles with elastic fibres of visceral pleura but does not invade beyond the thick elastic layer	T1 or higher (T category determined by features other than VPI such as size etc)
<i>Visceral pleural invasion (VPI) present</i>		
PL1	Tumour invades beyond the elastic layer	At least T2
PL2	Tumour invades to the visceral pleural surface	At least T2
PL3	Tumour invades into parietal pleura or chest wall	At least T3

PL = pleura; VPI = visceral pleural invasion
a Modified from Travis 2009³³

Figure S3.03d Diagram of visceral pleural invasion



CS3.03e A tumour with local invasion across the interlobar fissure into an ipsilateral lobe without tumour on the visceral pleural surface should be classified as T2.³³

S3.04 Vessel invasion must be recorded as present or absent.

CS3.04a If present, state whether involvement of artery, vein or lymphatic if possible.

If present, state the extent of vascular or lymphatic invasion (eg extensive, focal).

CS3.04b Although the presence of vascular or lymphatic invasion does not change the pT staging, it is an unfavourable prognostic finding in some studies³⁴⁻³⁹ and may influence the selection of treatment by some clinicians.

G3.01 Perineurial (perineural) invasion should be recorded.

S3.05 The status of the bronchial resection margin must be recorded.

CS3.05a State whether the bronchial resection margin is free of tumour or involved by tumour. If involved, state whether the tumour is invasive or in situ carcinoma. If invasive, state whether the tumour involves bronchial tissue only or infiltrates peribronchial soft tissue.⁴⁰

CS3.05b For tumours involving a major bronchus and where the tumour extends close to the surgical margin on gross inspection, the microscopic clearance should be measured in millimetres.

CS3.05c The presence of carcinoma in situ at the bronchial resection margin is classified as residual disease (R1 (is)) by the UICC and the term 'uncertain resection' has been proposed. In cases with invasive carcinoma in the peribronchial tissue, the prognosis is similar to that of N2 disease.⁴⁰

S3.06 The status of the vascular resection margin must be recorded.

CS3.06a State whether the vascular resection margin is free of tumour or involved by tumour.

CS3.06b If involved by tumour, state the nature of involvement: Tumour thrombus present in the lumen of the vessel; vessel wall involved by tumour etc.

CS3.06c Involvement of the vascular resection margin determines treatment and follow-up.

S3.07 The status of other lung surgical resection margins must be recorded.

CS3.07a For example, surgical margin of a wedge resection specimen, must be assessed for tumour clearance.

S3.08 Direct involvement of contiguous structures must be recorded as present

or absent.

- CS3.08a For example, hilar soft tissue, mediastinal tissue, pericardium, diaphragm, parietal pleura, chest wall and other.
- CS3.08b State whether the tumour is absent or present at the inked resection margin for any structures mentioned.
- CS3.08c Measure and record the distance of tumour from the closest margin in millimetres.

S3.09 *In situ* carcinoma must be recorded as present or absent.

- CS3.09a Note presence or absence of *in situ* component (eg squamous cell carcinoma *in situ* or atypical adenomatous hyperplasia). This is important information for follow-up of patients.

S3.10 Lymph node involvement by tumour must be recorded as absent or present.

- CS3.10a Record the number and site of involved or tumour-free nodes per number received or retrieved (eg 3/6 or 0/6).⁴⁰ These may be regional lymph nodes included in the resection specimen or separately submitted from other sites.
- CS3.10b Direct invasion by tumour is included as lymph node involvement in the TNM staging of lung cancer
- CS3.10c Surgical removal of a sufficient number of lymph nodes is necessary to determine an accurate pN category. The number of lymph nodes evaluated is associated with patient survival, probably as a result of reduced likelihood of missing involved nodes and more accurate tumour staging.⁴¹⁻⁴²

G3.02 The extent of lymph node replacement by tumour should be recorded.

- CG3.02a State whether tumour involvement of nodes is focal, extensive or complete. It should also be stated if the nodal involvement appears to be by direct invasion rather than metastatic spread even though this does not affect staging

G3.03 The presence or absence of extracapsular extension should be recorded.

- CG3.03a Although extracapsular extension does not change the pN staging, it is an important prognostic finding and may influence the selection of treatment by some clinicians. Lack of extracapsular extension is one of the requirements for a tumour to be considered as having complete surgical resection (see G5.02).

S3.11 Histological findings in non-neoplastic lung must be recorded.

- CS3.11a Microscopic examination is used to confirm macroscopic impression of atelectasis/obstructive pneumonitis.
- CS3.11b Microscopic examination of lung tissue away from the tumour may reveal lymphatic spread of the tumour, satellite nodules, preneoplastic lesions (eg, atypical adenomatous hyperplasia) or other conditions

(eg, emphysema, respiratory bronchiolitis, interstitial lung disease, asbestosis).

G3.04 Any additional relevant comments should be recorded.

4 Ancillary studies findings

Ancillary studies may be used for a number of purposes including to assist in disease classification, to provide prognostic information or to predict the likelihood of patient response to specific biologic therapies.

S4.01 Results of any immunohistochemical stains used to assist in diagnosis must be recorded.

CS4.01a The WHO classification of lung tumours (2004)¹¹ relies predominantly on light microscopy for classification but immunohistochemistry may be helpful in some instances for precise subclassification and exclusion of metastasis. Immunohistochemical assessment is therefore not necessary in routine diagnosis of most cases of lung cancer.¹¹ However, immunohistochemical stains may be useful in some instances to assess rarer types of lung tumours (eg large cell neuroendocrine carcinoma, spindle cell neoplasms), to distinguish between primary and metastatic lung cancers (eg adenocarcinomas with a signet-ring or enteric appearance) and at times, to help reach a diagnosis in small biopsy samples when there is only limited material available for morphological assessment.

CS4.01b Pathologists are advised to refer to available literature for greater detail regarding the most appropriate use of immunohistochemical stains in lung cancer^{11,43-44}. The immunohistochemical profile of thyroid transcription factor-1 (TTF-1), cytokeratin 7 and 20 (CK7 and CK20) can be particularly useful in helping to distinguish between primary and metastatic lung adenocarcinomas (in addition to attention to tumour morphology and the clinical and radiological findings).⁴⁵ TTF-1 is a fairly specific marker for a variety of lung (and thyroid) tumours. However, its sensitivity is only high for adenocarcinomas (~75%) and small cell carcinomas (~90%), with less sensitivity observed in large cell carcinomas (~50%) and squamous cell carcinomas (~10%) of lung origin.⁴³⁻⁴⁴ TTF-1 is less useful in small cell carcinomas, as specificity is low with about 1/3–1/2 of small cell carcinomas from extrapulmonary sites also expressing this marker.⁴⁶

While the majority of primary lung adenocarcinomas are CK7+/CK20-/TTF-1+ (~75%), CK20 may also be positive, particularly in cases with mucinous or enteric-type differentiation.⁴⁴⁻
⁴⁶ Immunohistochemical markers are not useful in distinguishing between primary and metastatic squamous cell carcinoma where attention to clinical scenario as well as the number and the site of lesions is more useful.

The current view of many Clinical Oncological groups⁴⁷⁻⁵⁶ is that precise evaluation of histological subtype is now mandatory, and will be increasingly relevant to later molecular target therapy, i.e. a simple division into small cell carcinoma and non-small cell carcinoma is no longer sufficient to determine current complex treatment regimes. Immunohistochemistry may therefore become more important in the examination of lung resection specimens, as well as small bronchial biopsies, fine needle biopsies, and cytology cell block material. For example, some pathologists use p63 and

CK5/6 immunostaining to help in assigning a tumour to a squamous or non-squamous type. This approach is however not standardised or validated in detail and will also be subject to the well recognised heterogeneity in phenotype within individual lung cancers.

- G4.01 Molecular testing of NSCLC should be considered when it will influence treatment.
- CG4.01a The purpose of pathological evaluation of lung cancer includes the determination of molecular abnormalities that can guide patient selection for appropriate therapy.⁵⁷ Testing should be done when it is considered that the information provided will be of clinical value. This may be because of an immediate need to consider therapy, or to plan therapeutic options in the future. Currently, this is restricted to testing for abnormalities that are associated with sensitivity or resistance to small molecule inhibitors of the epidermal growth factor receptors (EGFRs) — gefitinib and erlotinib. The presence of an *EGFR* gene mutation in tumour tissue is required for patients to receive gefitinib under the Pharmaceutical Benefits Scheme (PBS) in Australia. Erlotinib is PBS funded but not based on mutation testing. As yet there are no published direct trials of gefitinib and erlotinib to conclude they are equally active, although this may eventually prove to be the case.
 - CG4.01b Reported somatic mutations in the *EGFR* gene are associated with favourable outcomes from treatment with such therapy.⁵⁸ The mutations are limited to exons 18–21 of *EGFR* and occur in non-small cell lung cancer (NSCLC) in 10–15% of Caucasians and 30–40% of Asians. As well as ethnicity, the frequency of mutations is higher in NSCLC from never smokers, women, and in adenocarcinomas. Greater than 80% of mutations are either short deletions in exon 19 or single point mutations in exon 21 (L858R).
 - CG4.01c Mutations in the *KRAS* gene are associated with lack of benefit from EGFR inhibitors.⁵⁹ Mutations occur in exon 2 at codon 12 or 13 and are single point mutations. Mutations in the *EGFR* and *KRAS* genes are virtually never both present in the same tumour.⁵⁹
 - CG4.01d Other potential molecular markers that could be used to guide patient selection for treatment with certain chemotherapy agents have been reported but not yet widely validated. These include *ERCC1* for cisplatin, *RRM1* for gemcitabine, and *TS* for pemetrexed.
- G4.02 Molecular pathology testing result(s) should be recorded if performed
- CG4.02a The molecular test will often be oncologist-initiated and requires discussion between the oncologist and the pathologist, preferably in the setting of a multidisciplinary meeting.
 - CG4.02b Mutation testing can be performed on fresh tissue or paraffin-embedded blocks. The diagnosis of lung cancer is often made on small biopsy or cytology samples. The small volume of tumour material available in these cases can be a limiting factor in molecular testing. The role of the pathologist is primarily to select and forward the block for mutation testing. Factors to consider in selecting the most appropriate block to detect a somatic mutation by conventional DNA sequencing include the greatest volume of tumour material, the highest tumour cell content and the

presence of some normal tissue. Ideally, the tumour area should contain at least 3:1 ratio of neoplastic:normal cells (approximately 75% tumour cell content).

CG4.02c The mutation test result should be included as a supplementary report in the original pathology report if the test has been performed by the same laboratory. However, it may be performed some years later by a completely different laboratory. In that case the test result from the molecular diagnostic laboratory may be considered a stand-alone report.

5 Synthesis and overview

Information that is synthesized from multiple modalities and therefore cannot reside solely in any one of the preceding chapters is described here. For example, tumour stage is synthesized from multiple classes of information – clinical, macroscopic and microscopic.

Overarching case comment is synthesis in narrative form. Although it may not necessarily be required in any given report, the provision of the facility for overarching commentary in a cancer report is essential.

By definition, synthetic elements are inferential rather than observational, often representing high-level information that is likely to form part of the 'diagnostic summary' section in the final formatted report.

S5.01 The pathological stage must be recorded.

CS5.01a Staging is a classification system that provides information regarding the anatomical extent of a tumour based on attributes that encompass the natural behaviour of the tumour. The AJCC/UICC classification is based on three main attributes — extent of local tumour spread (T), regional lymph node involvement (N) and distant metastases (M).

Clinical staging (cTNM) is based on information obtained before the initial treatment and may include physical examination, radiology, endoscopy, biopsy and surgical findings.

Pathological staging (pTNM) is based on information obtained from pathological examination in addition to clinical information. Pathological examination of the resected primary tumour and regional lymph nodes is used to ascertain the highest pT and pN categories.

For cases in which pathological staging is performed subsequent to initial treatment (eg neoadjuvant chemotherapy), the prefix 'y' can be used to indicate that staging has not been performed prior to multimodality therapy (eg ypTNM).

CS5.01b See Appendix 5 for details of the AJCC/UICC staging for lung cancer. Please note the changes to the TNM Classification of Lung Cancer in 2010.^{21,26,60}

G5.01 Residual tumour status should be recorded.

CG5.01a Residual tumour (R) is a TNM descriptor used to categorise the absence or presence of residual tumour after treatment.

CG5.01b The R categories are:
RX: Presence of residual tumour cannot be assessed
R0: No residual tumour
R1: Microscopic residual tumour.

Residual tumour at the bronchial margin may be:

R1: Invasive mucosal carcinoma or peribronchial infiltration

R1(is): Carcinoma in situ
R2: Macroscopic residual tumour.

- G5.02 "Completeness of surgical resection" should be recorded if known.
- CG5.02a "Completeness of surgical resection" is a recently developed clinicopathological concept.⁴⁰
- The International Association for the Study of Lung Cancer (IASLC) Staging Committee created the Complete Resection Subcommittee in 2001 to work on an international definition of complete resection in lung cancer surgery.
- "Completeness of surgical resection" is recognised as an important determinant of prognosis and important information for treatment. Unlike residual tumour (R) status, it cannot be established by pathological examination alone and requires correlation with clinical information and intraoperative findings. The assessment of the status is best achieved via discussion at the multidisciplinary meeting.
- CG5.02b The resection is defined as:
- complete
 - incomplete
 - uncertain.
- CG5.02c The resection is defined as complete when it meets all of the following criteria: free resection margins proved microscopically; systematic nodal dissection or lobe-specific systematic nodal dissection; no extracapsular nodal extension of the tumour; and the highest mediastinal node removed must be negative.
- Systematic nodal dissection consists of excision of the mediastinal fat and enclosed lymph nodes as well as excision of hilar and intrapulmonary lymph nodes.⁴⁰
- CG5.02d The resection is defined as incomplete if there is involvement of resection margins, extracapsular nodal extension, unremoved positive lymph nodes or positive pleural or pericardial effusions.
- CG5.02e The resection is defined as uncertain when the resection margins are free and no residual tumour is left but the resection does not fulfil the criteria for complete resection for one or more of the following factors: intraoperative lymph node evaluation less rigorous than systematic nodal dissection or lobe-specific systematic nodal dissection; the highest mediastinal node removed is positive; there is carcinoma in situ at the bronchial margin; pleural lavage cytology is positive.
- G5.03 The 'diagnostic summary' section of the final formatted report should include:
- a. specimen type (S2.04)
 - b. tumour site and laterality (S2.06)
 - c. tumour type (S3.01)

- d. tumour stage (S5.01)
- e. residual tumour status (G5.01)
- f. completeness of surgical resection (G5.02).

S5.02 The reporting system must provide a field for free text or narrative in which the reporting pathologist can give overarching case comment.

CS5.02a This field may be used, for example, to:

- discuss the significance of ancillary tests
- discuss any noteworthy prognostic features
- express any diagnostic subtlety or nuance that is beyond synoptic capture
- document further consultation or results still pending.

CS5.02b Use of this field is at the discretion of the reporting pathologist.

6 Structured checklist

The following checklist includes the standards and guidelines for this protocol which must be considered when reporting, in the simplest possible form. The summation of all 'Standards' is equivalent to the 'minimum dataset' for lung cancer. For emphasis, standards (mandatory elements) are formatted in bold font.

S6.01 The structured checklist provided may be modified as required but with the following restrictions:

- a. **All standards and their respective naming conventions, definitions and value lists must be adhered to.**
- b. **Guidelines are not mandatory but are recommendations and where used, must follow the naming conventions, definitions and value lists given in the protocol.**

G6.01 The order of information and design of the checklist may be varied according to the laboratory information system (LIS) capabilities.

CG6.01a Where the LIS allows dissociation between data entry and report format, the structured checklist is usually best formatted to follow pathologist workflow. In this situation, the elements of synthesis or conclusions are necessarily at the end. The report format is then optimised independently by the LIS.

CG6.01b Where the LIS does not allow dissociation between data entry and report format, (for example where only a single text field is provided for the report), pathologists may elect to create a checklist in the format of the final report. In this situation, communication with the clinician takes precedence and the checklist design is according to principles given in Chapter 7.

G6.02 Where the checklist is used as a report template (see G6.01), the principles in Chapter 7 and Appendix 2 apply

CG6.02a All extraneous information, tick boxes and unused values should be deleted

Clinical information and surgical handling

S1.01	Patient name	_____
	Date of birth	_____
	Sex	_____
	Identification and contact details of requesting doctor	_____
	Type of specimen	_____
	Date of request	_____
	Clinical information relevant to the investigations requested	_____
G1.01	Patient identifiers (eg MRN, UHI, NHI)	_____ _____
G1.02	Pathology accession number	_____
G1.03	Principal clinician involved in the patient's care	_____
S1.02	Nature of the resection:	
	Wedge resection	___
	Segmentectomy	___
	Lobectomy	___
	Pneumonectomy	___
	Other (please specify)	___
S1.03	Site and laterality of tumour	
	Right upper lobe	___
	Right middle lobe	___
	Right lower lobe	___

Left upper lobe _____

Left lower lobe _____

Main bronchus _____

- G1.04 Results of previous cytological investigations or biopsies _____
- G1.05 Details of any previous treatment of the current tumour _____
- G1.06 Details of previous cancer diagnosis _____
- G1.07 Risk factors for lung cancer (including smoking history, ethnicity and asbestos exposure) _____
- G1.08 Clinical tumour stage _____
- G1.09 Other relevant information and comments _____

Macroscopic findings

S2.04 Specimen type:

Wedge resection _____

Segmentectomy _____

Lobectomy _____

Pneumonectomy _____

Other (please specify) _____

S2.05 Nature and sites of blocks _____

S2.06 Tumour site:

Right upper lobe _____

Right middle lobe _____

Right lower lobe _____

Left upper lobe ____

Left lower lobe ____

Main bronchus ____

G2.02 Tumour location:

Central ____

Peripheral ____

S2.07 Number of tumours ____

S2.08 Maximum tumour diameter ____ mm

S2.09 Extent of direct spread of tumour _____

Description of pleura overlying a peripheral tumour _____

S2.10 Distance of tumour from the bronchial resection margin ____ mm

S2.11 Lymph nodes:

Number ____

Site ____

S2.12 Non-neoplastic lung _____

G2.03 Other relevant information and comments _____

Microscopic findings

S3.01 Histological tumour type:

Squamous cell carcinoma ____

Adenocarcinoma ____

Small cell carcinoma ____

Large cell carcinoma ____

G3.01 Perineural invasion _____

S3.05 **Bronchial resection margin:**

Tumour free _____

Involved:

In situ _____

Invasive (bronchial or peribronchial tissue) _____

Microscopic clearance _____ mm

S3.06 **Vascular resection margin:**

Tumour free _____

Involved _____

Nature of involvement _____

S3.07 **Other surgical margins (lung)**

Tumour free _____

Involved _____ if involved specify

S3.08 **Direct involvement of contiguous structures:**

Absent _____

Present _____

Margins:

Involved _____ if involved specify

Not involved _____ clearance from margin _____ mm

S3.09 **In situ carcinoma:**

Absent _____

Present _____

S3.10 **Lymph node involvement by tumour:**

Absent _____

Present: _____

Number involved _____

Site of involved nodes _____

G3.02 Lymph node replacement:

Focal _____

Extensive _____

Complete _____

G3.03 Extracapsular extension:

Absent _____

Present _____

S3.11 Non-neoplastic lung _____

G3.04 Other relevant information and comments

Ancillary test findings

S4.01 Immunohistochemical stains _____

G4.02 Molecular pathology testing _____

Synthesis and overview

S5.01 Tumour stage:

T _____

N _____

M _____

G5.01 Residual tumour status:

RX _____

R0 _____

R1 _____

R2 _____

G5.02 Completeness of surgical resection:

Complete _____

Incomplete _____

Uncertain _____

G5.03 Diagnostic summary

S5.02 Other relevant information and comments

7 Formatting of pathology reports

Good formatting of the pathology report is essential to optimise communication with the clinician, and will be an important contributor to the success of cancer reporting protocols. The report should be formatted to provide information clearly and unambiguously to the treating doctors, and should be organised with their use of the report in mind. In this sense, the report differs from the structured checklist, which is organised with the pathologists' workflow as a priority.

Uniformity in the format as well as in the data items of cancer reports between laboratories makes it easier for treating doctors to understand the reports; it is therefore seen as an important element of the systematic reporting of cancer.

Please see Appendix 2 for further guidance.

Appendix 1 Pathology request form for lung cancer

S1.01 Patient name _____

Date of birth _____

Sex _____

Identification and contact details of requesting doctor _____

Type of specimen _____

Date of request _____

Clinical information relevant to the investigations requested _____

G1.01 Patient identifiers (eg MRN, UHI, NHI) _____

G1.03 Principal clinician involved in the patient's care _____

S1.02 Nature of the resection:

Wedge resection _____

Segmentectomy _____

Lobectomy _____

Pneumonectomy _____

Other (please specify) _____

S1.03 Site and laterality of tumour

Right upper lobe _____

Right middle lobe _____

Right lower lobe _____

Left upper lobe

Left lower lobe

Main bronchus

G1.04 Results of previous
cytological investigations
or biopsies

G1.05 Details of any previous
treatment of the current
tumour

G1.06 Details of previous cancer
diagnosis

G1.07 Risk factors for lung
cancer (including
smoking history, ethnicity
and asbestos exposure)

G1.08 Clinical tumour stage

G1.09 Other relevant
information and
comments

Appendix 2 Guidelines for formatting of a pathology report

Layout

Headings and spaces should be used to indicate subsections of the report, and heading hierarchies should be used where the LIS allows it. Heading hierarchies may be defined by a combination of case, font size, style and, if necessary, indentation.

- Grouping like data elements under headings and using 'white space' assists in rapid transfer of information.⁶¹

Descriptive titles and headings should be consistent across the protocol, checklist and report.

When reporting on different tumour types, similar layout of headings and blocks of data should be used, and this layout should be maintained over time.

- Consistent positioning speeds data transfer and, over time, may reduce the need for field descriptions or headings, thus reducing unnecessary information or 'clutter'.

Within any given subsection, information density should be optimised to assist in data assimilation and recall.

- Configuring reports in such a way that they 'chunk' data elements into a single unit will help to improve recall for the clinician.⁶¹
- 'Clutter' should be reduced to a minimum.⁶¹ Thus, information that is not part of the protocol (eg billing information, Snomed codes, etc) should not appear on the reports or should be minimised.
- Injudicious use of formatting elements (eg too much bold, underlining or use of footnotes) also increases clutter and may distract the reader from the key information.

Where a structured report checklist is used as a template for the actual report, any values provided in the checklist but not applying to the case in question must be deleted from the formatted report.

Reports should be formatted with an understanding of the potential for the information to 'mutate' or be degraded as the report is transferred from the LIS to other health information systems.

As a report is transferred between systems:

- text characteristics such as font type, size, bold, italics and colour are often lost
- tables are likely to be corrupted as vertical alignment of text is lost when fixed font widths of the LIS are rendered as proportional fonts on screen or in print
- spaces, tabs and blank lines may be stripped from the report, disrupting the formatting
- supplementary reports may merge into the initial report.

Appendix 3 Example of a pathology report for lung cancer

Robbin, Chris W. C/O Paradise Close Wineglass Bay Resort Tasmania Male DOB 1/7/1998 MRN FMC1096785	Lab Ref: 09/P28460 Referred: 30/2/2009
Managing Clinician: Dr G. Fortune Rainforest Cancer Centre. 46 Smith Road, Woop Woop, 3478	Referred by: Mr V. Butler Suite 3, AJC Medical Centre, Bunyip Crescent Nar Nar Goon West, 3182

LUNG CANCER STRUCTURED REPORT

Page 1 of 2

Diagnostic Summary

Right lower lobe of lung (lobectomy):

**Squamous cell carcinoma,
 AJCC Stage IB, (T2a, N0, MX)
 R1 (is) Carcinoma in-situ at bronchial resection margin**

Supporting Information

CLINICAL

Site and laterality: Right lower lobe
Previous biopsies:
FNA: Squamous cell carcinoma (RPAH, 18/2/1009)
Right pleural effusion: Negative (RPAH, 14/2/2009)
Previous treatment: Nil
Risk factors: Nil known
Clinical stage: cT1, Nx, M0
Comment: N/A

MACROSCOPIC

Specimen type: Right lower lobe lobectomy
Tumour location: Central
Topography: Right lower lobe
Number of tumours: 1
Tumour size: 50mm maximum diameter
Contiguous spread: Tumour abuts the pleura
Bronchial margin clearance: 12mm
Lymph nodes: 6 peribronchial, 1 mediastinal
Non-neoplastic lung: Normal apart from obstructive pneumonitis adjacent to the tumour

MICROSCOPIC

Histological type: Squamous cell carcinoma
Histological grade: Moderately differentiated
Visceral pleural invasion: Present . The tumour has invaded beyond the elastic layer of the visceral pleura (confirmed by elastic stain) but not to the visceral pleural surface – PL1.
Vessel invasion: Extensive – pulmonary artery branches
Bronchial margin:
Carcinoma in-situ: Focally involved
Invasive carcinoma: Not involved, 7mm clearance

MICROSCOPIC (cont.)

Lab Ref: **09/P28460**

Page 2 of 2

Vascular margin:	Not involved
Contiguous structures:	Parietal pleura not involved
Carcinoma in-situ:	Present
Lymph nodes:	
Peribronchial:	0/6
Mediastinal:	0/1
Non-neoplastic lung:	Partial involvement by obstructive pneumonitis. There is also evidence of mild respiratory bronchiolitis.

Reported by Dr Samuel Wilks

Authorised 4/3/2009

Appendix 4 World Health Organization classification of lung neoplasms¹¹

Squamous cell carcinoma

- Papillary
- Clear cell
- Small cell
- Basaloid

Small cell carcinoma

- Combined small cell carcinoma

Adenocarcinoma

- Adenocarcinoma, mixed subtype
- Acinar adenocarcinoma
- Bronchioloalveolar carcinoma
 - Non-mucinous
 - Mucinous
 - Mixed non-mucinous and mucinous or indeterminate
- Solid adenocarcinoma with mucin production
- Foetal adenocarcinoma
- Mucinous ('colloid') carcinoma
- Mucinous cystadenocarcinoma
- Signet ring adenocarcinoma
- Clear cell adenocarcinoma

Large cell carcinoma

- Large cell neuroendocrine carcinoma
 - Combined large cell neuroendocrine carcinoma
- Basaloid carcinoma
- Lymphoepithelioma-like carcinoma
- Clear cell carcinoma
- Large cell carcinoma with rhabdoid phenotype

Adenosquamous carcinoma

Sarcomatoid carcinoma

- Pleomorphic carcinoma
- Spindle cell carcinoma
- Giant cell carcinoma
- Carcinosarcoma
- Pulmonary blastoma

Carcinoid tumour

- Typical carcinoid
- Atypical carcinoid

Salivary gland tumours

- Mucoepidermoid carcinoma

Adenoid cystic carcinoma
Epithelial-myoepithelial carcinoma

Pre-invasive lesions

Squamous carcinoma in situ

Atypical adenomatous hyperplasia

Diffuse idiopathic pulmonary neuroendocrine cell hyperplasia

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Appendix 5 Staging of lung cancer

7th edition of the TNM classification for lung cancer, 2010

The seventh edition of the TNM classification of lung cancer was published and implemented at the beginning of 2010.^{26,60} The classification is based on the sixth edition published in 2002¹³ but with significant changes to the T and M components²¹.

The full staging descriptors for the 7th edition TNM classification for lung cancer 2010 are included in tables A5.01 and A5.02 below.^{21,26,60}

Table A5.01 **Definitions for T, N, M descriptors.** Used with the permission of the American Joint Committee on Cancer (AJCC), Chicago, Illinois. The original source for this material is the AJCC Cancer Staging Manual, Seventh Edition (2010) published by Springer Science and Business Media LLC, www.springerlink.com.

Descriptors	Definitions
Primary tumour (T)	
TX	Primary tumour cannot be assessed, or tumour proven by the presence of malignant cells in sputum or bronchial washings but not visualised by imaging or bronchoscopy.
T0	No evidence of primary tumour
Tis	Carcinoma in situ
T1	Tumour 3cm or less in greatest dimension, surrounded by lung or visceral pleura, without bronchoscopic evidence of invasion more proximal than the lobar bronchus (ie not in the main bronchus)*
T1a	Tumour 2cm or less in greatest dimension
T1b	Tumour more than 2cm but 3cm or less in greatest dimension
T2	Tumour more than 3cm but 7cm or less or tumour with any of the following features (T2 tumours with these features are classified T2a if 5cm or less);
	Involves main bronchus 2cm or more distal to the carina Invades visceral pleura (PL1 or PL2); Associated with atelectasis or obstructive pneumonitis that extends to the hilar region but does not involve the entire lung
T2a	Tumour more than 3 cm but 5cm or less in greatest dimension
T2b	Tumour more than 5 cm but 7cm or less in greatest dimension
T3	Tumour more than 7cm or one that directly invades any of the following:
	parietal pleural (PL3) chest wall (including superior sulcus tumours), diaphragm, phrenic nerve, mediastinal pleura, parietal pericardium;
	or tumour in the main bronchus (less than 2cm distal to the carina*) but without involvement of the carina;
	or associated atelectasis or obstructive pneumonitis of the entire lung
	or separate tumour nodule(s) in the same lobe
T4	Tumour of any size that invades any of the following: mediastinum, heart, great vessels, trachea, recurrent laryngeal nerve, oesophagus, vertebral body, carina;
	separate tumour nodule(s) in a different ipsilateral lobe
Regional lymph nodes (N)	
NX	Regional lymph nodes cannot be assessed

N0	No regional node metastasis
N1	Metastasis in ipsilateral peribronchial and/or ipsilateral hilar lymph nodes and intrapulmonary nodes, including involvement by direct extension
N2	Metastasis in ipsilateral mediastinal and/or subcarinal lymph node(s)
N3	Metastasis in contralateral mediastinal, contralateral hilar, ipsilateral or contralateral scalene, or supraclavicular lymph node(s)
Distant metastasis (M)	
M0	No distant metastasis
M1	Distant metastasis
M1a	Separate tumour nodule(s) in a contralateral lobe;
	tumour with pleural nodules or malignant pleural (or pericardial) effusion**
M1b	Distant metastasis

- * The uncommon superficial spreading tumour of any size with its invasive component limited to the bronchial wall, which may extend proximally to the main bronchus, is also classified as T1a.
- ** Most pleural (and pericardial) effusions with lung cancer are due to tumour. In a few patients, however, multiple cytopathologic examinations of pleural (pericardial) fluid are negative for tumour, and the fluid is nonbloody and is not an exudate. Where these elements and clinical judgement dictate that the effusion is not related to the tumour, the effusion should be excluded as a staging element and the patient should be classified as M0.

Table A5.02

TNM elements included in stage groups. Used with the permission of the American Joint Committee on Cancer (AJCC), Chicago, Illinois. The original source for this material is the AJCC Cancer Staging Manual, Seventh Edition (2010) published by Springer Science and Business Media LLC, www.springerlink.com.

Stage group	T	N	M
Occult Carcinoma	TX	N0	M0
Stage 0	Tis	N0	M0
Stage IA	T1a	N0	M0
	T1b	N0	M0
Stage IB	T2a	N0	M0
Stage IIA	T2b	N0	M0
	T1a	N1	M0
	T1b	N1	M0
Stage IIB	T2a	N1	M0
	T2b	N1	M0
	T3	N0	M0
Stage IIIA	T1a	N2	M0
	T1b	N2	M0
	T2a	N2	M0
	T2b	N2	M0
	T3	N1	M0
	T3	N2	M0
	T4	N0	M0
Stage IIIB	T4	N1	M0
	T1a	N3	M0
	T1b	N3	M0
	T2a	N3	M0
	T2b	N3	M0
	T3	N3	M0
	T4	N2	M0
StageIV	Any T	Any N	M1a
	Any T	Any N	M1b

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