The deposition of active substances in the bronchial system is critically dependent on the correct use of the inhalation systems. Particularly when metered dose inhalers (MDIs) are used, there are many ways mistakes can be made [1], which can seriously affect the success of the treatment. A holding chamber is very helpful in preventing the loss of efficiency by poor inhalation technique. These holding chambers are especially beneficial for children who are undergoing treatment for asthma, because they often do not have the mental ability to carry out all of the steps correctly. Consequently, the use of a holding chamber is recommended in the international guidelines (e.g., Global Initiative for Asthma [GINA]) for treating children with asthma.

The correct inhalation technique is imperative for the success of the treatment, since ineffective operation can lead to reduced compliance with the treatment regimen by the patients [2]. Therefore inhalation technique should be checked regularly, at least once a year and every time the medication therapy is changed or in the event of substitution/aut idem replacement.

Another advantage of the holding chamber is that it helps to reduce oropharyngeal deposition. This is particularly pertinent when topical corticosteroids are inhaled, in order to minimise the risk of undesirable side-effects in the oropharyngeal region, such as candidiasis or dysphonia [3].

Goncalvez et al. analysed in an in vitro study the Fine Particle Deposition and Throat Deposition of the pMDI Innovair® (100 μg beclometasone / 6 μg formoterol) with the use of various holding chambers [4]. The results confirm that the aerosol is not as greatly impacted in the throat region when holding chambers are used. A higher fine particle dose was achieved for the two active agents beclometasone and formoterol with the antistatic holding chambers used here. Other studies have also yielded clear evidence to the effect that the Fine Particle Dose (FPD) of the active ingredient is significantly higher when antistatic holding chambers are used rather than with holding chambers made from electrostatic material [5,6]. This means that antistatic holding chambers no longer need to be rinsed with soapy water, which represents a further relief of the burden on the patient.

The VORTEX® performed significantly better than the other holding chambers in terms of FPD, Delivered Dose and Residual Volume. In order to enable holding chambers to be used even by the very youngest patients, they are offered in conjunction with
Sources:

appropriate masks. The GINA Guidelines recommend the usage of a mask plus the dedicated spacer for children younger than 4 years. In order to keep any losses by using a mask to a minimum, it is important to take account of critical criteria such as sealing performance, the shape of the mask, flexibility, dead space and acceptance when developing such children’s masks [8].

Fig. 1: The results of the investigation by Goncalves in 2012 returned significantly higher FPD values for beclometasone when antistatic holding chambers were used. Comparable results were also achieved with formoterol, the 2nd active agent contained in the predefined combination.

Fig. 2: The VORTEX® child masks have been developed using anthropometric data for children (e.g., width of mouth, length of nose, width of cheekbone, head circumference) as well as other parameters. Considerable thought was given to child-friendly designs, in an effort to increase patient compliance. Ladybug mask for infants (aged 0–2 years) and the Frog mask for children (ages 2 and above) [8].

Masks for holding chambers – Must Have [6]
- Airtight seal between mask and face
- Pleasant wearing sensation
- Minimal dead space
- Good acceptance
- Child-oriented designs

No doubt you are thinking about the devastating effects of the cyclones shown in television news reports. But the principle of the whirlwind can also be used to increase efficiency in a holding chamber (Latin: Vortex = whirl). The consistent rotating airstream in the chamber helps to reinforce the effect of impaction on the larger droplets in the metered dose inhaler, and thus increase the proportion of fine particle during inhalation. [9]