

**RECOMMENDATIONS FOR THE REPORTING OF SURGICAL SPECIMENS
CONTAINING NEOPLASMS WITHIN OR RELATED TO THE CENTRAL
NERVOUS SYSTEM EXCLUDING PITUITARY**

Committee Members: Cynthia T. Welsh, M.D., Harry V. Vinters, M.D., Roger E. McLendon. Departments of Pathology of Medical University of South Carolina, University of California at Los Angeles, and Duke University.

ASSOCIATION OF DIRECTORS OF ANATOMIC AND SURGICAL PATHOLOGY

(Updated September 2004, Version 1.1)

Address correspondence to

Cynthia T. Welsh, M.D.
Department of Pathology
MUSC
Charleston, SC

Telephone: 843-792-9210
e-mail: welshct@musc.edu

Introduction for ADASP reporting Guidelines

It has been evident for decades that pathology reports are very variable even within a single institution. Standardization of reporting is the optimal way to insure that information necessary for patient management, prognostic and predictive factor assessment, grading, staging, analysis of outcomes and tumor registries are included in pathology reports. In recent years, two societies (first ADASP and then the CAP), have undertaken to publish guidelines for the reporting of common cancers. The CAP assigned multidisciplinary groups of pathologists, surgeons, radiation and medical oncologists to develop the protocols. Other pathologists and clinicians then reviewed them. After those reviews the protocols were reviewed by multiple CAP committees and finally approved by the Board of Governors.

The ADASP, in contrast, chose a pathologist expert in each field to assemble a group from within the pathology community (with clinician input if desired) to write specific cancer protocols. These were then approved by the ADASP council and subsequently by the membership. Even though both societies began the process at approximately the same time the streamlined approach adopted by the ADASP enabled them to publish years earlier in pathology journals frequented by anatomic pathologists. While the formats are somewhat different, the contents are essentially the same.

The American College of Surgery (ACS) Commission on Cancer (COC) accredits cancer centers in the USA. Recently, the COC decided to require elements, deemed as essential by the CAP, to be described in all pathology reports in their accredited cancer centers as of January 2004. Importantly they do not require that the specific CAP protocols or synoptic reports be utilized. ADASP has updated all of its protocols to comply with the COC requirements in the form of 37 uniform checklists. The checklists use the staging criteria cited in the American Joint Committee on Cancer (AJCC) 2002 staging manual (sixth edition) but include a variety of other references listed in each of the checklists. Moreover, the checklists are formatted for ease of use. They may be used as templates for uniform reporting and are designed to be compatible with voice-activated transcription.

The different elements in these revised ADASP Diagnostic Checklists have been divided into Required and Optional. The term Required in this context only signifies compliance with the COC guidelines. ADASP realizes that specimens and practices vary and it will not be possible to report these elements in every case. However, ADASP hopes that pathologists will find these checklists to be useful in daily clinical practice, while facilitating compliance with the new COC requirements.

The checklists are in standard PDF file format, and may be easily downloaded from the ADASP website. They are not to be reproduced, altered or used for commercial purposes without consent from ADASP.

FEATURES THE ASSOCIATION RECOMMENDS TO BE INCLUDED IN THE FINAL REPORT

Because they are generally accepted as being of diagnostic/prognostic importance, are required for therapy or traditionally expected.

Brief but precise overall clinical description and history; radiologic characteristics

1. Clinical history - duration, known primary tumor at another site, previous CNS diagnosis, previous chemotherapy/ radiation therapy, predisposing conditions (e.g. phakomatoses) for certain tumors, predisposing conditions for infectious tumor look-alikes (e.g. immunosuppression, diabetes, endocarditis, travel history, etc).
2. Exact anatomic location of tumor {e.g. extra-axial (dural-based, extradural, intradural) or intraparenchymal (cerebrum, cerebellum, brainstem, spinal cord); grey/white matter, relationship to surface/ventricle }
3. Size of tumor
4. Clinically apparent extension to adjacent tissue, such as the dura, orbit, sinuses, or brain/spinal cord (if extra-axial)
5. Radiologic characteristics - enhancement, cysts, calcifications, edema, necrosis, single versus multiple lesions

Gross Description

1. Identification: how the specimen was identified, e.g., labeled with patient name/age/gender, medical record number, site, clinician
2. Condition of the specimen on receipt in the laboratory: e.g., fresh, in fixative (e.g., formalin); manipulated (by pathologist or surgeon) or intact; special investigation required (e.g., frozen section)
3. Number of specimen containers
4. Brief but precise overall gross description focusing on the site and extent of the lesion and its relationship to surrounding structures, if present:
 - a. Accurate overall dimensions of each specimen received, larger specimens are weighed
 - b. A variety of normal tissue components (grey matter, white matter, choroid plexus, leptomeninges, dura, cerebellum, etc) may be present and should all be described with relationship to tumor. Larger specimens, such as lobectomies, should be described in detail and cut surfaces described.
 - c. Variation within tumor (e.g. necrosis, hemorrhage, cysts) should be documented grossly and sections submitted to confirm these areas microscopically.
 - d. Comment on the proximity of extra-axial tumor to pertinent resection margins. If ink is used for marking resection margins, provide a section code for subsequent interpretation of the microscopic findings.
5. Handling of tissue:
 - a. Frozen sections - frozen sections are the mainstay of intraoperative diagnosis in many institutions and may allow for primary diagnosis, in addition to evaluation of the need for tissue for special procedures such as culture or simply adequacy of tissue for later diagnosis.
 - b. Cytology - because frozen sections often obscure fine nuclear and cytologic detail, smears and touch preparations are very useful preparations which should not be looked on as optional accessories. They can also obviate the artifacts of frozen sections such as nuclear angulation and vesiculation, and preserve small specimens for permanent sections. Macrophages may be more readily identified in cytologic preparations leading to the possibility of a non-neoplastic differential. Glial processes of both tumor and reactive change may also be easier to identify on smears.
 - c. Submitted tissue - blocks should be taken to show the relationship of tumor to surrounding structures and margins (if present), and to demonstrate both the highest grade of the lesion (areas of necrosis usually) and the tumor type.

d. Special studies - tissue submitted for special studies such as microbiology (preferably from the operating room rather than from pathology to prevent contamination), flow cytometry, cytogenetics, and/or glutaraldehyde fixed and held/processed for ultrastructure.

Intraoperative consultation

1. There should be inclusion of the intraoperative report verbatim into the final report.
2. Discrepancies may be recorded and discussed in the report, or intradepartmentally.

DIAGNOSTIC INFORMATION

1. **Histologic tumor type** - The following modified terminology as revised and adopted by the International Society of Neuropathology and International Academy of Pathology, under the auspices of the World Health Organization is recommended:

A. Tumors of neuroepithelial tissue

Astrocytic tumors

Diffuse astrocytoma - WHO grades II-IV

 Fibrillary astrocytoma

 Gemistocytic astrocytoma

Glioblastoma - WHO grade IV

 Giant cell glioblastoma

 Gliosarcoma

Pilocytic astrocytoma

Protoplasmic astrocytoma

Pleomorphic xanthoastrocytoma

Subependymal giant cell astrocytoma

Oligodendroglial tumors

Oligodendroglioma

Anaplastic (malignant) oligodendroglioma

Mixed gliomas

Oligoastrocytoma

Anaplastic oligoastrocytoma (Malignant mixed glioma)

Ependymal tumors

Ependymoma

Cellular

Papillary

Clear cell

Tanycytic

Anaplastic (malignant) ependymoma

Myxopapillary ependymoma

Subependymoma

Choroid plexus tumors

Choroid plexus papilloma

Choroid plexus carcinoma

Glial tumors of uncertain origin

Astroblastoma

Gliomatosis cerebri

Chordoid glioma of the 3rd ventricle

Neuronal and mixed neuronal-glial tumors

Gangliocytoma

Dysplastic gangliocytoma of cerebellum (Lhermitte-Duclos)

Desmoplastic infantile astrocytoma / ganglioglioma

Dysembryoplastic neuroepithelial tumor

Ganglioglioma

Anaplastic (malignant) ganglioglioma

Central neurocytoma

Cerebellar liponeurocytoma

Paraganglioma of the filum terminale

Pineal parenchymal tumors

Pineocytoma

Pineoblastoma

Pineal parenchymal tumor of intermediate differentiation

Embryonal tumors

Medulloepithelioma

Ependymoblastoma

Medulloblastoma

Desmoplastic medulloblastoma

Large cell medulloblastoma

Medullomyoblastoma

Melanotic medulloblastoma

Atypical teratoid/rhabdoid tumor

Supratentorial primitive neuroectodermal tumor (PNET)

Neuroblastoma

B. Tumors of the meninges/related tissues

Tumours of meningotheial cells

Meningioma

- Meningothelial
- Fibrous (fibroblastic)
- Transitional (mixed)
- Psammomatous
- Angiomatous
- Microcystic
- Secretory
- Metaplastic
- Clear cell
- Chordoid
- Papillary
- Rhabdoid

Atypical (borderline) meningioma

Anaplastic (malignant) meningioma

Mesenchymal, non-meningothelial tumours

Lipoma

Angiolipoma

Hibernoma

Liposarcoma

Solitary fibrous tumour

Fibrosarcoma

Malignant fibrous histiocytoma

Leiomyoma

Leiomyosarcoma

Rhabdomyoma

Rhabdomyosarcoma

Chondroma

Chondrosarcoma

Chordoma

Osteoma

Osteosarcoma

Osteochondroma

Hemangioma

Epithelioid hemangioendothelioma

Hemangiopericytoma

Angiosarcoma

Kaposi sarcoma

Primary melanocytic lesions

Diffuse melanocytosis
Melanocytoma
Malignant melanoma
Meningeal melanomatosis

Tumors of uncertain histogenesis

Hemangioblastoma

C. Hematopoietic neoplasms

Malignant lymphomas
Plasmacytoma
Granulocytic sarcoma (chloroma)

D. Germ cell neoplasms

Germinoma
Embryonal carcinoma
Endodermal sinus (Yolk sac) tumor
Choriocarcinoma
Teratoma
 Mature
 Immature
 Teratoma with malignant transformation
Mixed germ cell tumors

E. Tumors of the sellar region

Craniopharyngioma
 Adamantinomatous
 Papillary
Granular cell tumor
Pituitary adenoma, carcinoma

F. Cysts

Epidermoid cyst
Dermoid cyst
Colloid cyst
Enterogenous cyst
Neuroglial cyst

G. Metastatic tumors

2. **Tumor grade** - grading should be performed on all tumors for which grading has been shown to be a significant prognostic variable with consideration given to recording of the particular grading scheme used unless it is standard and understood by all clinicians.

A. Astrocytic tumors

1. Pilocytic tumors are WHO grade I by definition
2. Fibrillary astrocytomas begin at grade II (atypia) by definition, with increase to grade III - IV by adding to atypia the additional criteria of one or more of the following: mitoses, vascular-endothelial hyperplasia (VEH), and/or necrosis

WHO (or Daumas-Duport) grade II	nuclear atypia and <u>none</u> of the above additional criteria	previously known as astrocytoma
WHO (or Daumas-Duport) grade III	nuclear atypia and <u>one</u> of the above (usually mitoses or VEH)	includes some of the tumors previously known as anaplastic astrocytoma
WHO (or Daumas-Duport) grade IV	nuclear atypia and <u>two or more</u> of the above criteria	includes some of the tumors previously known as anaplastic astrocytoma and all glioblastomas (pseudopalisading necrosis)

B. Oligodendroglial tumors - oligodendroglial tumors may be graded in two tiers (WHO) or four tiers (A-D, Smith et al) based on mitoses, VEH and necrosis

Oligodendroglioma - WHO grade II (alternately grades A-C)

Anaplastic (malignant) oligodendroglioma - WHO grade III (grade D)

C. Mixed gliomas - WHO grades II-III based on the worst grade present; excluding grade IV which is classified simply as glioblastoma

D. Ependymal tumors - grading based on cellularity, mitoses, "pseudopalisading" necrosis, and rosette formation

Ependymoma - WHO grade II

Anaplastic (malignant) ependymoma - WHO grade III

E. Choroid plexus tumors - grading based on mitoses, necrosis, pleomorphism, cellularity and brain invasion

Papilloma

Carcinoma

F. Mixed neuronal-glia tumors - grading based on the grade of the glial component

Ganglioglioma - WHO grade I-II

Anaplastic (malignant) ganglioglioma - WHO grade III-IV

G. Pineal parenchymal tumors - grading based on cellularity, and rosettes

Pineocytoma (Pinealoma)

Pineoblastoma

H. Tumors of meningotheial cells

Hemangiopericytomas are no longer considered angioblastic meningiomas.

Subtypes that are prognostically significant for risk of recurrence/aggressive growth: papillary, clear cell, chordoid and rhabdoid.

Grading: based on mitoses, necrosis, nuclear morphology, architectural pattern (lack thereof), and brain invasion.

Meningioma

Atypical meningioma

Anaplastic (malignant) meningioma

I. Teratoma - as in systemic tumors

Mature

Immature

Malignant transformation

REFERENCES

1. Andrews JM and Schumann GB. Neurocytopathology. Baltimore, MD:Williams and Wilkins, 1992.
2. Bigner DD, McLendon RE, Bruner JM. Russell and Rubinstein's Pathology of Tumors of the Nervous System. 6th edition. New York, NY:Oxford University Press; 1998.
3. Bigner SH and Johnston WW. Cytopathology of the Central Nervous System. Hong Kong:ASCP ; 1994.
4. Burger PC and Scheithauer BW. Tumors of the Central Nervous System. In Atlas of 5. Tumor Pathology, 3rd series, Fascicle 10. Washington, DC: Armed Forces Institute of Pathology; 1994.
5. Burger PC, Scheithauer BW and Vogel FS. Surgical Pathology of the Nervous System and its Coverings. 4th edition. New York, NY:Churchill Livingstone, 2002.
6. Chandrasoma PT and Apuzzo ML. Stereotactic Brain Biopsy. New York, NY:Igaku-Shoin, 1989.
7. Dumas-Duport C, Scheithauer B, O'Fallon J and Kelly P. Grading of Astrocytomas. A Simple and Reproducible Method. Cancer 62(10):2152-65, 1988.
8. Ellison D, Love S, Chimelli L, Harding B, Lowe JS, Vinters H. Neuropathology. 2nd ed. Chicago, IL:Mosby, 2004.
9. Graham DI and Lantos PL. Greenfield's Neuropathology. 7th ed. New York, NY.:Oxford University Press; 2002
10. Kleihues P and Cavenee WK. Pathology and Genetics: Tumours of the Nervous System. Lyon, France. World Health Organization; 2000.
11. Perry A, Stafford SL, Scheithauer BW, Suman VJ and Lohse CM. Meningioma Grading. An Analysis of Histologic Parameters. AJSP 21(12):1455-65, 1997.
12. Smith MT, Ludwig CL, Godfrey AD, and Armbrustmacher VW. Grading of Oligodendrogliomas. Cancer 52:2107-2114, 1983.

ASSOCIATION OF DIRECTORS OF ANATOMIC AND SURGICAL PATHOLOGY
Final Anatomic Diagnosis Checklist

BRAIN AND SPINAL CORD NEOPLASMS (excluding pituitary)

Vers 1.1 (9-04)

Accession No: _____ **Part No(s).** _____ **Date:** _____

Patient name: _____

Organ (circle)

Brain
Spinal cord
Meninges
Spinal nerve
Cranial nerve
Pineal gland

Procedure(circle all that apply)

Craniotomy
Biopsy
Needle biopsy
Lobectomy
Hemispherectomy
Tumor resection

Site (circle all that apply)

Cerebrum frontal parietal temporal occipital
Cerebellum lateral vermis cerebellopontine angle
Superficial grey matter white matter deep grey matter
Ventricle paraventricular choroid plexus
Suprasellar sellar
Brainstem
Spinal cord cervical thoracic lumbar
Nerve root specify location_____

- Primary Tumor Diagnosis (circle)^{required}

Astrocytoma, fibrillary (diffuse)
 Gemistocytic
 Glioblastoma multiforme
 gliosarcoma
 small cell glioblastoma
 giant cell glioblastoma
Astrocytoma, other
Astrocytoma, pilocytic
Astrocytoma, pleomorphic xanthoastrocytoma
Atypical teratoid/rhabdoid tumor
Central neurocytoma

ASSOCIATION OF DIRECTORS OF ANATOMIC AND SURGICAL PATHOLOGY
Final Anatomic Diagnosis Checklist

BRAIN AND SPINAL CORD NEOPLASMS (excluding pituitary)

Choroid plexus
 papilloma
 carcinoma
Craniopharyngioma
Dysembryoplastic neuroepithelial tumor
Ependymoma
 low grade
 anaplastic
 myxopapillary
Ganglioglioma
 gangliocytoma
 desmoplastic
Germ Cell Tumors
 teratoma mature immature
 single cell line germinoma yolk sac choriocarcinoma embryonal
 mixed germ cell tumor composition _____
Hemangioblastoma
Hemangiopericytoma
Lymphoma
 B-cell
 T-cell
Medulloblastoma
 desmoplastic
 large cell
Meningioma
 benign
 atypical
 subtypes with prognostic significance
 chordoid
 clear cell
 papillary
 rhabdoid
 malignant
Mixed glioma (oligoastrocytoma) *
Neuroblastoma

* WHO defines *oligoastrocytoma* as a tumor with at least 25% astrocytes (Mork et.al., *Oligodendroglioma. Histologic evaluation and prognosis. J Neuropathol Exp Neurol* 1986; 45: 65-78).

ASSOCIATION OF DIRECTORS OF ANATOMIC AND SURGICAL PATHOLOGY
Final Anatomic Diagnosis Checklist

BRAIN AND SPINAL CORD NEOPLASMS (excluding pituitary)

Oligodendroglioma
 anaplastic oligodendroglioma
Peripheral nerve sheath tumor
 Benign
 Neurofibroma
 plexiform
 Schwannoma
 plexiform
 cellular
 Malignant
 epithelioid
 melanotic
Pinealoma (pineocytoma)
Pineoblastoma
Pineal parenchymal tumor of intermediate differentiation
Primitive neuroectodermal tumor
Solitary fibrous tumor
Subependymoma
Other

A. Grade (circle)^{required}: **Not applicable** **I** **II** **III** **IV**

Note: Refer to Tumor Grade section within the recommendations or Kleihues P, Cavenee WK eds. World Health Organization Classification of Tumors: Pathology and Genetics of Tumours of the Nervous System. Lyon, France: IARC Press, 2000.

B. Size (if applicable) _____ x _____ x _____ cm.

- Margins of Resection (fill in blank, or circle)^{required}

Note: Margins are currently seldom applicable for glioma resections.

Not applicable
Cannot be assessed
Margins free of tumor
Tumor present at _____ margin.

ASSOCIATION OF DIRECTORS OF ANATOMIC AND SURGICAL PATHOLOGY
Final Anatomic Diagnosis Checklist

BRAIN AND SPINAL CORD NEOPLASMS (excluding pituitary)

- Lymph Nodes *required*

Note: Lymph nodes are seldom part of an intracranial tumor resection. Metastases to lymph nodes are rare, occurring usually only after initial surgery.

- Additional Tumor Features (circle if applicable) *optional*

Brain invasion (meningioma):	present	absent
Blood vessel invasion:	present	absent
Subarachnoid space invasion:	present	absent

- Ancillary Studies (fill in blanks as applicable) *optional*

Special stains are performed, the results are as follows:

- A. _____
- B. _____
- C. _____
- D. _____

Interpretation _____

Immunohistochemical studies are performed, the results are as follows:

- A. _____
- B. _____
- C. _____
- D. _____

Interpretation _____

pTNM

Note: TNM is not established for tumors of the central nervous system.

References:

1. AJCC Cancer Staging Manual. Lippincott-Raven Press, 6th edition, 2002 (pg. 125-130).