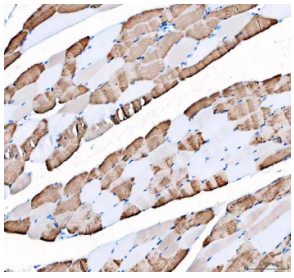
ATP2A1 Antibody / SERCA1 (R30155)

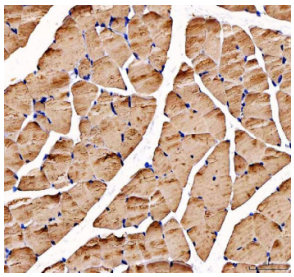
Catalog No.	Formulation	Size
R30155	0.5mg/ml if reconstituted with 0.2ml sterile DI water	100 ug

Bulk quote request

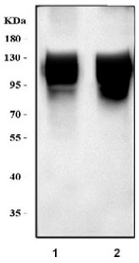
Availability	1-3 business days
Species Reactivity	Human, Mouse, Rat
Format	Antigen affinity purified
Host	Rabbit
Clonality	Polyclonal (rabbit origin)
Isotype	Rabbit IgG
Purity	Antigen affinity
Buffer	Lyophilized from 1X PBS with 2% Trehalose
UniProt	O14983
Localization	Cytoplasm (ER)
Applications	Western Blot : 0.5-1ug/ml Immunohistochemistry (FFPE) : 2-5ug/ml
Limitations	This ATP2A1 antibody is available for research use only.



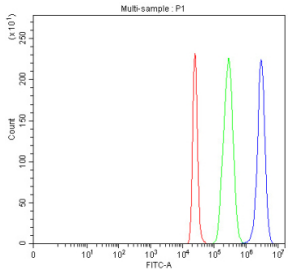
Immunohistochemical staining of FFPE human skeletal muscle tissue with ATP2A1 antibody, HRP-secondary and DAB substrate. HIER: boil tissue sections in pH8 EDTA for 20 min and allow to cool before testing.



Immunohistochemical staining of FFPE rat skeletal muscle tissue with ATP2A1 antibody, HRP-secondary and DAB substrate. HIER: boil tissue sections in pH8 EDTA for 20 min and allow to cool before testing.



Western blot of 1) rat skeletal muscle and 2) mouse skeletal muscle lysates probed with an ATP2A1 (SERCA1) antibody. A strong, broad band is detected at ~110 kDa in both tissues. The unusually thick band reflects SERCA1â€™s extremely high abundance and known tendency to migrate as a broad species due to its large transmembrane structure, partial oligomerization, and oxidative/post-translational modification states.



Flow cytometry analysis of fixed and permeabilized human 293T cells with ATP2A1 antibody at 1ug/million cells (blocked with goat sera); Red=cells alone, Green=isotype control, Blue= ATP2A1 antibody.

Description

ATP2A1 antibody detects the protein Sarcoplasmic/endoplasmic reticulum calcium ATPase 1, widely known as SERCA1, a calcium-transporting ATPase that plays a central role in muscle physiology and intracellular calcium homeostasis. The UniProt recommended name is Sarcoplasmic/endoplasmic reticulum calcium ATPase 1 (ATP2A1). SERCA1 belongs to the P-type ATPase family, a class of ATP-driven ion pumps responsible for establishing and restoring ionic gradients across intracellular membranes. In skeletal muscle, SERCA1 is responsible for rapidly clearing cytosolic calcium after contraction, enabling fast relaxation and supporting repeated high-frequency stimulation of fast-twitch fibers.

ATP2A1 antibody identifies a transmembrane pump of approximately 994 amino acids that resides in the sarcoplasmic reticulum of skeletal muscle and in the endoplasmic reticulum of select non-muscle tissues. SERCA1 operates by binding cytosolic calcium, undergoing ATP-dependent phosphorylation, and transporting calcium into the sarcoplasmic or endoplasmic reticulum lumen. This mechanism reestablishes basal calcium levels following excitation and prevents prolonged elevation of intracellular calcium that would otherwise impair contractility, metabolic stability, and cellular viability. The catalytic cycle of SERCA1 involves large conformational shifts between E1 and E2 states, a hallmark of P-type ATPases, enabling high-efficiency calcium transport at rapid kinetic rates compatible with fast muscle contraction cycles.

The ATP2A1 gene is located on chromosome 16p11.2 and is expressed most prominently in fast-twitch skeletal muscle fibers, where calcium handling demands are exceptionally high. Two major isoforms, SERCA1a and SERCA1b, arise from alternative splicing and differ in developmental expression. SERCA1b is enriched during fetal and neonatal periods, supporting early myofiber maturation, while SERCA1a predominates in adult fast-twitch muscle. Beyond skeletal muscle, ATP2A1 shows low-level expression in lung, skin, and certain secretory cells, reflecting broader physiological roles in endoplasmic reticulum calcium dynamics.

Functionally, SERCA1 maintains calcium sequestration essential for muscle relaxation, metabolic regulation, and prevention of calcium-dependent protease activation. Its rapid pumping capacity is critical for muscles that rely on explosive or repetitive contraction patterns, such as those involved in locomotion, respiration, and reflex responses. SERCA1 function is modulated by interacting proteins including phospholamban and sarcolipin, although ATP2A1 is generally less sensitive to inhibition by these regulators compared to other SERCA family members. Post-translational modifications including phosphorylation, redox changes, and nitrosylation further fine-tune ATPase activity in response to cellular metabolic states.

Pathologically, mutations in ATP2A1 cause Brody myopathy, a rare autosomal recessive skeletal muscle disorder

characterized by impaired muscle relaxation, delayed recovery from contraction, and exercise-induced stiffness. In this condition, defective SERCA1 activity leads to inadequate calcium clearance from the cytosol, resulting in prolonged contraction and impaired muscle performance. Beyond inherited disease, altered SERCA1 expression and impaired calcium pumping have been observed in muscle disuse, aging-related sarcopenia, metabolic stress, and certain neuromuscular disorders. Reduced SERCA function contributes to metabolic inefficiency, elevated oxidative stress, and susceptibility to fatigue. Conversely, experimental upregulation of SERCA1 enhances calcium cycling efficiency, highlighting its therapeutic potential in muscle weakness and metabolic dysfunction.

In broader cellular physiology, ATP2A1 participates in regulating endoplasmic reticulum calcium stores, shaping calcium-dependent signaling pathways that influence gene transcription, protein folding, and cell survival. Changes in luminal calcium can impact chaperone activity, stress responses, and secretion. As research into calcium signaling expands, SERCA1 remains a key determinant of intracellular calcium gradients and homeostasis.

ATP2A1 antibody is validated for use in relevant research applications to detect Sarcoplasmic/endoplasmic reticulum calcium ATPase 1 and support studies of muscle physiology, calcium handling, and intracellular signaling. NSJ Bioreagents provides ATP2A1 antibody reagents optimized for research in muscle biology, calcium transport, metabolic regulation, and neuromuscular pathology.

Application Notes

The stated application concentrations are suggested starting amounts. Titration of the ATP2A1 antibody may be required due to differences in protocols and secondary/substrate sensitivity.

Immunogen

An amino acid sequence from the N-terminus of human ATP2A1 (MEAAHAKTTEECLAYFGVSETTGLTPDQVKRN) was used as the immunogen for this ATP2A1 antibody.

Storage

After reconstitution, the ATP2A1 antibody can be stored for up to one month at 4oC. For long-term, aliquot and store at -20oC. Avoid repeated freezing and thawing.