



Protocol for the Examination of Biopsy Specimens From Patients With Soft Tissue Tumors

Version: 4.1.0.0

Protocol Posting Date: June 2021

The use of this protocol is recommended for clinical care purposes but is not required for accreditation purposes.

This protocol may be used for the following procedures AND tumor types:

Procedure	Description
Biopsy	
Tumor Type	Description
Soft tissue sarcomas	Includes soft tissue tumors of intermediate (locally aggressive and rarely metastasizing) potential and malignant soft tissue tumors.

The following should NOT be reported using this protocol:

Procedure
Resection (consider the Soft Tissue Resection protocol)
Cytologic specimens
Tumor type
Soft tissue tumors that may recur locally but have either no or an extremely low risk of metastasis
Carcinosarcoma (consider the appropriate site-specific carcinoma protocol)
Lymphoma (consider the Hodgkin or non-Hodgkin Lymphoma protocols)
Pediatric Ewing sarcoma (consider the Ewing Sarcoma protocol)
Pediatric rhabdomyosarcoma (consider the Rhabdomyosarcoma protocol)
Kaposi sarcoma
Gastrointestinal stromal tumor (consider the Gastrointestinal Stromal Tumor protocol)
Uterine sarcoma (consider the Uterine Sarcoma protocol)

Authors

Javier A. Laurini*

With guidance from the CAP Cancer and CAP Pathology Electronic Reporting Committees.

* Denotes primary author.

Accreditation Requirements

The use of this biopsy case summary is recommended for clinical care purposes, but is not required for accreditation purposes. The core and conditional data elements are routinely reported for biopsy specimens. Non-core data elements are included to allow for reporting information that may be of clinical value.

Summary of Changes

v 4.1.0.0

- General Reformatting
- New WHO 5th Edition Histological Updates
- Revised Margins Section

Reporting Template

Protocol Posting Date: June 2021

Select a single response unless otherwise indicated.

CASE SUMMARY: (SOFT TISSUE: Biopsy)

Standard(s): AJCC-UICC 8

The use of this template is recommended for reporting biopsy specimens, but is not required for accreditation purposes.

CLINICAL

+Prebiopsy Treatment (select all that apply)

- No known prebiopsy therapy
- Chemotherapy performed
- Radiation therapy performed
- Therapy performed, type not specified
- Not specified

SPECIMEN (Note [A](#))

Procedure

- Core needle biopsy
- Incisional biopsy
- Excisional biopsy
- Other (specify): _____
- Not specified

TUMOR

Tumor Site (Note [B](#))

- Head and neck (specify site, if known): _____
- Trunk and extremities (specify site, if known): _____
- Abdominal visceral organs (specify site, if known): _____
- Thoracic visceral organs (specify site, if known): _____
- Retroperitoneum (specify site, if known): _____
- Orbit (specify site, if known): _____
- Not specified

Histologic Type (World Health Organization [WHO] Classification of Soft Tissue Tumors) (Note [C](#))

The list is derived from the 2020 World Health Organization (WHO) classification of soft tissue tumors, edited to include ONLY soft tissue tumors of intermediate (locally aggressive and rarely metastasizing) potential and malignant soft tissue tumors for which anatomical staging using the AJCC system is considered to be clinically relevant.

- Adipocytic Tumors
 - Intermediate (locally aggressive)*
 - Atypical lipomatous tumor
- Malignant*
 - Well differentiated liposarcoma
 - Dedifferentiated liposarcoma
 - Myxoid liposarcoma

+Percentage of Hypercellular Areas (formerly known as round cells)

- Specify percentage: _____ %
- Other (specify): _____
- Cannot be determined
- Pleomorphic liposarcoma
- Epithelioid liposarcoma
- Myxoid pleomorphic liposarcoma
- Fibroblastic / Myofibroblastic Tumors
 - Intermediate (rarely metastasizing)*
 - Fibrosarcomatous dermatofibrosarcoma protuberans
 - Malignant*
 - Solitary fibrous tumor, malignant
 - Adult fibrosarcoma
 - Myxofibrosarcoma
 - Epithelioid Myxofibrosarcoma
 - Low grade fibromyxoid sarcoma
 - Sclerosing epithelioid fibrosarcoma
- So-called Fibrohistiocytic Tumors
 - Malignant*
 - Malignant tenosynovial giant cell tumor
- Smooth Muscle Tumors
 - Malignant*
 - Leiomyosarcoma
- Pericytic (Perivascular) Tumors
 - Malignant*
 - Malignant glomus tumor
- Skeletal Muscle Tumors
 - Malignant*
 - Embryonal rhabdomyosarcoma (including botryoid, anaplastic)
 - Alveolar rhabdomyosarcoma (including solid, anaplastic)
 - Pleomorphic rhabdomyosarcoma
 - Spindle cell / sclerosing rhabdomyosarcoma
 - Spindle cell / sclerosing rhabdomyosarcoma NOS
 - Congenital spindle cell rhabdomyosarcoma with VGLL2/NCOA2/CITED2 rearrangements
 - MYOD1-mutant spindle cell / sclerosing rhabdomyosarcoma
 - Intraosseous spindle cell rhabdomyosarcoma (with TFCEP2/NCOA2 rearrangements)
 - Ectomesenchymoma
- Vascular Tumors
 - Malignant*
 - Epithelioid hemangioendothelioma with WWTR1-CAMTA1 fusion
 - Epithelioid hemangioendothelioma with YAP1-TFE3 fusion
 - Epithelioid hemangioendothelioma NOS
- Peripheral Nerve Tumors
 - Malignant*
 - Malignant peripheral nerve sheath tumor
 - Epithelioid malignant peripheral nerve sheath tumor
 - Malignant granular cell tumor
 - Malignant perineurioma

___ Chondro-osseous Tumors

Malignant

___ Extraskeletal osteosarcoma

___ Tumors of Uncertain Differentiation

Intermediate (rarely metastasizing)

___ Ossifying fibromyxoid tumor

___ Mixed tumor: _____

___ Mixed tumor NOS, malignant: _____

___ Myoepithelioma

Malignant

___ Phosphaturic mesenchymal tumor, malignant

___ NTRK-rearranged spindle cell neoplasm

___ Synovial sarcoma, biphasic

___ Synovial sarcoma, spindle cell

___ Synovial sarcoma, poorly differentiated

___ Synovial sarcoma NOS

___ Epithelioid sarcoma, classic type

___ Epithelioid sarcoma, proximal or large cell type

___ Alveolar soft part sarcoma

___ Clear cell sarcoma of soft tissue

___ Extraskeletal myxoid chondrosarcoma

___ Ossifying fibromyxoid tumor, malignant

___ Myoepithelial carcinoma

___ Extraskeletal Ewing sarcoma

___ Round cell sarcoma with EWSR1-non ETS fusions

___ CIC-rearranged sarcoma

___ Sarcoma with BCOR genetic alterations

___ Undifferentiated / Unclassified Sarcomas

___ Undifferentiated spindle cell sarcoma

___ Undifferentiated pleomorphic sarcoma

___ Undifferentiated round cell sarcoma

___ Undifferentiated sarcoma NOS

___ Other histologic type not listed (specify): _____

___ Cannot be determined: _____

+Histologic Type Comment: _____

Histologic Grade (French Federation of Cancer Centers Sarcoma Group [FNCLCC]) (Note [D](#))

___ Grade 1

___ Grade 2

___ Grade 3

___ Ungraded sarcoma

___ Cannot be assessed: _____

Mitotic Rate (Note [D](#))

___ Specify mitotic rate per mm²: _____ mitoses per mm²

___ Specify mitotic rate per 10 high-power fields (HPF): _____ mitoses per 10 high-power fields (HPF)

___ Cannot be determined (explain): _____

Necrosis (Note D)

- Not identified
- Present

Extent of Necrosis

- Specify percentage: _____ %
- Cannot be determined (explain): _____
- Cannot be determined

+Treatment Effect (Note E)

- No known prebiopsy therapy
- Not identified
- Present

Percentage of Viable Tumor (compared with pretreatment biopsy, if available)

- Specify percentage: _____ %
- Cannot be determined (explain): _____
- Cannot be determined

+Lymphovascular Invasion (Note F)

- Not identified
- Present
- Cannot be determined: _____

+Tumor Comment: _____

MARGINS (for excisional biopsies only) (Note G)

Margin Status

- Not applicable
- All margins negative for tumor

Closest Margin(s) to Tumor

- Specify closest margin(s): _____
- Cannot be determined (explain): _____

Distance from Tumor to Closest Margin

Specify in Centimeters (cm)

- Exact distance: _____ cm
- Greater than: _____ cm
- At least: _____ cm
- Less than: _____ cm
- Less than 2 cm
- Other (specify): _____
- Cannot be determined: _____

Other Close Margin(s) to Tumor (less than 2 cm)

- Specify other close margin(s): _____
- Cannot be determined (explain): _____
- Not applicable
- Tumor present at margin

Margin(s) Involved by Tumor

- Specify involved margin(s): _____
- Cannot be determined (explain): _____

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___ Other (specify): _____
___ Cannot be determined (explain): _____

+Margin Comment: _____

ADDITIONAL FINDINGS

+Additional Findings (specify): _____

SPECIAL STUDIES

Immunohistochemistry

___ Specify: _____
___ Not performed: _____
___ Not applicable

Cytogenetics

___ Specify: _____
___ Not performed: _____
___ Not applicable

Molecular Pathology

___ Specify: _____
___ Not performed: _____
___ Not applicable

COMMENTS

Comment(s): _____

Explanatory Notes

A. Procedure / Tissue Processing

Fixation

Ideally, tissue specimens from soft tissue tumors are received fresh/unfixed in the pathology laboratory, in case fresh tissue for ancillary studies, such as cytogenetics, needs to be collected.

Tissue Submission for Histologic Evaluation

One section per centimeter of maximum dimension is usually recommended, although fewer sections per centimeter are needed for very large tumors, especially if they are homogeneous. Tumors known to be high grade from a previous biopsy do not require as many sections as those that were previously diagnosed as low grade, as documentation of a high-grade component will change stage and prognosis in the latter case. Sections should be taken of grossly heterogeneous areas, and there is no need to submit more than 1 section of necrotic tumor (always with a transition to viable tumor). Occasionally, gross pathology can be misleading, and areas that appear to be grossly necrotic may actually be myxoid or edematous. When this happens, additional sections of these areas should be submitted for histologic examination. When estimates of gross necrosis exceed those of histologic necrosis, the greater percentage of necrosis should be recorded on the surgical pathology report. In general, most tumors require 10 to 12 sections or fewer, excluding sections submitted to assess the status of surgical margins. Tumors with greater areas of heterogeneity may need to be sampled more thoroughly.

Although the ability to perform diagnostic molecular studies in formalin fixed paraffin embedded tissue has substantially diminished the need to collect fresh tissue on every case, [1,2,3,4](#) frozen tissue may be needed to enter patients into treatment protocols. Nevertheless, discretion should be used in triaging tissue from sarcomas. Adequate tissue should be submitted for conventional light microscopy before setting aside samples for cytogenetics, electron microscopy, or molecular analysis. Fresh tissue for special studies should be collected at the time the specimen is received.

Molecular Studies

It may be important to snap freeze a small portion of tissue as availability of frozen tissue may be a requirement for patient enrollment into clinical trials. In general, approximately 1 cm³ of fresh tissue (less is acceptable for small specimens, including core biopsies) should be cut into small, 0.2-cm fragments, reserving sufficient tissue for histologic examination. This frozen tissue should ideally be stored at minus (-)70°C and can be shipped on dry ice to facilities that perform molecular analysis.

Definition of Procedures

The following is a list of guidelines to be used in defining what type of procedure has been performed.

Intralesional Resection

Leaving gross or microscopic tumor behind. Partial debulking or curettage are examples or when microscopic tumor is left at the margin unintentionally in an attempted marginal resection.

Marginal Resection

Removing the tumor and its pseudocapsule with a relatively small amount of adjacent tissue. There is no gross tumor at the margin; however, there is a high likelihood that microscopic tumor is present. If microscopic disease is identified at the margin, then it is an intralesional resection. Note that occasionally

a surgeon will perform an “excisional” biopsy, which effectively accomplishes the same outcome as a marginal resection.

Wide Resection

An intracompartmental resection. The tumor is removed with pseudocapsule and a cuff of normal tissue surrounding the neoplasm, but without the complete removal of an entire muscle group, compartment, or bone.

Radical Resection

The removal of an entire soft tissue compartment (for example, anterior compartment of the thigh, the quadriceps) or bone, or the excision of the adjacent muscle groups if the tumor is extracompartmental.

References

1. Ladanyi M, Bridge JA. Contribution of molecular genetic data to the classification of sarcomas. *Hum Pathol*. 2000;31(5):532-538
2. Tomescu O, Barr FG. Chromosomal translocations in sarcomas: prospects for therapy. *Trends Mol Med*. 2001;7(12):554-559.
3. Jin L, Majerus J, Oliveira A. et al. Detection of fusion gene transcripts in fresh-frozen and formalin-fixed paraffin-embedded tissue sections of soft-tissue sarcomas after laser capture microdissection and rt-PCR, *Diagn Mol Pathol* . 2003 Dec;12(4):224-30
4. Smith SM, Coleman J, Bridge JA et al. Molecular diagnostics in soft tissue sarcomas and gastrointestinal stromal tumors. *J Surg Oncol*. 2015 Apr;111(5):520-31

B. Tumor Site

The 8th edition of the American Joint Committee on Cancer (AJCC) staging manual¹ places a great emphasis on the anatomic primary site of soft tissue sarcomas, due to implications for local recurrence and risk of metastatic disease. Separate staging systems have been developed for soft tissue sarcomas (STSs) of the extremities and trunk, retroperitoneum, head and neck, and visceral sites. For the first two sites, outcomes are well characterized, and good predictive models based on staging data are available. However, for the latter two anatomic sites, data are more limited, and the proposed staging systems are meant to be a starting point for refining risk assessment. Additionally, changes were made to the AJCC staging system for orbital sarcomas.¹

Head and Neck

Includes STS arising in the neck (subcutaneous and deep structures, including neurovascular structures); oral cavity; upper aerodigestive tract, including laryngeal structures; pharyngeal areas; nasal cavity and paranasal sinuses; infratemporal fossa and masticator space; major salivary glands, thyroid and parathyroid glands; cervical esophagus and trachea; and peripheral and cranial nerves. Although these STSs usually are found at a smaller size than those arising in other anatomic sites, they often have a greater risk of local recurrence, and they usually present unique problems from an anatomic standpoint. Soft tissue sarcomas arising in the orbit have their own staging system (see below).

Trunk and Extremities

Includes STS arising in extremities and trunk, including breast.

Abdomen and Thoracic Visceral Organs

Includes STS arising from hollow viscera, including esophagus, stomach, small intestine, colon and rectum, as well as solid viscera such as the liver, kidneys, lungs, and heart. Sarcomas arising within the peritoneal,

pleural, or mediastinal cavities, but not from a specific visceral organ, may be staged in a manner similar to that of retroperitoneal sarcomas.

Retroperitoneum

Approximately 10% of STS arise in this complex anatomic compartment. Sarcomas arising within the peritoneal, pleural, or mediastinal cavities, but not from a specific visceral organ, may be staged in a manner similar to that of retroperitoneal sarcomas.

Orbit

The orbit is a cone-shaped cavity surrounded by 7 bones. Numerous anatomic structures that support the globe and periorbital tissues, including the optic nerve and its meninges, lacrimal gland, extraocular muscles, fascial connective tissue, orbital fat, cranial and autonomic vessels, and blood vessels, can be the site of origin for a wide variety of primary orbital sarcomas.

References

1. Amin MB, Edge SB, Greene FL, et al, eds. *AJCC Cancer Staging Manual*. 8th ed. New York, NY: Springer; 2017.

C. Histologic Classification

Intraoperative Consultation

Histologic classification of soft tissue tumors is sufficiently complex that, in many cases, it is unreasonable to expect a precise classification of these tumors based on an intraoperative consultation. A complete understanding of the surgeon's treatment algorithm is recommended before rendering a frozen section diagnosis. Intraoperative consultation is useful in assessing if "lesional" tissue is present and in constructing a differential diagnosis that can direct the proper triage of tissue for flow cytometry (lymphoma), electron microscopy, and molecular studies/cytogenetics. Tissue triage optimally is performed at the time of frozen section. In many cases, it is important that a portion of tissue be submitted for ancillary studies, even from fine-needle aspiration (FNA) and core needle biopsy specimens, after sufficient tissue has been submitted for histologic evaluation.

Tumor Classification From Biopsies

It is not always possible to classify soft tissue tumors precisely based on biopsy material, especially FNA and core needle biopsy specimens. Although pathologists should make every attempt to classify lesions in small biopsy specimens, on occasion stratification into very basic diagnostic categories, such as lymphoma, carcinoma, melanoma, and sarcoma, is all that is possible. In some cases, precise classification is only possible in open biopsies or resection specimens.

WHO Classification of Tumors

Classification of tumors should be made according to the 2020 World Health Organization (WHO) classification of soft tissue tumors.¹ As part of the WHO classification, soft tissue tumors are divided into 4 categories: benign, intermediate (locally aggressive), intermediate (rarely metastasizing), and malignant.

The provided list of histologic types is derived from the 2020 World Health Organization (WHO) classification of soft tissue tumors, edited to only include soft tissue tumors of intermediate (locally aggressive and rarely metastasizing) potential and malignant soft tissue tumors for which anatomical staging using the AJCC system is considered to be clinically relevant. The full reference contains information on additional soft tissue tumors.

References

1. WHO Classification of Tumours Editorial Board. Soft Tissue and Bone Tumors. Lyon (France): International Agency for Research on Cancer; 2020. (WHO classification of tumours series, 5th ed.; vol. 3)

D. Grading

Unlike with other organ systems, the staging of soft tissue sarcomas is largely determined by grade. Whilst nomograms assess multiple clinical and histologic parameters to calculate the probability of recurrence for a given patient,¹ there is, however, no generally agreed-upon scheme for grading soft tissue tumors.² The most widely used soft tissue grading systems are the French Federation of Cancer Centers Sarcoma Group (FNCLCC) and National Cancer Institute (NCI) systems.^{3,4} Both systems have 3 grades and are based on mitotic activity, necrosis, and differentiation, and are highly correlated with prognosis.⁵ However, in addition to these criteria, the NCI system requires the quantification of cellularity and pleomorphism for certain subtypes of sarcomas, which is difficult to determine objectively. The FNCLCC system is easier to use in our opinion, and it may be slightly better in predicting prognosis than the NCI system.⁵ Other systems with 2 or 4 grades also have been used. The 8th edition of the *AJCC Cancer Staging Manual*⁶ adopted the FNCLCC grading system. The revision of the American Joint Committee on Cancer (AJCC) staging system incorporates a 3-tiered grading system; however, grade 1 and grades 2 to 3 (effectively low and high) are used for stage grouping. Accurate grading requires an adequate sample of tissue, which is not always available from FNA or core needle biopsy specimens or in tumors previously treated with radiation or chemotherapy. However, given the importance of grade in staging and treatment, efforts to separate sarcomas on the basis of needle biopsies into at least 2 tiers (ie, low and high grade) is encouraged. In many instances, the histologic type of sarcoma will readily permit this distinction (ie, Ewing sarcoma, pleomorphic liposarcoma), whereas in less obvious instances, the difficulty of assigning grade should be noted. In general, multiple needle core biopsies exhibiting a high-grade sarcoma can be regarded as high grade, since the probability of subsequent downgrading is remote, but limited core biopsies of low-grade sarcoma carry a risk of upgrading.

FNCLCC Grading

The FNCLCC grade is based on three parameters: differentiation, mitotic activity, and necrosis. Each of these parameters receives a score: differentiation (1 to 3), mitotic activity (1 to 3), and necrosis (0 to 2). The scores are summed to produce a grade.

Grade 1: 2 or 3
Grade 2: 4 or 5
Grade 3: 6 to 8

Differentiation: Tumor differentiation is scored as follows (see Table 1).

- Score 1: Sarcomas closely resembling normal, adult mesenchymal tissue and potentially difficult to distinguish from the counterpart benign tumor (eg, well-differentiated liposarcoma, well-differentiated leiomyosarcoma)
- Score 2: Sarcomas for which histologic typing is certain (eg, myxoid liposarcoma, myxofibrosarcoma)
- Score 3: Embryonal sarcomas and undifferentiated sarcomas, synovial sarcomas and sarcomas of doubtful tumor type

Tumor differentiation is the most problematic aspect of the FNCLCC system. Its use is subjective and does not include every subtype of sarcoma. Nevertheless, it is an integral part of the system, and an attempt should be made to assign a differentiation score.

Table 1. Tumor Differentiation Score According to Histologic Type in the Updated Version of the French Federation of Cancer Centers Sarcoma Group System

Tumor Differentiation

Histologic Type	Score
Atypical lipomatous tumor / Well-differentiated liposarcoma	1
Well-differentiated leiomyosarcoma	1
Malignant neurofibroma	1
Well-differentiated Fibrosarcoma	1
Myxoid liposarcoma	2
Conventional leiomyosarcoma	2
Conventional fibrosarcoma	2
Myxofibrosarcoma	2
High-grade myxoid (round cell) liposarcoma	3
Pleomorphic liposarcoma	3
Dedifferentiated liposarcoma	3
Pleomorphic Rhabdomyosarcoma	3
Poorly differentiated/pleomorphic leiomyosarcoma	3
Biphasic / monophasic / poorly differentiated Synovial sarcoma	3
Mesenchymal chondrosarcoma	3
Extraskeletal osteosarcoma	3
Extraskeletal Ewing sarcoma	3
Malignant rhabdoid tumor	3
Undifferentiated pleomorphic sarcoma	3
Undifferentiated sarcoma, not otherwise specified	3

Note: Grading of malignant peripheral nerve sheath tumor, embryonal and alveolar rhabdomyosarcoma, angiosarcoma, extraskeletal myxoid chondrosarcoma, alveolar soft part sarcoma, clear cell sarcoma, and epithelioid sarcoma is not recommended.⁴ The case for grading malignant peripheral nerve sheath tumor is currently being debated.

Modified with permission from Coindre JM.³

Mitosis Count: The count is made in the most mitotically active area, away from areas of necrosis, in either 10 consecutive high-power fields (HPF) (use the X40 objective) (1 HPF x 400 = 0.1734 mm²) or in the appropriate number of HPF to encompass 1 mm² based on each individual microscope. If the mitotic rate is close to the cutoff between mitotic scores, the count should be repeated.

Table 2. Mitotic Count Score equivalence

Mitotic Score	# mitosis / 10 HPF (1 HPF= 0.1734 mm ²)	# mitosis / 1 mm ² (see table 3)
Score 1	0 to 9 mitosis / 10 HPF	0 to 5 mitosis / 1 mm ²
Score 2	10 to 19 mitosis / 10 HPF	6 to 11 mitosis / 1 mm ²
Score 3	> 19 mitosis / 10 HPF	> 11 mitosis / 1 mm ²

The area of 1 HPF originally used for mitotic count measured 0.1734 mm². However, the area of 1 HPF using most modern microscopes with wider 40x lenses will most likely be higher. Pathologists are encouraged to determine the field area of their 40x lenses and divide 0.1734 by the obtained field area to obtain a conversion factor. The number of mitotic figures in 10 HPF multiplied by the obtained conversion factor and rounded to the nearest whole number should be used for grading purposes.

An important change in the 5th Edition of the WHO Classification of Tumours series⁷ is the conversion of mitotic count from the traditional denominator of 10 HPFs to a defined area expressed in mm², as an attempt to standardize the area used for mitotic count. Table 3 shows the approximate number of fields required to encompass 1 mm² based on the field diameter and its corresponding area.

Table 3. Approximate number of fields per 1 mm² based on field diameter and its corresponding area

Field diameter (mm)	Area (mm ²)	Approximate number of fields per 1 mm ²
0.40	0.126	8
0.41	0.132	8
0.42	0.138	7
0.43	0.145	7
0.44	0.152	7
0.45	0.159	6
0.46	0.166	6
0.47	0.173	6
0.48	0.181	6
0.49	0.188	5
0.50	0.196	5
0.51	0.204	5
0.52	0.212	5
0.53	0.221	5
0.54	0.229	4
0.55	0.237	4
0.56	0.246	4
0.57	0.255	4
0.58	0.264	4
0.59	0.273	4
0.60	0.283	4
0.61	0.292	3
0.62	0.302	3
0.63	0.312	3
0.64	0.322	3
0.65	0.332	3
0.66	0.342	3
0.67	0.352	3
0.68	0.363	3
0.69	0.374	3

Tumor Necrosis: Evaluated on gross examination and validated with histologic sections.

Score 0: No tumor necrosis

Score 1: <50% tumor necrosis

Score 2: ≥50% tumor necrosis

TNM Grading

The 8th edition of the American Joint Committee on Cancer (AJCC) and International Union Against Cancer (UICC) staging system for soft tissue tumors recommends the FNCLCC 3-tiered system but effectively collapses into high grade and low grade.^{6,8} This means that FNCLCC grade 2 and grade 3 tumors are considered “high grade” for the purposes of stage grouping.

References

1. Eilber FC, Brennan MF, Eilber FR, et al. Validation of postoperative normograms for 12-year sarcoma-specific mortality. *Cancer*. 2004;101:2270-2275.
2. Oliveira AM, Nascimento AG. Grading in soft tissue tumors: principles and problems. *Skeletal Radiol*. 2001;30(10):543-559.
3. Coindre JM. Grading of soft tissue sarcomas: review and update. *Arch Pathol Lab Med*. 2006;130:1448-1453.
4. Costa J, Wesley RA, Glatstein E, Rosenberg SA. The grading of soft tissue sarcomas: results of a clinicohistopathologic correlation in a series of 163 cases. *Cancer*. 1984;53(3):530-541.
5. Guillou L, Coindre JM, Bonichon F, et al. Comparative study of the National Cancer Institute and French Federation of Cancer Centers Sarcoma Group grading systems in a population of 410 adult patients with soft tissue sarcoma. *J Clin Oncol*. 1997;15(1):350-362.
6. Amin MB, Edge SB, Greene FL, et al, eds. *AJCC Cancer Staging Manual*. 8th ed. New York, NY: Springer; 2017.
7. WHO Classification of Tumours Editorial Board. *Soft Tissue and Bone Tumors*. Lyon (France): International Agency for Research on Cancer; 2020. (WHO classification of tumours series, 5th ed.; vol. 3)
8. Brierley JD, Gospodarowicz MK, Wittekind C, et al, eds. *TNM Classification of Malignant Tumours*. 8th ed. Oxford, UK: Wiley; 2016.

E. Response to Chemotherapy/Radiation Therapy Effect

Although agreement has not been reached about measuring the effect of preoperative (neoadjuvant) chemotherapy/radiation therapy in soft tissue tumors, an attempt should be made to quantify these effects, especially in the research setting. Therapy response is expressed as a percentage of total tumor area that is viable. Nonliquefied tumor tissue from a cross-section through the longest axis of the tumor should be sampled. At least 1 section of necrotic tumor (always with a transition to viable tumor) should be sampled to verify the gross impression of necrosis. Nonsampled necrotic areas should be included in the estimate of necrosis and the percentage of tumor necrosis reported. The gross appearance can be misleading, and areas that appear grossly necrotic may actually be myxoid or edematous. Additional sections from these areas should be submitted for histologic examination. When estimates of gross necrosis exceed those of histologic necrosis, the greater percentage of necrosis should be recorded on the surgical pathology report.

F. Lymphovascular Invasion

Lymphovascular invasion (LVI) indicates whether microscopic lymphovascular invasion is identified. LVI includes lymphatic invasion, vascular invasion, or lymphovascular invasion. By AJCC/UICC convention,

LVI does not affect the T category indicating local extent of tumor unless specifically included in the definition of a T category.

G. Margins

The most important predictor of local recurrence is the status of surgical excision margins.¹ Therefore, detailed reporting of surgical margins is a critical role of the pathologist. It has been recommended that for all margins located less than 2 cm, the distance of the tumor from the margin be reported in centimeters.² However, there is a lack of agreement on this issue. We recommend specifying the location of all margins located less than 2 cm and the distance of the closest margin that is less than 2 cm from the tumor. Margins from soft tissue tumors should be taken as perpendicular sections, if possible. If bones are present in the specimen and are not involved by tumor, or the tumor is located more than 2 cm from the margin, the marrow can be scooped out and submitted as a margin.

References

1. Gronchi A, Lo Vullo S, Colombo C, et al: Extremity soft tissue sarcoma in a series of patients treated at a single institution: local control directly impacts survival. *Ann Surg*.2010 Mar;251(3):506-11.
2. Recommendations for the reporting of soft tissue sarcomas. Association of Directors of Anatomic and Surgical Pathology. *Mod Pathol*. 1998;11(12):1257-1261.