

and repair mechanism with full regulation from outside the body. This is just futuristic view yet not the reality but this could be achieved in the coming time. Along with the benefits, there are potential risks associated with these nanomedicines for both environment and humans, which requires extensive research. Therefore it is foremost important to assess the acute and chronic effects of these nanocarriers on both the environment and humans. With gaining popularity of these nanomedicines, exploration for affordable nanomaterial will be a new area of research. At last, the controlled drug delivery by different nanocarriers as discussed in above section will continuously evolve along with advancement and development in nanomedicine.

7. CONCLUSION

Recently, a controlled pulmonary drug delivery system has gained significant attention because of its multiple advantages. This approach has numerous advantages over the conventional drug delivery system in the respiratory system. The large surface area of nanoparticles allows the rapid absorption of the therapeutic agent in the lungs. Additionally the small size of these nanocarriers certainly serves as an improvement over conventional dosage forms. Even the nonsoluble therapeutic agents can be incorporated in different nanocarrier systems. Liposomes and SLNs have an additional advantage because of their composition. But, biodegradable nanocarriers impose challenge of exhibiting constant drug release and this mechanism is still being investigated. Various studies are being conducted to evaluate the safety of using nanocarrier drug delivery system, many of which are in their preclinical stage of drug development and some of them are now available in the market. Alongside, while overcoming the challenges associated with this approach, the development of an effective nebulization device is also important. Furthermore, development of aerosol devices is also of utmost importance in accordance with incorporated active pharmaceutical ingredient and particle type. Additionally, the study on cell line is also important to know the range of safe and toxic concentration, as it is challenging to correlate the result of in vitro studies with in vivo studies. This prompts to infer the results with great precision so that both results of in vitro and in vivo analysis can be compared. Other than the formulation of these nanocarriers, the uptake and clearance mechanism of these nanocarrier in respiratory is highly important. Still the uncovering of the mechanisms involved in the transportation of drug across the epithelium of pulmonary system is under evaluation. Fluorescent or

radioisotope labeling are the two option which can be used to trace the mechanism of drug uptake in the cell, but further challenge of correlating the realistic disease with model is still a mystery. In conclusion, various opportunities are available for exploration in the pulmonary system for the triumph of nanocarrier system on human trials.

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