BACKGROUND

Nogo-A was originally identified as a myelin protein that inhibits neurite outgrowth in the adult central nervous system (CNS). Its identification confirmed the concept that molecules expressed by oligodendrocytes inhibit axon regeneration in the adult brain and spinal cord. This discovery was followed by intensive studies with the goal of developing new therapeutic strategies to enhance axon regeneration and functional recovery after CNS injury. In addition to its oligodendrocyte expression, Nogo-A is also detected in neurons of both the peripheral nervous system and the CNS, in particular, during development.[1] Nogo-A is one of the pivotal factors in the inhibition of axonal regeneration after injury. It is a large membrane protein of 1,163 amino acids containing two main inhibitory regions for neurite growth. The 66–amino acid region in the C-terminal domain (Nogo66), also common to other Nogo splice variants, i.e., Nogo B and C, binds to the Nogo66 receptor NgR. The Nogo66 signaling complex involves NgR, p75/Troy, LINGO-1, and, at least in some types of neurons, PirB. This signaling complex can also be activated by other myelin inhibitory proteins like myelin-associated glycoprotein (MAG) and oligodendrocyte myelin glycoprotein (OMgp). However, blocking NgR does not completely abolish myelin inhibition of neurite outgrowth, which suggests the existence of an NgR-independent mechanism. A 181–amino acid region in the central region of the Nogo-A protein called Nogo-delta20 is Nogo-A specific and is highly inhibitory for spreading and outgrowth of neurons and fibroblast even in the absence of NgR. The in vivo application of the monoclonal antibody 11C7, which is directed against this region and blocks Nogo-delta20 function, leads to enhanced regrowth and regenerative sprouting of spinal axons after spinal cord lesion in rats and monkeys. In vitro, Nogo-delta20 induces growth cone collapse and activates the small GTPase RhoA. The molecular mechanisms underlying Nogo-delta20 action may be involved in endocytic signaling. It was shown that Nogo-delta20 actions on growth cone collapse require signaling from endosomes that contain activated Rho. Internalization of Nogo-delta20 into the signaling endosomes is clathrin independent and occurs by Pincher-dependent endocytosis. The subsequent retrograde axonal transport of Nogo-delta20 in dorsal root ganglion (DRG) neurons results in increased Rho-GTP and decreased levels of phosphorylated cAMP response element binding (pCREB) in the soma. Thus, Pincher-dependent macroendocytosis leads to the formation of Nogo-A signaling endosomes, which act both within growth cones and after retrograde transport in the cell body to negatively regulate the neuronal growth program.[2] The orphan G protein-coupled receptor 50 (GPR50) was found to interact with NOGOA and affect neurite outgrowth. In addition, the physiological function of NOGO-A in the adult, uninjured CNS is involved in stabilizing and maintaining the architecture of hippocampal pyramidal neurons. Mechanistically, although the majority of the activity of Nogo-A relies on a receptor-mediated mechanism involving NgR1, its cell-autonomous function plays a minor role.[3] Moreover, it was shown that the depletion of Nogo-A or functional blockade of neuronal Nogo-A in the adult as well as postnatal intact nervous system causes the reorganization of the cytoskeletal growth cone machinery at both the molecular and morphological levels and that the LIMK1/cofilin phosphorylation state is critical for this process. It is suggested that in the unlesioned adult nervous system, neuronal Nogo-A can restrict neuronal growth through negative modulation of growth cone motility.[4] Furthermore, Nogo-A and its receptor complex play a role in the interplay of adhesive and repulsive cell interactions in radial migration during cortical development. It plays a role as a negative regulator of axon-axon adhesion and growth, and as a facilitator of neurite branching.[5] In addition, NOGO-A may play some role in non-neurosystems. It was shown that an increase Nogo-A in the heart is an adaptive mechanoresponse.

References:
1. Buchli, A.D. & Schwab, M.E.: Annals Med. 37:556-67, 2005
2. Joset, A. et al: J. Cell Biol. 188:271-85, 2010
3. Zagrebelsky, M. et al: J. Neurosci. 30:13220-34, 2010
4. Montani, L. et al: J. Biol. Chem. 284:10793-807, 2009
5. Mathis, C. et al: Cereb. Cortex 20:2380-90, 2010

TECHNICAL INFORMATION

Source: Anti-NOGO-A is a rabbit polyclonal antibody raised against a synthetic peptide corresponding to the C-terminus of human NOGO-A, different from the related rat sequence by single amino acid. NOGO-A specific antibody was purified by peptide affinity chromatograpohy.

Specificity and Sensitivity: It reacts specifically with NOGO-A of human, rabbit, mouse and rat origin in western blotting procedures.

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	1:100 – 400
IP	n/d
IHC	1:50 – 200
ICC	n/d
FACS	n/d

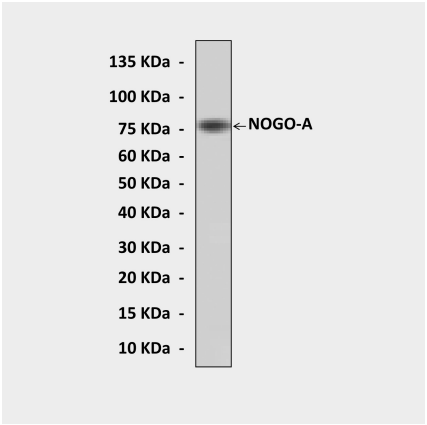
**Optimal dilutions must be determined by end user.*

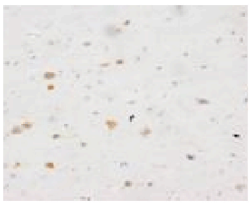
Nogo-A Antibody

Cat. No. CA1309

Applications:	**WB, IHC**
Detected MW:	**78 kDa**
Species & Reactivity:	**Human, Mouse, Rat, Rabbit**
Isotype:	**Rabbit IgG**

QUALITY CONTROL DATA





Top: Detection of NOGO-A from rat brain tissue lysate in Western blot assay, using Anti-NOGO-A. **Bottom:** Immunohistochemical staining of paraffin-embedded rat brain tissue, using Anti-NOGO-A.