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Characterization of Polyelectrolyte-atenolol Formulation Using a Nebulized System Intended for Cardiac Targeting †

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Abstract: Inhalatory delivery allows systemic treatments. In particular, this administration route is being investigated to treat cardiovascular disorders. Inhaled drugs can be administered by using nebulized systems, and polyelectrolytes could be useful in developing such nebulized formulations. The aim of this work was to study the *in vitro* aerosolization and deposition properties of a reconstituted polyelectrolyte-drug formulation and its *in vivo* performance in a mice model. Atenolol (AT), an antihypertensive and antiarrhythmic drug, was selected as a model drug due to its low oral bioavailability. To obtain a stable formulation with adequate geometric size for inhalatory administration, an aqueous dispersion of AT and alginic acid (AA) was spray-dried. AA-AT powder or free AT was redispersed in saline solution and used for *in vitro* and *in vivo* assays. The nebulized AA-AT system, tested in a multistage impactor, possessed adequate aerodynamic performance: mass median aerodynamic diameter was 3.41μm, and around 65% of the formulation would access the lungs. Tests in mice demonstrated that AT from AA-AT was absorbed from the lungs to the systemic circulation, with plasmatic AUC around 50% higher than the free drug. In conclusion, AA-AT products and the administration technology have the potential for cardiac administration of drugs via the lungs.

Keywords: atenolol; inhalatory administration; cardiac targeting.

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Conflicts of Interest

The authors declare no conflict of interest.