

A novel spray to prevent COVID-19 infection

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In news— Researchers have created new molecules that can be sprayed into the nose to block the SARS-CoV-2 virus from entering the lungs and causing infection

About the new spray-

- **Engineers at the Johns Hopkins University in the US have now created thin, thread-like strands of molecules called supramolecular filaments** capable of blocking the virus in its tracks.
- The idea is that the **filaments will work like a sponge to absorb the COVID-19 virus** and other viruses before they have the chance to bind to cells in our airways.
- The **key to this approach is the way that the filaments carry a receptor called angiotensin converting enzyme-2, or ACE2 which are also found in cells in the nasal lining**, the lung surface, and small intestine.
- **They have many biological roles, such as regulating blood pressure and inflammation.** The novel coronavirus enters our bodies primarily through interactions with this receptor.
- The spike protein of the virus clicks into this receptor, much like a key going into a lock, allowing it to enter the cell and replicate.
- Once the virus is locked into the cell, it prevents the cell from executing its normal functions, leading to and exacerbating infections.
- It is known to researchers that adding extra ACE2 into airways can block virus entry, essentially preventing the virus from binding with ACE2 in the lungs.
- However, since ACE2 has biological functions, simply delivering more ACE2 to the body may have **unforeseeable complications**.

- **The team's newly developed filament, called fACE2, serves as a decoy binding site for the virus,** with each filament offering several receptors for the COVID-19 spike protein to attach to, and silences ACE2's biological functions to avoid potential side effects.
- Researchers plan is that this would be administered as a nasal or oral spray, allowing it to be suspended in the lungs or settle on the surface of airways and lungs.
- When a person breathes in the COVID-19 virus, the virus will be fooled into binding to the decoy receptor and not the ACE2 receptors on cells.
- Since the filaments attract SARS-CoV-2's characteristic spike protein, it should work equally well on any current or future variants, the researchers said.
- They tested its design in mouse models and found their filament was not only present in the rodents' lungs up to 24 hours later, but also elicited no inflammation or obvious damage to the lungs' structures.
- This, the researchers said, suggests that **fACE2 may be retained in the lungs for a period of time, and is safe.**
- They noted that the molecules also may have the potential to treat people with active COVID-19 infections by thwarting replication of newly acquired viruses.

Further

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