Sponsored by

Malignant Odontogenic Tumours Histopathology Reporting Guide

Family/Last name

Given name(s)

Date of birth DD – MM – YYYY

Patient identifiers

Date of request DD – MM – YYYY

Accession/Laboratory number

Elements in **black text** are CORE. Elements in **grey text** are NON-CORE.

☐ indicates multi-select values ◯ indicates single select values

SCOPE OF THIS DATASET

CLINICAL INFORMATION (Note 1)

- ◯ Information not provided
- ◯ Information provided (select all that apply)
  - ☐ Previous therapy
    - ☐ Surgery
    - ☐ Chemotherapy
    - ☐ Radiotherapy
    - ☐ Targeted therapy, *specify if available*
    - ☐ Immunotherapy, *specify if available*
  - ☐ Other clinical information, *specify*

SPECIMEN(S) SUBMITTED (select all that apply) (Note 2)

- ◯ Not specified
- ◯ Debulking/curettage
- ◯ Biopsy (excisional, incisional, core needle), *specify*
- ☐ Surgical resection, *specify*
- ☐ Neck (lymph node) dissection,[a] *specify*
- ☐ Other, *specify*

[a] *If a neck (lymph node) dissection is submitted, then a separate dataset is used to record the information.*

TUMOUR SITE (select all that apply) (Note 3)

- ◯ Not specified
- ☐ Mandible
  - ☐ Ramus
  - ☐ Condyle
  - ☐ Coronoid process
  - ☐ Body
  - ☐ Anterior
- ☐ Maxilla
  - ☐ Nasal cavity/paranasal sinus (maxillary sinus)
  - ☐ Molar region alveolar process
  - ☐ Premolar region alveolar process
  - ☐ Incisor/canine region alveolar process
  - ☐ Zygomatic process
- ☐ Other, *specify*

TUMOUR LATERALITY (select all that apply)

- ◯ Not specified
- ☐ Left
- ☐ Right
- ☐ Midline

TUMOUR DIMENSIONS (Note 4)

Maximum tumour dimension (largest tumour) (pathology and/or imaging determination)

mm

Additional dimensions (largest tumour)

mm x mm

- ◯ Cannot be assessed, *specify*

BLOCK IDENTIFICATION KEY (Note 5)

(List overleaf or separately with an indication of the nature and origin of all tissue blocks)

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HISTOLOGICAL TUMOUR TYPE (select all that apply) (Note 6)
(Value list based on the World Health Organization Classification of Head and Neck Tumours (2024))

- ☐ Odontogenic carcinomas
  - ◯ Sclerosing odontogenic carcinoma
  - ◯ Ameloblastic carcinoma
  - ◯ Clear cell odontogenic carcinoma
  - ◯ Ghost cell odontogenic carcinoma
  - ◯ Primary intraosseous carcinoma, NOS
- ☐ Odontogenic carcinosarcoma
- ☐ Odontogenic sarcomas
- ☐ Other (hybrid, etc.), *specify*

HISTOLOGICAL TUMOUR GRADE (Note 7)
(Applicable to primary intraosseous squamous cell carcinoma only)

- ◯ Grade 1, well differentiated, low grade
- ◯ Grade 2, moderately differentiated, intermediate grade
- ◯ Grade 3, poorly differentiated, high grade
- ◯ Cannot be assessed, *specify*

NECROSIS (Note 8)

- ◯ Not identified
- ◯ Present
- ◯ Indeterminate, *specify reason*

EXTENT OF INVASION (Note 9)

- ◯ Not identified
- ◯ Present (select all that apply)
  - ☐ Clinical observation and/or imaging
  - ☐ Histologic
    - ◯ Entirely intraosseous
    - ◯ Cortex perforated but extent limited by periosteum
    - ◯ Infiltration into soft tissue beyond the periosteum
    - ◯ Other, *specify*

LYMPHOVASCULAR INVASION (Note 10)

- ◯ Not identified
- ◯ Present

PERINEURAL INVASION (Note 11)

- ◯ Not applicable
- ◯ Not identified
- ◯ Present
- ◯ Indeterminate, *specify reason*

MARGIN STATUS (Note 12)

- ◯ Not involved by invasive tumour
  - Distance of tumour from closest margin ____ mm
  - ◯ Distance not assessable
  - Specify closest margin(s), if possible
- ◯ Involved by invasive tumour
  - Specify margin(s)/anatomical site, if possible
- ◯ Cannot be assessed, *specify*

ANCILLARY STUDIES (Note 13)

- ◯ Not performed
- ◯ Performed (select all that apply)
  - ☐ *BRAF* status, *specify method*
  - ☐ Other, *record test(s), methodology and results*

Representative blocks for ancillary studies, *specify those blocks best representing tumour and/or normal tissue for further study and specify undecalcified when possible*

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Definitions

CORE elements

CORE elements are those which are essential for the clinical management, staging or prognosis of the cancer. These elements will either have evidentiary support at Level III-2 or above (based on prognostic factors in the National Health and Medical Research Council (NHMRC) levels of evidence[1]). In rare circumstances, where level III-2 evidence is not available an element may be made a CORE element where there is unanimous agreement by the Dataset Authoring Committee (DAC).

Molecular and immunohistochemical testing is a growing feature of cancer reporting. However, in many parts of the world this type of testing is limited by the available resources. In order to encourage the global adoption of ancillary tests for patient benefit, International Collaboration on Cancer Reporting (ICCR) includes the most relevant ancillary testing in ICCR Datasets as CORE elements, especially when they are necessary for the diagnosis. Where the technical capability does not yet exist, laboratories may consider temporarily using these data elements as NON-CORE items.

The summation of all CORE elements is considered to be the minimum reporting standard for a specific cancer.

NON-CORE elements

NON-CORE elements are those which are unanimously agreed should be included in the dataset but are not supported by level III-2 evidence. These elements may be clinically important and recommended as good practice but are not yet validated or regularly used in patient management.

Key information other than that which is essential for clinical management, staging or prognosis of the cancer such as macroscopic observations and interpretation, which are fundamental to the histological diagnosis and conclusion e.g., macroscopic tumour details, may be included as either CORE or NON-CORE elements by consensus of DAC.

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Scope

The dataset has been developed for the reporting of excision biopsy and resection specimens for malignant primary odontogenic (carcinoma and sarcoma) tumours. For resections of recurrent disease, the reporting guide may be used pragmatically although some data elements may be not applicable nor assessable. Malignant neoplasms arising in the nasal cavity and paranasal sinuses, oral cavity, salivary glands, trachea, pharynx and larynx are dealt with in separate ICCR datasets.[2] Non-odontogenic bone, soft tissue and lymphoma protocols are also dealt with in separate ICCR datasets.[3] In addition, neck dissections and nodal excisions are dealt with in a separate ICCR dataset, and this dataset should be used in conjunction, where applicable.[4]

This dataset is intended for use for primary cancer resections.

The second edition of this dataset includes changes to align the dataset with the World Health Organization (WHO) Classification of Head and Neck Tumours, 5th edition, 2024.[5]

A list of changes in this dataset edition can be accessed here.

The authors of this dataset can be accessed here.

Evidence to support this dataset

Dataset items should be completed taking into account all relevant information including clinical, pathological and radiological.

This dataset is based almost exclusively on professional judgement because there is no high level evidence to support behaviour of individual tumour types and the overall quality of the literature is poor.[6] Malignant odontogenic tumours are rare and published series are often not homogeneous by tumour type, extent or treatment, making conclusions about the value of individual items impossible. In general, those tumours that show aggressive histological features are more likely to be associated with poor survival, but this tumour group is characterised by unpredictability of behaviour; low grade tumours may recur or metastasize many years after excision. For all types, local recurrence and metastasis are poor prognostic features,[7,8] and outcomes are relatively poor after local recurrence.[9-11] Published mortality rates are limited by short follow up. Case series indicate that primary intraosseous carcinoma carries the worst prognosis,[12,13] but only grade is independently prognostic, performing better than in mucosal squamous cell carcinoma.[14] Ameloblastic carcinoma appears to carry a better prognosis than other types, for reasons that are unclear,[15] though maxillary lesions behave worse than mandibular because of more frequent pulmonary metastasis.[16]

There are no validated grading systems for odontogenic tumours other than primary intraosseous carcinoma with squamous differentiation. For this type only, the conventional squamous carcinoma grade has some value.[13,14]

Margin status after surgical excision is thought to be the key prognostic feature[7,17-20] and the best evidence relates to ameloblastic carcinoma,[15,21] primary intraosseous carcinoma,[9,13] and clear cell carcinoma.[17] Tumour dimensions and localisation are important prognostic features. Carcinomas arising in or limited to cysts therefore carry a better prognosis than those with widespread infiltration.[22] Site in the posterior maxilla is linked to poorer survival than other sites.[12]

As with most head and neck surgical resections, clearance may be very small or inadequate and extension into soft tissues beyond the periosteum is usually associated with a significant risk of local recurrence. The prognosis is worse when incomplete excision is in the infratemporal fossa or base of skull areas and therefore the anatomical site of involved margins should be specified clearly.

The role for adjuvant or salvage radiotherapy remains to be defined. The literature does not provide useful information on radiotherapy indications or the intent when it has been used. Despite use to control incompletely excised malignant odontogenic tumours, its value often appears limited[17,18] but has support in large series,[15] and is usually considered most effective as planned multimodality treatment.

Sclerosing odontogenic carcinoma is unusual. Despite extensive perineural spread, this carcinoma carries a relatively good prognosis.[23,24] Odontogenic sarcomas are overall of low grade and tend to show local recurrence rather than distant spread and thus carry a better prognosis than other types of sarcoma, but still have significant mortality and recurrence rates.[25,26]

No staging elements are included because there is no staging system for malignant odontogenic tumours recommended by the Union for International Cancer Control (UICC) or American Joint Committee on Cancer (AJCC), although staging based on size criteria has been suggested.[27]

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Note 1 – Clinical information (Core and Non-core)

In general, adjuvant or neoadjuvant therapy are not employed for odontogenic tumours, but as this field develops, it is recommended to include any previous surgery, chemotherapy, radiotherapy, targeted therapy or immunotherapy which may have been used to manage the patient prior to the biopsy/resection.

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Note 2 – Specimen(s) submitted (Core)

Specify specimen type; biopsy, surgical resection with curative intent, neck dissection if included, or debulking/palliative resection. If the category 'other' is used, specify specimen type.

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Note 3 – Tumour site (Core)

Specify sites of jaw(s) involved using the areas defined in Figure 1. There is a lack of evidence, but posterior maxillary site is considered to be a risk for early spread to the infratemporal fossa for all tumour types. Prognostic evidence relates to ameloblastic carcinoma only, though based on more frequent pulmonary metastasis rather than local recurrence.[16]

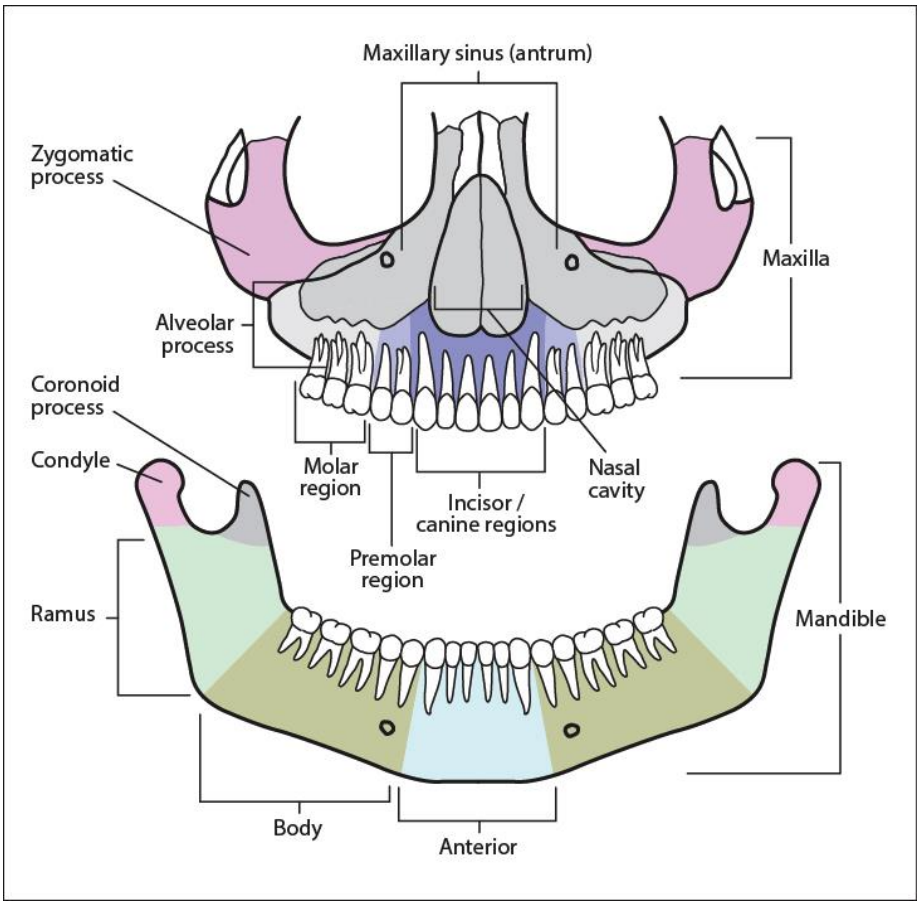

Figure 1: Diagram showing anatomical sites for extent of involvement.

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Note 4 – Tumour dimensions (Core and Non-core)

Due to the nature of odontogenic lesions, reference to any imaging or consultation with a radiologist is recommended and maximum tumour dimension (in millimetres) may be determined by a combination of methods including macroscopy, specimen or clinical radiology and microscopy. Size criteria for possible staging have been suggested,[27] with smaller tumour size associated with a better overall survival.[15]

The maximum dimension of the tumour should be reported as a core value. Other dimensions are considered non-core.

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Note 5 – Block identification key (Non-core)

The origin/designation of all tissue blocks should be recorded. This information should ideally be documented in the final pathology report and is particularly important should the need for internal or external review arise. The reviewer needs to be clear about the origin of each block in order to provide an informed specialist opinion. If this information is not included in the final pathology report, it should be available on the laboratory computer system and relayed to the reviewing pathologist. It may be useful to have a digital image of the specimen and record of the origin of the tumour blocks in some cases. Resection specimens for malignant odontogenic tumours will require extensive sampling if the tumour extends into soft tissues because excision margins are likely to be small over a large part of the specimen surface and the location of blocks must be recorded accurately in the block key.

Recording the origin/designation of tissue blocks also facilitates retrieval of blocks for further immunohistochemical or molecular analysis, research studies or clinical trials.

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Note 6 – Histological tumour type (Core)

All odontogenic and maxillofacial bone tumours should be given a type based on the most recent edition of the WHO Classification of Head and Neck Tumours, 5th edition, 2024 (Table 1).[5]

Table 1: World Health Organization classification of odontogenic and maxillofacial bone tumours.[5]

Descriptor	ICD-O codes[a]
Odontogenic carcinomas	
Sclerosing odontogenic carcinoma	9270/3
Ameloblastic carcinoma	9270/3
Clear cell odontogenic carcinoma	9341/3
Ghost cell odontogenic carcinoma	9302/3
Primary intraosseous carcinoma, NOS	9270/3
Odontogenic carcinosarcoma	9342/3
Odontogenic sarcomas	9330/3

[a] These morphology codes are from the International Classification of Diseases for Oncology, third edition, second revision (ICD-0-3.2).[28] Behaviour is coded /0 for benign tumours; /1 for unspecified, borderline, or uncertain behaviour: /2 for carcinoma in situ and grade Ill intraepithelial neoplasia; /3 for malignant tumours, primary site: and /6 for malignant tumours, metastatic site. Behaviour code /6 is not generally used by cancer registries.

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Note 7 – Histological tumour grade (Core)

For primary intraosseous squamous cell carcinoma only, the conventional squamous carcinoma grade is an independent risk factor for overall survival. No grading systems are established for other tumour types.[12,14]

Generic sarcoma grading systems are not applicable to odontogenic sarcomas.

No staging elements are included because there is no staging system for malignant odontogenic tumours recommended by the UICC or AJCC, although staging based on size criteria has been suggested.[27]

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Note 8 – Necrosis (Core)

In epithelial odontogenic tumours, the presence of intratumoral necrosis helps to confirm a diagnosis of malignancy in odontogenic tumours. Thus, while large clinical series of these rare tumours are not available, there is strong support that reporting necrosis aids in diagnosis, grading of squamous carcinoma and tumour classification.[7,29]

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Note 9 – Extent of invasion (Non-core)

Extent of invasion is best assessed by a combination of macroscopic, microscopic and radiographic information. Extent of invasion is a non-core element as no evidence currently exists to support the significance of specific extents but infiltration beyond periosteum into soft tissue is considered important, particularly if into the infratemporal fossa or parapharyngeal region. Note whether the extent of invasion is limited to bone, perforating bone but still circumscribed by periosteum, or with soft tissue infiltration.

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Note 10 – Lymphovascular invasion (Non-core)

Record lymphovascular invasion as a presumed risk factor for metastasis, though evidence is lacking. Therefore, lymphovascular invasion is considered a non-core element.

Cases that are still equivocal after taking additional steps may be reported as 'indeterminate' for lymphovascular invasion, but this designation should be sparingly used and it is useful to provide the reason in a comment in the report.

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Note 11 – Perineural invasion (Core)

While perineural infiltration is a poor prognostic feature of other head and neck tumour types, its definition in odontogenic tumours is complex and significance unclear because benign odontogenic tumour epithelium shows neurotropism.

In a malignant odontogenic tumour other than sclerosing odontogenic tumour, classical perineural spread (defined as growth into, and selectively along, nerve sheath as thin tumour extensions and within nerves as islands or strands extending to the edge of the tumour) should be reported as perineural spread.

For sclerosing odontogenic carcinoma, the extensive perineural spread seen is not a poor prognostic feature,[23,24] as this tumour type has only recently been reported to recur or metastasize.[30] Perineural spread should not be recorded for sclerosing odontogenic carcinoma pending further evidence.

Intraneural and perineural epithelium is not necessarily a sign of malignant behaviour in odontogenic tumours and may also be seen in benign odontogenic tumours, particularly frequently in odontogenic fibroma,[31] which has histologic resemblance to sclerosing odontogenic carcinoma.

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Note 12 – Margin status (Core)

Margin status is presumed to be a key prognostic item on the basis of the consensus judgement of the DAC, however it is acknowledged that there is currently a lack of specific evidence. Surgical clearance is often by only a small margin and it is important to know whether the excision is marginal around a large part of the periphery of the tumour or just focally. The anatomical site(s) of close margins should be recorded as reoperation may be possible.

The prognosis is worse where an incomplete excision is located in the infratemporal fossa or base of skull areas and therefore the anatomical site of involved margins should be specified clearly.

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Note 13 – Ancillary studies (Non-core)

There are a number of immunohistochemical and molecular studies that may be relevant. Some already have potential but unproven therapeutic benefit. Examples include *EWSR1* rearrangements in clear cell odontogenic carcinoma,[32] and *BRAF* p.V600E mutation in ameloblastic carcinoma.[33] Such tests may also increase diagnostic certainty and, if performed, should be recorded.

BRAF p.V600E mutation is present in fewer ameloblastic carcinomas than ameloblastomas and there is not yet evidence of the effectiveness of targeted therapy in ameloblastic carcinomas or sarcomas.[33-36] If performed, *BRAF* p.V600E testing should be by sequencing.

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