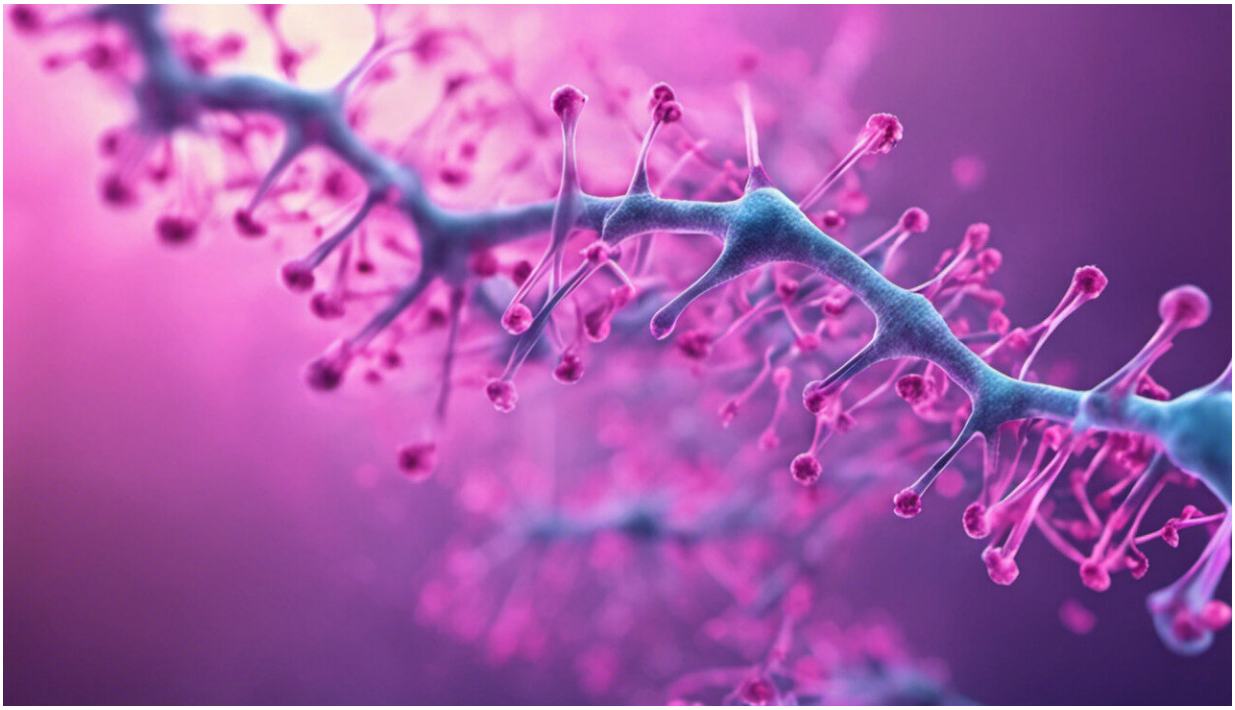
Chemists race to decode RNA of new coronavirus

March 24 2020, by Louise Lerner



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As scientists around the world race to decode the coronavirus that has caused more than 15,000 deaths in a matter of months, a group of University of Chicago chemists are focusing on understanding how the virus's RNA works—which could translate to a more effective vaccine.

COVID-19, like many other viruses, is made solely out of RNA, the set of molecules that most of us remember learning in biology class as messengers that carry out instructions from DNA. But Prof. Chuan He opened a new field of biology nearly a decade ago by discovering the process is much more complex than that: messenger RNA is actually an active player that can be modified and unmodified in ways that can crucially affect cell function.

Later studies found that viral RNA can hijack their host's modification processes to gain survival advantages. On the other hand, the host (or scientist) can also target these modifications to suppress an infection.

As the coronavirus outbreak has progressed, He's lab has turned its attention to decoding the role that RNA modifications play in COVID-19.

"We know that some RNA viruses are highly modified, including HIV and Zika, and that these are very important to the function of the virus," said He, the John T. Wilson Distinguished Service Professor at UChicago. "It's possible the same is true for COVID-19."

This information could be extremely valuable for understanding how the virus works, and especially so for making a more effective vaccine.

When researchers make a vaccine, one approach is to adapt the RNA sequence of the virus by chopping off the parts that are critical for viral infection. With its toxicity hampered, the virus can't take hold easily, and the host's immune system can use it to mount a response and gain immunity.

But not all vaccines are created equal. Some turn out to be more effective than others, and one crucial angle could be RNA modifications, He explained. By understanding how these modifications

work in the virus, researchers could be able to tune how the vaccine's version of the virus produces proteins, to make it easier for the host's immune system to respond.

"This is especially a concern with this virus, which appears to have a large number of asymptomatic carriers," He said. "If 80% of patients don't actually show many symptoms whether or not they're infected, if the vaccine is only partially effective, it would be difficult to tell."

He hopes to begin working on purified viral RNA from collaborators early this week. Other UChicago researchers are adapting their labs to study COVID-19 as well.

The process will teach them a lot about viruses in general, He said. "While many people study viruses, a large amount of that effort has been focused on viruses such as HIV. We do not know much about COVID-19, and there is clearly a lot to be learned."

Provided by University of Chicago

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