

Hemagglutinin (HA) and Neuraminidase (NA) [[1](#), [2](#), [3](#)]

HA and NA are **two glycoproteins found on the surface of influenza viruses**. They play crucial roles in the virus life cycle, facilitating attachment to host cells and release of new viruses. [[4](#), [5](#), [6](#), [7](#)]

Functions: [[8](#), [9](#), [10](#)]

- **HA:** Binds the virus to sialic acid receptors on host cell membranes, initiating infection. [[5](#), [11](#)]
- **NA:** Cleaves sialic acid receptors, allowing the virus to detach from infected cells and release new viruses. [[5](#), [12](#), [13](#)]

Role in Infection: [[14](#)]

1. **Attachment:** HA binds to sialic acid receptors on the host cell surface. [[7](#), [15](#), [16](#), [17](#)]
2. **Entry:** The virus enters the host cell through fusion or endocytosis. [[18](#)]
3. **Replication:** The virus replicates inside the host cell. [[19](#), [20](#)]
4. **Release:** NA cleaves sialic acid receptors, allowing the newly produced viruses to detach from the host cell and infect new ones. [[15](#), [21](#)]

Importance in Antiviral Therapy: [[22](#)]

HA and NA are important targets for antiviral drugs. Neuraminidase inhibitors (NAIs), such as oseltamivir (Tamiflu), prevent NA from cleaving sialic acid receptors, blocking virus release and inhibiting infection. [[23](#), [24](#), [25](#), [26](#), [27](#), [28](#)]

Additional Notes: [[29](#), [30](#), [31](#)]

- HA and NA are also found in other viruses, such as paramyxoviruses. [[29](#), [30](#), [31](#)]
- The subtypes of HA and NA determine the host specificity and virulence of influenza viruses. [[7](#), [32](#)]
- Mutations in HA and NA can lead to changes in virus infectivity and resistance to antiviral drugs. [[33](#), [34](#)]

Conclusion: [[35](#)]

Hemagglutinin (HA) and neuraminidase (NA) are essential viral glycoproteins that play critical roles in influenza virus infection. They facilitate attachment to host cells, entry, and release of new viruses. Understanding their functions and interactions is crucial for developing effective antiviral therapies and vaccines. [[16](#), [36](#), [37](#), [38](#), [39](#), [40](#), [41](#), [42](#), [43](#)]

Generative AI is experimental.

- [1] <https://www.sciencedirect.com/topics/immunology-and-microbiology/hemagglutinin-neuraminidase>
- [2] <https://www.sciencedirect.com/topics/immunology-and-microbiology/virus-hemagglutinin>
- [3] <https://pmc.ncbi.nlm.nih.gov/articles/PMC10549826/>
- [4] <https://www.cancer.gov/publications/dictionaries/cancer-terms/def/hemagglutinin-neuraminidase>
- [5] <https://pmc.ncbi.nlm.nih.gov/articles/PMC6520700/>
- [6] <https://pmc.ncbi.nlm.nih.gov/articles/PMC136693/>
- [7] <https://www.nature.com/articles/srep45043>
- [8] <https://www.sciencedirect.com/topics/medicine-and-dentistry/hemagglutinin>

- [9] <https://www.sciencedirect.com/topics/neuroscience/neuraminidase>
- [10] <https://pmc.ncbi.nlm.nih.gov/articles/PMC3169259/>
- [11] <https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/hemagglutinin-neuraminidase>
- [12] <https://www.sciencedirect.com/topics/immunology-and-microbiology/hemagglutinin-neuraminidase>
- [13] <https://pubmed.ncbi.nlm.nih.gov/31137516/>
- [14] <https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/hemagglutinin-neuraminidase>
- [15] <https://pmc.ncbi.nlm.nih.gov/articles/PMC2937864/>
- [16] <https://www.youtube.com/watch?v=caMne7nQUL8>
- [17] <https://pmc.ncbi.nlm.nih.gov/articles/PMC3410141/>
- [18] <https://pmc.ncbi.nlm.nih.gov/articles/PMC8830744/>
- [19] <https://pmc.ncbi.nlm.nih.gov/articles/PMC4162146/>
- [20] <https://pmc.ncbi.nlm.nih.gov/articles/PMC7149683/>
- [21] <https://pubmed.ncbi.nlm.nih.gov/37754760/>
- [22] <https://synapse.patsnap.com/article/what-are-hemagglutinin-inhibitors-and-how-do-they-work>
- [23] <https://pmc.ncbi.nlm.nih.gov/articles/PMC6362415/>
- [24] <https://pmc.ncbi.nlm.nih.gov/articles/PMC374304/>
- [25] <https://pmc.ncbi.nlm.nih.gov/articles/PMC7172302/>
- [26] https://wwwnc.cdc.gov/eid/article/24/10/et-2410_article
- [27] <https://pmc.ncbi.nlm.nih.gov/articles/PMC4074938/>
- [28] <https://www.cdc.gov/flu/hcp/antivirals/index.html>
- [29] <https://pmc.ncbi.nlm.nih.gov/articles/PMC136693/>
- [30] <https://www.sciencedirect.com/science/article/pii/S0969212605001310>
- [31] <https://www.sciencedirect.com/topics/medicine-and-dentistry/paramyxoviridae>
- [32] <https://pubmed.ncbi.nlm.nih.gov/2915381/>
- [33] <https://virologyj.biomedcentral.com/articles/10.1186/1743-422X-6-74>
- [34] <https://pmc.ncbi.nlm.nih.gov/articles/PMC7798331/>
- [35] <https://www.tandfonline.com/doi/pdf/10.1038/s41426-018-0182-2>
- [36] <https://pmc.ncbi.nlm.nih.gov/articles/PMC112098/>
- [37] <https://pubs.acs.org/doi/10.1021/acscentsci.8b00666>
- [38] <https://www.sciencedirect.com/science/article/pii/S1198743X16302312>
- [39] <https://pmc.ncbi.nlm.nih.gov/articles/PMC7397844/>
- [40] <https://pmc.ncbi.nlm.nih.gov/articles/PMC5536029/>
- [41] <https://pubmed.ncbi.nlm.nih.gov/31629602/>
- [42] <https://pmc.ncbi.nlm.nih.gov/articles/PMC6563287/>
- [43] <https://www.sinobiological.com/research/virus/influenza-hemagglutinin-function>