

The Role of Neuropilin-1 in the transmission process of the COVID-19 disease

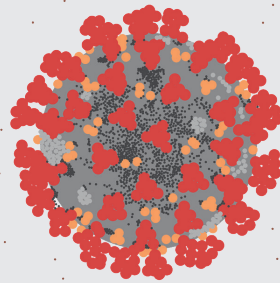
Neuropilin-1 (NRP1) is an essential trans-membrane cell surface receptor acting primarily as a co-receptor for various ligands (i.e. VEGF, Semaphorins) ⁽¹⁾. Due to alternative splicing or shedding, the extracellular region can be released into circulation as soluble Neuropilin-1 ⁽²⁾.

NRP1 functions in many key biological processes including the neuronal, cardiovascular and the immune system ⁽¹⁾.

The virus SARS-CoV-2 is the causative agent of the coronavirus disease COVID-19 ⁽³⁾

NRP1 is expressed in multiple cell types in the body but occurs primarily on cells in the lung, nose and brain (i.e. respiratory and olfactory epithelium as well as in the CNS) ⁽⁴⁾.

SARS CoV 2 enters the host cells by its spike proteins mainly through its binding to the angiotensin converting enzyme 2 (ACE2) ⁽⁶⁾.



Recent reports by two independent research groups proposed that NRP1 could play an important role in the transmission process of COVID-19 disease ^(4,5).

Did you know?

Total soluble Neuropilin-1 can easily be measured by ELISA.

Total soluble Neuropilin-1 ELISA
(cat.no. BI-20409)

RELIABLE – Rigorously validated according to international quality guidelines

LOW SAMPLE VOLUME – 10µl / well

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In addition to ACE2, the cellular receptor NRP1, may also be implicated in the SARS-CoV-2 infection ^(4, 5, 7).

By binding to the NRP1 receptor, SARS-CoV-2 could significantly potentiate its infectivity, which can be inhibited by a monoclonal NRP1 blocking antibody ^(4, 5, 7).

Gene expression analysis of lung tissue from COVID-19 patients revealed an up-regulation of NRP1 ⁽⁸⁾.

This early research leads to speculations on the role of NRP1 as a therapeutic target. Further intensive research is warranted to understand the possible role of NRP1 in the COVID-19 transmission process.

1. Guo HF and Vander Kooi CW. Neuropilin Functions as an Essential Cell Surface Receptor. J Biol Chem, 2015; 290:29120–29126.
2. Gagnon ML et al., Identification of a natural soluble neuropilin-1 that binds vascular endothelial growth factor: in vivo expression and antitumor activity. Proc Natl Acad Sci, 2000; 97, 2573–2578.
3. Zhu N et al., A Novel Coronavirus from Patients with Pneumonia in China, 2019. N Engl J Med, 2020; 382, 727-733.
4. Cantuti-Castelvetri L et al., Neuropilin-1 facilitates SARS-CoV-2 cell entry and provides a possible pathway into the central nervous system. bioRxiv, 2020.
5. Daly JL et al., Neuropilin-1 is a host factor for SARS-CoV-2 infection. bioRxiv, 2020.
6. Li W et al., Angiotensin-converting enzyme 2 is a functional receptor for the SARS coronavirus. Nature, 2003; 426:450–454.
7. Davies J et al., Neuropilin 1 as a new potential SARS CoV 2 infection mediator implicated in the neurologic features and central nervous system involvement of COVID 19. Mol Med Rep, 2020; 22:5; 4221-4226.
8. Ackermann M et al., Pulmonary vascular endothelialitis, thrombosis, and angiogenesis in Covid-19. N Engl J Med, 2020; 9; 383 (2): 120-128.