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Editorial

PULMONARY DRUG DELIVERY

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EDITORIAL

The use of pulmonary medication administration is becoming more common. Pharmaceutical chemists must address medication absorption, particle size management, appropriate toxicity models, and patient compliance while creating pulmonary medicines. The author examines the hurdles unique to creating medications for pulmonary delivery and analyses how these obstacles can be addressed with the correct knowledge and experience.

Respiratory diseases such as asthma, chronic obstructive pulmonary disease (COPD), and idiopathic pulmonary fibrosis are among the most significant and prevalent healthcare issues confronting the developed world, accounting for more than 400,000 fatalities in the European Union, or 8% of all deaths. These data demonstrate the increased demand for novel and effective therapies (Emami et al., 2019). Pulmonary drug delivery is gaining popularity as a non-invasive method for treating a variety of severe lung disorders on a local level; nonetheless, this route of administration presents new hurdles for medicinal and formulation chemists.

The lungs have the ability to quickly transfer chemicals into the circulatory system; oxygen is delivered into the bloodstream and carbon dioxide is expelled with each breath. However, when using extracellular targets to treat respiratory disorders, it's critical that topically acting medications stay in the lungs and act (Joshi et al., 2020). Depending on the method of the drug provided, absorption into the body could induce substantial adverse effects, such as those affecting the digestive, circulatory, and central nervous systems, as well as off-target effects. This problem runs counter to the goal of traditional orally delivered medication design, which involves medicinal chemists modifying an API's chemical characteristics to promote absorption and bioavailability in the body (Muneer et al., 2020).

When predicting the suitability of molecules as orally administered drugs, medicinal chemists often consider a set of four approximations to predict absorption in the gut, known as Lipinski's

Rule of Five. Lipinski's rules state that an orally active drug should have no more than one violation of the following criteria:

- A molecular mass less than 500 Daltons
- An octanol-water partition coefficient (log P) not greater than five
- No more than five hydrogen bond donors
- No more than 10 hydrogen bond acceptors.

Extracellular luminal targets, on the other hand, necessitate the utilisation of molecules that violate these laws in order to generate APIs that are less easily carried out of the lungs. Larger molecules, for example, have a harder time crossing the epithelial barrier, making them more difficult to absorb into the bloodstream (Rangaraj et al., 2019). Less lipophilic APIs will also have a harder time penetrating the airway lining, allowing them to stay at the site of action for longer. It's crucial to go against typical orally active drug design thought to reduce systemic exposure. Drugs that are not easily absorbed in the gut, which are heavily plasma protein-bound and/or swiftly metabolised and eliminated, will have a better chance of reducing treatment adverse effects (Athamneh et al., 2019).

Pulmonary drug delivery is becoming a more popular non-invasive treatment option for a variety of common and devastating lung disorders. However, when creating treatments that rely on this delivery mechanism, it's critical to keep in mind the major drawbacks of this method. These obstacles can be solved by collaborating with seasoned industry specialists, allowing for the faster and more affordable delivery of safe, effective treatments

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