BACKGROUND

The six actin isoforms found in mammalians constitute a family of closely related proteins expressed in a tissue-specific way. β- and γ-cytoplasmic actins are ubiquitous, and four muscle actins with very similar primary sequences [alpha-skeletal (alpha-SKA), alpha-cardiac (alpha-CAA), alpha-smooth muscle (alpha-SMA) and γ-smooth muscle actin (γ-SMA)] are found in the different muscle types. Actin is a globular protein that is one of the most highly-conserved proteins known. It is found in two main states; G-actin is the globular monomeric form, whereas F-actin forms helical polymers. Both G-and F-actin are intrinsically flexible structures - a feature vital in actin's role as a dynamic filament network. Actin has four major functions. Firstly, F-actin polymers form microfilaments - polar intracellular 'tracks' for kinesin motor proteins, allowing the transport of vesicles, organelles and other cargo. Actin is a component of the cytoskeleton and links to alpha-actinin, E-cadherin and beta-catenin at adherens junctions. This gives mechanical support to cells and attaches them to each other and the extracellular matrix. In muscle cells, actin-rich thin filaments associate with myosin-rich thick filaments to form actomyosin myofibrils. Using energy from the hydrolysis of ATP, myofibrils undergo cyclic shortening through actin-myosin head interactions, which represents the mechanics of muscle contraction. Finally, actin has a role in cell motility through polymerization and depolymerization of fibrils.[1]

Alpha-smooth muscle actin (alpha-SMA, or ACTA2) is 42 kD actin isoform. alpha-SMA is transiently expressed in the myocardium and skeletal muscle during the development of the embryo and is highly restricted in adult animals to smooth muscle cells (SMCs); however, it is also expressed in myofibroblasts during wound healing and in a very limited number of adult tissues. These cells are present in healing wounds, scars, and fibrocontractive lesions where they contribute to fibrosis.[2] Myofibroblast differentiation *in vivo* has been proposed to be dependent on a number of local environmental cues, including local production of growth factors such as transforming growth factor (TGF)-β1, extracellular matrix-integrin interactions, and mechanical stress. A number of *cis*-elements and *trans*-acting factors have been described that regulate gene expression of alpha-SMA in SMCs. Moreover, in myofibroblasts, cell-generated traction forces associated with alpha-SMA contribute to matrix remodeling, but exogenous mechanical forces can also increase alpha-SMA expression. Force-induced alpha-SMA utilizes a feed-forward amplification loop involving a priori alpha-SMA in focal adhesions, the binding of the p38 MAP kinase to alpha-SMA filaments, activation of Rho and binding of serum response factor to the CArG-B box of the alpha-SMA promoter. Thus, in addition to its importance as a structural protein in tissue remodeling and contraction, alpha-SMA may serve as a mechanotransducer, based on its ability to physically link mechanosensory elements and to enhance its own, force-induced expression.[3]

References:
1. Pollard, T.D. & Cooper, J.A.: Science 326:1208-12, 2009
2. Cherng, S. et al: J. Am. Sci. 4:7-9, 2008
3. Hinz, B. et al: Mol. Biol. Cell 14:2508-19, 2003

TECHNICAL INFORMATION

Source:
alpha-SMA Antibody is a mouse monoclonal antibody raised against a recombinant human alpha-SMA fragments expressed in *E. coli*.

Specificity and Sensitivity:
This antibody detects alpha-SMA proteins in various cell lysate.

Storage Buffer: PBS and 30% glycerol

Storage:
Store at -20°C for at least one year. Store at 4°C for frequent use. Avoid repeated freeze-thaw cycles.

APPLICATIONS

Application:	*Dilution:
WB	1:1000
IP	n/d
IHC (Paraffin)	1:50-200
ICC	1:50-200
FACS	1:50-200

**Optimal dilutions must be determined by end user.*

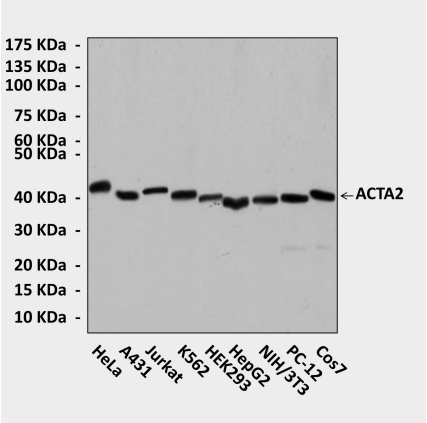
CELL APPLICATIONS, INC.

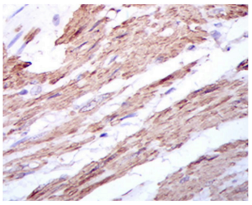
Alpha-SMA/ACTA2 Antibody

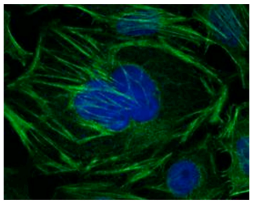
Cat. No. CP10399

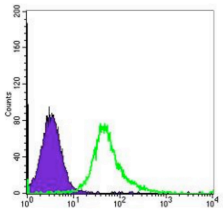
Applications:	**WB, IHC, ICC, FACS**
Detected MW:	**42 kDa**
Species & Reactivity:	**Human, Mouse, Rat**
Isotype:	**Mouse IgG1**

QUALITY CONTROL DATA









Top: Western blot detection of alpha-SMA proteins in various cell lysates using alpha-SMA Antibody. **Middle, Upper:** It also stains paraffin-embedded human esophagus tissue in IHC analysis. **Middle, Lower:** This antibody stains HepG2 cells in confocal immunofluorescent testing (alpha-SMA Antibody: Green; DRAQ5 DNA Dye: Blue). **Bottom:** This antibody detects alpha-SMA proteins specifically in HepG2 cells by FACS assay (alpha-SMA Antibody: Green; negative control: purple).