

Bikunin Biomimetic with Anti-Inflammatory and Antiviral Activity

The solution is a serine protease inhibitor, bikunin, that plays a role in controlling the early immune response to Influenza A virus.

What is the Problem?

Influenza is one of the leading causes of death in the US, infecting approximately 10% of the population. Developing solutions for the prevention and treatment of viral lung infections could decrease the influenza mortality rate. Influenza A virus (IAV) is the only influenza virus known to cause flu pandemics and can trigger pulmonary inflammation and lung damage. As a result, there is a need for the development of therapies for lung infections caused by IAV.

What is the Solution?

The solution is a serine protease inhibitor, bikunin, that plays a role in controlling the early immune response to IAV. Bikunin has a single chondroitin sulfate (CS) side chain with one or two heavy chains (HCs) covalently attached to the CS chain. When bikunin and TNF alpha-stimulated gene-6 (TSG-6) interact, the HCs are transferred to hyaluronan (HA) to form an extracellular matrix that promotes tissue inflammation. Furthermore, the sulfation of the CS side chains may control TSG-6 activity and the transfer of HCs to an HA matrix. As a result, the structure of bikunin CS side chains is important in blocking tissue inflammation. The design of a bikunin biomimetic will be anti-inflammatory and antiviral since bikunin is a serine protease inhibitor which blocks influenza virus infectivity.

What is the Competitive Advantage?

The competitive advantage of this technology lies in its ability to provide both anti-inflammatory and antiviral effects in treating IAV infection. This solution could decrease the morbidity and mortality of lung infections by decreasing viral replication and thus reducing lung inflammation and injury. It could also be used for other diseases involving tissue inflammation and injury. As the global influenza treatment market is valued at \$5.9 billion in 2023 with an expected CAGR of 1.2%, there is a significant opportunity for this technology to advance the field of influenza and viral respiratory disease therapies.

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