

CENTRAL NERVOUS SYSTEM TUMOURS STRUCTURED REPORTING PROTOCOL (1st Edition, 2011)

Core Document versions:

- World Health Organization Classification of Tumours of the Central Nervous System 2007, 4th edition
- World Health Organization Classification of Tumours Pathology and Genetics Tumours of Endocrine Organs. 2004

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Scope

This protocol contains standards and guidelines for the preparation of structured reports for resection and biopsy specimens for tumours of the central nervous system (CNS). This includes tumours arising from the spinal cord and from extra-axial structures. Lesions of the pituitary gland are included in this protocol.

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 cancer, whether as a minimum data set or fully comprehensive report.

Abbreviations

AJCC	American Joint Committee on Cancer
CNS	Central Nervous system
MGMT	O ⁶ -methyl-guanine-DNA methyl transferase
PBS	Pharmaceutical Benefits Scheme
RCPA	Royal College of Pathologists of Australasia
TNM	tumour-node-metastasis cancer staging system
UICC	International Union Against Cancer
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 "pre-test 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 (e.g. how does the item assist with clinical management or prognosis of the specific cancer).• cite published evidence in support of the standard or guideline• state any exceptions to a standard or guideline. <p>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).</p>
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 morphological assessment using a microscope or equivalent.
Predictive factor	A <i>predictive factor</i> is a measurement that is associated with response or lack of response to a particular therapy.
Prognostic factor	A <i>prognostic factor</i> is a measurement that is associated with clinical outcome in the absence of therapy or with the application of a standard. It can be thought of as a measure of the natural history of the disease.
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 utilises 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 modalities to derive new information

Introduction

Tumours of the CNS

The WHO classification of tumours of the CNS includes over 120 distinct entities, with a marked diversity of morphologic appearances and great variability in tumour incidence and prognosis. Intra-axial tumours – arising within the brain and spinal cord – differ greatly from extra-axial tumours, those arising from the coverings of the brain and spinal cord, but they are both included in these guidelines since their presentations may be very similar. In addition patients with either intra- and extra-axial lesions, together with patients with tumours of the pituitary gland are all treated by neurosurgeons within specialist centres, and thus they are all considered as CNS tumours for the purposes of this protocol.

Importance of histopathological reporting

Pathological reporting allows accurate identification of the tumour type and tumour grade, which provide important prognostic information. More recently molecular testing of some subtypes of CNS tumours has provided more detailed information regarding prognosis and possible response to treatment.

Benefits of structured reporting

Structured pathology reports with standardised definitions for each component have been shown to significantly enhance the completeness and quality of data provided to clinicians, and have been recommended both in North America and the United Kingdom¹⁻⁴.

The College of American Pathologists and the Royal College of Pathologists (UK) have recently published useful protocols for the reporting of cancer⁵⁻⁶. A protocol endorsed by the Royal College of Pathologists of Australasia and other Australasian organisations involved in the management of CNS tumours is timely.

Design of this protocol

This structured reporting protocol provides a complete framework for the assessment and documentation of all the pathological features of CNS tumours.

Mandatory elements (standards) are differentiated from those that are not mandatory but are recommended (guidelines). Consistency and speed of reporting is improved by the use of discrete data elements recorded from the checklist. However, the pathologist is encouraged to include free text or narrative to document any other relevant issues, to give reasons for coming to a particular opinion and to explain any points of uncertainty.

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.

Key documentation

- Guidelines for Authors of Structured Cancer Pathology Reporting Protocols⁷.
- The Pathology Request-Test-Report Cycle — Guidelines for Requesters and Pathology Provider⁸.
- WHO Classification of Tumours of the Central Nervous System (4th edition). Eds DN Louis, H Ohgaki, OD Wiestler, WK Cavenee. IARC, Lyon, 2007⁹.
- WHO Classification of Tumours. Pathology and Genetics Tumours of Endocrine Organs. Eds RA DeLellis, RV Lloyd, PU Heitz, C Eng. IARC, Lyon, 2004¹⁰.
- Australian Cancer Network Adult Brain Tumour Guidelines Working Party. Clinical Practice Guidelines for the Management of Adult Gliomas: Astrocytomas and Oligodendrogliomas. Cancer Council Australia, Australia Cancer Network and Clinical Oncological Society of Australia Inc., Sydney 2009¹¹.

Changes since the 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)

Australia and New Zealand association of neurologists

Australian Association of Pathology Practices Inc (AAPP)

Australian Cancer Network
Australian Commission on Safety and Quality in Health Care
Brain Tumour Alliance Australia
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 Institute NSW Oncology Group (NSWOG) Neuro-Oncology
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
Cooperative Trials Group for Neuro-Oncology (COGNO)
Department of Health and Ageing
Grampians Integrated Cancer Services (GICS)
Health Informatics Society of Australia (HISA)
International Brain Tumour Alliance (IBTA)
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 Australian and New Zealand Society for Neuropathology
The Australian Genomics and Clinical Outcomes of Glioma (AGOG)
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)
Victorian Cooperative Oncology Group (VCOG)
Western Australia Clinical Oncology Group (WACOG)

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Development process

This protocol has been developed following the nine-step process set out in *Guidelines for Authors of Structured Cancer Pathology Reporting Protocols*⁷.

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.

The standards and guidelines below specify the particular information and specimens required for central nervous system tumours. Some of this information can be collected on generic pathology request forms; any additional information required specifically for the reporting of central nervous system tumours may be recorded on a separate data sheet. Appendix 1 provides a standardised data sheet that may be useful in obtaining all relevant information.

S1.01 Adequate demographic and request information must be provided with the specimen by the requesting clinician.

CS1.01a The Royal College of Pathologists of Australasia (RCPA) *The Pathology Request-Test-Report Cycle — Guidelines for Requesters and Pathology Providers* must be adhered to⁸. This document specifies 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
- sex
- identification and contact details of requesting doctor
- date of request

Additional information specified in the RCPA *The Pathology Request-Test-Report Cycle — Guidelines for Requesters and Pathology Providers* such as the specimen type and clinical information relevant to the investigation is catered for in the following standards and guidelines.

CS1.01b The patient's ethnicity must be recorded, if known.

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 the Individual Healthcare Identifier (IHI).

S1.02 The pathology accession number of the specimen must be recorded.

S1.03 The principal clinician involved in the patient's care and responsible for investigating the patient must be identified.

CS1.03a The requesting clinician (identified under S1.01) may be the doctor who performs the surgery or biopsy, and may

not be the person with overall responsibility for investigating and managing the patient. Identification of the principal clinician is essential, to ensure that clinical information is communicated effectively.

- G1.02 The surgeon removing the tissue should be recorded.
 - CG1.02a Identification of the surgeon who performs the surgery or biopsy enables the pathologist to contact him or her for further information about the procedure.
- G1.03 The presenting symptom should be recorded.
- G1.04 The clinical history should be recorded.
 - CG1.04a The duration of clinical symptoms should be recorded as this may have implications for diagnosis and its inclusion can improve diagnostic accuracy.
 - CG1.04b Details of any relevant previous surgery or biopsy should be recorded. Providing previous diagnoses improves clinical accuracy. Providing the date, place and pathology provider of any previous biopsy may enable the specimens to be compared.
 - CG1.04c Details of any previous tumour should be recorded.
 - CG1.04d Any relevant family history of tumour or a familial tumour syndrome should be recorded.
- G1.05 Imaging findings, including the presence or absence of contrast enhancement, should be recorded.
 - CG1.05a Findings on imaging can contribute to the diagnosis and improve clinical accuracy.
- G1.06 Current and previous treatment should be recorded.
 - CG1.06a Treatment such as radiotherapy, chemotherapy and corticosteroids can change the histological appearance of tissues.
 - CG1.06b Lymphoma, in particular, is sensitive to corticosteroid treatment.
- S1.04 The anatomical site of the specimen must be recorded.**
 - CS1.04a The type of tissue, eg brain, dura, skull, is important for diagnosis.
 - CS1.04b For intra-axial tumours, the region of the neuraxis should be recorded eg frontal lobe, cerebellum, pineal region, spinal cord, filum terminale, cranial or spinal nerve.
 - CS1.04c Site is an important identifier when multiple biopsies are performed.

CS1.04d Sufficient information is required to localise the lesion for subsequent therapy. A diagram or photograph can facilitate this.

S1.05 The laterality of the lesion must be recorded.

CS1.05a Laterality information is needed for identification purposes.

S1.06 The type of specimen must be recorded.

CS1.06a Types of specimens include stereotactic biopsy, endoscopic biopsy, open biopsy, resection, lobectomy and transphenoidal resection.

G1.07 The clinical diagnosis or differential diagnosis should be recorded.

CG1.07a Providing the provisional clinical diagnosis or differential diagnosis improves clinicopathological correlation and improves diagnostic accuracy.

Surgical handling

G1.08 The tissue should be handled with care to avoid crush and diathermy injury.

G1.09 The specimen should be capable of orientation if the status of specific surgical margins is critical in determining the need for, or extent of, further treatment.

CG1.09a Where there are no anatomical landmarks, specimen orientation may be indicated with marking sutures or other techniques. If a specimen is orientated, the orientation should be indicated on the specimen request form (this may be facilitated by the use of a diagram). This may be relevant for dural and skull lesions and *en bloc* resection of brain (eg temporal lobectomy).

G1.10 In the following situations, and only after discussion with lab staff to ensure that someone is available to receive it, the specimen should be sent to the pathology department fresh ie without fixation:

- a) if smears and/or frozen sections are required for intraoperative diagnosis;
- b) if the specimen is to be stored frozen for diagnostic tests or for research;
- c) if a lymphoma is suspected;
- d) if infection is a possibility and samples are to be sent to microbiology;
- e) if tissue is to be banked;
- f) if sampling and culture for cytogenetics is required.

All other specimens should be received in formalin (refer G1.14).

- G1.11 If there may be delays in processing or the laboratory is closed, then the specimen should be transferred in formalin.
- CG1.11a Early fixation in 10% neutral buffered formalin (a minimum of 10 times the volume of tissue) prevents artefact from drying or from soaking in aqueous solution (such as saline).
- G1.12 Very small specimens should be transferred on lint free material such as lens paper or a non-adhesive dressing pad (eg Telfa ®)
- CG1.12a Very small specimens can be lost in the transfer medium if they are not placed on a carrier material.
- CG1.12b Gauze should be avoided.
- G1.13 Soft tumour being removed by suction should be collected in a sputum trap on the suction tubing and sent to the laboratory.
- CG1.13a For small, soft tumours, such as pituitary adenomas, the tissue collected by suction may be necessary for diagnosis.
- CG1.13b An equal volume of formalin should be added to the contents of the suction bottle before it is sent to the laboratory.
- G1.14 If the ultrasonic aspirator has been used to resect tumour, the contents of the suction bottle should be sent to the laboratory.
- CG1.14a An equal volume of formalin should be added to the contents of the suction bottle before it is sent to the laboratory.
- These specimens should remain in saline for as short a period as possible to reduce autolysis. They should be received at the conclusion of the operation and should not remain unfixed overnight.
- CG1.14b Heterogeneity within gliomas is well documented and in many cases only a small part of the resected tumour is submitted for pathological examination. In some cases, examination of the aspirated material may result in a change in tumour grade and may alter clinical management.
- G1.15 Identification of research samples should be done in consultation with the pathologist in order to avoid compromising the diagnosis.
- G1.16 If prion disease is suspected a biopsy should not be done.

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

S2.01 If intraoperative consultation (frozen section) is requested, the entire specimen must not be frozen.

CS2.01a Freezing introduces significant artefact that may compromise diagnosis.

CS2.01b In cases where fresh tissue has been submitted for intra-operative diagnosis (smear or frozen section), any residual tissue should be fixed in formalin for routine processing.

G2.01 Pathologists may be asked to provide tissue samples from fresh specimens for tissue banking or research purposes. The decision to provide tissue should only be made when the pathologist is sure that the diagnostic process will not be compromised. As a safeguard, research use of the specimen should be put on hold until the diagnostic process is complete so that the specimen can be retrieved, if required.

G2.02 If intraoperative consultation is requested, cytological preparations are recommended, in addition to or instead of a frozen section.

CG2.02a The cytological preparation will usually be a smear although touch or crush preparations may also be used.

CG2.02b Although various stains may be used for cytological preparations, a technique that stains both nuclei and cytoplasmic processes is recommended. Staining with haematoxylin and eosin allows direct comparison with histological preparations.

CG2.02c Cytological preparations should be rapidly fixed to avoid drying artefact.

CG2.02d Cytological preparations should not be discarded after examination but should be retained as part of the case.

S2.02 Specimens received for routine examination must be adequately fixed to ensure high quality pathological assessment.

CS2.02a Large specimens may require dissection to allow rapid fixation.

CS2.02b Bony or heavily calcified specimens may require

decalcification following fixation and prior to blocking.

- G2.03 In cases where electron microscopy may be of benefit, a small fragment of tissue should be placed in a suitable fixative eg 2% glutaraldehyde'.
 - CG2.03a The quality of examination is greater if it has not been embedded in paraffin.
- G2.04 For large amounts of aspirated material, only representative blocks should be processed.
- G2.05 For small biopsies (eg stereotactic biopsies) the specimen should be embedded in its entirety.
 - CG2.05a Small specimens should not be processed between sponges as this introduces artefact.
- G2.06 For large specimens, multiple blocks should be taken to ensure adequate sampling.
- G2.07 In the case of lobectomy specimens the tissue should be oriented and any anatomical structures identified, if possible
 - CG2.07a The specimens should be sliced at 5mm intervals, perpendicular to the cortical surface of the specimen.
 - CG2.07b Although the infiltrative nature of many primary intra-axial CNS tumours precludes complete excision, the extent of tumour resection has been shown to be a prognostic factor. An attempt should be made to assess the margins of excision and estimate the volume of tumour resected.
 - CG2.07c Due to the heterogeneity often seen in CNS tumours multiple blocks should be taken to ensure adequate sampling.
- G2.08 In the case of extra-axial tumours the specimen should be oriented with regards to the brain interface, if possible.
- G2.09 In the case of extra-axial tumours, the tumour should be adequately sampled.
 - CG2.09a At least 1 block per 1cm diameter is recommended.
 - CG2.09b If an interface with normal tissue can be identified then this area should be sampled.
- G2.10 In the case of pituitary tumours the entire specimen should be examined histologically.
 - CG2.10a A small portion should be fixed in glutaraldehyde for electron microscopy.

Macroscopic findings

S2.03 All measurements are in SI units, unless explicitly stated.

S2.04 The number of specimens received must be documented.

S2.05 Each specimen must be described in detail. The description must include:

- **size in three dimensions (mm)**
- **macroscopic description**
- **recognisable anatomical structures.**

CS2.05a Very large specimens should be weighed.

CS2.05b Fragmented specimens should be measured in aggregate.

G2.11 If the entire specimen is not processed, the proportion of the specimen processed or the amount of remaining tissue should be recorded.

G2.12 In cases where the tumour is resected with dura, then the distance to the nearest dural resection margin should be measured.

G2.13 Features such as colour, consistency and the presence of haemorrhage, necrosis, cystic change or calcification should be noted.

G2.14 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.

CG2.14a 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.

CG2.14b 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 (morphological) assessment. Information derived from multiple investigational modalities, or from two or more chapters, is described in Chapter 5.

G3.01 The microscopic findings should be recorded.

CG3.01a The microscopic features and results of associated ancillary studies allow typing and grading of the tumour (see Chapter 5).

G3.02 In cases where the tumour is resected with dura, then the distance to the nearest dural resection margin should be measured.

S3.01 If the specimen is not diagnostic, this must be recorded.

CS3.01a The reason why the tissue is not diagnostic should be recorded

CS3.01b Artefacts that render the tissue uninterpretable such as crush, autolysis, cautery etc should be recorded.

G3.03 For meningiomas, the presence or absence of brain invasion should be recorded.

CG3.03a Brain invasion should be distinguished from tumour growth in the subarachnoid space.

CG3.03b Brain invasion may have prognostic significance.

G3.04 Any additional relevant microscopic comments should be recorded.

4 Ancillary studies findings

Ancillary studies may be used to determine lineage, clonality or disease classification or subclassification; as prognostic biomarkers. Ancillary studies may provide predictive biomarkers to indicate the likelihood of patient response to specific biologic therapies.

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

- CS4.01a The WHO classification of tumours of the CNS relies predominantly on the H&E appearance on light microscopy for classification, but immunohistochemistry may be helpful in some instances, eg the exclusion of metastasis.
- CS4.01b Pathologists are advised to refer to the available literature for details regarding the most appropriate use of immunohistochemistry in the diagnosis of CNS tumours.
- CS4.01c In the case of metastatic disease further testing may be appropriate in order to subclassify the tumour.

G4.01 Results of any molecular testing should be recorded.

- CG4.01a For example, molecular testing for the loss of heterozygosity of 1p and 19q should be considered in cases of tumours showing histological features of oligodendroglial differentiation.

1p and 19q deletions have been shown to identify a subgroup of oligodendroglial tumours with a better prognosis and a better response to treatment¹².
- CG4.01b Molecular testing for methylation of the MGMT promoter could be considered in cases of glioblastoma. Detection of methylation of the MGMT promoter has been associated with a better prognosis¹³ and may have treatment implications.

5 Synthesis and overview

Information that is synthesised from multiple modalities and therefore cannot reside solely in any one of the preceding chapters is described here.

For example, tumour stage is synthesised from multiple classes of information – clinical, macroscopic and microscopic.

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

Overarching case comment is synthesis in narrative format. 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.

S5.01 The histological type of the tumour must be recorded.

CS5.01a The tumour must be classified according to the most recent edition WHO classification of tumours of the CNS (see Appendix 4).

S5.02 The histological grade of the tumour must be recorded if possible

CS5.02a The tumour must be graded (I, II, III or IV) according to the most recent edition of the WHO classification of tumours (see Appendix 4).

CS5.02b Grading may not be possible in cases where the tumour has been previously treated by chemotherapy and/ or radiotherapy.

CS5.02c If a tumour cannot be graded, this should be documented in a comment.

G5.01 A descriptive or narrative field should be provided to support the choice of histological type and grade.

G5.02 The "Diagnostic summary" section of the final formatted report should include:

- a. Specimen type (S1.06)
- b. Tumour site and laterality (S1.04 and S1.05)
- c. Tumour type (S5.01)
- d. Tumour WHO grade (S5.02)

S5.03 The reporting system must provide a field for free text or narrative in which the reporting pathologist can give overarching case comment.

- CS5.03a This field may be used, for example, to:
- list any relevant ancillary tests
 - document any noteworthy adverse gross and/or histological features
 - express any diagnostic subtlety or nuance that is beyond synoptic capture
 - document further consultation or results still pending.
- CS5.03b 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 Data Set" for tumours of the central nervous system. For emphasis, standards (mandatory elements) are formatted in bold font.

S6.01 The structured checklist provided below 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.

G6.03 Additional comment may be added to an individual response where necessary to describe any uncertainty or nuance in the selection of a prescribed response in the checklist. Additional comment is not required where the prescribed response is adequate.

CLINICAL INFORMATION AND SURGICAL HANDLING

S1.01 Patient name _____

Date of birth _____

Sex _____

Identification and contact details of requesting doctor _____

Date of request _____

Ethnicity:

Aboriginal or Torres Strait Islander _____

Other ethnicity _____

Unknown _____

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

S1.02 Pathology accession number _____

S1.03 Principal clinician _____

G1.02 Surgeon's name _____

G1.03 Presenting symptom _____

G1.04 Clinical history (eg duration of symptoms, previous diagnoses/ biopsy/surgery, previous tumour, family history) _____

G1.05 Imaging findings _____

Contrast enhancement:

 Absent _____

 Present _____

G1.06 Current and previous treatment (eg corticosteroids, radiotherapy, chemotherapy) _____

S1.04 Anatomical site

Intra-axial:

Frontal lobe _____

Temporal lobe _____

Parietal lobe _____

Occipital lobe _____

Basal ganglia _____

Cerebellum _____

Brain stem _____

Pineal region _____

Spinal cord _____

Filum terminale _____

Cranial nerve _____

Spinal nerve _____

Other (specify) _____

Extra-axial:

Dura _____

Skull _____

Pituitary _____

Other (specify) _____

S1.05 Laterality of tumour

Right _____

Left _____

Midline _____

Not stated _____

S1.06 Specimen type

Stereotactic biopsy —

Endoscopic biopsy —

Transphenoidal resection —

Resection —

Lobectomy —

Open biopsy —

Other (Specify) _____

G1.07 Clinical or differential diagnosis _____

MACROSCOPIC FINDINGS

S2.04 **Number of specimens** —

S2.05 **Specimen description**

Specimen 1:

Size (in 3 dimensions) ___x___x___ mm

Weight (very large specimens) ___ g

Description _____

Recognisable anatomical structures _____

Specimen 2:

Size (in 3 dimensions) ___x___x___ mm

Weight (very large specimens) ___ g

Description _____

**Recognisable
anatomical
structures**

G2.11 Amount of unprocessed tissue % or g

G2.12 Macroscopic distance between tumour and nearest dural resection margin (where dura is included) mm

G2.13 Additional features:

Colour

Consistency

Haemorrhage

No

Yes

Necrosis

No

Yes

Cystic change

No

Yes

Calcification

No

Yes

G2.14 Other relevant information and comments

MICROSCOPIC FINDINGS

G3.01 Microscopic findings

G3.02 Distance between tumour and nearest dural resection margin (where dura is included) _____ mm

S3.01 Is the specimen diagnostic?

No _____

Yes _____

If no, provide details

Artefacts impacting specimen? eg crush, autolysis, cautery etc

G3.03 Brain invasion (for meningiomas)

Absent _____

Present _____

G3.04 Other relevant microscopic comments

ANCILLARY TEST FINDINGS

S4.01 Immunohistochemical stains

Antibodies:

Positive antibodies

Negative antibodies

Equivocal antibodies

Interpretation

Clinical significance

G4.01 Molecular pathology testing eg 1p and 19q, methylation of MGMT promoter _____

SYNTHESIS AND OVERVIEW

S5.01 **Histological tumour type** _____

S5.02 **Histological tumour grade**

WHO I _____

WHO II _____

WHO III _____

WHO IV _____

Not possible _____
(specify why)

G5.01 Comment on tumour type and grade _____

G5.02 Diagnostic summary _____

S5.03 **Overarching comment** _____

7 Formatting of pathology reports

Good formatting of the pathology report is essential for optimising 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. For guidance on formatting pathology reports, please refer to Appendix 2.

Appendix 1 Pathology request form for tumours of the central nervous system

S1.01 Patient name _____

Date of birth _____

Sex _____

Identification and contact details of requesting doctor _____

Date of request _____

Ethnicity:

Aboriginal or Torres Strait Islander _____

Other ethnicity _____

Unknown _____

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

S1.03 Principal clinician _____

G1.02 Surgeon's name _____

G1.03 Presenting symptom _____

G1.04 Clinical history (eg duration of symptoms, previous diagnoses/ biopsy/surgery, previous tumour, family history) _____

G1.05 Imaging findings _____

Contrast enhancement:

Absent _____

Present _____

G1.06 Current and previous treatment (eg corticosteroids, radiotherapy, chemotherapy) _____

S1.04 Anatomical site

Intra-axial:

Frontal lobe _____

Temporal lobe _____

Parietal lobe _____

Occipital lobe _____

Basal ganglia _____

Cerebellum _____

Brain stem _____

Pineal region _____

Spinal cord _____

Filum terminale _____

Cranial nerve _____

Spinal nerve _____

Other (specify) _____

Extra-axial:

Dura _____

Skull _____

Pituitary _____

Other (specify) _____

S1.05 Laterality of tumour

Right _____

Left _____

Midline _____

S1.06 Specimen type

**Stereotactic
biopsy** —

**Endoscopic
biopsy** —

**Transphenoidal
resection** —

Resection —

Lobectomy —

Open biopsy —

Other (Specify) _____

G1.07 Clinical or differential
diagnosis

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.¹⁴

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.¹⁴
- 'Clutter' should be reduced to a minimum.¹⁴ Thus, information that is not part of the protocol (e.g. billing information, SNOMED (Clinical Terminology) codes, etc) should not appear on the reports or should be minimized.
- Injudicious use of formatting elements (e.g. too much bold, underlining or use of footnotes) constitutes 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

Citizen, Georgina W. C/O Paradise Close Wreck Bay Resort Nar Nar Goon East, 3181 Female DOB 1/7/1951 MRN FMC1096785	Lab Ref: 10/P28460 Referred: 30/8/2010
Copy to: Dr G. Grey Rainforest Cancer Centre. 46 Smith Road, Woop Woop, 3478	Referred by: Dr V. Smith Suite 3, AJC Medical Centre, Bunyip Crescent Nar Nar Goon West, 3182

CNS TUMOUR STRUCTURED REPORT

Page 1 of 2

Diagnostic Summary

Stereotactic brain biopsy of left lateral ventricle tumour:

Central Neurocytoma, WHO grade II

Comment: If amenable to resection these tumours tend to have a good prognosis.

Supporting Information

CLINICAL

Presenting symptom	Collapse
Clinical history	Sudden onset
Imaging findings	Intraventricular mass with haemorrhage
Contrast enhancement	Present
Current and previous treatment	Nil
Anatomical site	Lateral ventricle
Laterality of tumour	Left
Specimen type	Stereotactic biopsy
Clinical or differential diagnosis	Not provided

MACROSCOPIC

Number of specimens	1
Specimen description:	
Size	10x8x3mm
Weight	Not weighed
Description	Tan haemorrhagic tissue
Recognisable anatomical structures	None
Amount of unprocessed tissue	0%
Distance to nearest dural resection margin	N/A
Additional features:	
Colour	Tan
Consistency	Soft
Haemorrhage	Yes
Necrosis	No
Cystic change	No

Calcification	No
Other comments	Nil

MICROSCOPIC**Microscopic description**

The tumour consists of uniform round cells with round to ovoid nuclei containing finely speckled chromatin with occasional small nucleoli. Cells are separated by neurophil-like fibrillary material containing arborizing capillaries. Bland infarct like necrosis is present but there is no mitotic activity and no vascular endothelial proliferation. Recent and old haemorrhage is present.

Distance to nearest dural resection margin	N/A
Is the specimen diagnostic?	Yes
Artifacts impacting specimen?	Nil

ANCILLARY FINDINGS**Immunohistochemical stains:**

Positive for:	Synaptophysin, GFAP (focal)
Negative for:	EMA
Comment:	Low (<2%) Ki67 proliferation fraction
Molecular pathology testing	N/A

Reported by Dr Bernard Beckstein

Authorised 4/9/2010

Appendix 4 WHO Classification of Tumours of the Central Nervous System⁹

TUMOURS OF NEUROEPITHELIAL TISSUE

Astrocytic tumours

Pilocytic astrocytoma	9421/11
Pilomyxoid astrocytoma	9425/3*
Subependymal giant cell astrocytoma	9384/1
Pleomorphic xanthoastrocytoma	9424/3
Diffuse astrocytoma	9400/3
Fibrillary astrocytoma	9420/3
Gemistocytic astrocytoma	9411/3
Protoplasmic astrocytoma	9410/3
Anaplastic astrocytoma	9401/3
Glioblastoma	9440/3
Giant cell glioblastoma	9441/3
Gliosarcoma	9442/3
Gliomatosis cerebri	9381/3

Oligodendroglial tumours

Oligodendroglioma	9450/3
Anaplastic oligodendroglioma	9451/3

Oligoastrocytic tumours

Oligoastrocytoma	9382/3
Anaplastic oligoastrocytoma	9382/3

Ependymal tumours

Subependymoma	9383/1
Myxopapillary ependymoma	9394/1
Ependymoma	9391/3
Cellular	9391/3
Papillary	9393/3
Clear cell	9391/3
Tanycytic	9391/3
Anaplastic ependymoma	9392/3

Choroid plexus tumours

Choroid plexus papilloma	9390/0
Atypical choroid plexus papilloma	9390/1*
Choroid plexus carcinoma	9390/3

Other neuroepithelial tumours

Astroblastoma	9430/3
Chordoid glioma of the third ventricle	9444/1
Angiocentric glioma	9431/1*

Neuronal and mixed neuronal-glial tumours

Dysplastic gangliocytoma of cerebellum (Lhermitte-Duclos)	9493/0
Desmoplastic infantile astrocytoma/ ganglioglioma	9412/1
Dysembryoplastic neuroepithelial tumour	9413/0
Gangliocytoma	9492/0

Ganglioglioma	9505/1
Anaplastic ganglioglioma	9505/3
Central neurocytoma	9506/1
Extraventricular neurocytoma	9506/1*
Cerebellar liponeurocytoma	9506/1*
Papillary glioneuronal tumour	9509/1*
Rosette-forming glioneuronal tumour of the fourth ventricle	9509/1*
Paraganglioma	8680/1

Tumours of the pineal region

Pineocytoma	9361/1
Pineal parenchymal tumour of intermediate differentiation	9362/3
Pineoblastoma	9362/3
Papillary tumour of the pineal region	9395/3*

Embryonal tumours

Medulloblastoma	9470/3
Desmoplastic/nodular medulloblastoma	9471/3
Medulloblastoma with extensive nodularity	9471/3*
Anaplastic medulloblastoma	9474/3*
Large cell medulloblastoma	9474/3
CNS primitive neuroectodermal tumour	9473/3
CNS Neuroblastoma	9500/3
CNS Ganglioneuroblastoma	9490/3
Medulloepithelioma	9501/3
Ependymoblastoma	9392/3
Atypical teratoid / rhabdoid tumour	9508/3

TUMOURS OF CRANIAL AND PARASPINAL NERVES

Schwannoma (neurilemoma, neurinoma)	9560/0
Cellular	9560/0
Plexiform	9560/0
Melanotic	9560/0
Neurofibroma	9540/0
Plexiform	9550/0
Perineurioma	
Perineurioma, NOS	9571/0
Malignant perineurioma	9571/3
Malignant peripheral nerve sheath tumour (MPNST)	
Epithelioid MPNST	9540/3
MPNST with mesenchymal differentiation	9540/3
Melanotic MPNST	9540/3
MPNST with glandular differentiation	9540/3

TUMOURS OF THE MENINGES

Tumours of meningotheial cells

Meningioma	9530/0
Meningothelial	9531/0
Fibrous (fibroblastic)	9532/0
Transitional (mixed)	9537/0
Psammomatous	9533/0
Angiomatous	9534/0
Microcystic	9530/0
Secretory	9530/0
Lymphoplasmacyte-rich	9530/0
Metaplastic	9530/0
Chordoid	9538/1
Clear cell	9538/1
Atypical	9539/1
Papillary	9538/3
Rhabdoid	9538/3
Anaplastic (malignant)	9530/3

Mesenchymal tumours

Lipoma	8850/0
Angiolipoma	8861/0
Hibernoma	8880/0
Liposarcoma	8850/3
Solitary fibrous tumour	8815/0
Fibrosarcoma	8810/3
Malignant fibrous histiocytoma	8830/3
Leiomyoma	8890/0
Leiomyosarcoma	8890/3
Rhabdomyoma	8900/0
Rhabdomyosarcoma	8900/3
Chondroma	9220/0
Chondrosarcoma	9220/3
Osteoma	9180/0
Osteosarcoma	9180/3
Osteochondroma	9210/0
Haemangioma	9120/0
Epithelioid haemangioendothelioma	9133/1
Haemangiopericytoma	9150/1
Anaplastic haemangiopericytoma	9150/3
Angiosarcoma	9120/3
Kaposi sarcoma	9140/3
Ewing sarcoma - PNET	9364/3

Primary melanocytic lesions

Diffuse melanocytosis	8728/0
Melanocytoma	8728/1
Malignant melanoma	8720/3
Meningeal melanomatosis	8728/3

Other neoplasms related to the meninges

Haemangioblastoma	9161/1
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LYMPHOMAS AND HAEMATOPOIETIC NEOPLASMS

Malignant lymphomas	9590/3
Plasmacytoma	9731/3

Granulocytic sarcoma 9930/3

GERM CELL TUMOURS

Germinoma 9064/3
Embryonal carcinoma 9070/3
Yolk sac tumour 9071/3
Choriocarcinoma 9100/3
Teratoma 9080/1
 Mature 9080/0
 Immature 9080/3
 Teratoma with malignant transformation 9084/3
Mixed germ cell tumour 9085/3

TUMOURS OF THE SELLAR REGION

Craniopharyngioma 9350/1
 Adamantinomatous 9351/1
 Papillary 9352/1
Granular cell tumour 9582/0
Pituicytoma *9432/1**
Spindle cell oncocytoma
 of the adenohypophysis *8291/0**

METASTATIC TUMOURS

- 1 Morphology code of the International Classification of Diseases for Oncology (ICD-O)(614A) and the Systematized Nomenclature of Medicine (<http://snomed.org>).Behaviour is coded /0 for benign tumours, /3 for malignant tumours and /1 for borderline or uncertain behaviour.
- * The italicised numbers are provisional codes proposed for the 4th edition of ICD-O. While they are expected to be incorporated into the next ICD-O edition, they currently remain subject to change.

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WHO grades of CNS tumours

	I	II	III	IV		I	II	III	IV
Astrocytic tumours					Central neurocytoma		•		
Subependymal giant cell astrocytoma	•				Extraventricular neurocytoma		•		
Pilocytic astrocytoma	•				Cerebellar liponeurocytoma		•		
Pilomyxoid astrocytoma		•			Paraganglioma of the spinal cord	•			
Diffuse astrocytoma		•			Papillary glioneuronal tumour	•			
Pleomorphic xanthoastrocytoma		•			Rosette-forming glioneuronal tumour of the fourth ventricle	•			
Anaplastic astrocytoma			•		Pineal tumours				
Glioblastoma				•	Pineocytoma	•			
Giant cell glioblastoma				•	Pineal parenchymal tumour of intermediate differentiation		•	•	
Gliosarcoma				•	Pineoblastoma				•
Oligodendroglial tumours					Papillary tumour of the pineal region		•	•	
Oligodendroglioma		•			Embryonal tumours				
Anaplastic oligodendroglioma			•		Medulloblastoma				•
Oligoastrocytic tumours					CNS primitive neuroectodermal tumour (PNET)				•
Oligoastrocytoma		•			Atypical teratoid / rhabdoid tumour				•
Anaplastic oligoastrocytoma			•		Tumours of the cranial and paraspinal nerves				
Ependymal tumours					Schwannoma	•			
Subependymoma	•				Neurofibroma	•			
Myxopapillary ependymoma	•				Perineurioma	•	•	•	
Ependymoma		•			Malignant peripheral nerve sheath tumour (MPNST)		•	•	•
Anaplastic ependymoma			•		Meningeal tumours				
Choroid plexus tumours					Meningioma	•			

	I	II	III	IV		I	II	III	IV	
Choroid plexus papilloma	•					Atypical meningioma		•		
Atypical choroid plexus papilloma		•				Anaplastic / malignant meningioma			•	
Choroid plexus carcinoma			•			Haemangiopericytoma		•		
Other neuroepithelial tumours						Anaplastic haemangiopericytoma			•	
Angiocentric glioma	•					Haemangioblastoma	•			
Chordoid glioma of the third ventricle		•				Tumours of the sellar region				
Neuronal and mixed neuronal-glial tumours						Craniopharyngioma	•			
Gangliocytoma	•					Granular cell tumour of the neurohypophysis	•			
Ganglioglioma	•					Pituicytoma	•			
Anaplastic ganglioglioma			•			Spindle cell oncocytoma of the adenohypophysis	•			
Desmoplastic infantile astrocytoma and ganglioglioma	•									
Dysembryoplastic neuroepithelial tumour	•									

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