ADIPOCYTIC TUMORS

Benign tumors and reactive conditions
Lipoma
Lipomatoses
  - Multiple symmetric lipomatoses (Launois-Bensaude syndrome)
  - Asymmetric lipomatoses
Lipomatosis of nerve
Adiposis dolorosa
Piezogenic pedal papules
Fat necrosis of the morbidly obese
Nevus lipomatosus superficialis
Fibrohistiocytic lipoma
Lipofibromatosis
Lipoblastoma/lipoblastomatosis
Lipoblastoma-like tumor of the vulva
Angiolipoma
Myolipoma of soft tissue
Myelolipoma
Chondroid lipoma
Spindle cell lipoma
Pleomorphic lipoma
Hibernoma

Malignant tumors
Atypical lipomatous tumor/well-differentiated liposarcoma/dedifferentiated liposarcoma
Spindle cell liposarcoma
Myxoid liposarcoma
Pleomorphic liposarcoma
Benign tumors and reactive conditions

LIPOMA

Definition
- A benign dermal or subcutaneous mesenchymal tumor composed of mature adult-type adipose tissue

Clinical features

Epidemiology
- The most commonly encountered mesenchymal tumor
- Majority of patients are adults
- No sex predilection

Presentation
- Most cases are asymptomatic
- Occasionally painful when compressing nerves
- Slowly growing, but size is variable
- Usually solitary
- Multiple lipomas may be associated with neurofibromatosis, multiple endocrine neoplasia syndromes, or Bannayan syndrome (haemangiomas and multiple lipomas)

Prognosis and treatment
- Treated mostly for aesthetic reasons
- Cured by conservative surgical excision
- Recur only if incompletely excised and then only rarely
- Not associated with progression to liposarcoma

Pathology

Histology
- Resemble normal adult-type adipose tissue
- Lobules of adipocytes bounded by thin fibrous septa
- Adipocytes have large single lipid vacuole in their cytoplasm and eccentrically located small nuclei
- May show areas of fat necrosis and increased fibrosis after trauma
- No atypia, pleomorphism, mitoses, or hyperchromasia

Immunohistochemistry/special stains
- Adipocytes express S100 protein

Genetic profile
- True neoplasms
- Translocation at 12q14 involving HMGA2 gene is the most common aberration, often with LPP (3q27)
- 6p21-23 rearrangements involving HMG1B gene are also seen

Main differential diagnoses
- Normal adipose tissue
- Pseudolipomatosis cutis
- Atypical lipomatous tumor

Fig. 1. Lipoma. Deeper lipomas are well-circumscribed neoplasms composed of mature adipose tissue essentially indistinguishable from normal fat.

Fig. 2. Lipoma. High-power view of mature adipocytes exhibiting minimal size variation and small, eccentric nuclei.
Fig. 3. **Lipoma.** Intradermal lipoma is a well-demarcated dermal neoplasm. It is composed of lobules of mature adipose tissue bounded by fibrous septa.

Fig. 4. **Lipoma.** High-power view of intradermal lipoma. Note the mature adipocytes.
Definition
• Diffuse overgrowth of mature adipose tissue
• The disease presents in two forms: multiple symmetric lipomatosis (Launois-Bensaude syndrome) and asymmetric lipomatosis

Clinical features
Epidemiology
• Rare disorder, commonly associated with obesity
• Some familial cases show evidence of autosomal-dominant mode of inheritance
• Common in children less than 2 years of age
• Adults can occasionally be affected
• Can present in trunk, head and neck, and extremities

Presentation
• Painless, diffuse enlargement of affected area due to fat accumulation
• Rapid growth is characteristic

Prognosis and treatment
• Recurrence after palliative surgical removal is common
• Usually cured by radical surgical excision
• Although benign, can be fatal due to laryngeal obstruction

Pathology
Histology
• Sheets and lobules of mature adipocytes
• No encapsulation

Immunohistochemistry/special stains
• The mature adipocytes strongly express S100 protein

Main differential diagnoses
• Intramuscular lipoma
• Atypical lipomatous tumor
Multiple symmetric lipomatosis (Launois-Bensaude syndrome)

- The most common form of lipomatosis characterized by symmetrical deposition of adipose tissue in the trunk and head and neck area
- Two variants exist: diffuse and localized
- The diffuse variant usually affects the trunk of male children
- The localized variant characteristically affects the cervical area of adult males and can present with laryngeal obstruction
- Patients can present with neuropathy

Asymmetric lipomatosis

- Asymmetric deposition of adipose tissue affecting any part of the body
- Less common than the symmetric form of lipomatosis
- Can present with macrodactyly or gigantism of affected body area
LIPOMATOSIS OF NERVE

**Definition**
- A rare hamartomatous condition characterized by fatty infiltration of epineurium of a major nerve
- Also known as fibrolipoma of nerve, fibrolipomatous hamartoma of nerve, macrodystrophia lipomatosa, perineural lipoma, and intraneural lipoma

**Clinical features**

**Epidemiology**
- Affected individuals are mostly newborns and young children
- Female predilection

**Presentation**
- The median nerve is the most common location, followed by the ulnar nerve
- Slowly growing masses or macrodactyly
- Can be asymptomatic or associated with pain, paresthesia, or motor deficit

**Prognosis and treatment**
- Benign condition, but management can be challenging
- Surgical excision may result in permanent sensory and/or motor deficit
- Incomplete removal is associated with high rate of recurrence

**Pathology**

**Histology**
- Infiltration of epineurium and perineurium by mature adipose tissue admixed with fibrous tissue
- Metaplastic bone formation is rarely seen

**Main differential diagnoses**
- Intraneural lipoma
- Diffuse lipomatosis
- Traumatic neuroma

Fig. 1. Lipomatosis of nerve. Mature adipose tissue surrounds individual nerve branches but is bounded by epineurium.
Fig. 2. **Lipomatosis of nerve.** Fibrosis of the surrounding adipose tissue is often seen.

Fig. 3. **Lipomatosis of nerve.** Extensive concentric fibrosis of the largest central nerve bundle.

Fig. 4. **Lipomatosis of nerve.** A small nerve bundle with less surrounding fibrosis.
Definition
- A rare condition characterized by multiple painful plaques of accumulated subcutaneous fat
- Also known as Dercum disease

Clinical features
Epidemiology
- Rare disorder, commonly associated with obesity
- Affected individuals are mainly postmenopausal women

Presentation
- Painful and tender plaques
- Usually multiple
- Most cases are located in the lower extremities and pelvic area

Prognosis and treatment
- Benign condition cured by surgical excision

Pathology
Histology
- Subcutaneous lobules of mature adipocytes
- Fat necrosis can be seen

Immunohistochemistry/special stains
- The mature adipocytes strongly express S100 protein

Main differential diagnoses
- Lipoma
- Other forms of lipomatosis
PIEZOGENIC PEDAL PAPULES

Definition
• Multiple papules located at the internal aspects of the heels

Clinical features
Epidemiology
• Commonly affects athletes, particularly marathon runners
• Associated with Ehlers-Danlos and Prader-Willi syndromes as well as rheumatoid arthritis
• Rarely familial

Presentation
• Multiple asymptomatic skin-colored papules
• Lesions become more pronounced after prolonged standing
• Pressure may elicit pain

Prognosis and treatment
• Conservative management includes intralesional steroid and anesthetic injection or compression treatment
• Therapy outcome might not be satisfactory
• Surgical intervention is usually more effective

Pathology
Histology
• Mature adipose tissue herniating into the dermis

Immunohistochemistry/special stains
• The mature adipocytes strongly express S100 protein

Main differential diagnoses
• Intradermal lipoma
FAT NECROSIS OF THE MORBIDLY OBESE

**Definition**
- Necrosis of subcutaneous adipose tissue as a result of obesity
- It is thought to result from medial calcification of subcutaneous arterioles with subsequent ischemic necrosis of fat

**Clinical features**

**Epidemiology**
- Usually affects distal extremities
- Can affect thighs, abdomen, and other areas
- Associated with chronic renal failure and hyperphosphatemia

**Presentation**
- Painful induration and purplish discoloration of skin
- Associated skin necrosis can lead to ulcer formation

**Prognosis and treatment**
- High mortality rate due to development of secondary infection

**Pathology**

**Histology**
- Massive necrosis of subcutaneous adipose tissue with minimal inflammatory reaction
- Calcification of subcutaneous arterioles with luminal narrowing

- Skin ulceration progresses rapidly as level of phosphate peaks

![Fig. 1. Fat necrosis of the morbidly obese. Low-power view showing extensive fat necrosis.](image1)

![Fig. 2. Fat necrosis of the morbidly obese. Necrosis involving the adipocytes as well as the vascularized fibrous septa.](image2)
Fig. 3. Fat necrosis of the morbidly obese. Necrotic adipocytes and necrotic connective tissue septa are seen in this image.

Fig. 4. Fat necrosis of the morbidly obese. Viable adipocytes can be seen in a patchy or geographical distribution.

Fig. 5. Fat necrosis of the morbidly obese. Necrotic adipocytes often retain their shape but lose nuclear staining.

Fig. 6. Fat necrosis of the morbidly obese. Histiocytes infiltrate the adipose tissue. Note the arteriolosclerosis.
**Definition**
- A rare cutaneous hamartomatous lesion characterized by multiple small collections of adipocytes within the dermis

**Clinical features**

**Epidemiology**
- Affected individuals are children or adolescents
- Adults present with solitary variant
- No sex predilection

**Presentation**
- Multiple painless papules
- Size ranges from few millimeters up to 2 cm
- Most commonly affect the gluteal area, upper thighs, and lower back

**Prognosis and treatment**
- Cured by simple excision

**Pathology**

**Histology**
- Nonencapsulated lesion composed of variable number of fatty lobules deposited in the upper portion of the dermis
- The lobules condense around blood vessels and are interspersed by loose fibrous tissue
- Secondary changes include perifollicular fibrosis, follicular hyperkeratosis, and epidermal atrophy

**Immunohistochemistry/special stains**
- The mature adipocytes strongly express S100 protein

**Main differential diagnoses**
- Lipofibroma
- Fibroepithelial polyp

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*Fig. 1. Nevus lipomatosus superficialis. A lesion in the upper dermis composed of variably sized lobules of mature adipocytes.*
Fig. 2. Nevus lipomatosus superficialis. The overlying epidermis is slightly atrophic.

Fig. 3. Nevus lipomatosus superficialis. The adipocytic lobules are separated by fibrous septa.

Fig. 4. Nevus lipomatosus superficialis. High-power view demonstrates mature adipocytes with small, eccentric nuclei. Note the interspersed collagen fibers.
**Definition**
- A rare variant of lipoma characterized by the presence of fibrohistiocytic proliferation in addition to the conventional lipomatous component

**Clinical features**

**Epidemiology**
- Strong predilection for young adult males
- Anterior aspect of trunk is most commonly affected

**Presentation**
- Small, painless, subcutaneous lesions
- Usually solitary

**Prognosis and treatment**
- Cured by local excision
- No reports of recurrence or metastasis

**Pathology**

**Histology**
- Well-circumscribed subcutaneous lipomas with fibrohistiocytic foci
- Fibrohistiocytic foci depict slightly plump, bland-looking spindle cells arranged in fascicles in a collagenous stroma
- May exhibit minimal inflammation and/or hemosiderin deposition

**Immunohistochemistry/special stains**
- Tumor cells express CD34 and calponin
- Fibrohistiocytic component lacks S100 protein expression

**Main differential diagnoses**
- Benign fibrous histiocytoma
- Spindle cell lipoma
- Atypical lipomatous tumor
- Dermatofibrosarcoma protuberans

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![Fig. 1. Fibrohistiocytic lipoma. A circumscribed neoplasm admixing mature lipomatous cells and a spindle cell component. (Courtesy of Julie Fanburg-Smith, Washington, DC, USA.)](image1)

![Fig. 2. Fibrohistiocytic lipoma. The spindle cells have a fibrohistiocytic pattern. (Courtesy of Julie Fanburg-Smith, Washington, DC, USA.)](image2)
Fig. 3. Fibrohistiocytic lipoma. The adipose tissue and spindle cells can be admixed. (Courtesy of Julie Fanburg-Smith, Washington, DC, USA.)

Fig. 4. Fibrohistiocytic lipoma. The non-adipocytic component can be predominant in areas. (Courtesy of Julie Fanburg-Smith, Washington, DC, USA.)

Fig. 5. Fibrohistiocytic lipoma. Intimate juxtaposition of mature adipocytic cells and fibrohistiocytic cells. (Courtesy of Julie Fanburg-Smith, Washington, DC, USA.)

Fig. 6. Fibrohistiocytic lipoma. The nuclei are banal, and the cytoplasm is somewhat amphophilic. (Courtesy of Julie Fanburg-Smith, Washington, DC, USA.)
LIPOFIBROMATOSIS

Definition
- A benign fibrofatty neoplasm presenting in childhood

Clinical features
Epidemiology
- More common in males
- Develops in infancy and childhood (mean age 1 year)
- Already present at birth in a substantial number of cases (about 15%)

Presentation
- Slowly growing and ill-defined painless mass
- Size of the lesion usually between 2 and 5 cm
- Wide anatomical distribution with predilection for hands and feet

Prognosis and treatment
- Benign proliferation, associated with high rate of nondestructive recurrence(s) (about 70%)
- Diffuse involvement of the limbs can result in deformities of the underlying bone
- Risk factors for local recurrence(s) include congenital onset, male gender, incomplete excision, and increased mitotic rate
- Complete surgical excision generally curative, but may be difficult to achieve

Pathology
Histology
- Poorly delineated proliferation in the subcutis and/or deep soft tissues
- Two main components are mature fat and fibroblastic spindle-shaped cells
- Adipose tissue component
  - Integral part of the tumor
  - Usually the predominant component
  - Composed of mature adipocytes
  - Variably sized and poorly demarcated lobules

• Fibroblastic spindle cell component
  - Formation of fascicles, typically growing along the fat septa
  - Mild cytological atypia
  - Mitoses absent or rare in the majority of cases
  - Increased mitotic rate associated with increased likelihood of local recurrence
  - Small to moderate amounts of collagen
  - Focal myxoid change occasionally present
  - Univacuolated cells
    - Usually encountered at the interface between the fibroblastic and adipocytic component
    - Characterized by a single vacuole in the cytoplasm
    - Likely represent degenerating adipocytes, lipid-rich fibroblasts, or transitional cells between fibroblast and adipocyte
  - Seen in the majority of lesions
  - Entrapment of normal structures, including vessels, nerves, skin adnexa, and skeletal muscle within the tumor
  - Pigmented melanocytic spindled or dendritic cells (similar to the ones found in Bednar tumor) exceptionally seen among the lesional cells

Immunohistochemistry/special stains
- Not contributory
- Focal S100 protein positivity in the spindle cell component occasionally detected
- β-catenin negative

Main differential diagnoses
- Juvenile hyaline fibromatosis
- Fibrous hamartoma of infancy
- Calcifying aponeurotic fibroma
- Lipoblastoma
Fig. 1. **Lipofibromatosis.** An ill-defined neoplasm composed of proliferative fibrous tissue with islands of adipose tissue.

Fig. 2. **Lipofibromatosis.** Adipocytic and fibroblastic components are intimately admixed.

Fig. 3. **Lipofibromatosis.** Area with marked spindle cell fibroblastic proliferation with interspersed adipose tissue, somewhat resembling desmoid fibromatosis.

Fig. 4. **Lipofibromatosis.** The process infiltrates the underlying skeletal muscle.

Fig. 5. **Lipofibromatosis.** The spindle cell fibroblasts reveal bland nuclear features.

Fig. 6. **Lipofibromatosis.** The adipocytic component also demonstrates benign cytology.
LIPOBLASTOMA/LIPOBLASTOMATOSIS

Definition
• Lipoblastoma and lipoblastomatosis are lesions characterized by the presence of lobules of fetal-type adipose tissue
• Lipoblastoma is localized while lipoblastomatosis is the diffuse form of the disease

Clinical features
Epidemiology
• Lipoblastoma/lipoblastomatosis are considered the fetal counterpart of the adult lipoma and lipomatosis, respectively
• Most patients are infants or young children less than 3 years of age
• Boys are much more commonly affected than girls
• The extremities are the most common location followed by the mediastinum, the trunk, the retroperitoneum, and the head and neck

Presentation
• Discrete or diffuse superficial, painless masses of fatty tissue
• Small lesions, usually measure 2 to 5 cm

Prognosis and treatment
• Benign condition
• Localized form of disease is readily cured by total resection
• Lipoblastomatosis may recur on some occasions mainly due to inability to completely excise the lesion
• Untreated cases may undergo maturation into an adult-type lipoma/lipomatosis

Pathology
Histology
• Lobules of mature adipocytes admixed with lipoblasts in varying stages of development
• Number of lipoblasts present in the tumor tends to decrease as the patient age increases
• Lipoblastomatosis is less lobulated and may infiltrate skeletal muscle tissue
• May have prominent fibrous septa and myxoid matrix

Genetic profile
• 8q11–13 rearrangements resulting in HAS2-PLAG1 or COL1A2-PLAG1 fusion genes is common
• Gain of chromosome 8 seen in some cases

Main differential diagnoses
• Atypical lipomatous tumor
• Myxoid liposarcoma
• Lipofibromatosis

Fig. 1. Lipoblastoma. A discrete dermal neoplasm composed of lobules of adipose tissue separated by fibrous septa.

Fig. 2. Lipoblastoma. The neoplastic lobules are composed of adult- and fetal-type adipocytic components.
Fig. 3. Lipoblastoma. Fetal-type adipocytes at various stages of development admixed with mature adipocytes.

Fig. 4. Lipoblastoma. Numerous lipoblasts are seen with scattered mature adipocytes.

Fig. 5. Lipoblastomatosis. A diffuse dermal neoplasm composed of lobules of adult- and fetal-type adipose tissue, identical to isolated lipoblastoma.

Fig. 6. Lipoblastomatosis. High-power view demonstrating numerous lipoblasts with occasional mature adipocytes.
LIPOBLASTOMA-LIKE TUMOR OF THE VULVA

**Definition**
- An extremely rare mesenchymal neoplasm characterized by adipocytic differentiation

**Clinical features**

**Epidemiology**
- Adolescent and young adult females

**Presentation**
- Superficial, painless vulvar masses
- Can be cystic
- Can have mucoid consistency

**Prognosis and treatment**
- Cured with surgical resection
- Recurrences and metastases have not been reported

**Pathology**

**Histology**
- Well-circumscribed and lobulated
- Lobules are composed of uniform spindle cells showing slightly eosinophilic cytoplasm and elongated nuclei and variable number of lipoblasts separated by thin fibrous septa
- Lacks nuclear atypia and hyperchromasia
- Plexiform, “chicken-wire” vascular networks are commonly seen

**Immunohistochemistry/special stains**
- Fat cells express S100 protein
- No CD34 expression

**Main differential diagnoses**
- Lipoblastoma
- Myxoid liposarcoma
- Spindle cell lipoma
- Aggressive angiomyxoma
- Angiomyofibroblastoma

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**Fig. 1.** Lipoblastoma-like tumor of the vulva. Somewhat lobulated neoplasm with myxoid areas separated by fibrous stroma. (Courtesy of Antonio Nascimento, São Paulo, Brazil.)

**Fig. 2.** Lipoblastoma-like tumor of the vulva. Scattered univacuolar lipoblast-like cells are noted. (Courtesy of Antonio Nascimento, São Paulo, Brazil.)
Fig. 3. Lipoblastoma-like tumor of the vulva. Higher power view reveals bivacuolated lipoblast-like cells as well. (Courtesy of Antonio Nascimento, São Paulo, Brazil.)

Fig. 4. Lipoblastoma-like tumor of the vulva. Hypocellular myxoid areas can be seen. (Courtesy of Antonio Nascimento, São Paulo, Brazil.)

Fig. 5. Lipoblastoma-like tumor of the vulva. More cellular areas are highlighted in this picture. (Courtesy of Antonio Nascimento, São Paulo, Brazil.)

Fig. 6. Lipoblastoma-like tumor of the vulva. The spindle cells have bland nuclear features. (Courtesy of Antonio Nascimento, São Paulo, Brazil.)
Definition
- A benign dermal or subcutaneous encapsulated mesenchymal tumor composed of mature adult-type adipose tissue and thin-walled small blood vessels

Clinical features
Epidemiology
- Mainly affects adolescents and young adults
- Predilection for females
- Familial in 5% of cases and shows autosomal-dominant mode of transmission
- Most commonly encountered in the upper limbs, trunk, and distal extremities

Presentation
- Many are painful
- Commonly multiple
- Size ranges from a few millimeters to 2 cm

Prognosis and treatment
- Cured by conservative, complete surgical excision
- No recurrence or metastasis reported

Pathology
Histology
- Encapsulated tumors composed of adipocytes and variable number of thin-walled small blood vessels
- Blood capillary vessels commonly show microthrombi
- No atypia, pleomorphism, mitoses, or hyperchromasia
- A rare cellular variant is recognized
- Older lesions can show increased fibrosis

Immunohistochemistry/special stains
- The adipocytes express S100 protein
- The endothelial cells are highlighted by CD34, CD31, and ERG

Genetic profile
- Low-level mutations of protein kinase D2 have been demonstrated in 80% of cases

Main differential diagnoses
- Lipoma
- Hemangioma
- Kaposiform hemangioendothelioma
- Kaposi sarcoma
- Angiosarcoma

Fig. 1. Angiolipoma. A well-circumscribed neoplasm composed of predominantly adipose tissue with interspersed capillary blood vessels.

Fig. 2. Angiolipoma. Capillary blood vessels are variably prominent.
Fig. 3. **Angiolipoma.** This case shows a more abundant vascular component.

Fig. 4. **Angiolipoma.** Focal microthrombi involvement of capillaries is characteristic.

Fig. 5. **Angiolipoma.** Area with marked proliferation of small blood vessels, some of which show intravascular microthrombi.
**MYOLIPOMA OF SOFT TISSUE**

**Definition**
- A benign neoplasm characterized by the admixture of mature smooth muscle and mature adipose tissue

**Clinical features**

**Epidemiology**
- Exceptionally rare
- Affected patients are usually adults
- Female predilection
- Subcutaneous examples generally involve abdominal wall and extremities

**Presentation**
- Commonly present as asymptomatic masses
- Size is variable; subcutaneous tumors tend to be smaller than their deeply situated counterpart

**Prognosis and treatment**
- Cured by complete excision
- Benign tumor with no reports of recurrence or metastasis

**Pathology**

**Histology**
- A biphasic tumor composed of smooth muscle intimately admixed with mature adipose tissue
- Generally smooth muscle component predominates
- Smooth muscle fibers arranged in fascicles, resembling leiomyoma; scattered mast cells may be seen

- Smooth muscle cells show no atypia or mitoses; however, degenerative atypia is occasionally noted
- Mature adipocytes comprising the adipocytic component do not show atypia
- Edematous or hyalinized stroma can be present
- Lipoblasts are not seen
- Necrosis is absent

**Immunohistochemistry/special stains**
- The smooth muscle cells express smooth muscle actin, desmin, and often estrogen receptors
- Nuclear HMGA2 expression is commonly encountered in both the smooth muscle cells and the adipocytes
- CDK4 and MDM2 are usually negative

**Genetic profile**
- HMGA2 rearrangement has been reported in a single case

**Main differential diagnoses**
- Spindle cell lipoma
- Myofibroblastoma
- Leiomyoma
- Angiomyolipoma
- Leiomyosarcoma

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Fig. 1. Myolipoma. The neoplasm is predominantly composed of smooth muscle admixed with a lesser component of mature adipose tissue.

Fig. 2. Myolipoma. There is an intimate admixture of smooth muscle and adipose tissue.
Fig. 3. Myolipoma. Note the bland morphology of both the smooth muscle and the adipocytic components. There is no hyperchromasia, atypia, or mitoses.

Fig. 4. Myolipoma. The smooth muscle cells diffusely express smooth muscle actin (SMA) on immunohistochemistry.

Fig. 5. Myolipoma. Diffuse coexpression of desmin is characteristic.
**Definition**
- A rare neoplasm characterized by the presence of mature adipose tissue admixed with a variable proportion of hematopoietic elements

**Clinical features**

**Epidemiology**
- Affected patients are usually adults
- Extraadrenal examples have been described in mediastinum, kidney, retroperitoneum, liver, and other sites
- Cutaneous cases are exceptionally rare

**Presentation**
- Asymptomatic solitary mass
- Usually well circumscribed or pseudoencapsulated

**Prognosis and treatment**
- Conservative surgical excision is curative
- No reports of recurrence or metastasis

**Pathology**

**Histology**
- Mature adipose tissue resembling conventional lipoma
- Varying proportions of hematopoietic component
- Osseous metaplasia may be present

**Immunohistochemistry/special stains**
- Adipocytes express S100 protein

**Genetic profile**
- t(3;21)(q25;p11) has been reported in some cases

**Main differential diagnoses**
- Lipoma

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**Fig. 1.** Myelolipoma. Admixture of mature adipose tissue, resembling conventional lipoma, and a varying amount of hematopoietic component are characteristic.

**Fig. 2.** Myelolipoma. This example exhibits predominantly hematopoietic tissue with interspersed adipocytes.
Fig. 3. **Myelolipoma.** A myelolipoma with a predominantly lipomatous component. The more limited hematopoietic element infiltrates amidst the adipocytes.

Fig. 4. **Myelolipoma.** Mature adipocytes are intermingled with trilineage hematopoietic cells.
**Definition**
- A rare benign neoplasm composed of mature adipose tissue and a variable number of lipoblasts in a myxochondroid matrix

**Clinical features**

**Epidemiology**
- Vast majority of affected patients are adult females

**Presentation**
- Rare type of lipoma
- Painless, slow-growing, small tumors
- Subcutaneously located, but can be intramuscular
- Most tumors are located at the proximal extremities

**Prognosis and treatment**
- Benign course
- Cured by surgical excision
- Rarely recur and do not metastasize

**Pathology**

**Histology**
- Well circumscribed or pseudoencapsulated
- Nests of lipoblasts, mature adipocytes, and/or brown adipocytes

- Prominent myxochondroid matrix and vasculature
- No atypia or pleomorphism
- No or rare mitoses

**Immunohistochemistry/special stains**
- The mature adipocytes strongly express S100 protein
- Weak S100 protein expression is found in the lipoblasts
- Cyclin D1 is strongly expressed
- Cytokeratin is rarely expressed

**Genetic profile**
- t(11;16)(q13;p13) has been detected, resulting in C11orf95 and MLK2 fusion

**Main differential diagnoses**
- Lipoma with chondroid metaplasia
- Myxoid liposarcoma
- Extraskeletal myxoid chondrosarcoma
- Extraskeletal chondroma

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Fig. 1. Chondroid lipoma. A fibrous pseudocapsule surrounds this dermal neoplasm.

Fig. 2. Chondroid lipoma. Note the fibrous septa and the prominent chondromyxoid matrix.
**Fig. 3. Chondroid lipoma.** Abundant chondromyxoid component with scattered mature adipocytes.

**Fig. 4. Chondroid lipoma.** Mature adipocytes along with a variable number of lipoblasts embedded in a chondromyxoid matrix is typical of this rare entity.

**Fig. 5. Chondroid lipoma.** This example demonstrates the predominant matrix with acellular areas.

**Fig. 6. Chondroid lipoma.** Note the bland nuclear morphology of the chondromyxoid element.

**Fig. 7. Chondroid lipoma.** Mature adipocytes embedded in a chondromyxoid matrix.

**Fig. 8. Chondroid lipoma.** Lipoblasts are characteristic of chondroid lipoma.
**Spindle Cell Lipoma**

**Definition**
- An uncommon variant of lipoma that exhibits prominent spindle cell morphology
- It represents one end of a spectrum of the spindle cell lipoma–pleomorphic lipoma continuum
- Some tumors show a mixture of both entities

**Clinical features**

**Epidemiology**
- The majority of cases are subcutaneous in the shoulders and posterior aspect of the neck
- Commonly affects elderly males
- Familial and multiple lesions are rare
- Dermal lesions show female predilection and primarily facial location

**Presentation**
- Small, well-circumscribed tumors
- Slowly growing and solitary
- Consistency is firmer than with conventional lipomas

**Prognosis and treatment**
- Cured by complete surgical excision
- Rarely recur
- No reports of metastasis

**Pathology**

**Histology**
- A variable mixture of bland-appearing spindle cells, mature adipocytes, and giant floret cells in a collagenous (“ropey” collagen) or myxoid stroma
- The spindle cells show pale eosinophilic cytoplasm and small nuclei
- The floret cells are multinucleated giant cells with hyperchromatic nuclei arranged in a concentric wreathlike pattern
- Mitoses are rarely seen
- Lipoblasts can be seen occasionally

**Immunohistochemistry/special stains**
- The adipocytes express S100 protein
- The spindle cells are positive for CD34 but negative for S100 protein
- Loss of nuclear retinoblastoma protein (RB1) can be demonstrated by immunohistochemistry

**Genetic profile**
- Monosomy or partial loss of long arms of chromosomes 13 and 16, with the former containing RB1 (13q14)
- Pleomorphic lipoma, mammary-type myofibroblastoma, cellular angiofibroma, and superficial acral fibromyxoma also show RB1 loss

**Main differential diagnoses**
- Atypical lipomatous tumor
- Spindle cell liposarcoma

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**Fig. 1. Spindle cell lipoma.** A superficial dermal case is composed of spindle cells and thick collagen fibers admixed with lobules of mature adipose tissue.

**Fig. 2. Spindle cell lipoma.** Neoplastic spindle cells and adipocytes surrounding skin adnexal structures.
Fig. 3. **Spindle cell lipoma.** High-power view. Note the characteristic “ropey” collagen fibers.

Fig. 4. **Spindle cell lipoma.** Spindle cells show banal cytology.

Fig. 5. **Spindle cell lipoma.** The spindle cells strongly express CD34.
Fig. 6. **Spindle cell lipoma.** This example exhibits a more abundant adipocytic component.

Fig. 7. **Spindle cell lipoma.** Area predominantly composed of spindle cells with interlaced thick collagen fibers.

Fig. 8. **Spindle cell lipoma.** The spindle cells have pale eosinophilic cytoplasm and small nuclei.
Fig. 9. Spindle cell lipoma. Lipoblasts can be seen.

Fig. 10. Spindle cell lipoma. Abundant myxoid stroma is seen in some cases.

Fig. 11. Spindle cell lipoma. Bland-appearing spindle cells embedded in a myxoid stroma. This subtype of spindle cell lipoma must be differentiated from myxoid liposarcoma.

Fig. 12. Spindle cell lipoma. Mast cells within the myxoid areas are highlighted using Giemsa stain.
PLEOMORPHIC LIPOMA

Definition
- An uncommon variant of lipoma composed of a mixture of variably sized mature adipocytes, scattered pleomorphic forms, and giant floret cells
- It represents one end of a spectrum of the spindle cell lipoma–pleomorphic lipoma continuum
- Most tumors show mixture of features from both entities, at least focally

Clinical features

Epidemiology
- The majority of cases are located in the dermis of the shoulders and posterior aspect of the neck
- Affected patients are mainly elderly males
- Pure pleomorphic forms are much less common than spindle cell lipoma

Presentation
- Small, well-circumscribed tumors
- Slowly growing and solitary
- Consistency is firmer than with conventional lipomas

Prognosis and treatment
- Cured by complete surgical excision
- May rarely recur
- No reports of metastasis

Pathology

Histology
- Dermally located, well-circumscribed tumor
- Admixed and scattered pleomorphic forms are readily identified
- A mixture of variably sized mature adipocytes and giant floret cells in a collagenous fibrous stroma
- Mitoses are rarely seen
- Spindle-shaped cells can also be detected
- Lipoblasts can be rarely seen

Immunohistochemistry/special stains
- The adipocytes express S100 protein
- The other cells are positive for CD34

Genetic profile
- Similar to spindle cell lipoma, suggesting close relation between the two entities
- Monosomy or partial loss of long arms of chromosomes 13 and 16, with the former containing RB1 (13q14)
- Spindle cell lipoma, mammary-type myofibroblastoma, cellular angiofibroma, and superficial acral fibromyxoma also show RB1 loss

Main differential diagnoses
- Atypical lipomatous tumor
- Spindle cell liposarcoma

Fig. 1. Pleomorphic lipoma. This case is a discrete dermal neoplasm, composed of spindle cells and multinucleate giant cells.
Fig. 2. **Pleomorphic lipoma.** Spindle cells, multinucleate giant cells, and thick “ropey” collagen fibers demonstrating morphological overlap with spindle cell lipoma.

Fig. 3. **Pleomorphic lipoma.** The spindle cell component here demonstrates mild hyperchromasia and pleomorphism. Scattered multinucleate giant cells are also seen.

Fig. 4. **Pleomorphic lipoma.** Another example showing more conspicuous adipocytic component.

Fig. 5. **Pleomorphic lipoma.** Floret-type giant cells, spindle cells, and mature adipocytes are characteristic, but can be seen in varying degrees from case to case.

Fig. 6. **Pleomorphic lipoma.** Note the mild hyperchromasia and the pleomorphism of the floret-type giant cells.

Fig. 7. **Pleomorphic lipoma.** Mature adipocytes have banal features.
**Definition**
- A rare subcutaneous tumor composed of benign brown adipocytes

**Clinical features**

**Epidemiology**
- Rare neoplasms comprising only 1% of adipocytic tumors
- Most affected patients are young adults; uncommon in children
- Thighs are the most common location, followed by the trunk, upper extremities, and the head and neck

**Presentation**
- Slow-growing, painless, superficial lesions
- May be intramuscular
- Size is variable

**Prognosis and treatment**
- Benign; cured by local excision
- May recur if incompletely excised

**Pathology**

**Histology**
- Tumors composed of a variable mixture of brown and mature white adipocytes

- The brown fat cells are characterized by the presence of multivacuolated granular eosinophilic or pale cytoplasm and small, centrally located nuclei
- No atypia
- Histologically subclassified into four variants:
  - Typical
  - Myxoid
  - Lipoma-like
  - Spindle cell

**Immunohistochemistry/special stains**
- Tumor cells show vimentin and variable S100 protein expression
- Spindle cell variant exhibits CD34 positivity

**Genetic profile**
- 11q13-21 rearrangements are seen

**Ultrastructure**
- Hibernoma cells have multiple lipid droplets and abundant pleomorphic mitochondria
- Basal lamina surrounds individual tumor cells

**Main differential diagnoses**
- Granular cell tumor
- Other neoplasms with granular cell features

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**Fig. 1. Hibernoma.** The neoplasm is composed of a mixture of adult/white and fetal/brown adipocytes.

**Fig. 2. Hibernoma.** Varying proportions of adult/white and fetal/brown adipocytes can be encountered. Delicate vascularized fibrous septa traverse the neoplasm.
Fig. 3. *Hibernoma*. The adult/white and fetal/brown adipocytes can be quite mixed.

Fig. 4. *Hibernoma*. The fetal/brown adipocytes characteristically exhibit multivacuolated cytoplasm and centrally located small nuclei.

Fig. 5. *Hibernoma*. This example shows focal myxoid matrix.

Fig. 6. *Hibernoma*. The adult-type adipocytes predominate in this example.

Fig. 7. *Hibernoma*. The multivacuolated brown fat can exhibit granular-appearing cytoplasm. Note the lack of atypia and mitoses.
Malignant tumors

ATYPICAL LIPOMATOUS TUMOR/
WELL-DIFFERENTIATED LIPOSARCOMA/
DEDIFFERENTIATED LIPOSARCOMA

Definition
- Atypical lipomatous tumor/well-differentiated liposarcoma is a locally aggressive neoplasm characterized by its gross and microscopical resemblance to mature adipose tissue
- Currently, the two names well-differentiated liposarcoma (WDL) and atypical lipomatous tumor (ALT) are being used synonymously
- Some use WDL terminology for deep areas such as the retroperitoneum where complete excision is often not possible and ALT for superficial and extremity tumors amenable to complete excision
- Dedifferentiation represents an abrupt transition to a nonadipocytic sarcomatous component with conspicuous mitotic activity

Clinical features
Epidemiology
- The most common type of sarcoma in adults
- Most patients are in their sixth to seventh decade of life
- The majority of tumors are deeply situated
- Subcutaneous tumors are rare and mostly affect the lower extremities
- Ninety percent of dedifferentiated liposarcomas arise de novo, and only 10% are diagnosed in recurrent ALT/WDL

Presentation
- Slowly enlarging, painless masses
- Variably sized but usually attain large size

Prognosis and treatment
- WDL/ALT tends to recur locally but does not metastasize unless it undergoes dedifferentiation
- The tendency to dedifferentiate depends largely on the location and the duration of the tumor
- Subcutaneous peripheral tumors have a more favorable outcome and are very unlikely to undergo dedifferentiation, but tend to locally recur due to incomplete resection

Pathology
Histology
- Neoplastic mature adipocytes that show marked pleomorphism and nuclear hyperchromasia
- Thick, fibrous septa with stromal spindle and multinucleate cells
- Variable number of lipoblasts, but their presence is not required for the diagnosis, nor are they pathognomonic
- The stroma may show a myxoid quality
- Three histological variants:
  - Adipocytic (lipoma-like)
  - Sclerosing
  - Inflammatory
- Dedifferentiated component often resembles undifferentiated pleomorphic or spindle cell sarcoma
- Dedifferentiated areas can sometimes show heterologous differentiation such as a rhabdomyosarcomatous or angiosarcomatous component
- Dedifferentiation is exceedingly rare in superficial atypical lipomatous tumor

Immunohistochemistry/special stains
- Neoplastic cells show positive reaction with S100 protein (mature adipocytic component), MDM2, and CDK4

Genetic profile
- Supernumerary giant rod or ring chromosome containing an amplified 12q13-15 region that encodes for MDM2 is constantly found
- CDK4, CPM, SAS, and HMGA2 genes are also frequently amplified from the same genomic interval

Main differential diagnoses
- Lipoma
- Spindle cell or pleomorphic lipoma
- Myxoid liposarcoma
- Pleomorphic liposarcoma
- Undifferentiated pleomorphic sarcoma
Atypical Lipomatous Tumor/Well-Differentiated Liposarcoma/Dedifferentiated Liposarcoma

Fig. 1. Atypical lipomatous tumor/well-differentiated liposarcoma. Classic lipoma-like atypical lipomatous tumor/well-differentiated liposarcoma. The neoplasm is composed of lobules of variably sized adult-type adipocytes separated by thick, fibrous septa.

Fig. 2. Atypical lipomatous tumor/well-differentiated liposarcoma. Scattered cell nuclei within the fibrous septa exhibit hyperchromasia and pleomorphism.

Fig. 3. Atypical lipomatous tumor/well-differentiated liposarcoma. Lipoma-like area composed of adult-type adipocytes demonstrating variably sized cells.

Fig. 4. Atypical lipomatous tumor/well-differentiated liposarcoma. Fibrous septa with scattered stromal cells exhibiting nuclear hyperchromasia. Occasional multinucleate giant cells are also seen.

Fig. 5. Atypical lipomatous tumor/well-differentiated liposarcoma. Scattered adipocytes demonstrate nuclear atypia, hyperchromasia, and pleomorphism.

Fig. 6. Atypical lipomatous tumor/well-differentiated liposarcoma. Atypical stromal cells and the multinucleate giant cells can both show nuclear hyperchromasia and pleomorphism.
Adipocytic Tumors

Fig. 7. Atypical lipomatous tumor/well-differentiated liposarcoma. High-power view of the fibrous septa.

Fig. 8. Atypical lipomatous tumor/well-differentiated liposarcoma. High-power view of lipoblasts.

Fig. 9. Atypical lipomatous tumor/well-differentiated liposarcoma. High-power view of atypical adipocytes depicting marked nuclear atypia. Lipoblasts are also seen.

Fig. 10. Atypical lipomatous tumor/well-differentiated liposarcoma. High-power view of classic lipoblast showing multivacuolated cytoplasm. Multinucleate stromal cells are also seen.

Fig. 11. Atypical lipomatous tumor/well-differentiated liposarcoma. This dermal example is primarily sclerotic.

Fig. 12. Atypical lipomatous tumor/well-differentiated liposarcoma. Dermal case with adipocytic atypia.
Atypical Lipomatous Tumor/Well-Differentiated Liposarcoma/Dedifferentiated Liposarcoma

Fig. 13. Atypical lipomatous tumor/well-differentiated liposarcoma. Dermal case with area of overt atypia in the stromal/sclerotic component.

Fig. 14. Atypical lipomatous tumor/well-differentiated liposarcoma. Demarcation is usually stark between the atypical lipomatous tumor/well-differentiated liposarcoma component and the hypercellular, dedifferentiated spindle cell component.

Fig. 15. Atypical lipomatous tumor/well-differentiated liposarcoma. Dedifferentiated spindle cell sarcoma area.

Fig. 16. Atypical lipomatous tumor/well-differentiated liposarcoma. Dedifferentiation presenting as spindle cells arranged in herringbone-like pattern, resembling fibrosarcoma. Mitoses are readily identified.

Fig. 17. Atypical lipomatous tumor/well-differentiated liposarcoma, dedifferentiated. Case demonstrating dedifferentiated pleomorphic sarcomatous area.

Fig. 18. Atypical lipomatous tumor/well-differentiated liposarcoma. Dedifferentiation presenting as a small cell sarcomatous area resembling Ewing sarcoma in this unusual case.
**Definition**
• A liposarcoma that is composed primarily of spindle cells
• It has been considered in the past a variant of ALT/WDL, myxoid liposarcoma and a malignant counterpart of spindle cell lipoma
• Recently recognized as an exceedingly rare distinct type of liposarcoma with unique clinicopathological and molecular features that does not belong to the spectrum of atypical lipomatous tumor
• The term *fibrosarcoma-like lipomatous neoplasm* has been proposed to distinguish it from spindle cell morphological variants of other liposarcomas

**Clinical features**

**Epidemiology**
• Rare liposarcoma subtype
• Affected individuals are usually adults
• Slight male predilection is noted
• Tumors tend to occur in the subcutaneous tissues of extremities, trunk, and head and neck
• Commonly seen in thighs and chest walls

**Presentation**
• Painless, slow-growing masses
• Size is variable

**Prognosis and treatment**
• Usually managed by surgical excision, occasionally combined with adjuvant radiotherapy
• Limited follow-up reports show favorable prognosis with rare recurrences and no metastases

• Generally considered a low-grade sarcoma but biological behavior needs to be assessed further

**Pathology**

**Histology**
• Vaguely nodular neoplasms with thin, fibrous bands that are usually confined to subcutis but can invade underlying skeletal muscles
• Tumors composed of fibroblast-like spindle cells embedded in variably myxoid stroma
• Multivacuolated and signet-ring lipoblasts are easily identified, as well as more primitive mesenchymal cells
• The tumor recapitulates early stages of embryonic fat development
• Networks of thin-walled capillaries resembling those seen in myxoid liposarcoma can be recognized

**Immunohistochemistry/special stains**
• S100 protein is commonly seen, and CD34 is occasionally expressed
• No MDM2, HMGA2, or CDK4 expression

**Genetic profile**
• No MDM2/CDK4 amplification (12q13–15)
• No DDIT3 gene rearrangement (12q13)
• RB1 deletion was detected in some cases (13q14)

**Main differential diagnoses**
• Spindle cell variant of ALT/WDL
• Spindle cell lipoma
• Spindle cell sarcoma involving adipose tissue

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**Fig. 1.** Spindle cell liposarcoma. A vaguely nodular neoplasm composed of predominantly spindle cells.

**Fig. 2.** Spindle cell liposarcoma. Fibrous bands and fibroblast-like spindle cells with myxoid stroma constitute this neoplasm. Spindle cells with hyperchromatic nuclei are seen.
Fig. 3. Spindle cell liposarcoma. The presence of a variable amount of myxoid stroma is a typical feature of spindle cell liposarcoma.

Fig. 4. Spindle cell liposarcoma. Spindle cells in a background of collagenous and myxoid matrix. This example can be difficult to distinguish from benign spindle cell lipoma.

Fig. 5. Spindle cell liposarcoma. The adipocytic differentiation of neoplastic cells is supported by S100 protein expression.
Definition
- A malignant mesenchymal neoplasm characterized by the presence of a variable number of small, round, primitive mesenchymal cells; lipoblasts; and myxoid stroma with a characteristic delicate, chicken-wire-like vasculature and DDIT3–FUS fusion
- Increased confluent cellularity suggests more aggressive behavior, but is no longer termed round cell liposarcoma

Clinical features
Epidemiology
- The second most common type of liposarcoma after ALT/WDL
- Most patients are diagnosed during the fourth to fifth decade of life
- The most common liposarcoma in patients under the age of 20 years
- No sex predilection
- Majority of tumors are located in the thighs
- Subcutaneous localization is rare

Presentation
- Painless, slowly growing, large masses

Prognosis and treatment
- Increased confluent cellularity in more than 5% of tumor adversely affects survival
- Managed by wide surgical excision with or without chemoradiation
- Tend to metastasize to bones (particularly spine) and unusual locations such as fat-bearing areas before the lungs

Pathology
Histology
- Nodular tumors composed of a variable amount of hypocellular myxoid areas and cellular round cell areas
- The myxoid areas represent lower-grade component and the hypercellular areas represent the higher-grade component of tumor
- The myxoid areas are composed of uniform, bland-looking, round cells and small signet ring lipoblasts embedded in an abundant myxoid stroma that have a delicate chicken-wire vascular network
- The hypercellular areas are formed by solid sheets of primitive mesenchymal round cells with conspicuous nucleoli and high nuclear-to-cytoplasmic ratio
- Generally, no conspicuous pleomorphism, giant tumor cells, or significant mitosis

Immunohistochemistry/special stains
- S100 protein is variably expressed

Genetic profile
- Virtually all cases show t(12;16)(q13;p11) leading to fusion of DDIT3 (previously known as CHOP) located at 12q13, and FUS (also known as TLS) located at 16p11, to form FUS-DDIT3 (or TLS-CHOP) fusion gene
- t(12;22)(q13;q12) where the EWSR1 gene (related to FUS) fuses with DDIT3 is encountered rarely
- Thirty percent of cases show TP53 mutations

Main differential diagnoses
- Atypical lipomatous tumor/well-differentiated liposarcoma
- Extraskeletal myxoid chondrosarcoma
- Myxofibrosarcoma

Fig. 1. Myxoid liposarcoma. Classic morphology depicting a hypocellular myxoid neoplasm composed of small, round cells with bland-appearing nuclei. Note the delicate “chicken-wire” vasculature.

Fig. 2. Myxoid liposarcoma. Strikingly myxoid stroma and delicate blood vessels.
Fig. 3. **Myxoid liposarcoma.** High-power view showing signet ring cells representing univacuolated lipoblasts.

Fig. 4. **Myxoid liposarcoma.** Round cells admixed with signet ring–like lipoblast cells with no intervening stroma.

Fig. 5. **Myxoid liposarcoma.** Hypercellular component composed of sheets of monomorphic primitive mesenchymal round cells representing progression to a higher-grade neoplasm.

Fig. 6. **Myxoid liposarcoma.** The hypercellular component demonstrates high nuclear-to-cytoplasmic ratio, minimal pleomorphism, and infrequent mitoses.
**Definition**
- A high-grade pleomorphic sarcoma characterized by the presence of a variable number of pleomorphic lipoblasts

**Clinical features**

**Epidemiology**
- Rare subtype of liposarcomas but perhaps the most common to arise in dermis
- The extremities are the most common site
- Subcutaneous localization is rare

**Presentation**
- Painless, often large masses

**Prognosis and treatment**
- The most aggressive type of liposarcoma with high rate of metastasis
- Managed by wide excision, often combined with chemoradiation

**Pathology**

**Histology**
- Either well-circumscribed or infiltrative tumors with a variable number of characteristic pleomorphic lipoblasts
- Background of a high-grade pleomorphic sarcoma (similar to undifferentiated pleomorphic sarcoma) with the presence of spindle cells, inflammatory cells, and giant cells
- Brisk mitosis is usual
- The presence of lipoblasts is required to make the diagnosis
- Lack areas of typical ALT/WDL or heterologous differentiation
- An epithelioid variant is recognized

**Immunohistochemistry/special stains**
- S100 protein is expressed in less than 50% of cases
- Smooth muscle actin expression is common

**Genetic profile**
- Complex chromosomal structural rearrangements
- High rate of TP53 mutation

**Main differential diagnoses**
- Undifferentiated pleomorphic sarcoma
- Dedifferentiated liposarcoma
- Pleomorphic variant of other sarcomas such as leiomyosarcoma or rhabdomyosarcoma

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**Fig. 1. Pleomorphic liposarcoma.** This case is an infiltrative dermal neoplasm. (Courtesy of Sate Hamza, Winnipeg, Manitoba, Canada.)

**Fig. 2. Pleomorphic liposarcoma.** Dermal neoplasm composed of cells demonstrating adipocytic differentiation. (Courtesy of Sate Hamza, Winnipeg, Manitoba, Canada.)
Fig. 3. Pleomorphic liposarcoma. High-power view showing variably sized adipocytes and prominent multivacuolated lipoblasts exhibiting marked nuclear atypia. (Courtesy of Sate Hamza, Winnipeg, Manitoba, Canada.)

Fig. 4. Pleomorphic liposarcoma. Small round cells, lipoblasts, and larger cells with atypical, hyperchromatic nuclei infiltrating the dermal collagenous tissue. (Courtesy of Sate Hamza, Winnipeg, Manitoba, Canada.)

Fig. 5. Pleomorphic liposarcoma. Markedly pleomorphic adipocytes, some of which exhibit bizarre-appearing nuclei.

Fig. 6. Pleomorphic liposarcoma. Spindle cell sarcomatous area with brisk mitotic activity.

Fig. 7. Pleomorphic liposarcoma. Lipoblasts with characteristic multivacuolated cytoplasm.
Further Reading

Lipoma

Lipomatosis; Multiple Symmetric Lipomatosis (Launois-Bensaude); Asymmetric Lipomatosis

Lipomatosis of Nerve

Adiposis Dolorosa

Fat Necrosis of the Morbidly Obese

Piezogenic Pedal Papules

Nevus Lipomatosus Superficialis

Fibrohistiocytic Lipoma

Lipobromatosis

Lipoblastoma (Localized and Diffuse)

Lipoblastoma-Like Tumor of the Vulva
cases of a distinctive mesenchymal neoplasm of adipocytic differentiation. Histopathology 40, 505–509.

**Angiolipoma**

**Myelolipoma of Soft Tissue**

**Myelolipoma**

**Chondroid Lipoma**

**Spindle Cell Lipoma**

**Pleomorphic Lipoma**


**Hibernoma**

**Atypical Lipomatous Tumor/Well-Differentiated Liposarcoma/Dedifferentiated Liposarcoma**

**Spindle Cell Liposarcoma**
Mentzel, T., Palmedo, G., Kuhn, C., 2010. Well-differentiated spindle cell liposarcoma (‘atypical spindle cell lipomatous tumor’) does not belong to the spectrum of atypical lipomatous tumor but has a close relationship to spindle cell lipoma: clinicopathologic, immunohistochemical, and molecular analysis of six cases. Mod. Pathol. 23, 729–736.

**Myxoid Liposarcoma**

**Pleomorphic Liposarcoma**