

**NAK Antibody**  
Catalog # ASC10126**Specification****NAK Antibody - Product Information**

Application	ICC
Primary Accession	<a href="#">O9UHD2</a>
Other Accession	<a href="#">NP_037386</a> , <a href="#">7019547</a>
Reactivity	Human, Mouse
Host	Rabbit
Clonality	Polyclonal
Isotype	IgG
Calculated MW	84 kDa KDa
Application Notes	NAK antibody can be used for detection of NAK/TBK1 by Western blot. An 84 kDa band should be detected. Antibody can also be used for immunocytochemistry starting at 10 µg/mL.

**NAK Antibody - Additional Information**Gene ID **29110****Other Names**

NAK Antibody: NAK, T2K, NAK, NF-kappa-B-activating kinase, TANK-binding kinase 1

**Target/Specificity**

TBK1; No cross response to IKKa, IKKb, IKKy, or IKKe.

**Reconstitution & Storage**

NAK antibody can be stored at 4°C for three months and -20°C, stable for up to one year. As with all antibodies care should be taken to avoid repeated freeze thaw cycles. Antibodies should not be exposed to prolonged high temperatures.

**Precautions**

NAK Antibody is for research use only and not for use in diagnostic or therapeutic procedures.

**NAK Antibody - Protein Information****Name** TBK1 {ECO:0000303|PubMed:10581243, ECO:0000312|HGNC:HGNC:11584}**Function**

Serine/threonine kinase that plays an essential role in regulating inflammatory responses to foreign agents (PubMed:&lt;a href="http://www.uniprot.org/citations/10581243" target="\_blank"&gt;10581243&lt;/a&gt;, PubMed:&lt;a href="http://www.uniprot.org/citations/11839743" target="\_blank"&gt;11839743&lt;/a&gt;, PubMed:&lt;a href="http://www.uniprot.org/citations/12692549" target="\_blank"&gt;12692549&lt;/a&gt;, PubMed:&lt;a href="http://www.uniprot.org/citations/12702806" target="\_blank"&gt;12702806&lt;/a&gt;, PubMed:&lt;a href="http://www.uniprot.org/citations/14703513" target="\_blank"&gt;14703513&lt;/a&gt;, PubMed:&lt;a href="http://www.uniprot.org/citations/15367631" target="\_blank"&gt;15367631&lt;/a&gt;)

target="\_blank">15367631</a>, PubMed:<a href="http://www.uniprot.org/citations/15485837" target="\_blank">15485837</a>, PubMed:<a href="http://www.uniprot.org/citations/18583960" target="\_blank">18583960</a>, PubMed:<a href="http://www.uniprot.org/citations/21138416" target="\_blank">21138416</a>, PubMed:<a href="http://www.uniprot.org/citations/23453971" target="\_blank">23453971</a>, PubMed:<a href="http://www.uniprot.org/citations/23453972" target="\_blank">23453972</a>, PubMed:<a href="http://www.uniprot.org/citations/23746807" target="\_blank">23746807</a>, PubMed:<a href="http://www.uniprot.org/citations/25636800" target="\_blank">25636800</a>, PubMed:<a href="http://www.uniprot.org/citations/26611359" target="\_blank">26611359</a>, PubMed:<a href="http://www.uniprot.org/citations/32404352" target="\_blank">32404352</a>). Following activation of toll-like receptors by viral or bacterial components, associates with TRAF3 and TANK and phosphorylates interferon regulatory factors (IRFs) IRF3 and IRF7 as well as DDX3X (PubMed:<a href="http://www.uniprot.org/citations/12692549" target="\_blank">12692549</a>, PubMed:<a href="http://www.uniprot.org/citations/12702806" target="\_blank">12702806</a>, PubMed:<a href="http://www.uniprot.org/citations/14703513" target="\_blank">14703513</a>, PubMed:<a href="http://www.uniprot.org/citations/15367631" target="\_blank">15367631</a>, PubMed:<a href="http://www.uniprot.org/citations/18583960" target="\_blank">18583960</a>, PubMed:<a href="http://www.uniprot.org/citations/25636800" target="\_blank">25636800</a>). This activity allows subsequent homodimerization and nuclear translocation of the IRFs leading to transcriptional activation of pro-inflammatory and antiviral genes including IFNA and IFNB (PubMed:<a href="http://www.uniprot.org/citations/12702806" target="\_blank">12702806</a>, PubMed:<a href="http://www.uniprot.org/citations/15367631" target="\_blank">15367631</a>, PubMed:<a href="http://www.uniprot.org/citations/25636800" target="\_blank">25636800</a>, PubMed:<a href="http://www.uniprot.org/citations/32972995" target="\_blank">32972995</a>). In order to establish such an antiviral state, TBK1 form several different complexes whose composition depends on the type of cell and cellular stimuli (PubMed:<a href="http://www.uniprot.org/citations/23453971" target="\_blank">23453971</a>, PubMed:<a href="http://www.uniprot.org/citations/23453972" target="\_blank">23453972</a>, PubMed:<a href="http://www.uniprot.org/citations/23746807" target="\_blank">23746807</a>). Plays a key role in IRF3 activation: acts by first phosphorylating innate adapter proteins MAVS, STING1 and TICAM1 on their pLxIS motif, leading to recruitment of IRF3, thereby licensing IRF3 for phosphorylation by TBK1 (PubMed:<a href="http://www.uniprot.org/citations/25636800" target="\_blank">25636800</a>, PubMed:<a href="http://www.uniprot.org/citations/30842653" target="\_blank">30842653</a>). Phosphorylated IRF3 dissociates from the adapter proteins, dimerizes, and then enters the nucleus to induce expression of interferons (PubMed:<a href="http://www.uniprot.org/citations/25636800" target="\_blank">25636800</a>). Thus, several scaffolding molecules including FADD, TRADD, MAVS, AZI2, TANK or TBKBP1/SINTBAD can be recruited to the TBK1-containing-complexes (PubMed:<a href="http://www.uniprot.org/citations/21931631" target="\_blank">21931631</a>). Under particular conditions, functions as a NF-kappa-B effector by phosphorylating NF-kappa-B inhibitor alpha/NFKBIA, IKKB or RELA to translocate NF-Kappa-B to the nucleus (PubMed:<a href="http://www.uniprot.org/citations/10783893" target="\_blank">10783893</a>, PubMed:<a href="http://www.uniprot.org/citations/15489227" target="\_blank">15489227</a>). Restricts bacterial proliferation by phosphorylating the autophagy receptor OPTN/Optineurin on 'Ser-177', thus enhancing LC3 binding affinity and antibacterial autophagy (PubMed:<a href="http://www.uniprot.org/citations/21617041" target="\_blank">21617041</a>). Phosphorylates SMCR8 component of the C9orf72-SMCR8 complex, promoting autophagosome maturation (PubMed:<a href="http://www.uniprot.org/citations/27103069" target="\_blank">27103069</a>). Phosphorylates ATG8 proteins MAP1LC3C and GABARAPL2, thereby preventing their delipidation and premature removal from nascent autophagosomes (PubMed:<a href="http://www.uniprot.org/citations/31709703" target="\_blank">31709703</a>). Phosphorylates and activates AKT1 (PubMed:<a href="http://www.uniprot.org/citations/21464307" target="\_blank">21464307</a>). Seems to play a role in energy balance regulation by sustaining a state of chronic, low-grade inflammation in obesity, which leads to a negative impact on insulin sensitivity (By similarity). Attenuates retroviral budding by phosphorylating the endosomal sorting complex required for transport-I (ESCRT-I) subunit VPS37C (PubMed:<a href="http://www.uniprot.org/citations/21270402" target="\_blank">21270402</a>).

Phosphorylates Borna disease virus (BDV) P protein (PubMed:<a href="http://www.uniprot.org/citations/16155125" target="\_blank">16155125</a>). Plays an essential role in the TLR3- and IFN-dependent control of herpes virus HSV-1 and HSV-2 infections in the central nervous system (PubMed:<a href="http://www.uniprot.org/citations/22851595" target="\_blank">22851595</a>). Acts both as a positive and negative regulator of the mTORC1 complex, depending on the context: activates mTORC1 in response to growth factors by catalyzing phosphorylation of MTOR, while it limits the mTORC1 complex by promoting phosphorylation of RPTOR (PubMed:<a href="http://www.uniprot.org/citations/29150432" target="\_blank">29150432</a>, PubMed:<a href="http://www.uniprot.org/citations/31530866" target="\_blank">31530866</a>).

#### Cellular Location

Cytoplasm. Note=Upon mitogen stimulation or triggering of the immune system, TBK1 is recruited to the exocyst by EXOC2.

#### Tissue Location

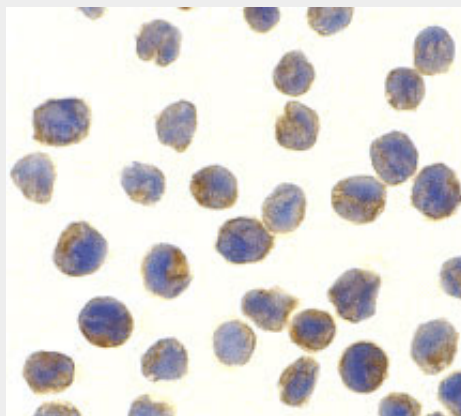
Ubiquitous with higher expression in testis. Expressed in the ganglion cells, nerve fiber layer and microvasculature of the retina.

### NAK Antibody - Protocols

Provided below are standard protocols that you may find useful for product applications.

- [Western Blot](#)
- [Blocking Peptides](#)
- [Dot Blot](#)
- [Immunohistochemistry](#)
- [Immunofluorescence](#)
- [Immunoprecipitation](#)
- [Flow Cytometry](#)
- [Cell Culture](#)

### NAK Antibody - Images



Immunocytochemistry of NAK in MOLT4 cells with NAK antibody at 10 µg/mL.

### NAK Antibody - Background

NAK Antibody: Nuclear factor kappa B (NF-κB) is a ubiquitous transcription factor and an essential mediator of gene expression during activation of immune and inflammatory responses. NF-κB mediates the expression of a great variety of genes in response to extracellular stimuli. NF-κB is

associated with I $\kappa$ B proteins in the cell cytoplasm, which inhibit NF- $\kappa$ B activity. Phosphorylation of I- $\kappa$ B by I $\kappa$ B kinase (IKK) complex leads to degradation of I- $\kappa$ B and activation of NF- $\kappa$ B. The IKK complex contains IKK $\alpha$ , IKK $\beta$ , and IKK $\gamma$ . A novel IKK related kinase was recently identified and designated TBK1 (TANK-binding kinase 1), NAK (NF- $\kappa$ B-activating kinase), and T2K. NAK/TBK1 activates IKK $\beta$  through direct phosphorylation. NAK/TBK1 is activated by growth factors and PMA and mediates IKK and NF- $\kappa$ B activation in response to growth factors. NAK/TBK1 functions upstream of NIK and the IKK complex. NAK/TBK1 is also critical in protecting embryonic liver from apoptosis.

### **NAK Antibody - References**

- Pomerantz JL, Baltimore D. NF- $\kappa$ B activation by a signaling complex containing TRAF2, TANK and TBK1, a novel IKK-related kinase. *EMBO J* 1999;18(23):6694-704
- Tojima Y, Fujimoto A, Delhase M, Chen Y, Hatakeyama S, Nakayama K, Kaneko Y, Nimura Y, Motoyama N, Ikeda K, Karin M, Nakanishi M. NAK is an I $\kappa$ B kinase-activating kinase. *Nature* 2000;404(6779):778-82
- Bonnard M, Mirtsos C, Suzuki S, Graham K, Huang J, Ng M, Itie A, Wakeham A, Shahinian A, Henzel WJ, Elia AJ, Shillinglaw W, Mak TW, Cao Z, Yeh WC. Deficiency of T2K leads to apoptotic liver degeneration and impaired NF- $\kappa$ B-dependent gene transcription. *EMBO J*. 2000;19(18):4976-85.