COMPARISON OF MESH NEBULIZER EFFICIENCY IN THE AEROSOL DELIVERY OF COLISTIMETHATE SODIUM SOLUTIONS

Rossi I.[a], Di Cuia M.[b], Bricoli S.[c], Balducci A. G.[b], Buttini F.[c]

[a] Consorzio TEFARCO Innova, Department of Pharmacy, University of Parma, Parma, Italy

[b] Interdepartmental Center, Biopharmanet_TEC, University of Parma, Parma, Italy

[c] Department of Pharmacy, University of Parma, Parma, Italy

mail to: irene.rossi@studenti.unipr.it

Purpose

The aim of this work is to identify the most efficient and convenient nebulizing system for colistimethate sodium CMS pulmonary administration. Nowadays CMS is on the marked and two different mesh nebulizers are commonly used for the therapy. This study assessed the *in vitro* performance of an aerosol of CMS nebulized by eFlow® *rapid* and the I-neb®.

Methods

In vitro nebulisation efficiency of CMS freeze-dried powder (1 milion I.U., 80 mg) dissolved in 1 or 3 ml saline was investigated by two different electronic mesh nebulisers: eFlow® *rapid* (PARI Pharma GmbH, Germany) and I-neb® equipped with a grey 0.3 ml chamber (Philips Respironics, UK).

Aerosol output and aerosol output rate were measured using a breath simulation test mimicking an adult breathing pattern (15 breaths/min, 500 ml tidal volume, inhalation/expiration=1). Aerodynamic particle size distribution was determined by next generation impactor operated at a flow rate of 15 l/min, in accordance with European Pharmacopoeia 8.0 2.9.44 specifications on aerosols. Sample solutions were assayed by a validated HPLC-method and UV detection.

Results

The two mesh nebulisers showed a different loading capacity: 3 ml for eFlow®, which permits to load 80 mg of CMS (1MIU) and 0.4 ml for I-neb® equal to a loading of 32 mg (0.4 MIU) of CMS.

The aerosol output (delivery dose) was similar for the two devices and around 25 mg of CMS. The drug delivery rate was higher for eFlow® (7.23 mg/min) than I-neb® (2.74 mg/min). Thus, the nebulization time was 3.8 and 8.9 min for eFlow® and I-neb®, respectively.

Despite to the different loaded dose (80 vs 32 mg) the respirable dose, i.e. the mass of drug with aerodynamic diameter lower than 5 µm, was similar for the two nebulizers. The residual volume of I-neb® was very low and the amount of drug loaded was efficiently emitted. In particular, the respirable dose was 19.6 mg for I-neb® and 17.6 mg for eFlow®.

Conclusions

This study demonstrates that the respirable dose *in vitro* produced nebulizing 1 MIU of CMS by I-neb® or eFlow® is equivalent. However, the nebulization time required by I-neb® was almost double compared the eFlow®.