Actins are ubiquitous eucaryotic proteins. Actin filaments are involved in diverse functions which include cell contraction, motility, adhesion, division, cell shape maintenance and muscle contraction. Four actin isoforms are tissue specific (α-smooth muscle actin, α-cardiac actin, α-skeletal actin and γ-smooth muscle actin). Two other actin isoforms (cytoplasmic β- and γ-actins) are ubiquitous. Alpha-smooth muscle actin (α-SMA) expression is typically found in vascular and enteric muscle tissue, in myoepithelial cells, myofibroblasts and pericytes. However, expression of this actin isoform could be detected in a variety of other cells and tumors with a preexisting different phenotype.

Our study focused on the expression of actin isoforms in some muscular and non-muscular tissues and tumors. The goals of our study were: 1 Analysis of actin isoforms expression in normal, osteoarthrotic, posttraumatic and transplanted cartilage. 2 Analysis of actin isoform expression in some non-muscle tumors. 3 Analysis of actin isoform expression in uterine leiomyomas after therapy and in leiomyomas with inclusion bodies of the gastrointestinal tract and uterus and the detailed analysis of inclusion bodies.

A total of 82 samples of cartilage, 591 samples of neuroectodermal tumors, 87 cases of breast carcinoma, and 29 cases of uterine and GIT leiomyoma were examined by means of the immunohistochemistry with antibodies directed against α-SMA and muscle specific actin. Some of these cases were examined immunohistochemically with a broad panel of other antibodies. Moreover, selected cases were examined ultrastructurally and by RT-PCR with primers for each actin isoform.

1 We found out that articular cartilage as well as human auricular cartilage contain α-SMA expressing chondrocytes. We confirmed the occurrence of the α-SMA expression in chondrocytes of human articular cartilage with osteoarthrotic changes. Moreover, we found α-SMA expression in chondrocytes of fibrocartilage developed after a chondrocyte transplantation. 2 We proved that the α-SMA expression could be found in some neural crest derived tumors on rare occasions including benign schwannoma, melanoma and melanoma metastases. The α-SMA expression was observed in two breast carcinomas with non-basal phenotype. 3 We demonstrated that there are two types of inclusions in leiomyomas with inclusion bodies with different ultrastructure and staining qualities. No differences in actin expression were observed between treated and untreated leiomyomas of the uterus.

The results of our study broadened the spectrum of normal, reactive and neoplastic cells and tissues different from smooth muscle, myoepithelias, myofibroblasts and pericytes, which could show an expression of α-SMA. Interpretation of this finding is difficult and differs in varying situations, because many questions regarding the specific functions of actin isoforms still remain to be answered. However, the knowledge of situations associated with aberrant or unusual α-SMA expression could have some theoretical as well as practical impact. From the practical point of view, we should be aware of the possibility of the α-SMA expression in some non-muscle cells and tumors to avoid an incorrect diagnosis of a myogenic tumor, especially in cases in which the available biopsy material is limited.