

## New inhalation devices

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It is now accepted that inhaled bronchodilator therapy is, whenever possible, to be preferred to oral treatment in the routine management of reversible airflow obstruction [1]. However, during the last two decades we have repeatedly been reminded that many patients have great difficulty in using the conventional pressurized metered dose inhaler (MDI) [2-6], today's most frequently prescribed inhalation device. Inefficient use leads to decreased therapeutic efficacy [7], and it is possible, therefore, that at least half of our adult patients, and perhaps a greater proportion of children, are getting little or no benefit from using inhalers because of poor inhalation technique [6, 8, 9]. It appears that the magnitude of this problem has been appreciated, and recently new devices have been developed which should allow more patients to benefit from inhaled therapy in the future.

It is unlikely that the MDI will be completely superseded by non-pressurized inhalers, but I believe that the future of the conventional MDI is limited. In the past this device has been modified in attempts to make it easier to use. The development of spacer systems was of great clinical importance [10], and large-volume spacers will continue to have a role in the management of asthmatic patients in the foreseeable future. Small-volume extension spacer devices are of less value and may be replaced by the new inhalers. Spacer attachments were necessary to overcome the inherent problems of a pressurized inhalation system, which is critically dependent upon the patient's coordination of dose release with inspiration.

Prior to the introduction of spacer systems a breath-actuated pressurized inhaler "Autohaler" had been introduced into clinical practice [11]. Although this is bulky compared to the MDI, it is much smaller than the combination of an MDI and a large-volume spacer, however, it has the disadvantage of generating a loud "click" when the valve mechanism is triggered. A generous inspiratory effort is also required to actuate the "Autohaler". For these reasons, and also because it was introduced containing isoprenaline as the bronchodilator, it has failed to secure a major share of the market. The concept of a breath-actuated pressurized aerosol is admirable, since the main problem of coordination of valve actuation and inspiration could be solved. On the other hand, the inability of some patients to continue to breathe in when propellant is released

into their mouths - the so called "cold-Freon effect" [12] - may not be overcome.

A much improved breath-actuated inhaler (BAI) has now been developed by the manufacturers of "Autohaler" and the disadvantages of the old device have been overcome. The BAI, containing up to 400 doses, is only slightly larger than the conventional MDI. It is primed by lifting a small lever in the top of the device. Dose-release is virtually silent and triggered by a low inspiratory flow-rate of *circa* 30 l·min<sup>-1</sup> [13]. The BAI containing salbutamol has been shown to be as effective as the conventional MDI used efficiently in patients with reversible airflow obstruction [14]. Preliminary studies have also shown that this device is much easier to use than, and preferred to, the conventional MDI by adults who have not previously used any types of inhaler [15]. The breath-actuated inhaler will be a welcome addition to the available range of inhalation devices and should do well in the competitive commercial world when challenged by the new multi-dose powder inhalers.

Two multi-dose powder inhalers are now available. Experience with the 200 dose "Turbuhaler" containing terbutaline sulphate is reported in this issue by PERSSON, GRUVSTAD and STAHL (page 681) [16], who found this device as effective as the conventional pressurized aerosol. The "Turbuhaler" is unique in that it is a metered dose inhaler, which is not pressurized and hence free from propellants, lubricants, surfactants etc, and dispenses pure drug without a lactose carrier. The device is disposable after its 200 doses have been used and has an "only 20 doses left" visual warning signal. In an assessment of 50 adults, who had not seen or used an inhaler before, 42 were able to use the "Turbuhaler" efficiently after reading its instruction leaflet, but only 25 of these individuals were capable of using a pressurized aerosol efficiently after reading and understanding its instruction pamphlet [8].

Prior to the release of the "Turbuhaler" all commercially available dry powder inhalers were single-dose and, therefore, less convenient, than the MDI, although easier to use. The "Rotahaler" has been of particular value in the treatment of children with asthma [17] and has been routinely prescribed by many clinicians for adult patients unable to use an MDI efficiently. Loading the "Rotahaler" prior to use has been found to be a disadvantage in children with exercise-provoked asthma [18], and some adult patients find it difficult to load due to poor manual dexterity or failing vision.

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Hence a multi-dose dry powder inhaler would be preferable. It is, therefore, gratifying that an alternative eight-dose reloadable device has been developed by the manufacturers of the "Rotahaler". The "Diskhaler" was designed to have similar efficiency to the "Rotahaler". Clinical trials in adults and children have demonstrated that with salbutamol and beclomethasone dipropionate the same doses administered from a "Rotahaler" and "Diskhaler" provide equivalent efficacy [19]. A single-dose study has demonstrated that equivalent bronchodilatation is obtained when 400 µg salbutamol is administered from the "Diskhaler" as when 200 µg is delivered from a pressurized MDI [19]. Handling studies have shown that there are significantly less errors in use after eight weeks use of this device compared with either the MDI or "Rotahaler". Preferences for the "Diskhaler" were greater than for either the aerosol or "Rotahaler". Even in patients who previously used an MDI, preferences for the "Diskhaler" was 41% compared with 34% for the aerosol, the remainder having no preference [19].

It is evident, therefore, that the "Diskhaler" and "Turbuhaler" are viable alternatives to the BAI. On present evidence these inhalation devices are preferable to the conventional pressurized MDI unless inhalation technique is checked routinely in all patients [3]. These new generation inhalation devices have exciting design features and are undoubtedly better than established inhalation systems in that they are as effective and easier to use. Multiple-dose non-pressurized inhalers are welcome alternatives to single-dose systems. When all these new devices are available for the delivery of bronchodilators, corticosteroids and perhaps anti-allergic drugs there is no doubt that the patient will benefit. During the next few years we will witness an intense degree of commercial rivalry as individual members of the pharmaceutical industry promote their exciting new devices. In the next decade I suspect there may well be a decrease in the use of the conventional pressurized aerosol and a steady rise in our prescription of these new inhalation devices.

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#### Editor's note

The driving gas in the conventional pressurized metered dose inhalers is a fluoro-hydrocarbon. The fluoro-hydrocarbon used in these inhalers comprise only a small fraction - probably around 1% - of the total fluoro-hydrocarbon production. The figures in Sweden for 1986 were 33 tons of fluoro-hydrocarbons (freons) from various inhalers used in the treatment of asthma vs a total production in Sweden of almost 5,000 tons. In spite of low fractional contribution from pressurized dose inhalers, the change-over to inhalers without fluoro-hydrocarbon is welcomed. It is indeed, desirable that other industries also diminish or abolish the use of fluoro-hydrocarbon.

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