総　説

骨軟部腫瘍の画像診断
－軟部腫瘍診断のチェックポイント10－

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Diagnosis of Soft Tissue Tumors : 10 checkpoints

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This review, presents 10 checkpoints for the diagnosis of soft tissue tumors and the MRI reporting method for the general radiologists. The 10 checkpoints consist of the following, (1) clinical information, (2) calcification, (3) characteristic shape, (4) multiplicity, (5) lymph node enlargement, (6) characteristic sign and appearance, (7) internal morphology (fatty component, myxoid matrix, collagenous tissue), (8) flow void, (9) early, strong enhancement, and (10) malignant lymphoma and inflammatory masses for differential diagnosis. A combination of these individual points yields higher sensitivity and specificity for tissue-specific diagnosis and differentiation between benign and malignant lesions. Although pathology will always remain the gold standard in the diagnosis of soft tissue tumors, prediction of a specific histologic diagnosis remains one of the ultimate goals of each imaging technique. Moreover, dicisions regarding biopsy and treatment could be simplified if a specific diagnosis or a limited differential diagnosis could be provided on the basis of imaging.

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はじめに

MRIの普及に伴い一般の画像診断医が軟部腫瘍のレポート作成に携わる機会が増えている．しかし軟部腫瘍の画像診断は，質的診断，良悪性鑑別診断を含めて最も診断の困難な分野とされており[1)-10)]，一般の画像診断医にとっては臨床医が求めるに十分なレポートが書けていないのが現状ではないかと思われる．その理由としては，種類が非常に多いこと[1),11)-13)]，非特異的所見が多いこと[2)-10)]などが挙げられる．しかし，頻度の高い腫瘍はある程度限られており，また所見の組み合わせから特異的所見に変わり得ることも少なくない[4),8)-10)]．本稿では，所見を中心にしたチェックポイントを10項目に絞り紹介し，一般の画像診断医にとっても比較的容易なレポート作成法について紹介する．

軟部腫瘤診断のDecision Tree

はじめにわれわれが考える軟部腫瘤診断のDecision TreeをFig. 1に示す．CTや核医学などの他の検査や生検の部位や必要性についてコメントしたり，定期的なフォローアップでいいのか，治療が必要なのかなどの意見を可能な限り言及できるレポート作成が理想ではないかと思われる[14),15)]．そのためには，年齢，性別，局在，症状，病歴などの臨床所見に単純X線写真や可能ならば超音波を加えた情報に，多くの症例ではさらにMRIの情報を追加することが必須と考えている．正確な存在診断，拡がり診断をレポートするとともに，比較的しばしば遭遇するような頻度の高い腫瘍は質的診断まで，稀な腫瘍では良悪性の鑑別程度までのレポート作成が必要ではないかと思われる[2)-10)]．

MRI読影のために必要と思われる情報とそれらが推測できる撮像法

目標とするレポートを作成するためには，存在とその拡がりが分かり，質的診断を絞り込めるようなあるレベル以上のMRIの撮像がなされていることが当然必要である．MRI読影のために必要と思われる情報をTable 1に，われわ

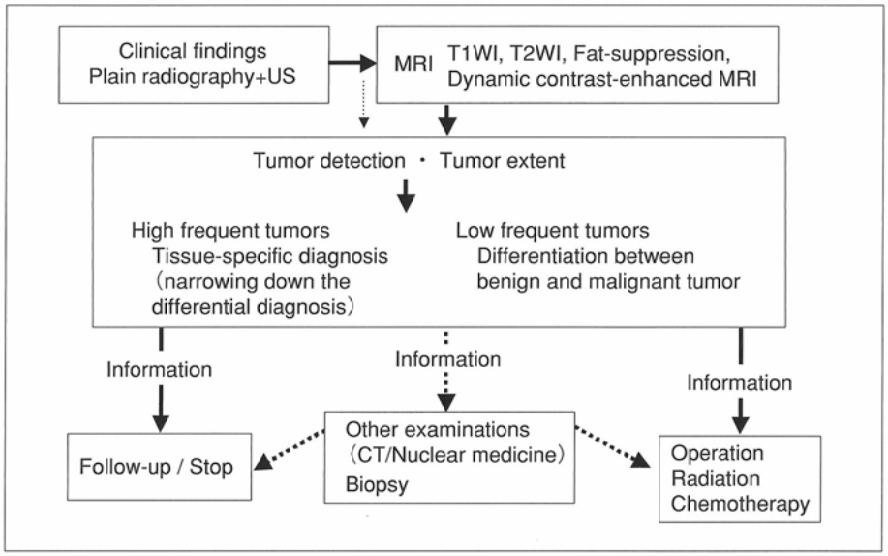


Fig. 1 Decision tree for diagnosis of soft tissue tumors

Table 1 The necessary information for diagnosis of soft tissue tumors

1. Detection（except: lipoma）	: Fat-suppression T2 weighted techniques
2. Extent	: Multiple imaging planes
Intra-/ Extra-compartment	
Differentiation between tumor	
and peritumoral edema	: + Vascularity
3. Tissue-specific diagnosis	: Gross morphology, Vascularity
4. Response to therapy	: Size, Internal morphology, Vascularity
5. Differentiation between residual tumor tissue and inflammatory changes	: Signal intensity, Vascularity

Table 2 Clinical MR imaging protocols for soft tissue tumors

Imaging planes : at least 2 planes（axial plane and longitudinal plane）
1. T1 weighted image
2. T2 weighted image（spin echo sequence）
3. Fat-suppression T2 weighted techniques : STIR* / ChemSat**
4. Dynamic contrast-enhanced MRI
5. Post contrast T1 weighted image
6. If need : MR Angiography（Essential vascular anatomical information）
#. 3D dynamic contrast-enhanced MRA = 4+6

*STIR : short inversion time inversion recovery sequence
**ChemSat : chemical saturation technique

れが行っている実際の撮像法をTable 2に示す．脂肪組織との関連の深いこの領域では脂肪抑制画像の有用性は高く[4),8)]，また，腫瘍の持つvascularityという情報が質的診断や治療効果判定などには必要なことが多くダイナミック造影法が効果を発揮する[16)-21)]．

チェックポイント10

以下にレポートを作成する際のチェックすべきポイントについて症例を呈示しながら解説する．

1．臨床所見から情報を探る

症例の年齢，性別，局在，症状，病歴などから考えられ

る疾患がある程度は絞り込むことが可能な症例もあり，そのためには頻度の高い腫瘍(Table 3A)，好発年齢，好発部位(Fig. 2，Table 3B)は記憶しておく必要がある[2)-4),22)]．

2．単純X線での石灰化(Fig. 3)

血管腫(静脈石)，化骨性筋炎(層状石灰化)，滑膜肉腫など石灰化の存在で鑑別診断がかなり絞れる症例があるため，生じ得る疾患の把握は重要であり，軟部腫瘍のMRI読影の際には必ず単純X線(またはCT)を合わせて検討する必要がある(Table 3C)．

3．特徴的な形態(Fig. 4)

腫瘍の形態も特徴的なものがあり，紡錘状で神経と連続がみられる神経鞘腫など形態から特異的診断が可能な症例も認められる[10),23)](Table 3D)．

4．多発することのある腫瘤(Fig. 5)

軟部腫瘍では多発することは少ないが，ときに多発することがありその場合は診断がある程度限られてくる[4),24)](Table 3E)．

5．リンパ節腫大を伴った場合(Fig. 6)

軟部腫瘤でリンパ節病変の可能性が考えられた場合は，リンパ節自体の疾患かリンパ節転移を伴った場合のいずれかである．リンパ節自体の疾患は基本的には軟部腫瘍には含まれないが，鑑別診断上しばしば問題になり，治療法も異なることが多いためそれらの理解はきわめて重要である[25)-27)]．またリンパ節に転移を来しやすい悪性軟部腫瘍は横紋筋肉腫やMFHなどかなり限られている(Table 3F)．

6．特徴的なサインを認めた場合(Fig. 7)

特異的なサインは少ないが，それらがみられた場合はその成立ちを理解しておけば質的診断に特に有用となる[28)]．

有名なtarget sign[10),23)]は，線維成分や細胞成分が中央に，粘液基質が辺縁に存在する場合に認められT2強調像で辺縁が著明な高，中央が相対的に低信号を呈する．神経線維腫でみられることが多いが神経鞘腫でもみられる．稀に肉眼病理構造は異なるがサルコイド結節などでもみられることがある．

Bowl of fruits appearance[28)]は，多結節状の腫瘍でT2強調像での各結節の信号が非常に多彩な場合に用いられる．内部の膠原線維成分，粘液腫様基質・成分，嚢胞・出血壊死などの多彩な肉眼病理像を反映しており，特にMFH[29)]，Ewing肉腫，滑膜肉腫ではしばしば認められる．

われわれは，神経鞘腫例で造影後T1強調像で被膜にしては厚い低信号帯をしばしば経験し，同帯はT2強調像では著明な高信号帯として描出されることより粘液基質成分が腫瘤辺縁部に圧排されるように存在したために生じたものと考えperipheral myxoid halo signと命名し診断に応用している．このサインは，悪性腫瘍と誤診されることの多い嚢胞変性や出血壊死などの変化が強い神経鞘腫において特に有用と考えている．

また，造影で内部がひび割れ状に増強されるspeckle enhancementは，線維性隔壁様構造部がゆっくり造影されて後期まで残存する場合に認められ，内部変性の少ない悪性リンパ腫や，横紋筋肉腫や平滑筋肉腫などの変性が少ない症例などにおいてのみ認められる(Table 3G)．

Table 3 (A)　High frequent soft tissue tumors

	Benign	Malignant
Essential	Lipoma Hemangioma Schwannoma Hematoma	MFH* Liposarcoma Rhabdomyosarcoma Malignant lymphoma
Important	Lymphangioma Neurofibroma Ganglioneuroma Paraganglioma	Leiomyosarcoma MPNST**
Interested	GCT of TS*** Ganglion Desmoid Epidermoid cyst	Synovial sarcoma Malignant melanoma ASPS**** Hemangiopericytoma

*MFH : malignant fibrous histiocytoma
** MPNST : malignant peripheral nerve sheath tumor
*** GCT of TS : giant cell tumor of tendon sheath
**** ASPS : alveolar soft part sarcoma

7．内部構成組織から探る

脂肪(Fig. 8)，粘液腫様成分(Fig. 9)，膠原線維成分，ヘモジデリン(Fig. 10)などの存在がMRI所見から推察できる場合は，質的診断上かなり有力な情報となる．ただし，漠然と読影していてはみつけられない場合も多く，常に存在していないかをチェックして読影を進めていく必要がある．脂肪を含んだ軟部腫瘍をTable 3Hに，粘液基質・粘液腫様成分を有する軟部腫瘍[30),31)]をTable 3Iに示す．

8．Flow voidを認めた場合(Fig. 11)

腫瘍の周囲や内部にflow voidを認める腫瘍は非常に少なく，vascularityのきわめて高い動静脈型の血管腫，血管外皮腫や胞巣状軟部肉腫[32)]などに限定され，質的診断の決め手になる場合が多い(Table 3J)．

9．早期に強く造影される場合(Fig. 12)

ダイナミック造影所見は質的診断に重要な情報を提供する[16)-21)]．基本的には，造影されない腫瘍，漸増していく腫瘍は良性，早期に強く造影される急増型の腫瘍は悪性である可能性が高い．しかしなかには例外疾患も認められ注意が必要である．早期に強く造影される良性腫瘍には，毛細血管型や動静脈型の血管腫，傍神経節腫，Castleman病[27)]，グロムス腫瘍[21),22),24)]などがある．早期に強く造影されにくい悪性腫瘍には，粘液型脂肪肉腫，分化型脂肪肉腫，約半分の平滑筋肉腫，約1/3の悪性リンパ腫などがある．逆にこれらは数が少なく質的診断に役立つことも多い(Table 3J)．

10．忘れてはいけない悪性リンパ腫(Fig. 6A，Fig. 7F)，**炎症性・肉芽腫性腫瘤**(Fig. 6C，D)

われわれの誤診例のretrospectiveな検討では，悪性リンパ腫を含むリンパ節病変[25)-27)]と炎症性・肉芽腫性腫瘤の誤診率が特に高率であった．これらは通常の軟部腫瘍とは治療

Table 3 (B) Preferential locations of soft tissue tumors

	Benign		Malignant	
Essential	Elastofibroma	: subscapular		
	Glomus tumor	: subungual		
	Fibromatosis	: plantar, palmar		
Important	Lymphangioma	: neck, axilla (infants)	Synovial sarcoma	: para-articular (calcification)
	Schwannoma	: along the nerve	Rhabdomyosarcoma	: head and neck (children)
	Ganglioneuroma	: paraspinal gutter		genitourinary (children)
	Paraganglioma	: paraspinal gutter	Epithelioid sarcoma	: forearm, hand (skin ulcer)
Interested	GCT of TS	: attached to tendon sheath (hand, foot)	Infantile fibrosarcoma	: distal lower limb
	Ganglion	: attached to tendon sheath (hand, foot)	Angiosarcoma	: scalp and face (older persons)
	Desmoid	: rectus abdominis muscle (postpuerperal women)	Lymphangiosarcoma	: upper limb (postmastectomy)
	Xanthoma	: Achilles tendon		
	Aggressive angiomyxoma	: pelvis (women)		
	Morton's neuroma	: intermetatarsal space (2nd, 3rd)		

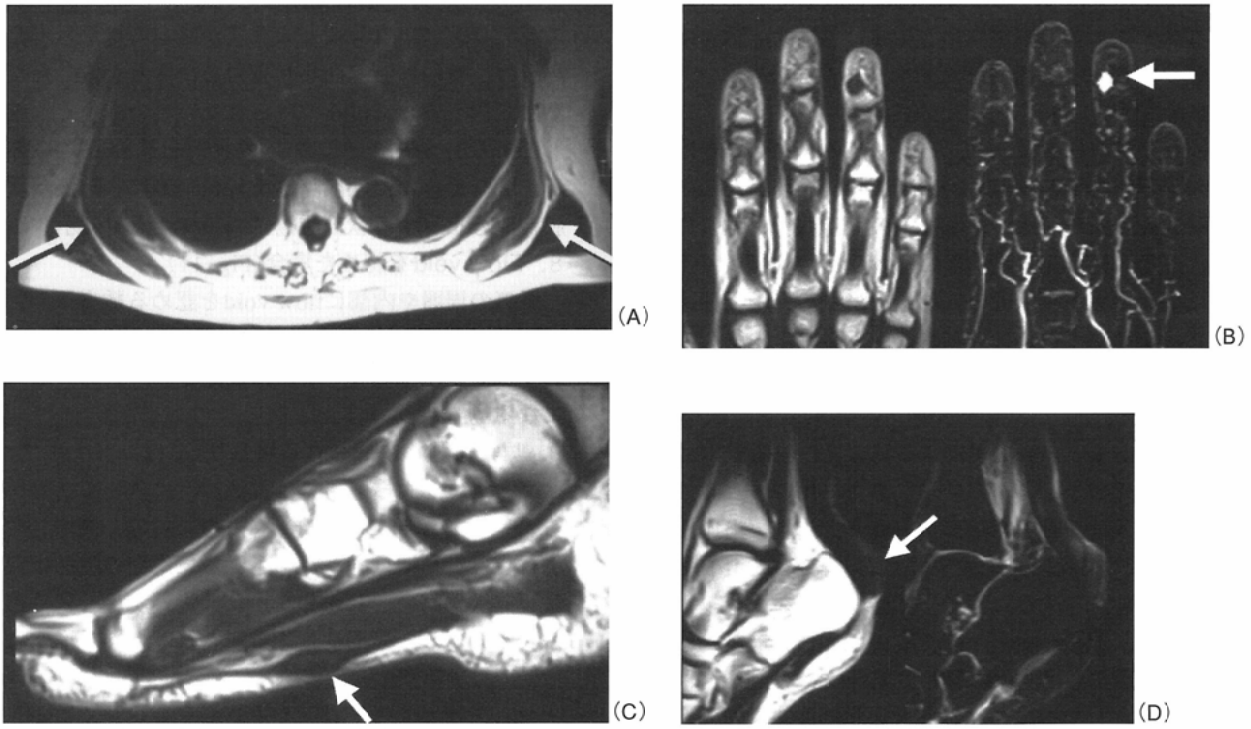


Fig. 2 Preferential locations of soft tissue tumors
A: Elastofibroma in a 72-year-old woman. Axial T1-weighted spin-echo MR image shows bilateral low signal intensity tumors at the subscapular region with a slightly high intensity area.
B: Glomus tumor in a 54-year-old woman. Coronal T1-weighted spin-echo MR image shows low signal intensity tumor at the forth subungual region.The tumor has early, strong enhancement at early phase on MR angiography (arrow).
C: Plantar fibromatosis in a 56-year-old man. Sagittal T2-weighted spin-echo MR image shows low signal intensity tumor (arrow) in the plantar aponeurosis.
D: Achilles tendon xanthoma in a 36-year-old man with familial hyperlipidemia. Sagittal T1-weighted spin-echo and STIR image show the enlarged tendon with slightly high signal intensity area (arrow).

Table 3 (C)　Calcification in soft tissue tumors

	Benign	Malignant
Essential	Myositis ossificans : zoning Hemangioma : phlebolith	Synovial sarcoma : para-articular poorly defined amorphous
Important	Extraskeletal chondroma : rings and arcs Tumoral calcinosis : near joints multinodular Leiomyoma Teratoma	Extraskeletal chondrosarcoma : rings and arcs Extraskeletal osteosarcoma : cloudlike MFH Leiomyosarcoma MPNST
Interested	Calcifying aponeurotic fibroma (children, hands, feet) Ossifying fibromyxoid tumor Schwannoma Desmoid Glomus tumor Lipoma Old hematoma	Metastatic tumor (colon cancer) Hemangiopericytoma Liposarcoma (well, dedifferentiated) Dermatofibrosarcoma protuberans

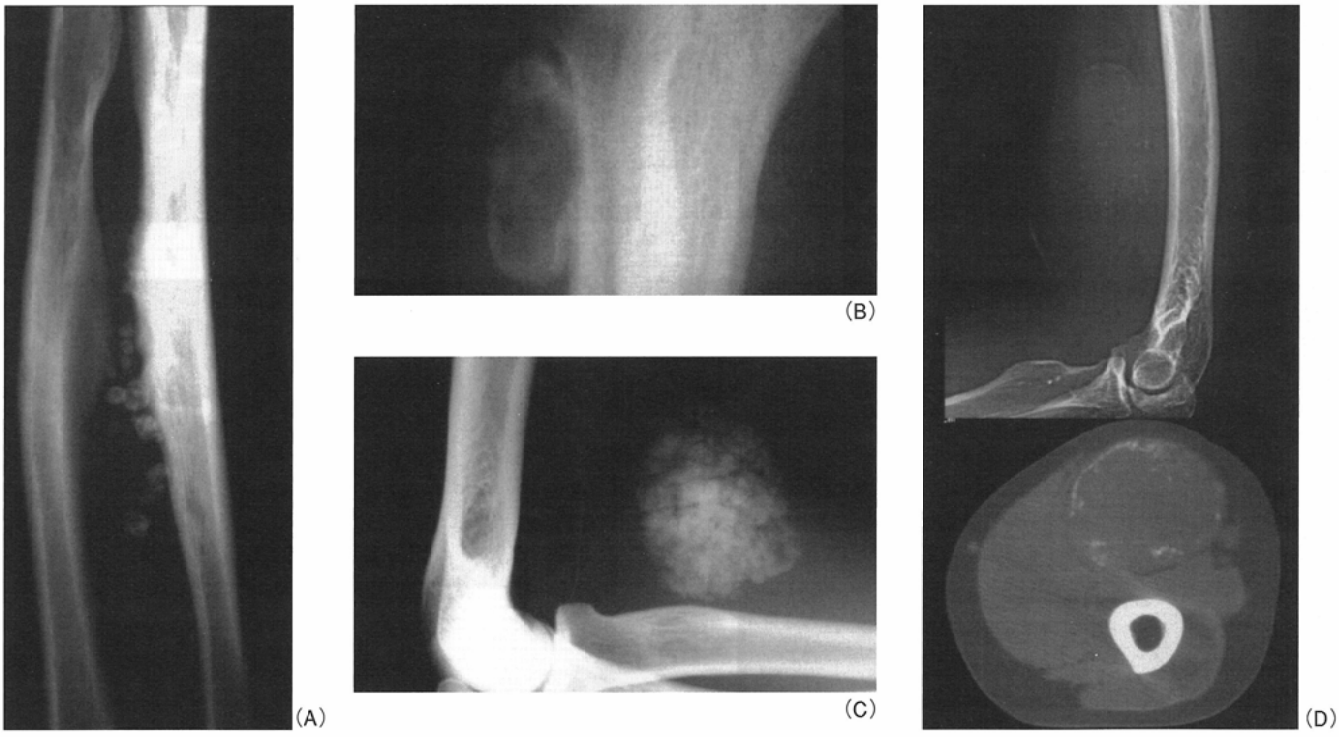


Fig. 3　Calcification in soft tissue tumors on plain X ray or CT
A: Hemangioma in a 50-year-old woman. There are multiple phlebolithes at the forearm.
B: Myositis ossificans in a 17-year-old girl. There is a calcified mass with zoning phenomenon.
C: Tumoral calcinosis in a 47-year-old man. There is a multinodular calcified mass near the elbow joint.
D: Synovial sarcoma in a 64-year-old woman. There is a round mass near the elbow joint with peripheral amorphous calcification.

Table 3 (D) Characteristic shape of soft tissue tumors

Essential	Fusiform (along the nerve)	: Schwannoma, Neurofibroma
	Plexiform	: Neurofibroma, Hemangioma,
	(hederiform)	(Malignant lymphoma)
	(racemosum, pampiniform)	
Important	Serpiginous	: Hemangioma
	Botryoid	: Botryoid rhabdomyosarcoma
Interested	Dumbbell	: Schwannoma, Neurofibroma, Desmoid
	Protuberance (sausage like)	: Dermatofibrosarcoma protuberans

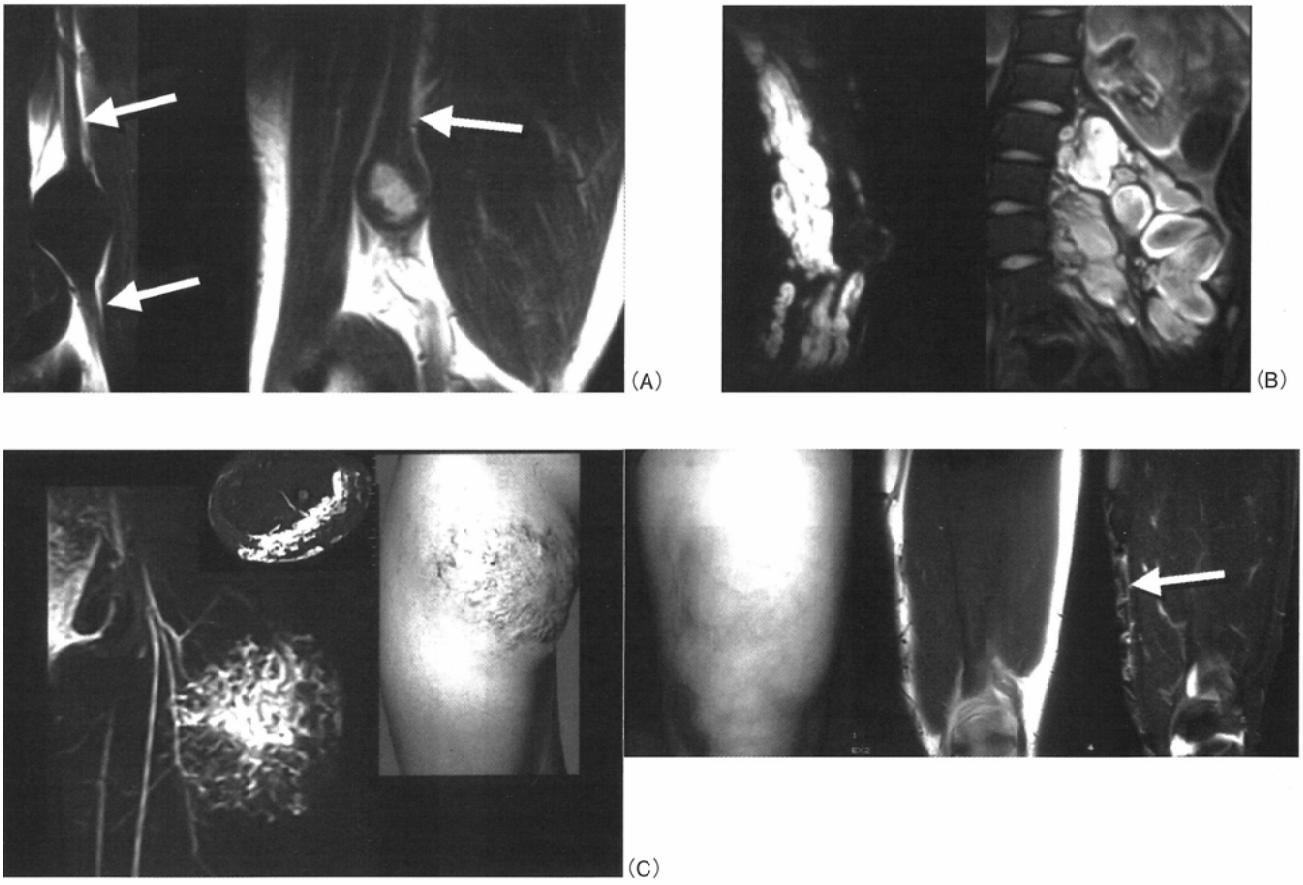


Fig. 4 Characteristic shape of soft tissue tumors
A: Fusiform in two different patients with schwannoma (left: 37-year-old man, T1WI; right: 45-year-old man, T2WI). These fusiform tumors are along the nerve (arrow).
B: Plexiform in two different patients with neurofibroma (left: 3-year-old girl, T2WI; right: 11-year-old girl, T2WI).
C: Serpiginous form (arrow) in two different patients with hemangioma (left: Intramuscular type, 16-year-old girl, STIR, MRA, photograph; right: venous type, 15-year-old girl, photograph, T1WI, STIR).

Table 3 (E)　Multiplicity in soft tissue tumors

	Benign	Malignant
Essential	Hemangioma Fibromatosis Neurofibroma	Metastasis (soft tissue, lymphnode) Malignant lymphoma
Important	Schwannoma Lipoma Desmoid Elastofibroma (bilateral) Extramedullary plasmacytoma	Kaposi's sarcoma Angiosarcoma
Interested	Castleman's disease Glomus tumor Xanthoma Myxoma Leiomyoma Angioleiomyoma	Dermatofibrosarcoma protuberans Epithelioid sarcoma

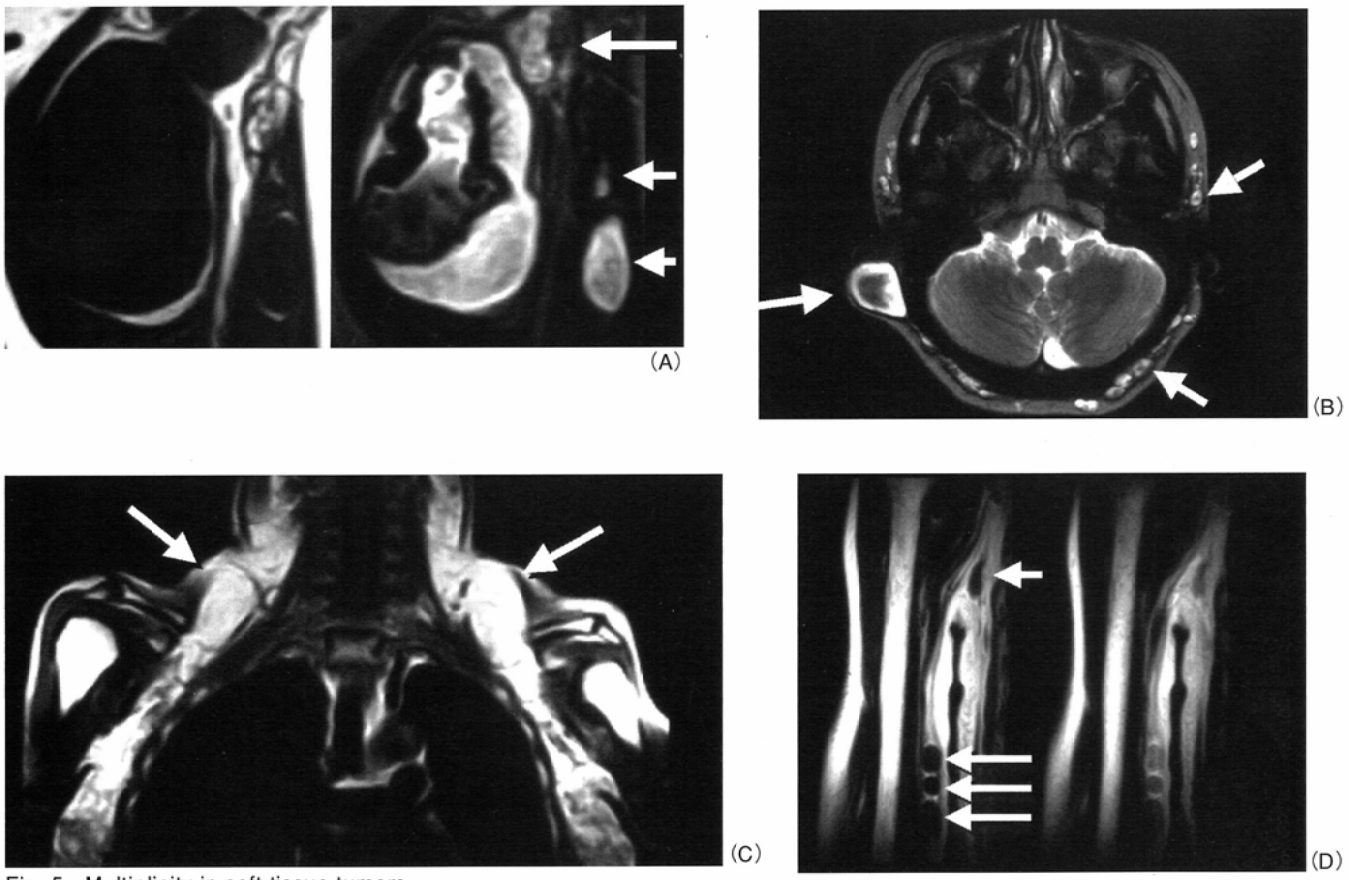
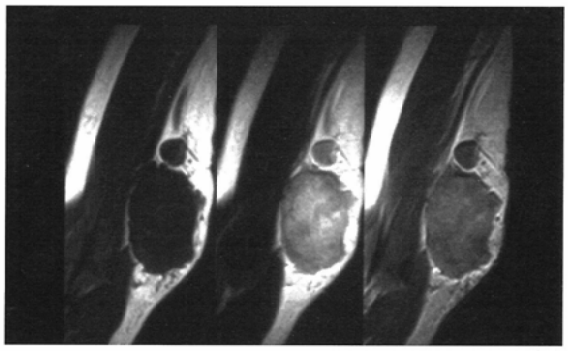


Fig. 5　Multiplicity in soft tissue tumors
A: Schwannomas in a 40-year-old woman with neurofibromatosis type I. There are multiple tumors with target sign at the left thigh (left: T1WI, right: T2WI).
B: Neurofibromas in a 24-year-old woman with neurofibromatosis type I. There are multiple tumors with target sign.
C: Cervical symmetrical lipomatosis in a 57-year-old man.
D: Castleman's disease in a 66-year-old woman. Multiple lymph nodes are present (left: T1WI , right: T2WI).

Table 3 (F) Soft tissue tumors with lymphnode enlargements

	Benign	Malignant
Essential	Castleman's disease	Malignant lymphoma Rhabdomyosarcoma
Important	Cat scratch disease (abscess like) Lymphadenitis	MFH Epithelicid sarcoma Synovial sarcoma
Interested		Malignant melanoma Clear cell sarcoma Angiosarcoma Dermatofibrosarccma protuberans

Differential diagnosis : Lymphnode metastasis from carcinoma



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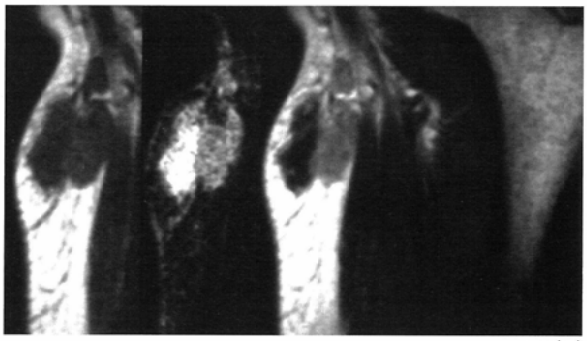

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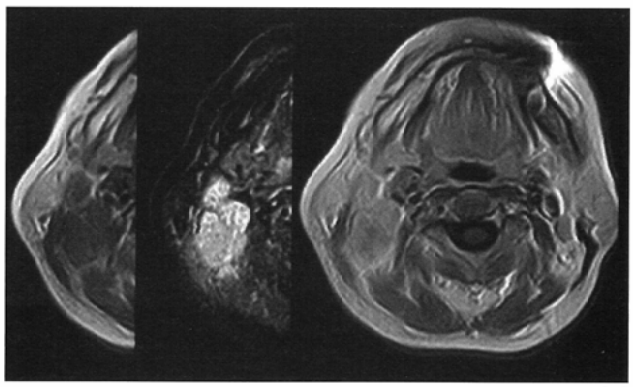


(C)

Fig. 6 Soft tissue tumors with lymph node enlargements
A: Malignant lymphoma presenting as a soft tissue mass in a 60-year-old woman with lymphnode metastasis (left: T1WI, center: T2WI, right: Gd-enhanced T1WI).
B: Cat scratch disease in a 26-year-old woman. There is a partial abscess-like appearance (left: T1WI, center: T2WI, right: Gd-enhanced T1WI).
C: Lymphadenitis (tuberculosis) in a 68-year-old woman (left: T1WI, center: T2WI, right: Gd-enhanced T1WI).

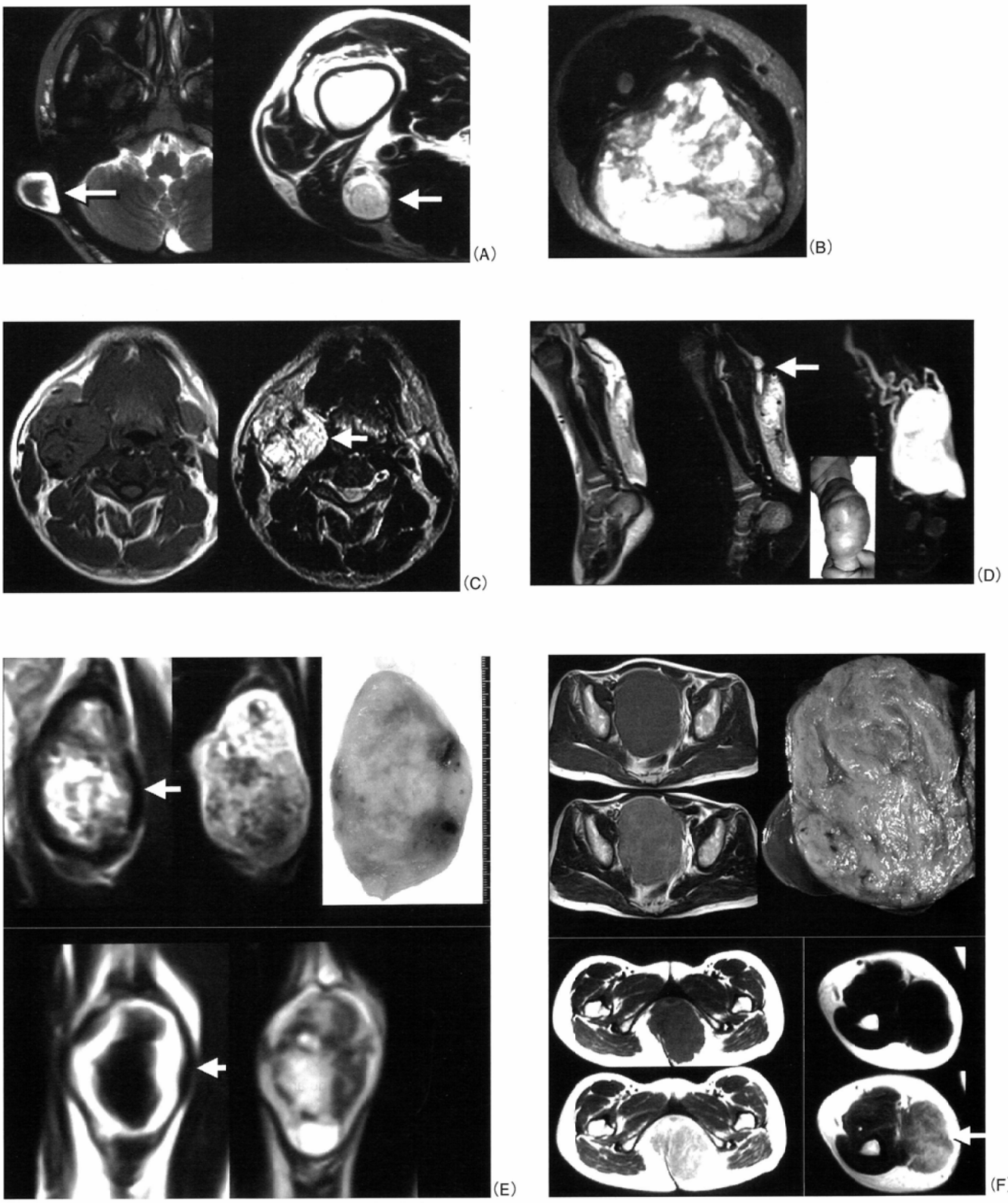


Fig. 7　Characteristic signs and appearances of soft tissue tumors
A: Target sign (left: neurofibroma in a 24-year-old woman, T2WI. Same case as in Fig.5(B), right: schwannoma in a 57-year-old man, T2WI).
B: Bowl-of-fruits appearance. MFH in a 40-year-old woman.
C: Salt-and-pepper appearance. Glomus jugulare tumor in a 34-year-old man (left: T1WI, right: T2WI).
D: Serpiginous pattern. Hemangioma in a 10-month-old baby with Kasabach-Merritt syndrome (T2WI, STIR, MRA and photo).
E: Peripheral myxoid halo sign in two different patients with schwannoma (upper: 61-year-old man, Gd-enhanced T1WI, T2WI, gross specimen, lower: 37-year-old man, Gd-enhanced T1WI, T2WI).
F: Speckle enhancement (upper: leiomyosarcoma in a 64-year-old man, T1WI, Gd-enhanced T1WI, gross specimen, Lower-left: rhabdomyosarcoma in a 15-year-old girl, T1WI, Gd-enhanced T1WI, Lower-right: malignant lymphoma in a 60-year-old woman. Same case as Fig. 6(A), T1WI, Gd-enhanced T1WI).

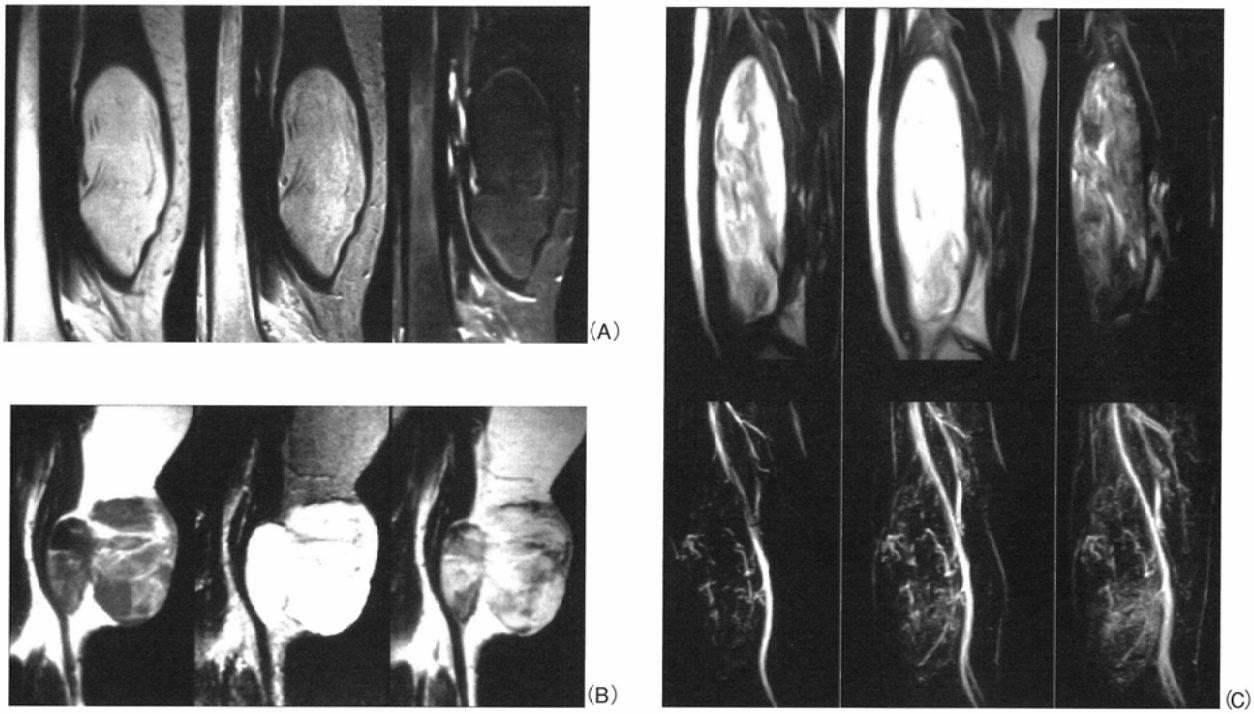


Table 3 (G) Characteristic signs and appearances of soft tissue tumors

Essential	Target sign (T2WI : peripheral high, central low)	Neurofibroma Schwannoma
Important	Bowl of fruits appearance (a lot of nodules and signals)	MFH Extraskeletal Ewing's sarcoma Synovial sarcoma
Interested	Serpiginous pattern Salt and pepper appearance Peripheral myxoid halo sign Speckle enhancement	Hemangioma Paraganglion (Glomus jugulare tumor) Schwannoma Malignant lymphoma Rhabdomyosarcoma Leiomyosarcoma

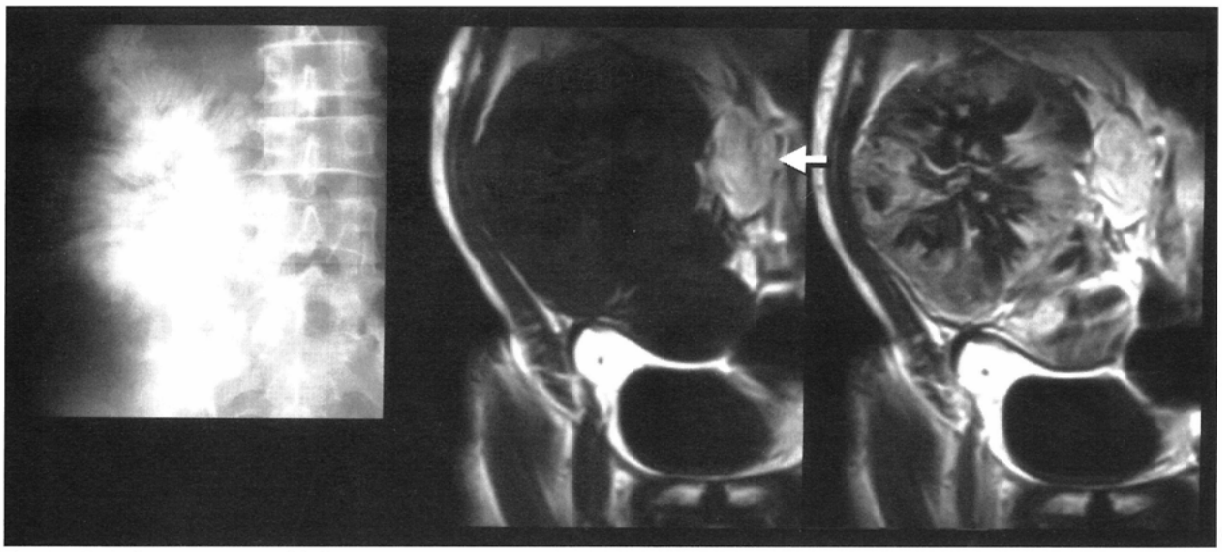
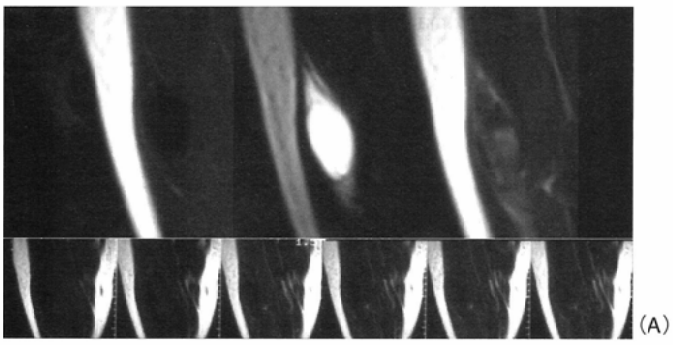
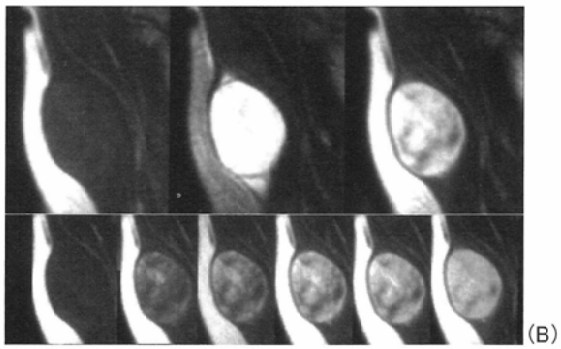
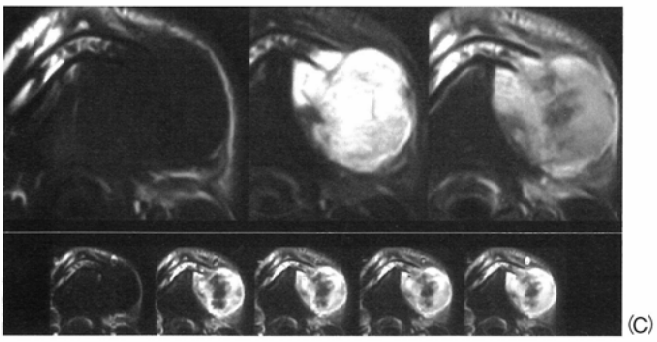


Fig. 8　Soft tissue tumors with fatty components
A: Lipoma in a 56-year-old woman (left: T1WI, center: T2WI, right: STIR).
B: Myxoid liposarcoma in a 59-year-old woman with lacy, linear, or amorphous hyperintense foci on T1WI near the capsule and septum (left: T1WI, center: T2WI, right: Gd-enhanced T1WI).
C: Well-differentiated liposarcoma with a faint enhancement in a 62-year-old man (upper-left: T1WI , upper-center: T2WI, upper-right: STIR lower: dynamic MRA).
D: Dedifferentiated liposarcoma with remarkable calcification and fatty component in a 60-year-old man(left: plain X- ray, center T1WI, right: Gd-enhanced T1WI). Note the fatty component (arrow) in the tumor margin, which simulates the retroperitoneal fat and may be missed. T1-weighted MR image shows that the tumor is composed of three components, which are histologically proved to be MFH, myxoid liposarcoma, and well-differentiated liposarcoma.







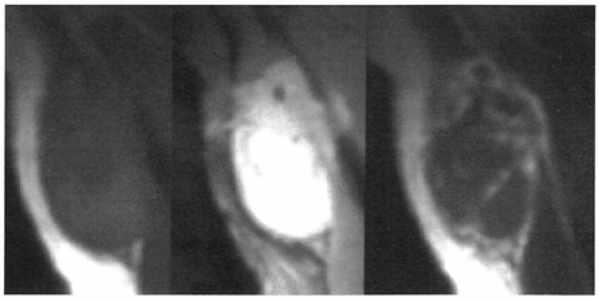


Fig. 9　Soft tissue tumors with myxomatous components
A: Intramuscular myxoma with very gradually enhancement in a 57-year-old woman (upper-left: T1WI, upper-center: T2WI, upper-right: Gd-enhanced T1WI, delayed phase, lower: Gd-dynamic MRI).
B: Myxoid liposarcoma with gradually and heterogeneous enhancement in a 63-year-old woman (upper-left: T1WI, upper-center: T2WI, upper-right: Gd-enhanced T1WI, delayed phase, lower: Gd-dynamic MRI).
C: Myxoid MFH with very early and well enhancement in a 19-year-old man (upper-left: T1WI, upper-center: T2WI, upper-right: Gd-enhanced T1WI/delayed phase, lower: Gd-dynamic MRI).
D: Extraskeletal myxoid chondrosarcoma with rings and arcs enhancement in a 39-year-old man (left: T1WI, center: T2WI, right: Gd-enhanced T1WI).

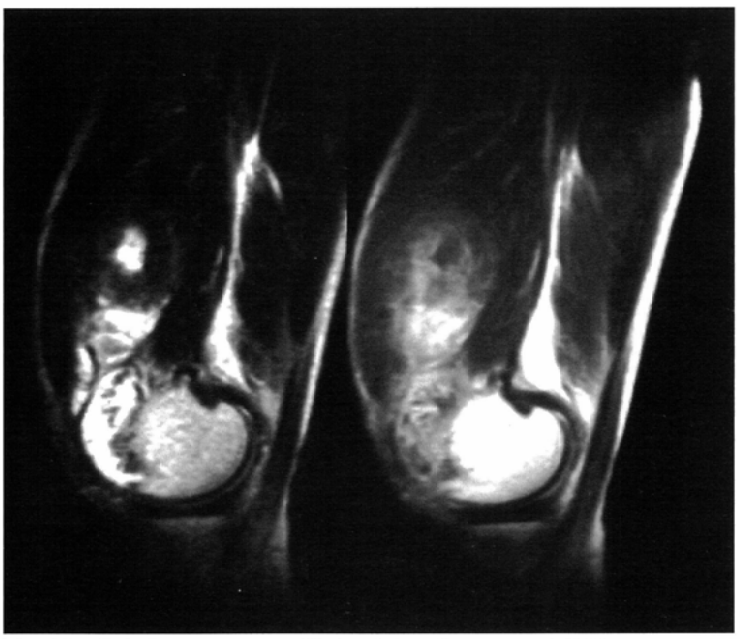
Table 3 (H) Soft tissue tumors with fatty components

	Benign	Malignant
Essential	Lipoma Hibernoma (brown fat) Lipoblastoma	Liposarcoma
Important	Lipomatosis Hemangioma Angiolipoma Elastofibroma	MPNST
Interested	PVNS* GCT of TS Schwannoma Neurofibroma Fatty infiltration due to muscle atrophy	

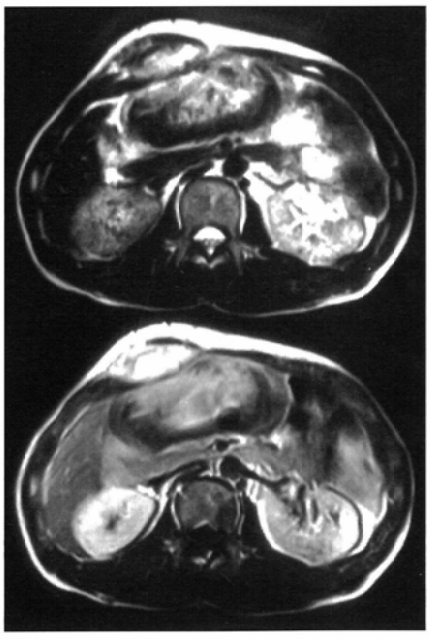
* PVNS: pigmented villonodular synovitis

Table 3 (I) Soft tissue tumors with myxomatous components

	Benign	Malignant
Essential	Intramuscular myxoma	Myxoid liposarcoma Myxoid MFH Extraskeletal myxoid chondrosarcoma
Important	Aggressive angiomyxoma Nodular fasciitis Schwannoma Neurofibroma	Myxoid leiomyosarcoma MPNST
Interested	Neurothekeoma Ganglioneuroma Lipoblastoma Tumors with myxomatous changes	Botryoid rhabdomyosarcoma Tumors with myxomatous changes



(A)



(B)

Fig. 10 Soft tissue tumors with low intensity area on T2WI
A: Hemosiderin: PVNS of the knee in a 58-year-old man with the massive low intensity area due to local changes in susceptibility in the vicinity of hemosiderin deposits on T2WI (left: T2WI, right: Gd-enhanced T1WI).
B: Collagenous component : Desmoid tumor of the abdominal wall in a 32-year-old man with the peripheral very low intensity area due to dense collagen on T2WI (upper: T2WI, lower: Gd-enhanced T1WI).

Table 3 (J)　Early and well enhanced soft tissue tumors

	Benign	Malignant
Essential	Hemangioma (capillary, arteriovenous*) Paraganglioma* Castleman's disease Glomus tumor	Most cases of malignant tumors (especially) MFH Synovial sarcoma Epithelioid sarcoma Rhabdomyosarcoma Alveolar soft part sarcoma* Hemangiopericytoma* Mesenchymal chondrosarcoma
Important	GCT of TS PVNS Active inflammation Rheumatoid nodule	
		# Malignant tumors without early enhancement Myxoid liposarcoma Well differentiated liposarcoma Leiomyosarcoma (1/2) Malignant lymphoma (1/3)

* : Flow signal void (+)

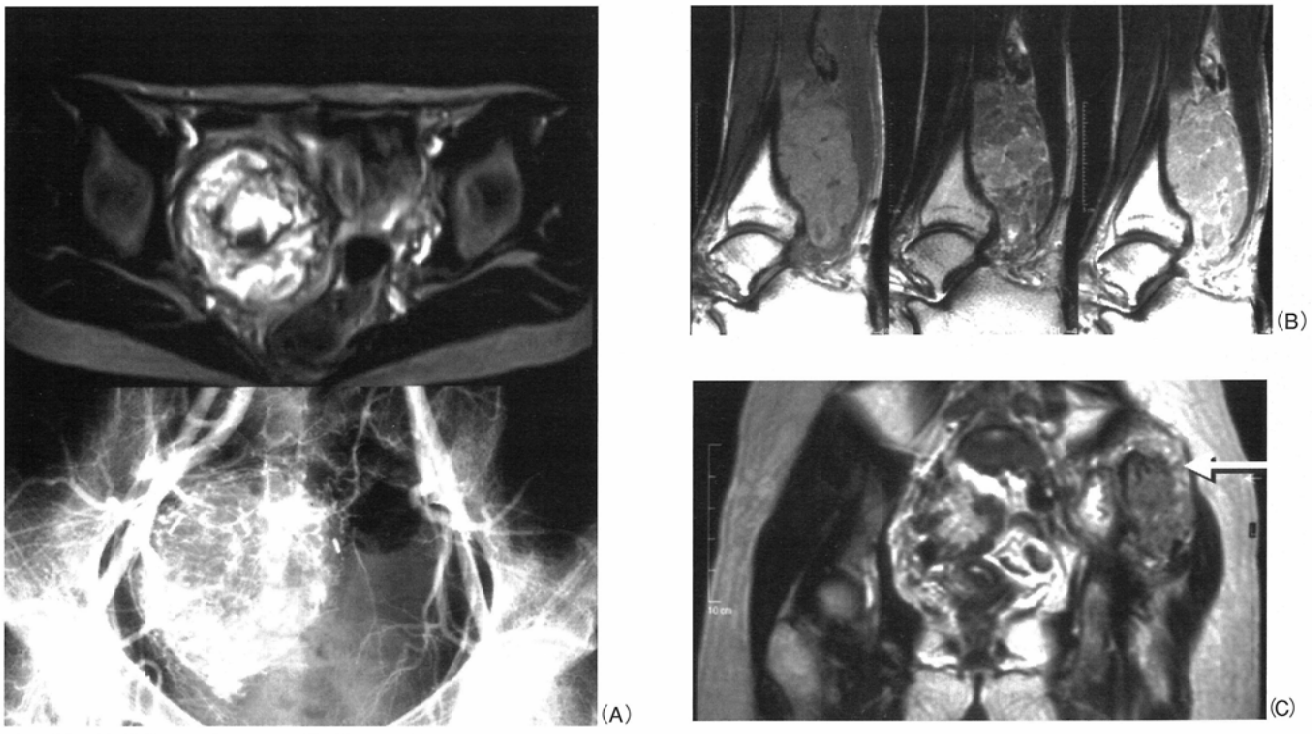


Fig. 11　Soft tissue tumors with flow void appearances
A: Hemangiopericytoma of the pelvis in a 30-year-old woman (upper: T2WI, lower: angiography).
B: Hemangiopericytoma of the leg in a 36-year-old man (left: T1WI, center: T2WI, right: Gd-enhanced T1WI).
C: Alveolar soft part sarcoma of the buttocks in a 23-year-old woman (T2WI).

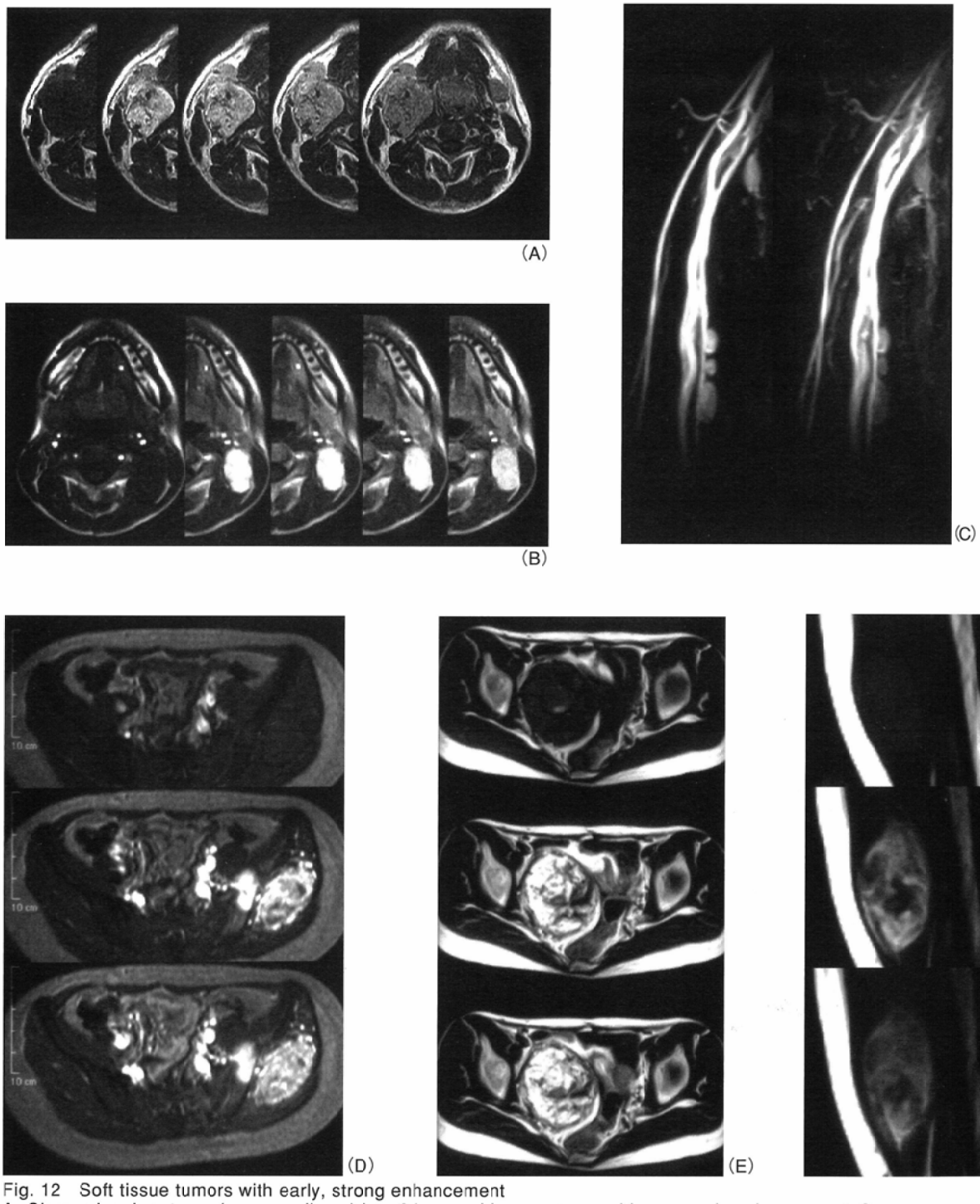


Fig. 12 Soft tissue tumors with early, strong enhancement
A: Glomus jugulare tumor(paraganglioma) in a 34-year-old man, strong with very early enhancement. Same case as Fig.7C(Gd-dynamic MRI).
B: Capillary hemangioma in a 17-year-old boy, with early, strong enhancement(Gd-dynamic MRI).
C: Castleman's disease of the right upper arm in a 66-year-old woman with very early enhancement and relatively early washout. Same case as Fig.5D(MRA early phase, late phase).
D: Alveolar soft part sarcoma of the buttocks in a 23-year-old woman, with very early enhancement. Same case as Fig.11C(Gd-dynamic MRI).
E: Hemangiopericytoma of the pelvis in a 30-year-old woman,
with very early enhancement. Same case as Fig.11A(Gd-dynamic MRI)
F: Soft tissue metastasis of renal cell carcinoma in a 55-year-old woman with early enhancement and relatively early washout (Gd-dynamic MRI).

法が異なるために，読影に際しそれらの可能性を常に念頭においてレポートを作成することが肝要と思われる．画像上それらの可能性が少しでも考えられた場合には記載するように心掛けるべきである．

各所見の組み合わせが特に大切である

Table 4 に比較的特徴的な信号強度，Table 5 にその他の良悪性の鑑別点をまとめた．上記の10のポイントと組み合わせて総合的に評価すればかなりの例で質的診断に迫れるようなレポートが作成できるのではないかと思われる．その鑑別の一例として粘液基質・粘液腫様成分を有する軟部腫瘍の鑑別診断のポイントをTable 6 に示す．この場合のポイントは少量の脂肪成分の確認とダイナミック造影のパターンおよび形態の認識に集約される．

おわりに

最後にわれわれが考える質的診断の理想のレポート例をTable 7 に示す．診断の難しいとされる軟部腫瘍においては，得られる情報をできるだけ多くし，さらにそれらを詳細に読影し所見の組み合わせから診断を進めていくことが肝要であり，臨床医だけでなく病理医への情報として有意義なレポートになるように心掛ける気概が大切である．本稿が軟部腫瘍のレポート作成の一助になれば幸いである．

Table 4　Signal intensities on spin echo sequences

T1WI		T2WI	
marked high	slightly high	low	marked high
Methohemoglobin Hematoma Hemorrhage Hemorrhagic necrosis *Fatty mass* Lipoma Liposarcoma Hibernoma Liposarcoma	*Proteinous* Proteinous fluid Abscess *Melanin* Malignant melanoma *Fatty component* Hemangioma Schwannoma Neurofibroma Elastofibroma	*No proton* Calcification (CT) *Fibrous component* Collagenous tumor *Hemosiderin* Chronic hematoma Coagulation *Deoxyhemoglobin* Acute hematoma *Manganese* Fungus ball *Proteinous* Proteinous fluid *Flow void*	*Watery* Cystic tumor Lymphangioma *Vascular lakes* Hemangioma *Myxomatous* Myxomatous tumor *Cartilaginous* Cartilaginous tumor

Table 5　Differentiation from benign and malignant soft tissue tumors

	Benign	exceptional tumors	Malignant	exceptional tumors
Size	small	Lipoma Schwannoma Desmoid	large	
Margins aggressive extent*	well-defined rare	Hemangioma Desmoid Fibromatosis PVNS Inflammation	ill-defined often	Liposarcoma Malignant lymphoma Rhabdomyosarcoma
Homogeneity hemorrhage, cystic necrosis, low SI** septations	homogeneous rare	Hemangioma Schwannoma	inhomogeneous often	Liposarcoma Malignant lymphoma Rhabdomyosarcoma
Growth rate	low	Nodular fasciitis Myositis ossificans Hematoma Inflammation	high	Synovial sarcoma Alveolar soft part sarcoma

* aggressive extent : bone involvement , neurovascular bundle encasement , extracompartmental distribution
** SI : signal intensity

Table 6 Differential diagnosis for myxomatous soft tissue tumors

	Homogeneity (T2WI)	Fat	Collagenous Tissue	Vascularity Dynamic enhanced pattern
Intramuscular myxoma	homo.*	−	few	−〜+ very gradually enhancement
Myxoid liposarcoma	slightly hete.**	+***	few	+〜++ gadually enhancement
Myxoid MFH	hete.	−	+〜++	++〜+++ early enhancement
Myxoid chondrosarcoma	slightly hete.	−	few	−〜++ rings and arcs pattern
Neurofibroma	homo.〜slightly hete. T2WI: target sign	−〜±	+	−〜+ central enhancement
Schwannoma	homo.〜hete. peripheral myxoid halo	−〜±	+	+〜+++ gradually enhancement
Ganglionneuroma	homo.〜slightly hete.	−	+	−〜+ very gradually enhancement

* homo. : homogeneous, **hete. : heterogeneous
*** : lacy, linear, or amorphous hyperintense foci on T1WI nearby capsule and septum

Table 7 Ideal reports for tissue-specific diagnosis of soft tissue tumors

これまでのレポート

○○に○×○cm大の，辺縁……で，境界……な腫瘤存在．
T1WIで低，T2WIで高信号．
造影では不均一に造影．
非特異的な所見で，部位，年齢などより……などを疑います．

理想のレポート

○○に○×○×○cm大の，辺縁……で，境界……な腫瘤存在．
T1WIでやや低，T2WIで著明に高信号．
造影では早期から強く造影され後期では軽度washoutされており内部は不均一になっています．
以上より，○○成分主体でvascularity豊富な腫瘍が推察され，臨床所見と合わせて，
……が最も考えられるようです．
鑑別としては，……などが挙がります．

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