A 72-year-old man presented with a well-circumscribed nonpainful mass in the upper inner quadrant of his left breast that was first noticed a year prior to admission. He was otherwise healthy. A lumpectomy was performed at an outside hospital to rule out malignancy. The slides were sent to the Ohio State University Department of Pathology for consultation. Grossly, the tumor was described as a 3.3 × 1.5 × 1.5-cm solid and sharply circumscribed mass with a gray-yellow and lobulated cut surface. No cystic spaces, hemorrhage, necrosis, or hard areas were noted. Microscopically, the tumor was sharply circumscribed with fibrous pseudocapsule (Figure 1). It was comprised of bland spindle-shaped tumor cells in a variably collagenous (Figure 2, A) and myxoid (Figure 2, B) stroma. The tumor cells had pale eosinophilic cytoplasm with stellate processes, fusiform nuclei with irregular contour, and indistinct nucleoli (Figure 2). Mitotic count was extremely low, averaging 0 to 1 per 10 high-power fields. No epithelial component, adipocytes, smooth muscle, cartilage, or necrosis was noted in the tumor. Immunostaining showed that the tumor cells were strongly and diffusely positive for vimentin, CD34 (Figure 3, A), and Bcl-2 (Figure 3, B); focally positive for desmin (Figure 4); and negative for S100, smooth muscle actin, smooth muscle myosin heavy chain, and cytokeratin.

What is your diagnosis?
Pathologic Diagnosis: Myofibroblastoma

Myofibroblastoma (MFB) of the breast is an uncommon but highly characteristic mesenchymal tumor. This tumor, described by Wargotz and associates in 1987, is probably the same spindle cell tumor of the breast previously reported by Toker and colleagues in 1981. It is also labeled with different, less-popular terms (benign spindle cell stromal tumor, spindle cell lipoma, fibroma, solitary fibrous tumor, and myogenic stromal tumor) because of its diverse differentiation with variable histologic and immunohistochemical features. It occurs predominantly in elderly men (average age, 64 years). Clinically, patients present with a solitary, nonpainful, movable mass. Radiographically, MFB is a homogeneous, lobulated, well-delimited, round to oval dense mass, usually 1 to 4 cm in diameter. No microcalcifications are present. Ultrasonographically, the tumor is solid, well circumscribed, hypechoic, and compressible with pressure. By gross examination, MFB is a discrete, well-circumscribed mass that does not usually infiltrate the surrounding breast tissue. The cut surface is homogeneous, gray to pink, bulging, and lobulated. Cystic degeneration, necrosis, and hemorrhage have not been reported. Microscopically, a classic MFB is devoid of mammary ducts and lobules. The tumor contains slender spindle-shaped cells arranged in clusters with broad bands of hyalinized collagen throughout the tumor. Mitotic figures are sparse. The border of the tumor usually is circumscribed microscopically. Occasionally, some tumors may contain scattered adipocytes and have an infiltrative border. Myxoid areas may be present. Rarely, smooth muscle cells and cartilage may be seen. Several variants of MFB have been described based on histologic features, without clinical implication. In a collagenized or fibrous variant, the spindle cells are distributed in a highly collagenous stroma. The broad, deep eosinophilic fibrous bands, typical of classic MFB, are absent. Instead, irregular slitlike spaces are present between tumor cells. The epithelioid variant features polygonal or epithelioid cells arranged in alveolar groups. However, there is no reactivity for cytokeratin in the epithelioid MFB. A cellular variant is characterized by a dense proliferation of spindle-shaped neoplastic myofibroblasts. This variant tends to have infiltrative borders microscopically. The infiltrative or lipomatous variant shows infiltrative growth pattern. It consists not only of the classic MFB areas but also fat, mammary stroma, ducts, and lobules. Finally, a myxoid variant consists of dispersed stellate and spindle cells in highly myxoid stroma. Fine-needle aspiration of MFB can be misinterpreted as a malignancy, especially when clinical and imaging findings are not taken into consideration. Typically, cohesive and single spindle cells without atypia are present. The oval nuclei have fine granular chromatin with occasional nuclear groove. However, the smear can be cellular, with dyscohesive epithelioid cells, resulting in overdiagnosis. MFBS are typically immunoreactive for vimentin, CD34, and Bcl-2. They are usually positive for one or more of muscle markers, such as muscle-specific actin, smooth muscle actin, and desmin. Typically, the tumors are negative for smooth muscle myosin heavy chain, S100 protein, and cytokeratin. On electron microscopy the tumor is predominantly comprised of myofibroblasts. The main features of myofibroblasts are prominent surface fibronectin fibrils, unique fibronexus, stellate and long cytoplasmic processes, discontinuous external basal lamina, modestly developed microfilaments with focal density, modest round endoplasmic reticulum, and deep indentation of nuclear contour. Fibronexus, also known as microtendon, apparently unique to myofibroblasts, represents the point of convergence of intracellular microfilaments and extracellular fibronectin filaments. MFB may share histologic and immunohistochemical features with solitary fibrous tumor and spindle cell lipoma. A recent cytogenetic study also linked MFB to spindle cell lipoma. Some investigators reserve the diagnosis of myofibroblastoma for lesions expressing both actin and CD34, while classifying actin-negative and CD34-positive lesions as solitary fibrous tumors. These distinctions seem unwarranted in view of the “plasticity” of myofibroblastic phenotypic expression. Myofibroblasts may express vimentin only or may be positive for actin and/or desmin in addition to vimentin, depending on the functional status of the myofibroblasts.

Several benign and malignant spindle cell neoplasms may mimic MFBS. Spindle cell sarcomas and spindle cell metastatic carcinoma are more cellular, with evident atypia and frequent mitotic figures. Spindle cell adenomyoepithelioma contain spindle-shaped myoepithelial cells that are typically immunoreactive for smooth muscle myosin heavy chain and variably positive for S100 protein and cytokeratin. Ultrastructurally, myoepithelial cells contain prekeratin tonofilaments. Fibromatosis consists of abundant collagen and long sweeping fascicles of attenuated fibroblastic cells rather than short fascicular clusters of myofibroblasts. The tumor cells are negative for CD34, Bcl-2, or smooth muscle actin. Smooth muscle neoplasms are immunoreactive for smooth muscle myosin heavy chain and calponin in addition to smooth muscle actin and are negative for CD34 and Bcl-2. In addition, both fibroblasts and smooth muscle cells are ultrastructurally distinct from myofibroblasts.

Cellular angiolipoma of breast have spindle cell areas associated with collapsed and patent blood vessels in a background of mature adipose tissue. A characteristic feature of this tumor is the presence of intravascular fibrin thrombi. Immunohistochemical studies show immunoreactivity for endothelial markers. Nerve sheath tumors show typical wavy spindle cells with nuclear palisading and are positive for S100 protein and negative for CD34, Bcl-2, and actin.

MFB is a benign mesenchymal neoplasm. None of the original patients described by Wargotz et al developed recurrence or metastasis. Simple excision is adequate, except for large tumors, which may require mastectomy.

References