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Rajiv Kumar*

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Opinion Article

SARS-CoV-2, Inflammation, Allergy of the Lungs and Nanotherapeutics

Rajiv Kumar

National Institute of Medical Science, India.

Corresponding Author: Rajiv Kumar, National Institute of Medical Science, India.

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Introduction

Nanomaterials and nanotechnology are quite helpful in disease identification, prevention, treatment, scheming, and monitoring [4]. The properties of multifunctional nanomaterials altered by applying the strategies of nanotechnology and furnished for designing novel remedies for various medical applications. Furthermore, modified features of nanomaterials can influence their fate and also upgrade their claims in inhalation. Thus these types of nanoscale innovations achieved by adopting aforesaid strategies significantly. The nanotools and remedies treat viral infection and, in the end, also improve the health of the lungs [1]. As well, the physiognomies of engineered nanomaterials suited to the physiology of the lungs, and accordingly, these remedies developed as per the necessities of insight of drug delivery. The bioavailability of inhaled nanoparticles also displayed cutting-edge therapeutic efficacy and efficiency. During the clinical trials of these nanoscale remedies, no toxicity was witnessed in the pulmonary region. Environmental epidemiology is another feature that is considered a key element of these nanotopographies and nanomedicines. Its elucidation will be a good source to apply in the clinical trials of these remedies for a better drug delivery in the lungs [2]. By applying innovative tactics of nanotechnology for alteration and modification in the composition of materials at nanoscale for the preparation of nanomedicine, these newly opened avenues are fruitful for innovating discoveries in the aforementioned field and more efforts are required to achieve novel formulation. By adopting aforesaid methods for preparing novel nanomedicines that can control severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), inflammation, allergy, and other virus outbreaks, new hope is there to be applied for searching for effective remedies. Though the authors review the individualities and claims of innovative nanotechnology and their role in the detection, treatment, and prevention of SARS-CoV-2 [3]. and as well as emphasized the advancement and drawbacks of these technologies, specifically in current prospects. Nanomedicine and developed engineered nanomaterials can closely mimic the severe acute respiratory syndrome coronavirus-2, interact strongly with its proteins at the nanoscale, and combat it. The main disquiet of the researchers is to accentuate airway inflammation that may happen at the time of nanoparticle inhalation. Chronic inflammatory respiratory disease can be deepened its impact at the time of nanoparticle exposure [5]. At the same time; it will be quite challenging to detect the route of the development and progression of respiratory disease in the lung because it is a dynamic proceeding and will not allow disclosing of the proceedings of the microbiota-host interaction easily. Specific features of nanomaterials at the nanoscale may directly influence the deposition processes of these remedies during inhalation. Besides interrelated factors and the fate of the cellular environment there are other hidden concerns. There is a need to summarize the known features of clinical, immunological, and toxicological consequences and concerned routes in the human airway and can be done by evaluating nanoparticle-microbiome interactions. The host immune-inflammatory response is one of the key characteristics of inhaled nanoparticles and toxicants. It is one of the features that help to get insight into mechanisms promoting nanoparticle-induced airway damages [6].

A need is there to find out the impact of inhaled nanoparticles on the host immune system by investigating the interrelated pathways and routes that persisted in the environment and airway microbiomes. Moreover, to have an insight into the discoursed mechanisms that happened and induced airway damages, a proper examination is essential (Figure 1) [7]. The features of engineered materials that can be altered or enriched by chemical functionalization by applying nanotechnology are included there. It was assumed that these approaches would deal with the needs of the concerned routes accordingly. In the same way, nanotechnology and nanomaterial science are offering a new approach to deal with the ongoing SARS-CoV-2 pandemic and providing new strategies to furnish antiviral research for developing desired remedies [8]. Moreover, the developed nanotools were employed for investigation of the actual features of viral structures in-depth. These advanced tools and nanomaterials are providing new platforms to detect viruses and perform as the best approach for applying drug delivery vehicles while delivering antiviral drugs and vaccines at the location. Nanotechnology is a key component of the designing process of these virus-detection devices for accurate recognition and can explore future possibilities [9]. These nanodevices and tools are not only enhancing the possibilities to understand the route of SARS-CoV-2 infection but also increasing the chances to develop new technologies. Such upgraded technologies can perform in a better way during detection and treatment. Though, these nanomaterials and concerned technologies are good sources for discovering remedies to treat viral diseases in current settings. Apart from that, nanotechnology is answering those clinical problems, which have emerged as life-

threatening pandemics (SARS-CoV-2) recently, are participating in the discoveries of newly developed therapeutics at the nanoscale to treat SARS-CoV-2 and allied complications [10]. Defined nanotherapeutics are very effective in the healing of the lung epithelium and respiratory tract. Despite it, these underlined machineries contribute to enhancing phagocytic uptake and particles by removing resident macrophages at the said scale. Advanced pulmonary therapies in the form of nanomedicines are capable of targeting specific cell types. These therapies have high bioavailability and can control the related kinetics necessary for blocking apoptosis. The surface properties of these materials can regulate cell adhesion and activation processes too. Specific biocompatibility of these tools and devices can alter or inhibit thrombosis and the formation of blood clots according to the needs of the cellular environment, even though these nanoparticle-based thrombolytic agents can play a key role in treating the lungs by removing blood clots and will be a good remedy for treating SARS-CoV-2, inflammation, allergy of the lungs.

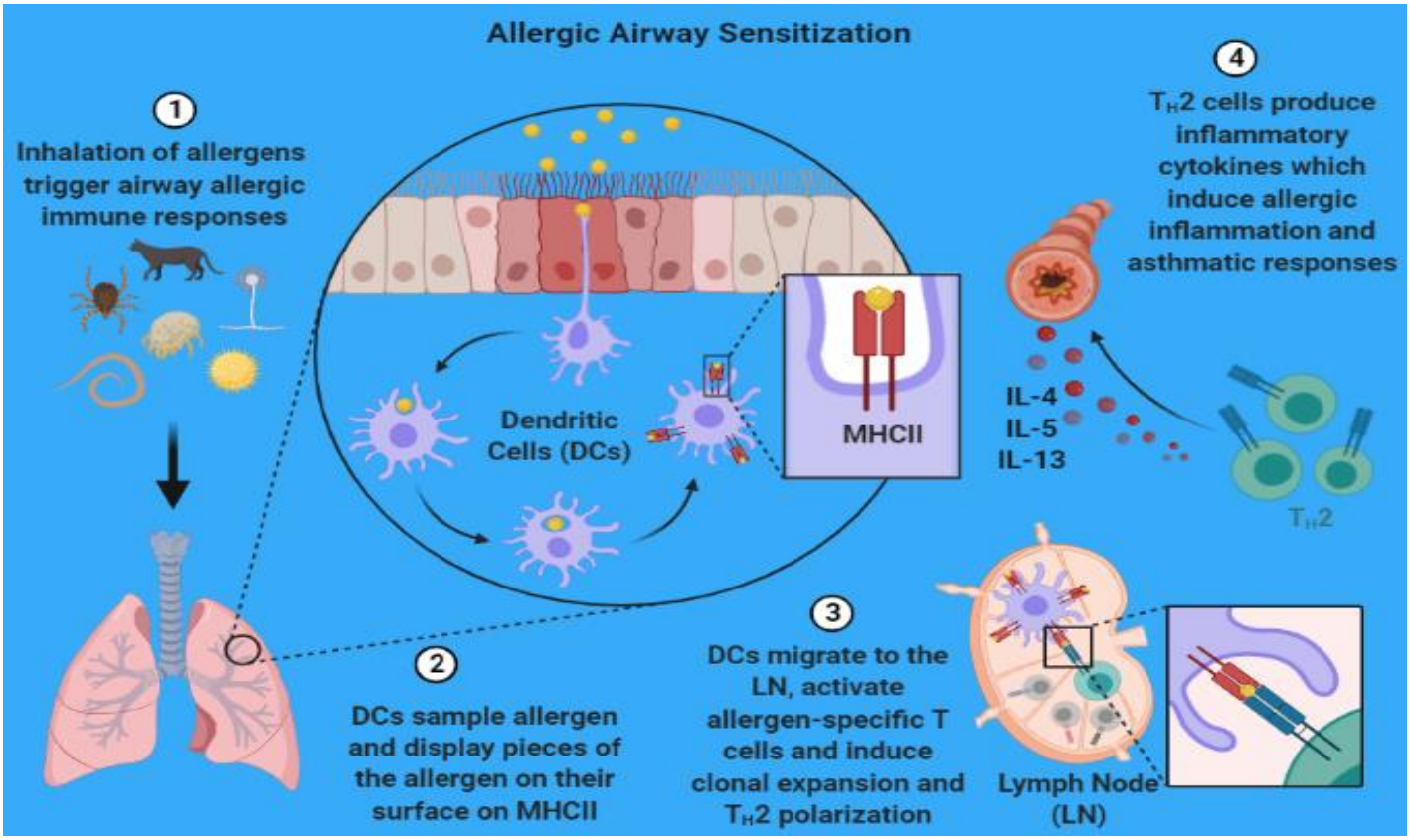

Figure 1: *An illustration of allergic airway sensitization in the lungs*

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Availability of data and materials

Wherever necessary, relevant citations included in the reference section.

Competing interests

The author has declared that no competing interest exists.

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