Temperature Fluctuations Affect Coronavirus; Myth or Fact?

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Now that it has been months since the emergence of the new coronavirus, everyone clings to the hope that warm spring and hot summer temperatures will help slow down and even stop the spread of the virus, but no one is sure about the scientific underpinnings of this supposition. Find out what science has to say and what nanotechnology has to do with it.

Temperature has long been recognized as a major determinant of spontaneous mutation and as playing a critical role in the mutation rate of bacteria and viruses. The reasons behind this phenomenon include the existence of temperature-sensitive mutants in a wide range of viruses, including the influenza A virus.

Some species, like bats, are natural reservoirs of viruses. As some bats have no mechanisms for regulating temperature, their viral reservoirs may be subject to constant temperature variation (~17–35°C). It was recently found that environmental fluctuations have the capacity to significantly alter the fate of mutations. Climate change can significantly influence a bat's habits and life cycle. These alterations may also affect the temperature fluctuation within the bodies of bats, which may, in turn, produce unexpected mutations in the viruses for which bats serve as natural reservoirs. The current outbreak of COVID-19, an unprecedented mutation of a coronavirus, may provide evidence to support this speculation, as bats are likely to be the main reservoir of coronaviruses.

Nanotechnology in Battle Against Coronavirus ...

Researchers have studied the role of slight temperature variations in the functionality and affinity properties of proteins (in terms of their interactions with nanoparticles) using both experimental and computational approaches and found that even slight temperature may change the binding site of proteins with nanoparticles and therefore change the biological

identity of nanoparticles (i.e., a layer of biomolecules that covers the surface of nanoparticles, which is like spike proteins on the surface of coronavirus), which affects their cellular uptake and toxicities. Therefore, one may also speculate that temperature variations in the viral host might alter the functionality and affinity of spike proteins on the surface of coronaviruses.

However, Dr. Morteza Mahmoudi - assistant professor at Michigan State University and writer of several papers about the effects of temperature on biomolecules-nanomaterials interactions - believes that deeper understanding of the part of spike proteins that can be affected by temperature variations can help researchers to better understand other possible binding sites of spike proteins to human receptors, which helps scientists to design complementary drugs/approaches to minimize virus resilience to specific therapeutic approaches. As extensive multi-disciplinary research studies are addressing the COVID-19 pandemic, the scientific community should also consider the crucial effects of temperature, not only for prediction of possible future mutations of coronaviruses, but also with regard to proposed diagnostic and therapeutic approaches.

The COVID-19 outbreak is showing us that we are much more vulnerable than we thought to such unexpected mutations in viruses. The prediction of any future mutations, more proactive action responding to the growing issue of climate change and other factors that may affect the mutation of the coronavirus, together with the creation of a comprehensive unified global platform for rapid response to the pandemic crisis (through integrated functioning of all stakeholders), may help us to address future outbreaks more adequately and in a more timely manner, saving more lives and significantly reducing the social and economic burdens posed by such disasters.

Read the original article on The Nanomed Zone.