

Pulmonary Delivery of Pharmacotherapeutics: A Non-Invasive Promising Approach

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Introduction

Drug delivery strategies become scientific temperament during present day research arena. Pharmacotherapeutics can be successfully delivered through pulmonary route and this approach has captivated excellent scientific and biomedical attention in recent years. This approach has shown substantial progress within the context of local treatment for respiratory disorders, due to the augmented local targeting and decreased systemic side effects with comparatively lesser dose and rapid onset of action [1-4]. Furthermore, due to the enormous surface area and high permeation capability of the lung encouraged the scientific community to develop inhalable drug delivery devices. But the respiratory tract tends to be considered as very promising route for the delivery of pharmacotherapeutics in the treatment of local pulmonary diseases such as asthma, chronic obstructive pulmonary diseases, microbial infections as well as systemic diseases such as diabetes, angina pectoris, cancer, bone disorders, tuberculosis, migraine, acute lung injury and others [5-8].

The pulmonary drug delivery approach can thus be used to minimize the systemic toxicity and target the drug to a particular site, avoid the invasive injectable route of drug administration, maintain sustained action with reduction in the side effects, modulate the drug effect, increase the patient compliances, and minimize the treatment cost.

Type of formulations used

The pharmacotherapeutics can be effectively administered by pulmonary route through two different techniques namely aerosol inhalation and intra tracheal instillation. Through aerosol inhalation mode, it is possible to achieve more uniform distribution of particulate system with maximum peripheral penetration or alveolar art of the lung. This technique is costlier and presents difficulty in measuring the dose amount inside the lungs. In contrary to this, intra tracheal instillation route is comparatively simple and cheap. There are many formulations utilized to deliver through pulmonary route, one among them is aerosols of mono or multiphase systems which deliver by depositing drug in the airways by gravitational sedimentation, inertial impaction and diffusion. Clinical aerosols are of three types: jet or ultrasonic nebulizers, metered dose inhalers, and dry powder inhalers [9].

Pulmonary approaches

Micro molecular Pharmacotherapeutics administered by pulmonary route are rapidly absorbed, whereas, macromolecules such as proteins and peptides shows low bioavailability due to enzymatic degradation are slowly absorbed. Some permeation enhancers can be used to

improve the bioavailability of pharmacotherapeutics. The pulmonary administration of macromolecules presents many challenges such as protein stability, delivery issues and type of devices utilized. These all issues are addressed properly by the formulation development scientists to make the therapy successful by this novel route. Though pulmonary route present many challenges, many macromolecules such as insulin, calcitonin and hormones are currently investigated for possible systemic and local absorption through lungs.

Conclusion

Pulmonary administration has gaining much attention in the last decade, in response to the need for alternatives to conventional drug delivery approaches to the delivery of potent pharmacotherapeutic agents of biological origin. In the beginning, asthma was the only clear example of a chronic disorder that could be treated through pulmonary route by delivering therapeutics directly to lungs, but, today many systemic and pulmonary disorders and diseases such as diabetes, cancer, neurological diseases, lung infections, and cystic fibrosis are being considered suitable for treating through pulmonary administration. With the help of a greater understanding of the science and technology of pharmaceutical powder characteristics and their influence on the performance of the final product made it possible to implement erudite technological approaches to resolve the complications allied with efficient, reproducible and successful pulmonary delivery of potent pharmacotherapeutics to achieve systemic as well as local pharmacological effect.

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