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Nanotechnology in the Era of Covid-19

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The SARS-CoV-2 virus caused the coronavirus infectious disease (COVID-19), which began in late 2019. The epidemic has now infected around 6 million people and resulted in 350k of deaths, with the number of deaths as of this writing still increasing steadily, affecting most countries across the globe [1]. Initial infections were observed in China's Wuhan city in December 2019. Those infected showed pneumonia-like symptoms and computed tomography (CT) images of an abnormal lung. Samples from infected patients were tested using a panel of recognized pathogens called multiplex polymerase chain reaction (PCR). It delivered negative results.The before undiscovered pathogen was recognized as an RNA virus by next-generation sequencing[2]. The genome sequencing revealed that in 2002–2003, the novel virus was identical to SARS-CoV, the virus that caused severe acute respiratory syndrome (SARS), and was called SARS-CoV-2. The availability of the entire genome sequence allowed researchers to develop PCR kits for diagnosing COVID-19-patients. Investigators also invented isothermal amplification tests, serological tests and lateral diagnostic flow tests for COVID-19 [3]. Scientists are investigating different drug formulations in conjunction with the production of diagnostic tests to treat patients suffering from COVID-19. One alternative therapy currently undergoing clinical trials is the combination of liponavir – ritonavir with the HIV drug. The studies have thus far shown no significant difference between patients treated with this drug cocktail and placebo [4]. The class of nanotechnologies will make a major contribution in the battle towards COVID-19. Nanomaterials have been used to produce point-of - care diagnostics, therapeutic carriers, and the development of vaccines. Recommend a range of nanotechnology work goals.

Persons diagnosed with SARS-CoV-2 are or may be silent carriers with a wide range of symptoms common to other respiratory infections (cough, breath problems and fever). A significant problem is the dissemination of COVID-19 by the Society. It is important to have a cost-effective, fast point-of-care diagnostic test available to physicians in emergency rooms, clinics, and community hospitals. These diagnoses allow frontline workers to simply triage patients and avoid further spread of the virus. Diagnosis is critical when determining an infection's spread. Rapid-diagnostic mass surveillance helps public health officials monitor the spread of viruses, proactively identify areas with increasing infections, anticipate the need for surge capacity, and deploy the necessary resources to the relevant areas. A system's effectiveness depends on effective and open coordination and cooperation among federal and state / main facilities, hospitals, government entities, and communities. The World Health Organization and others have argued that it would require extensive monitoring to stop this pandemic. Patients can need to be monitored once they are reported as having COVID-19. Those therapies block the host's virus replication. It is possible to adapt basic studies of nano-bio interactions to explain how SARS-CoV-2 infects their cells, which can lead to new therapeutic agents and design. Vaccines are effective in disease prevention by strengthening the immune system against a pathogen. One vaccine tested is a messenger RNA (mRNA)–lipid nanoparticle vaccine based on previous studies of SARS-CoV and Respiratory Syndrome in the Middle East.

Nano coatings comprise nanoparticles of healthy metal ions and polymers mixed with antimicrobial and anti-viral characteristics that will be effective for months [5]. The investigators evaluated the effectiveness of surfaces in human cells coated with different metal nanoparticles on the infectivity of HIV family lentiviruses. Findings suggested that surfaces filled with copper nanoparticles effectively block cell virus infection. It is essential to note that the creation of coatings that are successful not only upon coronavirus but also toward different viruses as shown in our design operations and also against bacteria would make them applicable to a wide range of administrations. The anti-viral coatings are based on polymers which include copper and other metal nanoparticles and which can be applied or sprayed on surfaces. These nanoparticles will allow the regulated release onto the coated surface of metal ions.

Research shows that these ions have a robust anti-viral impact which can kill surface adhering virus particles[6]. Whereas existing practices of surface disinfection depend primarily on compounds that are harmful to humans, such as bleach, or on substances that evaporate readily based on alcohol, the coating development based on metals that are harmful to viruses or bacteria but that are fully human safe. Because of the design of the metals, such as the propensity to oxidize and corrode, the use of these metals for anti-viral applications now faces major challenges. Nanoparticles give a solution to these hurdles. A further characteristic of nanoparticles is the large surface area to the volume ratio, resulting in an effective anti-viral surface using a relatively small amount of metal.

The peptide nanostructures of SQI have already been shown to be highly successful in regenerative medicine and the Institute is working hard to get the technology into clinical trials. In certain regenerative medicine goals, the potency of the SQI carriers is also dependent on protecting the fragile proteins required to signal cells, and this same phenomenon may be instrumental in the production of antiviral vaccines [7].

Antibody check helps medical practitioners to assess whether someone measures COVID-19 positively within 3 minutes, and issues negative readings within 15 minutes. The test also provides an alternative identification measure for suspicious cases with negative identification of nucleic acid from the PCR devices, or in the evaluation of suspected cases in combination with nucleic acid detection. This means fewer incorrect findings fall between the cracks, and COVID-19 diagnosis is even more reliable [8].

The antibody test has many advantages compared to PCR which saves time and does not require devices, it is easy to operate and needs only minimal practice. It can be done in any clinic or laboratory at the bedside, at airports, and at railway stations. Use fingers or heel blood instead of vein blood for out-of-clinic screening is more comfortable. It has been shown that the initial findings using fingertip blood are as strong as that of vein blood, which means that these antibody test kits can be used for fast field identification. The monitoring of asymptomatic carriers is another possible application of this test, as asymptomatic carriers will spread COVID-19 easily even without a warning sign. It makes it more difficult to monitor the monitoring of coronavirus outbreaks, as there is no standardized system available to track asymptomatic carriers. The antibody test kit enables the asymptomatic carriers to be screened on a large scale. The test helped us to identify IgM and IgG, and is also used in early detection and during treatment monitoring. It has been shown that infection starts at the lungs, not in the upper respiratory tract, so sampling with throat swabs may not detect the virus during the early stage of infection. This is why the number of false negatives in PCR tests is explained. This sampling effect should not affect the detection of IgG and IgM through the rapid antibody test, though.

Team of researchers reported how they have produced a nano-filter that preserves excellent filtering performance even after hand washing through the advancement of proprietary technology which aligns nanofibers in orthogonal or multidirectional directions with a diameter of 100~500 nm. A reusable, nano-filtered face mask could help ease the pressures of face mask supply shortages [9].

No obvious diagnosis or vaccine was recommended for treating COVID-19 apart from some customarily used medication used to improve the malaria immune system called chloroquine. Nevertheless, the interesting and surprising characteristics of chemical compounds, particularly nanodrugs, can significantly contribute not only to the medicine and pharmaceuticals, but promising solutions can also arise to halt the dangerous COVID-19 outbreak worldwide.

The nanoparticles will be able to make a change sue to their size and accelerated characteristics triggered by the severe surface area to volume ratio spike. The composition of the coronavirus shows similarities with the nanoparticles. The idea is nanoscale atoms, as small as the virus, can come into contact with spike proteins or bind to them by implementing electromagnetic radiation mainly infrarot light with the subsequent disruption of the viral structure. The resulting structural destruction can deprive the virus and its genome of the ability to multiply and recreate within a host [10].

Newly began to emerge are those involving the detection and neutralization of nanodrug and nanomedicine viruses with a focus on diagnosis and treatment. Appropriately, there are reports of nanoparticles being used to fight microbes that provoke influenza and tuberculosis. Owing to the potential surface modification and functionalization, nanoparticles can detect the pathogens and viruses with a large number of literature reports. Nanoparticles can be modified or functionalized to dissolve the virus's lipid membrane or even bind to the spike proteins at S1 and/or penetrate the envelope, encapsulating nucleocapsid and RNA. Nanoparticles may be modified/functionalized to attack a specific virus, bacteria, and other pathogens, or a rage. Despite the size, altered nanoparticles can travel in the bloodstream via the body without causing complications or disturbing other functions, particularly those that participate in the human immune system and can persist much longer to detect viruses.

References

1. World Health Organization: Coronavirus Disease (COVID-19) Pandemic.
2. She J, Jiang J, Ye L, Hu L, Bai C, et al. (2020) 2019 novel coronavirus of pneumonia in Wuhan, China: emerging attack and management strategies. Clin Trans Med 9:1-7. https://doi.org/10.1186/s40169-020-00271-z
3. Udugama B, Kadhiresan P, Kozlowski HN, Malekjahani A, Osborne M, et al. (2020) Diagnosing COVID-19: the disease and tools for detection. ACS Nano 14:3822-3835. https://doi.org/10.1021/acsnano.0c02624
4. Chan WC (2020) Nano Research for COVID-19. ACS Nano.https://dx.doi.org/10.1021/acsnano.0c02540
5. Álvarez-Paino M, Muñoz-Bonilla A, Fernández-García M (2017) Antimicrobial polymers in the nano-world. Nanomater 7:48.https://doi.org/10.3390/nano7020048
6. PlasticsToday (2020) Anti-Coronavirus Surface Coating Could Be Effective for Months. MDDI.
7. Nanostructures could safely deliver a notoriously fragile drug to coronavirus (2020). Nano.
8. Rapid nano-gold tests can ease pressure on centralised testing for COVID-19 (2020). Nano.
9. Reusable nano-filtered face mask could relieve COVID-19 supply issues (2020). Nano.
10. COVID-19 and Nanotechnology (2020). Nanografi Blog.