INHALED COMBINATION POWDERS FOR RESPIRATORY SYSTEM INFECTIONS AND DISORDERS

The use of inhaled or aerosolized drugs to treat respiratory conditions offers the distinct advantages of rapid delivery of drugs to the site of action (i.e. respiratory airways) and bypassing the first-pass effect. Due to the localized drug effects and avoidance of absorption barrier, inhaled drugs can therefore be applied in much lower doses than is possible with oral or parenteral administration, thereby minimizing severe adverse effects. Since dry power inhalers (DPIs) have the advantages of higher delivery doses, enhanced formulation stability and improved patient compliance as compared to the other inhalation delivery platforms, such as nebulizers and pressurized-metered dose inhalers (pMDIs), significant efforts have been devoted to develop novel DPI formulations. More recently, there has been a trend towards the use of combination therapy in inhaled drug delivery. This could potentially contribute to the convenience of drug administration as well as confer synergistic drug interactions (where the effect of the combination treatment is greater than the sum of the single-drug treatments) to the formulations, leading to better treatment adherence and clinical outcomes. Combining two or more therapeutic agents that have complimentary interactions into a single inhaled formulation represents an incremental innovation that has extended the range of therapeutic options for treating of respiratory system infections and disorders. Hence, this thesis seeks to develop novel DPI combination formulations that have improved efficacies over the single inhaled species. In order to evaluate the performance of a DPI combination product, the DPI combination formulations developed and studied in this thesis are characterized in terms of their physicochemical properties, tested for their in vitro aerosol performance and assessed on that in-vitro antimicrobial activity or in-vitro inflammatory mediator response.

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