Relative lung dose from antistatic valved holding chambers

To the Editor:

We read with interest the data of Hagedoorn et al looking at the in vitro performance of antistatic valved holding chambers (VHCs), suggesting that some devices are more efficient than others and may not be interchangeable. Crucially, their in vitro technique does not account for the unique real-life interaction between the device and the patient in addition to effects of altered airway geometry in asthmatic airways.

We have previously reported on in vivo delivery of inhaled hydrofluoroalkane suspension formulation of fluticasone propionate (FP) pressurized metered dose inhaler (pMDI: Flixotide Evohaler; GlaxoSmithKline, Brentford, United Kingdom) via 3 antistatic VHCs, namely, 280 mL polyamide plastic Zerostat-V (Cipla, Mumbai, India), 250 mL stainless steel Nebuchamber (AstraZeneca, Cambridge, United Kingdom), and 197 mL plastic Aerochamber Max (Trudell Medical, London, Canada).\(^3\) The spacers were all used new out of the box without washing or priming and without delay between actuation and inhalation in 18 patients with mild to moderate asthma. The relative lung dose of FP as bioavailability was calculated from the suppression of over-treatment and without delay between actuation and inhalation in 18 patients with mild to moderate asthma.

In another study using new out of box unprimed unwashed conventional plastic holding chambers, the relative lung delivery of the same dose of hydrofluoroalkane FP/salmeterol pMDI (Seretide Evohaler; GlaxoSmithKline) was compared with pMDI alone.\(^4\) The relative lung dose of FP was 62% higher via 149 mL Nebuchamber and 71% by Aerochamber Max, and 71% by Aerochamber Max.

Hence, all the VHCs, whether they were antistatic or not, primed/prewashed or not, resulted in appreciable improvements in the relative lung dose of FP pMDI in vivo. This would be likely to have an impact in not only improving antiasthmatic airway efficacy but also worsening systemic adverse effects. Comparing the best and worst devices for relative lung dose, namely, Aerochamber Max (71%) and Volumatic (40%-49%), the difference in relative lung dose of FP was marked, bearing in mind that these devices were used under optimal conditions using single puffs along with deep inhalation and without delay. In a real-life clinic setting, we believe that such differences would be obviated because of poor spacer technique.

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Lipworth et al underestimate the clinical effect of differences in antistatic behavior between VHCs.

More importantly, we are of the opinion that a clear differentiation between inter- and intrapatient variability in lung deposition is in order for the current discussion. Differences in inhalation technique and (diseased) airway geometry are relevant especially to intrapatient variability. However, to a single patient, having a reproducible inhalation technique (however poor) and a particular airway geometry, intrapatient variability does not matter. Because for this patient the delicate balance between therapeutic and adverse effects, once achieved, will be shifted only by a change in delivered dose from the mouthpiece of the inhalation device. Such a change in the delivered dose may be an increase or a decrease and with our in vitro experiments we have irrefutably shown that this may very well result from switching between (antistatic) VHCs. Hence, although the use of antistatic VHCs is advisable, switching between them should be discouraged when no change in drug delivery is desired.

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