

# Nucleocapsid-His

Soluble SARS-CoV-2 nucleocapsid protein fused to a poly-histidine (6 x His) tag

Catalog code: his-sars2-n

<https://www.invivogen.com/sars2-nucleocapsid-proteins>

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Version 2019-NJ

## PRODUCT INFORMATION

### Contents:

- 50 µg of lyophilized Nucleocapsid-His protein
- 1.5 ml endotoxin-free water

### Protein construction:

Full-length Nucleocapsid [M1-A419] with a poly-histidine tag in C-terminus

**Accession sequence:** PODTC9

**Species:** SARS-CoV-2 (2019-nCoV); Wuhan-Hu-1 (D614) isolate

**Tag:** C-terminal poly-histidine (6 x His)

**Total protein size:** 430 a.a. (secreted form)

**Molecular weight:** ~52 kDa (SDS PAGE)

**Purification:** Ni<sup>2+</sup> affinity chromatography

**Purity:** >95% (SDS-PAGE)

### Formulation:

0.2 µm filtered solution in a sodium phosphate buffer with glycine, saccharose, and stabilizing agents

### Storage:

- Product is shipped at room temperature. Store lyophilized product at -20°C. Lyophilized product is stable for at least 1 year.
- Reconstituted protein is stable for 1 month when stored at 4°C and for 1 year when aliquoted and stored at -20°C. Avoid repeated freeze-thaw cycles.

### Quality control:

- The size and purity of the protein has been confirmed by SDS-PAGE.
- Nucleocapsid-His has been functionally validated by ELISA using an Anti-SARS Nucleocapsid antibody.
- Absence of bacterial contamination (e.g. lipoproteins and endotoxins) has been confirmed using HEK-Blue™ TLR2 and TLR4 cellular assays.

## BACKGROUND

The SARS-CoV-2 Nucleocapsid (N) is an important structural protein that plays important roles in the viral life cycle including replication, transcription, and genome packaging<sup>1</sup>. The SARS-CoV-2 N features two important NTD and CTD functional domains in N-terminal and C-terminal, respectively<sup>1-6</sup>. NTD interacts with both the RNA genome and M proteins to form virion particles. The N protein interaction with the RNA forms the virus ribonucleoprotein core which is packed as a helical “beads-on-a-string” conformation. CTD allows RNA synthesis through binding of the replication-transcription complexes (RTCs), oligomerization of multiple N proteins through its dimerization domain, and genome incorporation into the new virion. N is a major immunogen of SARS-CoV-2. Indeed, elevated Anti-SARS-CoV-2 N IgG and IgM antibody titers have been reported in COVID-19 patients’ sera<sup>7-9</sup>. These observations make SARS-CoV-2 N an attractive tool for early diagnosis<sup>7-9</sup> and a potential therapeutic drug-target<sup>3</sup>.

## PRODUCT DESCRIPTION

Nucleocapsid-His is a soluble SARS-CoV-2 fusion protein generated by fusing the full-length Nucleocapsid [M1-A419] to a C-terminal poly-histidine (6 x Histidine) tag with a 3 amino acid linker. This fusion protein has a molecular weight of ~52 kDa on a SDS PAGE gel. Nucleocapsid-His has been generated by recombinant DNA technology, produced in CHO cells, and purified by Ni<sup>2+</sup> affinity chromatography.

## APPLICATIONS

- **Vaccination studies:** using combinations of Nucleocapsid protein antigens and adjuvants.
- **Antibody screening:** finding anti-Nucleocapsid antibodies in COVID-19 patients’ sera.
- **Inhibitor screening:** finding small molecules able to block the SARS-CoV-2 nucleocapsid interaction with replication-transcription complexes (RTCs).

## METHODS

### Nucleocapsid-His resuspension (100 µg/ml)

*Note: Ensure you see the lyophilized pellet before resuspension.*

- Add 500 µl of endotoxin-free water to the vial and gently pipette until completely resuspended.
- Prepare aliquots and store at -20°C or 4°C.

## TECHNICAL SUPPORT

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## PROTEIN SEQUENCE

MEIKVLFALICIAVAEAL**LE**MSDNGPQNQRNAPRI  
TFGGPSDSTGNSNNGERSGARSKQRRPQGLPNN  
TASWFTALTQHGKEDLKFPRGQGVPIINTNSSPDD  
QIGYYRRATRIRIRGGDGKMKDLSPRWYFYLLGTG  
PEAGLPYGANKDGIWVATEGALNTPKDHIGTRN  
PANNAAILVQLPQGTTLPKGFYAEGSRGGSQASS  
RSSRSRNSSRNS TPGSSRGTSPARMAGNGGDA  
ALALLLLDRLNQLESKMSGKGGQQQGGQTVTKKSA  
AEASKKPRQKRATKAYNVTQAFGRRGPEQTQG  
NFGDQELIRQGTDYKHWPQIAQFAPSASAFFGM  
SRIGMEVTPSGTWLTYTGAIKLDDKDPNFKDQVI  
LLNKHIDAYKTFPPTEPKKDKKKKADETQALPQR  
QKKQQTVTLLPAADLDDFSKQLQQSMSSADSTQ  
AGSG**H H H H H**

Green: signal sequence

Purple: stabilizing amino acid sequence

Blue: Nucleocapsid sequence

Black: tri-amino acid short linker

Red: 6 x Histidine

## REFERENCES

1. **Mu, J. et al., 2020.** SARS-CoV-2-encoded nucleocapsid protein acts as a viral suppressor of RNA interference in cells. *Sci China Life Sci* 63, 1-4. 2. **Chang C. et al., 2006.** Modular organization of SARS coronavirus nucleocapsid protein. *J. Biom. Sci.* 13:59-72. 3. **Krokhin O. et al., 2003.** Mass spectrometric characterization of proteins from the SARS virus. *Mol. & Cell. Prot.* 2:346-356. 4. **Cubuk, J. et al., 2020.** The SARS-CoV-2 nucleocapsid protein is dynamic, disordered, and phase separates with RNA. *bioRxiv.* doi:10.1101/2020.06.17.158121. 5. **Kang, S. et al., 2020.** Crystal structure of SARS-CoV-2 nucleocapsid protein RNA binding domain reveals potential unique drug targeting sites. *Acta Pharm Sin B.* doi:10.1016/j.apsb.2020.04.009. 6. **Khan, M.T. et al., 2020.** SARS-CoV-2 nucleocapsid and Nsp3 binding: an in silico study. *Arch Microbiol.* doi: 10.1007/s00203-020-01998-6. 7. **Liu, W. et al., 2020.** Evaluation of Nucleocapsid and Spike Protein-Based Enzyme-Linked Immunosorbent Assays for Detecting Antibodies against SARS-CoV-2. *J Clin Microbiol* 58. 8. **Guo L. et al., 2020.** Profiling Early Humoral Response to Diagnose Novel Coronavirus Disease (COVID-19). *Clinical Infectious Diseases.* 71(15) :778-785. 9. **To K. K-W. et al., 2020.** Temporal profiles of viral load in posterior oropharyngeal saliva samples and serum antibody responses during infection by SARS-CoV-2: an observational cohort study. *The Lancet Infectious Diseases.* 20(5):565-574.

## RELATED PRODUCTS

Product	Catalog Code
Nucleocapsid-Fc	fc-sars2-n
Spike-S1-Fc	fc-sars2-s1
Spike-S1-His	his-sars2-s1
Spike-RBD-Fc	fc-sars2-srbd
Spike-RBD-His	his-sars2-srbd

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