Introduction

Endothelial cells distinguished by their epithelioid morphology have been recognized for many years. Rosai first characterized them as “histiocytoid” in appearance in 1979 and soon thereafter they became known by the more popularized term "epithelioid". By the early and mid 1980's this nomenclature was incorporated into classification schemes of epithelioid vascular tumors that included reactive, benign and malignant proliferations such as variants of bacillary angiomatosis, epithelioid hemangioma, spindle cell hemangioma, epithelioid hemangioendothelioma and epithelioid angiosarcoma. Subsequently, several new uncommon entities including composite hemangioendothelioma and epithelioid sarcoma-like hemangioendothelioma were described. As a group, these tumors can originate in a variety of different organ systems however, most develop in the soft tissues and skeleton. The epithelioid endothelial cell is common to them all, however, it is very important to distinguish amongst them as they have significant differences in their clinical behavior and biological potential and consequently their treatment and prognosis.

The Epithelioid Endothelial Cell

The hallmark of epithelioid endothelial cells is their polyhedral shape and abundant densely eosinophilic cytoplasm which frequently contains one or more large vacuoles and their large nuclei. The vacuoles represent the earliest stage of vessel lumen formation and may be empty or contain intact or fragmented red blood cells. As vacuoles from neighboring cells fuse they create vascular spaces of varying degrees of differentiation. This process is best developed in the benign lesions where well-formed vessels are numerous and the lining epithelioid endothelial cells bulge into the lumens in a “tombstone “or “hobnail-like” fashion. In malignant neoplasms the tumor cells are often arranged in cords and sheets with only subtle evidence of vessel lumen formation, which may only be in the guise of intracytoplasmic vacuoles. It is important to note, however, that a solid cord or sheet-like growth pattern can be seen in all types of epithelioid vascular neoplasms, irrespective of their biologic potential and should be recognized as a key diagnostic pitfall because, in our experience, it can cause a benign lesion to be misconstrued as a malignancy. As with many types of tumors, the histologic significance of architecture in epithelioid vascular tumors must be evaluated in the context of other compelling morphological features.
Epithelioid Vascular Tumors of Bone and Soft Tissue

The nuclear features of the epithelioid endothelial cells vary according to the biologic nature of the tumor. In reactive conditions and benign neoplasms they are hyperlobated, have irregular or grooved membranes, vesicular chromatin and small or sometimes prominent nucleoli. In the more aggressive tumors, namely, epithelioid hemangioendothelioma and epithelioid angiosarcoma, the nuclei differ in that they exhibit a significantly greater degree of pleomorphism and hyperchromasia.

Epithelioid endothelial cells express all of the characteristic vascular endothelial markers including Ulex europeus lectin, Factor VIII related antigen, CD34, CD31, and Fli-1. Epithelioid vascular tumors have not been systematically studied for the expression of GLUT-1 and D2-40, however, the limited information available suggests that they are negative for GLUT-1 and epithelioid hemangioendothelioma and angiosarcoma express D2-40. Additionally, epithelioid endothelial cells frequently demonstrate strong and diffuse staining for a variety of molecular weight cytokeratins and epithelial membrane antigen. This is another diagnostic hazard, as other types of tumors composed of epithelioid cells that are in the histological differential diagnosis, such as carcinoma and epithelioid sarcoma also express keratin and EMA.

Ultrastructurally epithelioid endothelial cells contain abundant ctyoplasmic filaments, mitochondria, lysosomes, pinocytotic vesicles and Weibel-Palade bodies and are surrounded by basal lamina.

No genetic abnormalities have been found to be specific for epithelioid endothelial cells.

**Bacillary Angiomatosis**

Bacillary angiomatosis (BA), previously known as epithelioid angiomatosis is a distinctive reactive vascular proliferation elicited by infection by Bartonella (formerly Rochalimaea) henselae and quintana organisms, which are small gram negative rods. These pathogens are introduced into humans, who serve as reservoirs, by blood-sucking arthropods (body louse- Pediculus humanus and cat flea) or in the case of the former by a direct cat scratch or bite. Once infection occurs an intraerythrocyte bacteremia develops and the organisms target endothelial cells where they grow within and around the cells. These species of bacteria are unique in their ability to produce vasoproliferative lesions by secreting mitogens which result in the development of new capillaries from preexisting ones. Histologically, the proliferating endothelial cells can cause confusion with epithelioid hemangioma, epithelioid hemangioendothelioma, Kaposi's sarcoma and angiosarcoma.

BA usually occurs in immunocompromised hosts especially those infected with HIV, however, it has also been reported to rarely involve immunocompetent persons. The lesions present as erythematous cutaneous nodules that are frequently multiple and may be wide spread. Extracutaneous lesions may also develop and have been reported in the mucus membranes, lymph nodes, bone marrow, liver, spleen and soft tissue. Clinically, the cutaneous manifestations can mimic pyogenic granuloma, Kaposi's sarcoma and angiosarcoma.
Microscopically, the vascular proliferation in BA has a spectrum of findings. The vessels are frequently arranged in vague lobules and range from small, well formed capillaries lined by flattened to plump endothelial cells to interanastomosing cords and nests of epithelioid endothelial cells. The epithelioid endothelial cells may have prominent nucleoli, cytoplasmic vacuoles, numerous mitoses and regions of necrosis. Present in all cases are interstitial edema, and perivascular collections of neutrophils with karyorrhectic and fine granular basophilic debris. The Warthin-Starry silver stain shows clumps of pleomorphic bacilli 1 to 3 microns in length located in the areas of basophilic debris.

Cutaneous BA is polypoid, frequently ulcerated and its base is surrounded by a hyperplastic squamous collarette. These architectural features as well as the lobular distribution of the vessels can mimic pyogenic granuloma. However, pyogenic granuloma lacks the diffuse infiltrate of neutrophils and granular debris and importantly, epithelioid cells are either not prominent or are absent. The presence of neutrophils and granular debris are also helpful in separating BA from epithelioid hemangioma. Epithelioid hemangioendothelioma lacks the inflammation and micro-organisms but also has a prominent myoid or hyaline stroma that is not present in BA. Epithelioid angiosarcomas show a greater degree of cytologic atypia, atypical mitoses and do not have a significant inflammatory infiltrate and certainly no micro-organisms.

Treatment is the administration of antibiotics, namely erythromycin which result is resolution of the lesions. Untreated, patients can develop fatal systemic disease.

**Epithelioid Hemangioma**

Epithelioid hemangioma, previously designated angiolymphoid hyperplasia with eosinophilia and histiocytoid hemangioma, is a well recognized clinicopathologic entity. It has been most extensively documented in the skin and subcutis, and has also been described in bone, lymph nodes, lung, penis, eye, tongue, breast, arteries, colon, heart, spleen, and testis. The skeleton, it turns out, is probably the second most common location for this benign neoplasm.

In the superficial tissues epithelioid hemangioma usually presents as a solitary or cluster of small, pink to red-brown, dome-shaped nodules in the head and neck region of adults. Typically, the tumor has been noted months to several years prior to diagnosis and a few patients may also have associated regional adenopathy. In our experience with over 50 cases arising in bone, the patients range in age from 10-75, average 35 years and present with pain localized to the involved site. In the skeleton the tumors tend to involve the long tubular bones (38%), distal lower extremities (18%), flat bones (18%), vertebrae (16%), and small bones of the hands (8%). Radiographically, epithelioid hemangioma is lytic with well-defined margins. In a minority of instances the tumor is expansive, and especially in the small tubular bones, there may be cortical destruction and a periosteal reaction in conjunction with a soft tissue mass.

Epithelioid hemangioma of the skin and subcutis is multifocal in as many as 50%, whereas, only 18% of those developing in the skeleton affect more than one bone. Involvement of widely separate sites, including simultaneous involvement of skin and bone and skin and lymph node is uncommon.
Epithelioid hemangioma of the skin and subcutis ranges in size from 0.2 to 8 cm, whereas in bone they are often larger varying in size from 2.5-15 cms (mean 5 cm). The tumors are solid, well-circumscribed, tan-red and hemorrhagic and have a lobular architecture. In the skin and subcutis they are often associated with a large caliber, thick-walled vessel that exhibits changes suggestive of previous injury.

The hallmark of epithelioid hemangioma is large polyhedral endothelial cells that either line numerous well-defined vascular spaces or grow in solid cords and sheets which can produce a densely cellular mass. The tumor cells have oval, kidney bean shaped, lobated, grooved, vesicular nuclei with variably sized nucleoli. The cytoplasm is eosinophilic, abundant and some cells contain conspicuous, round, clear, cytoplasmic vacuoles which may harbor fragments of red blood cells. In some cases, there is abundant intralesional hemorrhage which is usually associated with proliferating, cytologically bland, spindle cells. Nuclear atypia, mitotic activity and necrosis are generally limited. The stroma frequently contains a prominent inflammatory cell infiltrate rich in lymphocytes, including follicles with germinal centers, and variable numbers of eosinophils and other mononuclear cells. In some cases, particularly those in bone, the inflammatory infiltrate is sparse or absent all together.

Epithelioid hemangioma of the skin and subcutis has limited growth potential, and is usually not very aggressive. Accordingly, marginal surgical excision is generally the treatment of choice, which is associated with non-aggressive recurrences in approximately one-third of cases. Rare examples of tumors spontaneously resolving have been reported.

Treatment of bone tumors usually consists of intralesional curettage or local resection. Untreated tumors have usually remained stable, and recurrences have been relatively infrequent.

No metastases have been reported, however, tumors involving bone and other distant sites and types of tissue which likely reflects multicentric disease, have rarely been described. Evans et al. argue that these latter cases are manifestations of metastases and use this to bolster their opinion that epithelioid hemangioma (as defined in the skin and subcutis) of bone is non-existent and simply represents a misdiagnosed hemangioendothelioma - a tumor with metastatic potential. Evidence they cite to support this assertion, I feel, is not very convincing, and includes the observations that epithelioid hemangioma of bone usually does not involve medium or large-sized vessels, especially arteries, and shows a greater degree of histologic variability. In contention, medium to large-sized vessels are normally not present in the medullary cavity of bones, and small vessels, if indeed the site origin may be obliterated by the expanding tumors (which are usually larger than those originating in the skin and subcutis). Additionally, most, if not all, of the morphologic variants observed in osseous tumors have been described in classic lesions originating in the skin. Also relevant is the fact that hemangioendothelioma of bone, not otherwise specified or qualified, is not a distinct diagnostic entity in current classification systems.

Epithelioid hemangioma can be confused with various benign diseases and neoplasms. It simulates eosinophilic granuloma because of the tissue eosinophilia and the morphologic characteristics of the endothelial cells. However, the Langerhans cells in
Langerhans cell histiocytosis do not have cytoplasmic vacuoles, do not form vascular lumens, are S-100 protein positive and Factor VIII negative and have different ultrastructural features. Kimura's disease differs from epithelioid hemangioma in the clinical findings and the absence of epithelioid endothelial cells.

Epithelioid hemangioma can be difficult to distinguish from epithelioid hemangioendothelioma and angiosarcoma. This is most evident in cases in which the endothelial cells tend to grow in solid sheets and arise in blood vessels with infiltration through the vessel walls into the surrounding soft tissue. The lack of myxoid-hyaline stroma, hyperchromasia, atypical mitoses, necrosis and anastomotic network as well as the presence of the inflammatory infiltrate are important differential points.

**Spindle Cell Hemangioma**

Spindle cell hemangioma (SCH) is a morphologically unusual vascular tumor that was first described by Weiss and Enzinger in 1986 as a variant of a hemangioendothelioma. Subsequently it has been recognized as a benign lesion whose hallmark is the admixture of cavernous hemangioma-like and Kaposi's sarcoma-like spindle cell regions.

SCH develops in all age groups but approximately 50% of patients are young adults in the 3rd-5th decade of life; the sexes are equally affected. Clinically, the tumor presents as a painless firm superficial mass that has usually been present for years or even a decade prior to diagnosis. In approximately 40% of patients the lesions are multifocal, but, tend to involve a single localized area of the body.

SCH commonly arises in the dermis and subcutis of the distal extremities; tumors originating in bone are extraordinarily rare. It is not uncommon for them to involve or be completely intravascular in growth (50%) and this may be the mechanism by which multiple lesions arise in a relatively restricted region. Grossly, the mass is red-blue, nodular and ranges from several millimeters to several centimeters in greatest dimension. Histologically, SCH is composed of two elements, which share some histologic features. The first is a cavernous hemangioma-like component consisting of large, dilated, thin-walled vascular spaces that are lined by flattened or somewhat plump cytologically banal endothelial cells. Occasionally the lumen is expanded by calcified thrombi or phleboliths. Surrounding and admixed with the cavernous spaces is the second element which consists of fascicles of spindle cells that likely represent a combination of collapsed vessels, fibroblasts, and cells with features of pericytes. Some of the spindle cells delineate slit-like vascular spaces that are filled with red blood cells. The spindle cells have elongate nuclei containing finely granular chromatin and small nucleoli. They are not pleomorphic and there is minimal mitotic activity. Scattered amongst the spindle cells are cords and small groups of larger epithelioid cells that have vacuolated cytoplasm. Some of the vacuoles contain red blood cells and others are large and empty mimicking adipocytes.

Immunohistochemically, the cells lining the cavernous spaces express endothelial markers, however, the spindle cells are frequently negative. A variety of etiologies have been proposed for the development of SCH including a reactive process caused by bouts
of repeated thrombosis and recanalization, hamartomatous growth, and neoplastic proliferation. Interestingly, SCH has been described in patients with a variety of disease including Maffucci's syndrome, congenital lymphedema, and Klippel-Trenaunay syndrome.

In addition to the other epithelioid vascular tumors, Kaposi’s sarcoma is an important lesion in the differential diagnosis of SCH. Kaposi's sarcoma occurs in chronic, lymphadenopathic, transplantation associated and AIDS related forms. Clinically, SCH and AIDS related Kaposi's sarcoma have some overlapping features in that they affect young adults, are frequently superficial in location, and have a tendency to be multifocal. However, an important difference is that patients with SCH have not been reported to be infected with HIV. Histologically, SCH and Kaposi's sarcoma can be distinguished because Kaposi's sarcoma does not have cavernous areas or epithelioid cells, and SCH does not demonstrate the hyaline globules seen in some of the cells of Kaposi’s sarcoma. Although the clinical course of Kaposi's sarcoma is variable it is more aggressive than SCH and in the AIDS related variant involvement of lymph nodes and viscera is common. Also, Kaposi’s sarcoma has been shown to be closely related to human herpes virus 8 which has not been described in SCH.

The recommended initial treatment of SCH is conservative excision. In more than 50% of cases, however, new lesions may develop in the same region and they may either be followed or excised.

**Epithelioid Hemangioendothelioma**

Epithelioid hemangioendothelioma (EHE) is an uncommon endothelial tumor that most frequently arises in the soft tissues, liver, lung, and skeleton. It usually behaves as a low-grade sarcoma, however, a minority are aggressive and life threatening. Cytogenetic studies have revealed inconsistent findings including a t(1;3)(p36;25), t(10;14)(p13;q24) and gains and deletions involving chromosomes 11 and 12.

Epithelioid hemangioendothelioma can be seen in most age groups and has its peak frequency in the 2nd and 3rd decades. The tumor affects males and females equally and develops in whites disproportionately more often than members of other races. In the soft tissues the tumor presents as slowly growing somewhat painful solitary mass that arises in the subcutis or the deeper muscle. Frequently, it is angiocentric and is associated with a medium sized vessel, especially a vein.

In contrast, tumors that develop in the skeleton demonstrate multifocal involvement in approximately one-third to one-half of cases and involvement may be in the form of multiple sites in a single bone or separate lesions in multiple bones simultaneously. The tumor tends to arise in the extremities, pelvis and spine. In the extremities, the long bones, as well as the small bones of the hands and feet are commonly involved and typically cause localized pain that may be associated with swelling. Some patients also have disease in the soft tissues, liver or lung at the time of diagnosis of the skeletal disease. The radiographic features are variable; most lesions range in size from 1-5 cm and are round or elongate and predominately lytic. The margins may be well delineated or poorly defined, and the adjacent bone is usually sclerotic.
Epithelioid hemangioendothelioma is pale tan in color, and lacks the red, hemorrhagic appearance of conventional hemangiomas. Microscopically, it is composed of large epithelioid and spindle endothelial cells with round or elongate nuclei, prominent nucleoli, and abundant eosinophilic cytoplasm. Intracytoplasmic lumens appear as vacuoles that may contain intact or fragmented red blood cells. The vacuoles may coalesce to form primitive vascular channels, recapitulating embryonic angiogenesis, however well-formed blood vessels are not prominent in most cases. Instead, the tumor cells are arranged in cords and nests which are embedded within a myxoid to hyalinized ground substance that may resemble cartilaginous matrix. Only in a minority of cases is a prominent inflammatory infiltrate present. In some cases the spindle cells are prominent and are arranged in intersecting fascicles. The neoplastic cells generally show limited cytologic atypia and mitotic activity, but in some cases, nuclear hyperchromasia and pleomorphism are significant and mitoses numerous, making it difficult to distinguish the neoplasm from high-grade angiosarcoma.

The tumor cells express the full spectrum of immunohistochemical endothelial markers including Factor VIII, CD34, and CD31 and, like epithelioid endothelial cells in general, may also exhibit intense and extensive positive staining for keratin and epithelial membrane antigen. The tumor cells usually do not stain with antibodies to S-100 protein, and desmin. Ultrastructurally, the neoplastic cells contain abundant intermediate filaments, pinocytotic vesicles, intracytoplasmic lumens and basal lamina material.

Epithelioid hemangioendothelioma is treated by complete surgical excision if feasible. However, multifocal lesions may be difficult to excise and may require radiation or thermal ablation. Soft tissue primaries metastasize in almost 50% of cases, but many of these involve regional lymph nodes. Only 10-15% of patients with cytologically banal tumors die of disease reflecting their somewhat indolent growth and ability to be cured by excision of metastatic sites, when present. Predicting the outcome for patients with osseous epithelioid hemangioendothelioma is problematic as the clinical behavior is not always predicted by the morphologic features of the tumor. In one large series, 20% of patients succumbed to disease; of those who died most had concurrent visceral tumors. In the absence of parenchymal organ involvement, epithelioid hemangioendothelioma of bone usually behaves in an indolent fashion and infrequently metastasizes. They may locally recur following curettage or slowly enlarge and destroy bone if left untreated.

The differential diagnosis of epithelioid hemangioendothelioma includes other epithelioid vascular neoplasms particularly epithelioid hemangioma and angiosarcoma. Epithelioid hemangioendothelioma is distinguished from epithelioid hemangioma by its characteristic hyalinized stroma and the paucity of well-formed vessels. Angiosarcoma also lacks the hyalinized stroma and usually shows a greater degree of cytologic atypia and mitotic activity. The epithelioid features of the tumor cells, their cohesive nature, and intracytoplasmic vacuoles can also mimic metastatic adenocarcinoma. The staining of tumor cells of epithelioid hemangioendothelioma for epithelial markers can further complicate this distinction. Accordingly, immunohistochemistry employing antibodies directed against endothelial markers should be performed on unusual epithelioid tumors of bone. Fortunately, metastatic carcinomas do not stain for endothelial markers, and the myxoid or hyalinized stroma is distinct from the desmoplasia seen in metastatic carcinoma. The cells in cartilaginous tumors do not form cohesive nests, stain immunohistochemically for S-100 protein, and are negative for endothelial markers.
Composite Hemangioendothelioma

Composite hemangioendothelioma is a rare neoplasm composed of elements that recapitulate vascular tumors of different types that range in biology from benign to malignant. Less than 20 cases have been reported and most have affected young and middle aged adults; several patients have been young children. The tumors tend to arise in the dermis or subcutis and three cases have originated in the oral cavity. One patient had Maffucci’s syndrome. The tumors present as a slowly enlarging mass of frequent long duration, in fact, in some instances, the tumors were first noted at the time of birth. Composite hemangioendotheliomas are poorly defined and infiltrative and the dominant histologic component is a central area of retiform hemangioendothelioma admixed and surrounded by areas that have the appearance of epithelioid hemangioendothelioma. Other components that have been noted include foci that display the features of spindle cell hemangioma, lymphangioma, angiomatosis, arteriovenous malformation, and angiosarcoma. The angiosarcoma element is usually present in only small amounts.

Biologically, composite hemangioendothelioma is locally aggressive and has recurred in approximately 50% of cases, but has only rarely metastasized (lymph nodes and soft tissue). Excision with negative margins is the goal of therapy, however, this may be difficult to achieve because of the large size of some of the lesions.

Epithelioid sarcoma-like Hemangioendothelioma

Epithelioid sarcoma-like hemangioendothelioma is another very rare type of epithelioid vascular neoplasm of low grade malignancy. Only seven cases have been reported and they tend to arise in young adults (17-54, mean 23 years) within the superficial or deep soft tissues, most frequently the extremities. The tumors are usually several centimeters in size and grow as nodules or sheets of large cells with prominent deeply eosinophilic glassy cytoplasm. Many of the cells are polyhedral and they sometimes blend with those that are spindle shaped. The nuclei are gun metal gray and demonstrate minimal to moderate atypia; mitoses are infrequent. Vascular channel formation and hemorrhage are absent, however, intracytoplasmic vacuolization suggestive of cytoplasmic lumen formation is often noted. Immunohistochemically, the tumors express keratin, EMA, CD 31, and Fli-1, but are negative for CD 34. Biologically these tumors have demonstrated recurrence following excision and local soft tissue metastasis.

The differential diagnosis includes epithelioid sarcoma and epithelioid hemangioendothelioma. Epithelioid sarcoma differs in that it is usually composed of nodules of tumor with central necrosis, which is lacking in epithelioid sarcoma-like hemangioendothelioma, and is negative for CD 31, but positive for CD 34. Epithelioid hemangioendothelioma differs morphologically in that the tumor cells grow in cords, have a myxohyaline stroma, and frequently arise from a vessel.

Epithelioid Angiosarcoma

Epithelioid angiosarcoma refers to a variant of angiosarcoma that is composed of neoplastic cells that have an epithelioid morphologic appearance. These tumors are usually poorly differentiated and biologically aggressive. Epithelioid angiosarcoma is the most aggressive of epithelioid vascular tumors and has been described to arise in a variety of different
organs including skin, soft tissue, bone, adrenal, breast, bladder, lung, thyroid, gastrointestinal tract, heart, and great vessels.

In our experience most angiosarcomas of soft tissue and bone are of the epithelioid type. All age groups are affected but the majority of patients are middle aged adults. Some tumors may arise in the background of previous radiation, in an arterio-venous fistula, be associated with genetic diseases such as neurofibromatosis, Klippel-Trenaunay, and Maffucci’s syndromes, or arise in association with a different type of neoplasm. In the soft tissues these tumors usually present as a rapidly growing aggressive mass in the superficial or deep soft tissues of the extremities, followed by the trunk and head and neck. In the skeleton the long bones, especially the femur are frequently affected followed by the spine and small bones of the distal extremities; approximately 60% of bone lesions are multifocal. Radiographically, the tumors present as lytic, poorly defined masses that frequently destroy the cortex and extend into the soft tissues.

The tumors are friable hemorrhagic masses that range in size from several centimeters to greater than 14 cms. Histologically, they grow with an infiltrative pattern and are composed of large polyhedral cells with prominent nucleoli and abundant eosinophilic cytoplasm that may contain clear vacuoles similar to those in the other types of epithelioid endothelial cell tumors. The cells may grow in solid sheets, form well-developed vascular channels, assume papillary structures mimicking papillary endothelial hyperplasia, and contain cystically dilated spaces filled with blood. In many cases the epithelioid cells transition into those that are spindle shaped which can be arranged in fascicles. Nuclear pleomorphism is severe, mitoses including atypical forms are often numerous, hemorrhage is abundant, and necrosis is commonplace. In some tumors a prominent neutrophilic may be present.

Immunohistochemically, the tumors express one or more of the endothelial markers including Factor 8 related antigen, CD 31, CD 34 and Fli-1. A significant percentage of cases also strongly express keratin and EMA.

Ultrastructurally the epithelioid cells are frequently surrounded by basal lamina, and have intercellular and intracellular lumina. Intermediate filaments arranged in whorls are common, pinocytotic vesicles are usually seen and some tumor cells have tonofilament-like structures. Weibel-Palade bodies are rare or absent.

Biologically these tumors are aggressive and need to be treated with side complete excision, if possible. At least 50% of patients with soft tissue epithelioid angiosarcoma and almost all patients with bone primaries die of metastatic disease.

The differential diagnosis includes a variety of lesions, but one of the most important is metastatic carcinoma. Metastatic carcinoma can be difficult to distinguish from epithelioid angiosarcoma, especially in the skeleton. Both tumors can involve multiple bones, affect older individuals, and are composed of sheets of epithelioid tumor cells that may express epithelial markers. Helpful histologic features in correctly identifying epithelioid angiosarcoma include the presence of well-formed vascular channels, cytoplasmic vacuoles that are mucin negative and contain intact or fragments of red blood cells, and an intratumoral neutrophilic infiltrate. Lastly, most carcinoma do not express endothelial markers.
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References

Bacillary Angiomatosis

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