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Comparison of amikacin lung delivery between AKITA® and eFlow rapid® nebulizers in healthy controls and patients with CF: A randomized cross-over trial

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Abstract
Introduction: Nebulization plays a key role in the treatment of cystic fibrosis. The Favorite function couple to jet nebulizers (AKITA®) emerged recently. The aim of this study was to assess the efficiency of the lung delivery by the AKITA® by comparing the urinary concentration of amikacin after nebulization with the AKITA® and the eFlow rapid®, in healthy subjects and patients with CF (PwCF). Method: The two samples (healthy subjects and PwCF) were randomized (cross-over 1:1) for two nebulizations (500 mg of amikacin diluted in 4 mL of normal saline solution), with the AKITA® and with the eFlow rapid®. The primary endpoint was the amount of urinary excretion of amikacin over 24 h. The constant of elimination (Ke) was calculated based on the maximal cumulative urinary amikacin excretion plotted over time. Results: The total amount of urinary amikacin excretion was greater when AKITA® was used in PwCF (11.7 mg (8.2–14.1) vs 6.1 mg (3.7–13.3); p = 0.02) but not different in healthy subjects (14.5 mg (11.7–18.5) vs 12.4 mg (8.0–17.1); p = 0.12). The duration of the nebulization was always shorter with eFlow rapid® than with AKITA® (PwCF: 6.5 ± 0.6 min vs 9.2 ± 1.8 min; p = 0.001 – Healthy: 4.7 ± 1.3 min vs 9.7 ± 1.6 min; p = 0.03). The constant of elimination was similar between the two modalities in CF subjects (0.153 (0.071–0.205) vs 0.149 (0.041–0.182); p = 0.26) and in healthy subjects (0.166 (0.130–0.218) vs 0.167 (0.119–0.210), p = 0.25). Conclusion: the Favorite inhalation is better to deliver a specific amount of drug than a mesh nebulizer (eFlow rapid®) in PwCF but not in healthy subjects. © 2023 SPLF and Elsevier Masson SAS

Author Keywords
Cystic fibrosis; Drug delivery; Nebulization

Index Keywords
amikacin, amikacin, antiinfective agent; adult, Article, clinical article, clinical feature, controlled study, crossover procedure, cystic fibrosis, drug delivery system, drug elimination, human, intermethod comparison, male, nebulization, patient satisfaction, randomized controlled trial, treatment duration, urinary excretion, lung, respiratory droplets and aerosols, urine; Amikacin, Anti-Bacterial Agents, Cross-Over Studies, Humans, Lung, Nebulizers and Vaporizers, Respiratory Aerosols and Droplets

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