



True Colostrum

Sweet Sialic Acid & Pathogen Protection

Joseph Phillips

WHY COLOSTRUM6?



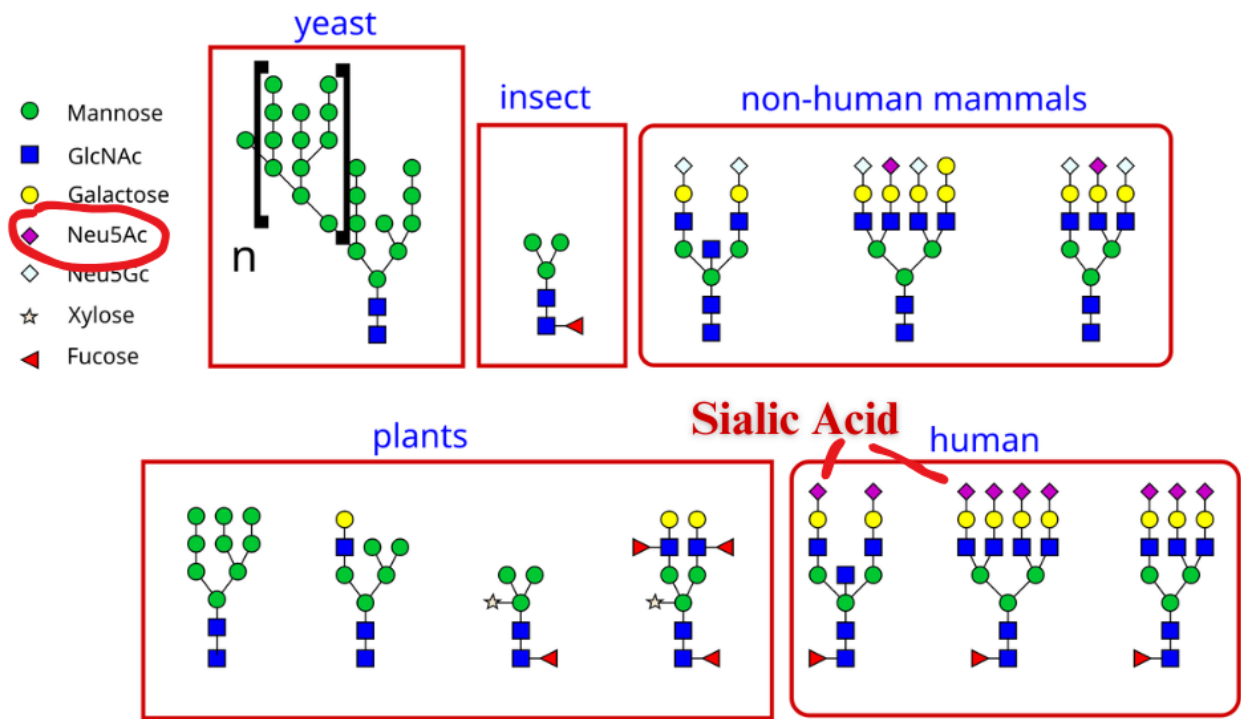
By Land (Colostrum) & Sea (Fucoidan)

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First Contact Point of Pathogens with Sialic Acid Receptors

The initial encounter between pathogens and human cells often involves **sialic acid** receptors. These are essentially sugar receptors. This is crucial in the study of glycoimmunology, which is the study of how sugars (glycans) impact immune function, otherwise known as “[The Sugar Code](#)”. Sialic acid is at the tip of the glycan sugar chain and first point of contact with foreign invaders like H5N1 Bird Flu Influenza.

N-Linked Glycosylation

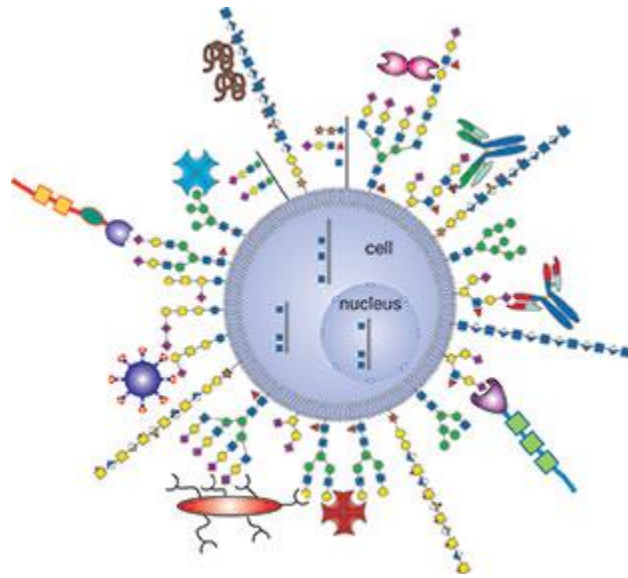


Variety of Glycans (Sugars)

The Role of Glycans and Sialic Acid

Every cell in the human body is draped in a cloak of sugars, or sugar chains, known as glycans. These glycans are not just decorative; they are functional elements that play a part in various biological processes, including cell-to-cell

communication, immunity, and infection. At the pinnacle of these sugar chains is sialic acid, a unique sugar that's often the first point of contact for pathogens like viruses and bacteria.



The Pivotal Role of Sialic Acid in Pathogen Detection and Immune Response

In the tapestry of human biology, sialic acid plays the role of a watchful guardian at the gateway of cellular interaction. This unique sugar, perched on the outermost point of glycans that cloak every cell, serves a critical function in the complex interplay of pathogen recognition and immune response. When discussing "Sialic Acid" and "self pattern recognition," it refers to the concept that sialic acids act as a "self-associated molecular pattern (SAMP)" that is recognized by the immune system as a marker of "self," allowing the body to distinguish its own cells from foreign invaders, essentially acting as a key component in self-recognition mechanisms. [R]

Glycans and the Sentinel Role of Sialic Acid

Glycans, the sugar chains that drape over cells, are not mere decorations but are intrinsic to numerous biological functions, including cellular signaling and immune modulation. Sialic acid, as the terminal sugar on these chains, acts as the frontline in the differentiation between **self and non-self**. This distinction is paramount in our body's constant battle against infection, autoimmune diseases, and cancer,

setting the stage for either a harmonious defense or an unwarranted attack on the body's own tissues.

Self vs. Non-Self Discrimination

Sialic acid's presence or absence on cell surfaces is a key determinant in the immune system's ability to recognize self from non-self. Pathogens often exploit sialic acids to evade the host's immune defenses, mimicking self-markers to avoid detection. Conversely, the loss of sialic acid on diseased or damaged cells marks them for destruction and removal by immune cells. [[R](#)]

Infection and Disease Implication

Sialic acid's role extends into the realms of infectious diseases, autoimmune disorders, and cancer. In infections, pathogens might alter or mask their sialic acid to evade immune surveillance. For autoimmune diseases, the misinterpretation of sialic acid markers can lead to the immune system mistakenly attacking the body's own cells. In cancer, tumor cells often overexpress sialic acids to shield themselves from immune detection and destruction. [[R](#), [R](#), [R](#)]

Sialic Acid in Allergic Disease

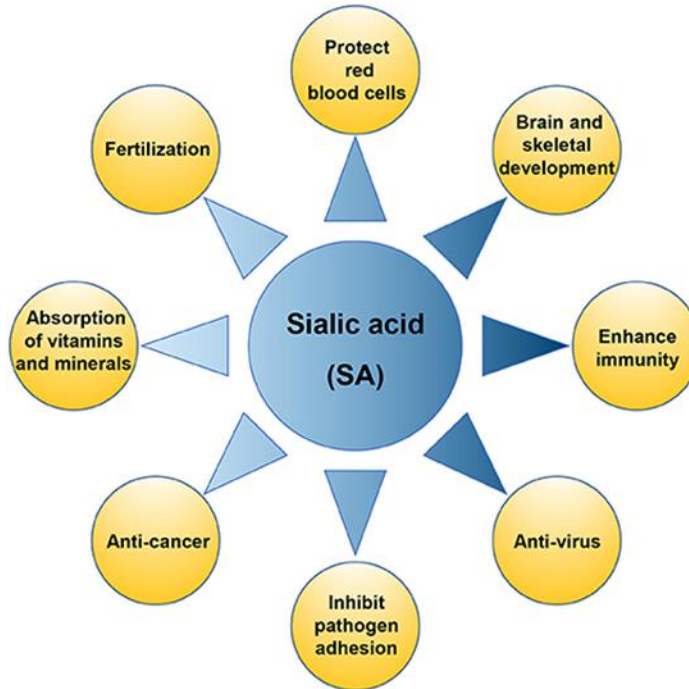
In the context of allergic diseases, sialic acid plays a complex and nuanced role, particularly in the modulation of IgE and mast cells. IgE, the antibody type involved in allergic reactions, binds to mast cells which are rich in sialic acid. The interaction of sialic acid with these elements may affect the severity and sensitization phase of allergic responses. The modulation of sialic acid on immune cells like mast cells can influence their activation and the subsequent release of histamines, which are central to the allergic response. Thus, sialic acid can impact the intensity and threshold of allergic reactions, making it a focal point in the understanding and managing of allergic diseases. The implications reach far and wide even into the realm of food allergies and even asthma. [[R](#), [R](#), [R](#), [R](#)]

Abundance of Sialic Acid in Nature and Its Health Implications

While sialic acid is ubiquitous in human tissues, its concentrated sources like **Edible Bird's Nest** and **Colostrum** boast noteworthy health benefits. These natural substances are prized not only for their nutrient content but also for their

sialic acid concentration, which is implicated in supporting immune health, brain development, and potentially mitigating allergic reactions.

The intricate dance of sialic acid at the crossroads of self and non-self recognition underscores its critical role in immunological defenses, influencing the outcomes of infections, autoimmune diseases, cancer, and allergic diseases.



Benefits of Sialic Acid in the Body

Sialic acid is involved in many aspects of our health:

1. **Immune Response:** It helps regulate the immune response by distinguishing between the body's cells and unwanted invaders, promoting the appropriate immune action. [R]
2. **Pattern Recognition:** Sialic acid is critical for pattern recognition processes and helps in the development of tissues and organs. [R]
3. **Brain Development:** It has a profound role in brain development and cognitive function due to its presence in gangliosides, elements that are crucial for neuronal function. [R]

4. **Anti-inflammatory Properties:** Sialic acid has been known to display anti-inflammatory properties, helping the body to manage inflammation and repair. [\[R\]](#)
5. **Cellular Signaling:** It's also vital for cellular signaling, a process by which cells respond to cues in their environment. [\[R\]](#)

Sialic Acid in Nature

While sialic acid is present in various bodily tissues, it's notably abundant in certain natural substances:

- **Edible Bird's Nest:** Considered a delicacy in Chinese cuisine and traditional Chinese medicine, the edible bird's nest, created by swiftlets using their saliva, is rich in sialic acid. It's been lauded for its health benefits, which are often attributed to its high sialic acid content.
- **Colostrum:** This is the first form of milk produced by mammals immediately following the delivery of the newborn. Colostrum is more readily available and rich in nutrients and antibodies, including sialic acid. Its function is not only to nourish but also to provide potent immune protection to the newborn, wherein sialic acid plays an integral role.

Both of these sources have gained attention for their potential health benefits linked to their sialic acid content, proposing a supportive role in immune health and potentially cognitive function.

Decoy Defense: Harnessing Sialic Acid Supplementation to Thwart Viral Infections

Using sialic acid in the form of supplementation, can play a strategic role in preventing viral infections by acting as decoy receptors that bind virions and block virus infection. Sialic acids, abundant on the surfaces of vertebrate cells and especially on mucosal surfaces, interact with various microbes, including viruses, by facilitating or hindering their ability to bind to host cells. The supplementation with sialic acid or its mimetics can essentially offer "false targets" for viruses, thereby hindering their attachment and subsequent entry into genuine host cells. This mechanism is particularly relevant in the context of influenza viruses, which utilize their hemagglutinin proteins to attach to sialic acid residues on host cells as the initial step of infection. [\[R, R, R\]](#)

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In essence, sialic acid supplementation saturates the "binding sites" of viruses with decoy molecules, reducing the chances that these pathogens can bind to and enter human cells. Through such a blockade, the spread of the virus within the host can be significantly minimized or even prevented altogether, providing a protective shield against a range of sialic acid-binding viruses.

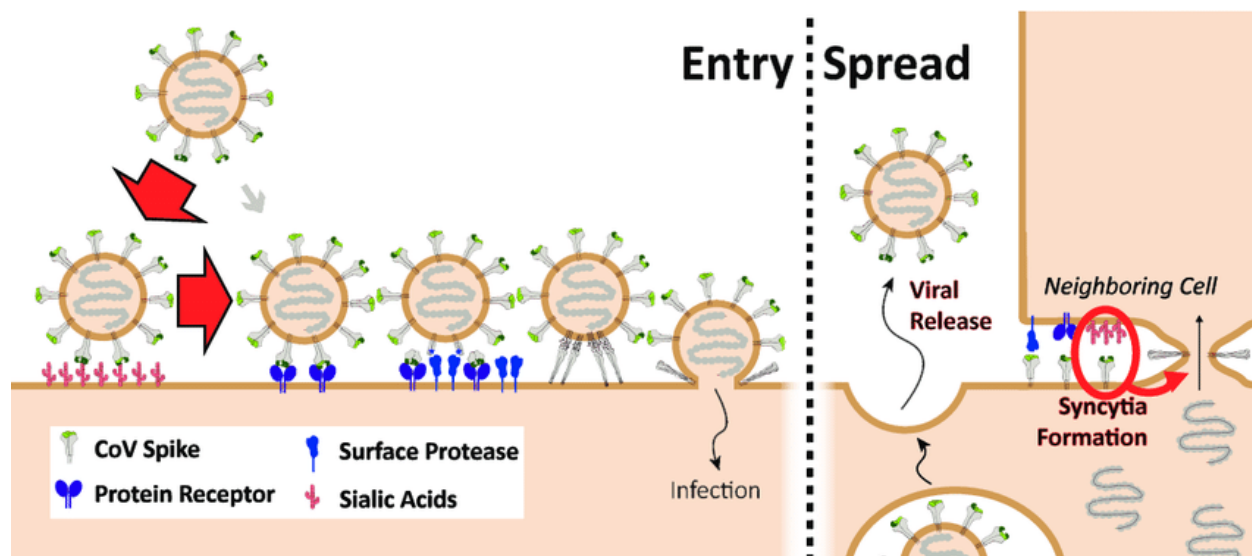
The therapeutic strategy focuses on leveraging the natural virus entry mechanism against itself by exploiting its specificity for sialic acids. This approach, grounded in the intricate understanding of the virus-host interaction, underlines the potential of sialic acid supplementation not only as a preventive measure but also as a component of broader antiviral strategies.

Sources:

1. [https://www.cell.com/trends/microbiology/fulltext/S0966-842X\(16\)30093-2](https://www.cell.com/trends/microbiology/fulltext/S0966-842X(16)30093-2)
2. <https://pmc.ncbi.nlm.nih.gov/articles/PMC5123965/>
3. <https://www.sciencedirect.com/science/article/pii/S2633067924000218>

Sialic Acid and Viral Attachment

Sialic acid plays a pivotal role in cellular recognition processes, particularly in the interactions between cells and pathogens such as viruses. Found at the outermost ends of glycan chains on the surface of cells, sialic acids are critical for the attachment and entry of viruses into host cells, marking the initial step in viral infections.

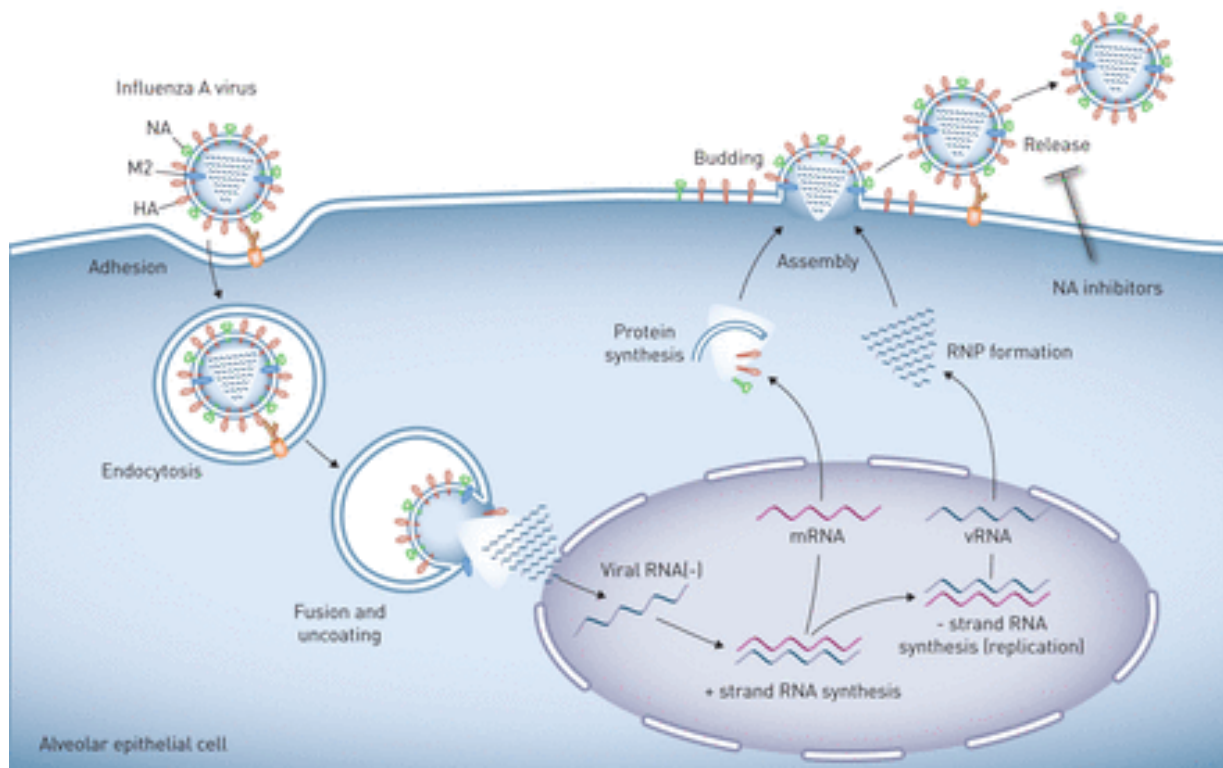


Importance in Viral Lifecycle

In the context of influenza viruses, sialic acid is especially crucial. These viruses possess hemagglutinin (HA) proteins on their viral envelope that specifically recognize and bind to sialic acid moieties **present on the surface of respiratory tract cells**. This binding is selective and dictates the tropism of the virus, meaning it determines which host species and cell types the virus can infect. [R]

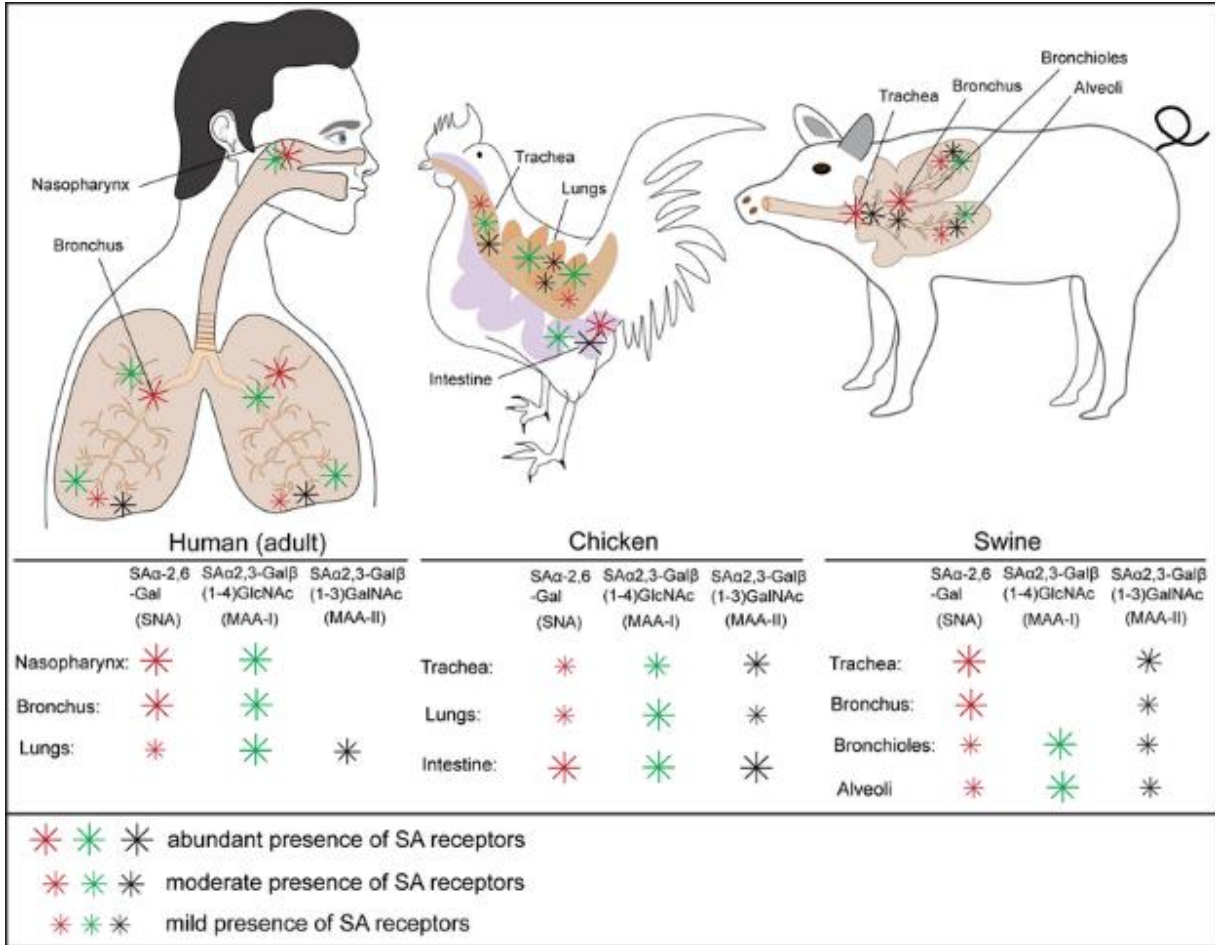
Viral Attachment Process

The process begins when the HA protein of the influenza virus binds to sialic acid residues linked to proteins or lipids on the surface of epithelial cells in the respiratory tract. This attachment is the first critical step in the viral entry process, allowing the virus to anchor itself securely to the host cell. Following this binding, the virus can then initiate entry into the cell, either via endocytosis or membrane fusion, depending on the virus and the specific cellular context. [R]



Species specificity:

Avian influenza viruses like H5N1 usually prefer "**alpha-2,3 linked sialic acid**" receptors [R], which are more abundant in bird respiratory tracts, while **human influenza viruses typically bind to "alpha-2,6 linked sialic acid"** receptors. [R]



Implications for Treatment and Prevention

Understanding the interaction between sialic acid and viral HA has significant implications for both treatment and prevention of viral infections. It facilitates the development of antiviral compounds that can block this initial step of viral attachment, thereby preventing the virus from successfully infecting the host cells.

For instance, designing mimetics of sialic acid that bind to viral HA without facilitating further steps in the viral lifecycle can serve as effective decoys, blocking actual virus binding and entry. Moreover, the role of sialic acid in viral attachment has also aided in the identification of strains and predictions of virus

evolution. Sialic acid serves as a critical molecular link between viruses and host cells, facilitating viral attachment and subsequent infection. Targeting this interaction remains a promising strategy in the design of antiviral therapies and in understanding the mechanisms of virus transmission and adaptation.

The FURIN Force & Fucoidan

FURIN – To Ward Away Evil and Epidemics

In Japanese culture a furin is a wind chime. From ancient times, it was believed that when a strong wind blows, an epidemic will spread. Therefore, in order to avoid epidemics and to ward off evil, a bronze wind chime in the shape of a bell called the futaku was hung up.

The furin were the simpler versions hung up everywhere during the summer when epidemics spread due to the high temperature and humidity as a ward against these problems.

The furin has a piece of paper hung from the center of the bowl shaped bell. When the wind blows, the paper catches the wind and moves the clapper to produce the sound.

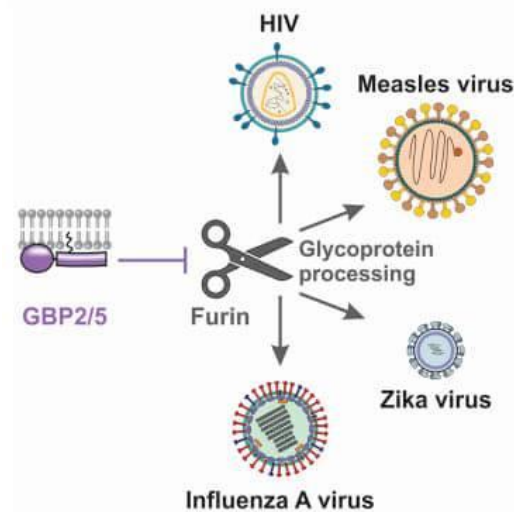


Japanese wind bells are called Furin; “Fu” is wind and “rin” is bell in Japanese.

It was said that within hearing range of its booming sound, people would be protected from disasters and the evil spirits.

Role of FURIN in Enhancing Infectivity and Pathogenicity of H5N1 Avian Influenza

FURIN, a member of the proprotein convertase family, is an enzyme that plays a significant role in the maturation and activation of various proteins within the host organism. In the context of pathogen infections, FURIN is particularly notable for its capability to cleave (cut) precursors of viral proteins, thereby facilitating their activation. This cleavage is crucial for the infectivity and pathogenicity of many viruses.



In the case of H5N1, the role of FURIN is particularly pronounced. The hemagglutinin (HA) protein of H5N1, akin to the spike protein in coronaviruses, is a surface protein that is pivotal for the virus's entry into host cells. The HA protein enables the virus to attach to host cell receptors and facilitates the fusion of viral and cellular membranes, a critical step for the viral genome's entry into the host cell.

For the HA protein to be functional, it needs to be cleaved into two subunits, HA1 and HA2. This cleavage, performed by FURIN, occurs at a specific recognition site present on the HA protein. The presence of a polybasic cleavage site in the HA protein of H5N1 is a distinguishing feature that makes it susceptible to cleavage by FURIN.

FURIN's action on the HA protein of H5N1 not only activates the protein but also significantly enhances the virus's ability to infect a wide range of host tissues. This widespread activation potential contributes to the high pathogenicity and virulence of H5N1, making it a concern for both animal and human health. The cleavage of HA by FURIN thus facilitates a more efficient fusion of the viral envelope with the host cell membrane, leading to an enhanced viral entry process.

Understanding the role of FURIN in the activation of the HA protein of H5N1 and other pathogens helps highlight potential therapeutic targets for inhibiting viral entry and spread. By targeting the interaction between FURIN and viral proteins, it may be possible to develop antiviral strategies that limit the pathogenicity and transmission of highly virulent strains such as H5N1.

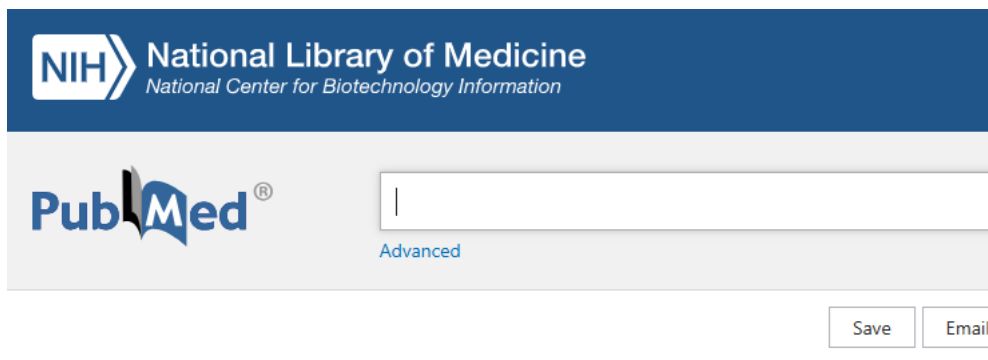
Targeting FURIN Naturally

The inhibition of Furin activity represents a strategic target for antiviral therapeutics.

Natural compounds that exhibit Furin inhibitory activity might offer a novel therapeutic approach not only for H5N1 but also for a broad range of Furin-dependent pathogens, including other influenza viruses, coronaviruses, and bacterial toxins.

Fucoidan The FURIN Inhibitor

Fucoidan is a sulfated polysaccharide found in various species of brown seaweed, known for its wide range of biological activities, including antiviral, anti-inflammatory, and antitumor effects. Its antiviral mechanism is multifaceted; it has been proposed to block viral entry, viral replication, and modulates the immune response. Fucoidan influences the host's cellular machinery, including inhibition of Furin-like enzymes required for the processing of viral precursors into active forms.



> [Biochem Pharmacol.](#) 2023 Sep;215:115688. doi: 10.1016/j.bcp.2023.115688. Epub 2023 Jul 21.

Natural fucoidans inhibit coronaviruses by targeting viral spike protein and host cell furin

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Affiliations + expand

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The Fucoidan Furinator [\[R\]](#)

Conclusion

Combining both Colostrum, with its sialic acid content, and Fucoidan we can mount an effective defense against a vast majority of potential threats! The two work in synergy with one another to strengthen our immune systems like nothing else!

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