

Soft tissue tumors: Lipoma / benign lipomatous tumors

Identity

Note lipomas are benign adipose tissue tumors with many subtypes, constituting one-third of all soft tissue tumors

Classification

Ordinary lipoma: the solitary, ordinary lipomas represent the most common soft tissue tumors, with subcutaneous tumors being much more common than the deep-seated ones

Epidemiology: the incidence of lipomas is about one in 1000 inhabitants per year, but is probably underestimated since many lesions cause few problems; they occur most frequently between 30 and 70 years of age, with a peak incidence between 40 and 60 years

Clinics: solitary lipomas are slow-growing masses, most frequently located in the upper back, neck, shoulder, abdomen, and the proximal portions of the extremities

Evolution: surgery is required primarily when the tumors reach large size and cause cosmetic problems or complications due to their anatomical site; there is no risk of progression to malignancy, and recurrences are rare after shelling-out

Angiolipoma: angiolipomas show characteristic histological features and occur primarily as subcutaneous, painful nodules; multiple lesions are much more common than solitary ones; they are usually smaller than solitary, ordinary lipomas and present at an earlier age, with the dominating site being the forearm; an increased familial incidence has been noted

Spindle cell/ pleomorphic lipoma: the characteristic feature of spindle cell lipoma is the replacement of mature fat by collagen-forming spindle cells; these rare tumors typically occur subcutaneously in the neck and shoulders of men aged 45 to 65 years

pleomorphic lipoma probably represents a highly pleomorphic variant of spindle cell lipoma and show similar clinical features;

both of these types of lesions may be confused with liposarcoma

Lipoblastoma: lipoblastoma is a tumor of the infancy; most tumors occur before three years of age and may occasionally be seen already at birth; the site is primarily the upper and lower extremities; there may be a close resemblance to myxoid liposarcoma

Hibernoma: hibernoma is chiefly a tumor of adults, although in average occurring at lower ages than solitary, ordinary lipomas; the most common sites are the scapular and interscapular regions, mediastinum and upper thorax

Angiomyo-lipoma: angiomyolipoma is a hamartomatous lesion in the kidneys of adult patients, with a preponderance of women

Chondroid lipoma: chondroid lipoma is a rare tumor occurring in the subcutis or muscle of adults; it may be confused with liposarcoma and chondrosarcoma, and shows microscopic features of both lipoma and hibernoma

Cytogenetics

Cytogenetics **Ordinary lipoma:**

Morphological the majority of tumors show fairly simple, structural chromosome aberrations; numerical changes are rare; seemingly balanced aberrations dominate over unbalanced changes, as also indicated by the finding of no copy number changes in smaller series of lipomas investigated by CGH

in more than two-thirds of cases with karyotypic changes, there is an involvement of chromosome segment 12q13-15, which may recombine with a large variety of other chromosomal segments; so far, more than 80 of the 320 chromosome bands in the standard karyotype have been involved in these rearrangements

the most frequent aberration is t(3;12)(q27-28;q14-15), found in one-fifth of cases with 12q13-15 changes

other recurrently involved chromosome segments include 1p36, 1p32-34, 2p22-24, 2q35-37, 5q33, 10q22, 11q13, 12p11, 12q24, 13q12-14, and 21q21-22; all recurrent changes combined represent 75% of cases with 12q13-15 changes and 45-50% of all karyotypically abnormal ordinary lipomas among cases without 12q13-15 changes, one subset of tumors display translocations involving 6p21-23 and another subset have loss of 13q material with breakpoints in 13q12-14 and/or 13q22; many of the latter aberrations are seen as del(13)(q12q22); these 6p and 13q changes are found at similar frequencies, each occurring in 6-8% of ordinary lipomas with cytogenetic aberrations

some 15-20% of the aberrant tumors have rearrangements involving neither 6p21-23, 12q13-15, 13q12-14 nor 13q22

Cytogenetics the rearrangements frequently affect the high mobility group protein
Molecular gene [HMGIC](#) in 12q15, with most breakpoints occurring in the large intron 3; the outcome of the 3;12-translocations is the formation of a chimeric gene involving HMGIC and [LPP](#)

LPP is a member of the LIM protein gene family, containing a leucin-zipper motif in its amino-terminal region and three LIM domains in its carboxy-terminal region

Result of the chromosomal anomaly: the HMGIC/LPP transcripts frequently contain coding sequences for the three DNA-binding domains of HMGIC and two or three LIM domains from LPP; HMGIC/LPP is not specific for lipomas, but has also been identified in a series of pulmonary chondroid hamartomas with t(3;12), and HMGIC is rearranged in a variety of benign tumors

another fusion has been with [LHFP](#) in a lipoma with t(12;13)(q13-15;q12); the expressed HMGIC/LHFP fusion transcript encoded the

three DNA binding domains of HMGIC and 69 amino acids from frame-shifted LHFP sequences
a candidate gene for rearrangements affecting 6p21 in lipomas is [HMG1Y](#)

Cytogenetics **Angiolipoma:** subcutaneous angiolipomas have a normal karyotype
Morphological as shown by chromosome banding

Cytogenetics **Spindle cell/ pleomorphic lipoma:** few cases have been
Morphological investigated cytogenetically; the characteristic features are losses of chromosome 13 and 16 sequences, in particular involving the segments 13q12 and 16q13-qter, respectively

Cytogenetics **Lipoblastoma:** few cases have been investigated cytogenetically;
Morphological they have all had rearrangements of 8q11-13 in common; this segment has been found to recombine with a variety of other chromosome bands; preliminary data have indicated that the [PLAG1](#) gene in 8q12 is affected, resulting in a similar promoter swapping as has been described in pleomorphic adenomas of the salivary gland

Cytogenetics **Hibernoma:** the characteristic feature is rearrangements of 11q13,
Morphological which may recombine with a variety of other chromosome bands; in contrast to ordinary lipomas, no translocations involving both 11q13 and 12q13-15 have been found in hibernomas. FISH analyses have demonstrated that both homologs of chromosome 11, including the seemingly normal one, have deletions encompassing the multiple endocrine neoplasia type I, [MEN1](#), locus and a second region about 3 Mb distal to MEN1

Cytogenetics **Angiomyo-lipoma:** few cases have been investigated cytogenetically;
Morphological the only recurrent change identified has been trisomy 7; however, interphase FISH analysis did not reveal any significant fraction of cells with +7 in the angiomyolipomas investigated

Cytogenetics **Chondroid lipoma:** a cytogenetically identical rearrangement,
Morphological t(11;16)(q13;p13), found in the only two cases reported indicate that this is a recurrent aberration

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Contributor(s)

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