The right way to inhale with asthma and COPD
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● **Inhalation therapy – the direct way to get fast relief**

The preferred modern treatment of respiratory diseases is with inhalation therapy, where the medicine is not taken as a tablet or liquid by mouth (orally), but is breathed in, or inhaled. Relief is felt from where the disease originates – the lungs. This type of therapy is also known as local or topical therapy.

● **Advantages of inhalation therapy**

An orally ingested substance first passes through the digestive tract and is distributed via the bloodstream throughout the body, before it arrives at the site where action is required. This is different to inhalation therapy, where inhalation results in the drug taking the shortest route through the mouth and throat into the bronchi and lungs. Such local treatment therefore requires only a relatively small amount of active ingredient and results in fast relief. As such, the effect on the body, i.e. the risk of side-effects, is very low and tolerability is good.

● **The best way into the lungs**

Modern medicine available today for the treatment of respiratory diseases is highly effective and low in side effects. In order to achieve the best relief, however, the medicine needs to be used correctly. This ensures that the drug travels directly to the right destination - the bronchi and the lungs – and is available at the correct dose.
Inhalation Devices

Inhaled therapy is effective only when the inhaled drug particles reach the lungs and can deliver their effects there. Only very small particles, a few micrometers wide, can penetrate deeply into the lungs through the respiratory tract. This medication inhalation is done with the help of inhaler devices. An essential feature of these devices is that they release the drug into fine, breathable particles. The inhaler device generates an aerosol which can immediately be inhaled. Three different aerosol production systems are mainly in use:

- **Pressurised Metered Dose Inhalers (MDIs)**
- **Jet and Ultrasonic Nebulizers**
- **Dry Powder Inhalers (DPIs)**

A fundamental prerequisite for effective inhalation therapy is the proper use of the inhalation device. Mistakes in use can severely reduce the effectiveness of the medication.

This leaflet covers the main inhalation systems, including their advantages and disadvantages. Possible mistakes when inhaling are shown and solutions are offered.

Key points:

- Only inhale the medication prescribed by your doctor for you. These are specifically selected for your respiratory illness.
- Daily use should be done with the frequency and order as prescribed by your doctor.
- The inhalation should be performed correctly. Guidance on how to use your particular medication should be closely followed.
Bronchodilating drugs
- These combat shortness of breath and have an immediate effect.

Anti-inflammatory drugs
- These fight the causes of asthma: the inflammation of the bronchial mucosa, and must be used regularly.

Am I inhaling the right way?
This question should be asked by every patient who has been prescribed an inhalation therapy. Only correct use of the medication will achieve a reliable and effective action. In asthma, usually two different types of drugs are used:

Anti-inflammatory medications, which are most important to address the progression of the disease, do not lead to an immediate effect being felt, which can be problematic. This is because when immediate relief is not felt, it can be difficult to know if you have correctly inhaled.
If you already use an inhalation device:
„Are you sure that you inhale correctly and a sufficient quantity of the drug reaches the lungs?“

If it is the first time your doctor has prescribed an inhaler device for you, ask how to correctly take your drug. If you already use an inhaler, ask your doctor or pharmacist to check occasionally whether you are inhaling correctly. Should you feel uncertain or have difficulties using the inhaler, talk to your doctor about the problems.

You can be trained how to correctly inhale

If you do not feel comfortable with your inhalation device or feel uncertain, you can ask your doctor for simpler alternatives or systems with good control option. On the following pages you will find an overview of the current inhalation devices available.

Tip:
Regular checks of your lung function, either at home using a peak flow meter or at your doctor’s with a lung function test will also help to improve the use and effectiveness of your medication.
**Metered Dose Inhalers (MDIs)**

With MDIs, the active ingredient is sprayed using a propellant gas. It is important to breathe in at the same time as the spray is dispersed, which many patients find difficult. Therefore, MDIs are not a suitable form of device for all patients.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Small, handy</td>
<td>• Handling – co-ordination required for inhalation aids</td>
</tr>
<tr>
<td>• High dosage accuracy</td>
<td>• High particle exit speed – particles deposited in the mouth and throat</td>
</tr>
<tr>
<td>• If acute medication is required:</td>
<td>• No control of correct inhalation</td>
</tr>
<tr>
<td>can be used in an acute attack</td>
<td>• In some cases, no single dose unit counter</td>
</tr>
<tr>
<td>• Quick inhalation</td>
<td>• Use of propellant gas</td>
</tr>
<tr>
<td>• Fine particle spray</td>
<td>• Cold stimulus caused by propellant gas</td>
</tr>
<tr>
<td>• Particle size independent of inspiration rate</td>
<td>• Sensitive to high temperatures</td>
</tr>
</tbody>
</table>

**Possible mistakes in use**

- Not co-ordinating breathing in and actuating the device at the same time
- carrying out inhalation procedure
- removing cap
- to shake the MDI prior to use
- keeping MDI in an upright position
- posture when inhaling
- wrong number of single dose units

**Possible solutions**

- Patient education and use of inhalation aids (spacers etc) can significantly reduce inhalation errors
- Switching to an inhalation device with simpler handling

For more information, please see www.admit-online.info
Jet and ultrasonic nebulizers

Using electrical nebulizer products allow inhalable aerosols to be released from liquid medications. The nebulisation takes place using compressed air, generated by a compressor, or by ultrasound.

Nebulizers are very well suited for babies and toddlers. From pre-school age onwards, children’s compliance in regularly inhaling can be increased by fully or partially moving to a faster inhalation device. Metered Dose Inhalers (MDIs) are suitable alternatives, however only when using inhalation aids. Dry powder inhalers (DPIs) with inhalation control function and low inspiratory flow needs should be given preference because of their simpler use.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Easy to Use</td>
<td>• Long inhalation times</td>
</tr>
<tr>
<td>• No coordination during inhalation required</td>
<td>• Extensive cleaning required</td>
</tr>
<tr>
<td>• Very easy to use with babies, toddlers and elderly patients</td>
<td>• Either battery or wall outlet required</td>
</tr>
<tr>
<td></td>
<td>• Not all drugs can be nebulised</td>
</tr>
<tr>
<td></td>
<td>• Not available quickly for use in acute attack</td>
</tr>
<tr>
<td></td>
<td>• Compressors are often unwieldy (e.g. transport issues)</td>
</tr>
<tr>
<td></td>
<td>• Space required for set-up</td>
</tr>
</tbody>
</table>

Possible mistakes in use

• Incorrect breathing when using nebulizers without valve control
• Poor hygiene maintenance
• Faults caused by negligence and clumsy use

Possible solutions

• Using valve-controlled systems
• Following cleaning instructions
• Switching to a faster inhalation device
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- **Dry Powder Inhalers (DPIs)**

  In dry powder inhalers, different techniques provide the active ingredient without use of a propellant gas. Inhalation is generally simple – a co-ordinated release of the active ingredient and breath intake is not required in breath-activated DPIs. Only one type of DPI requires comparable patient co-ordination to conventional MDIs. Some devices on the market differ significantly in technology and handling, as well as in their advantages and disadvantages. Innovative state-of-the-art devices, e.g. Novolizer, have feedback control mechanisms that check correct inhalation and require only a low inspiratory flow for optimal deposit of the drug in the lungs. Inhalation is easy and fast. Refillable powder inhaler devices are particularly environmentally-friendly.

- **An overview of the various types is shown below in the following table:**

<table>
<thead>
<tr>
<th>Non-refillable</th>
<th>Refillable</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Single unit doses, e.g.</strong></td>
<td><strong>Single unit doses, e.g.</strong></td>
</tr>
<tr>
<td>- Diskus®</td>
<td>- Aerolizer®</td>
</tr>
<tr>
<td>- Handihaler®</td>
<td>- Handihaler®</td>
</tr>
<tr>
<td><strong>Multi-dose systems, e.g.</strong></td>
<td><strong>Multidose systems, e.g.</strong></td>
</tr>
<tr>
<td>- Turbohaler®</td>
<td>- Novolizer</td>
</tr>
<tr>
<td>- Easyhaler®</td>
<td>- Auto-Jethaler®</td>
</tr>
<tr>
<td>- Twisthaler®</td>
<td>- Auto-Jethaler®</td>
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</tbody>
</table>
Currently available dry powder inhalers contain different amounts of the relevant drug:

- **Diskus**: 60 single dose units
- **Turbohaler und Easyhaler**: 60/100/120/200 single dose units
- **Aerolizer**: 60 single dose units
- **Novolizer**: 60/100/200 single dose units

The possible life-span of the various DPIs varies, as some are refillable and others are not. For example, Aerolizer® can only be used for 60 single dose units, but due to its refilling capacity, Novolizer can be used up to a year. This saves money and protects the environment.

### Advantages
- Small, handy
- Easy to use
- Short inhalation time
- Only minor inspiratory flow required (in some devices)
- No propellant gas
- Refillable (some devices)
- Very good control and validation of successful inhalation (some devices)
- With single dose unit counter (some devices); and in Novolizer dose counter which assesses dose taken, doses left
- No evaporative cooling
- Not temperature sensitive

### Disadvantages
- No control system to check on successful inhalation, relief cannot always be felt (except Novolizer)
- Environmental burden: Some devices not refillable
- Sensitive to moisture (some devices)
- High inspiratory flow required (some devices)

### Possible mistakes in use
- Inadequate drug dose from devices without inhaling control
- Breath intake not strong enough (insufficient inspiratory flow)

### Possible solutions
- Use of a device with inhalation control to check for successful inhalation
- Use of a device with inhalation control and low internal device resistance, suitable for low inspiratory flow
Improving quality of life

In recent years, the systems for generating aerosols have been progressively developed. Potential sources of mistakes have been eliminated from standard devices. A particularly large number of innovations and technical improvements have been made in DPIs. Today these devices can meet the requirements for an effective respiratory therapy with good control options.

One of the most recent developments is the Novolizer (MEDA, Bad Homburg, Germany), which significantly contributes to increased therapeutic safety. The Novolizer powder inhaler is easy to use and is also environmentally-friendly as it can be refilled. Once the content of the drug cartridge is exhausted, the Novolizer is simply loaded with a new one. The device can be re-used for up to one year. Novolizer can be used to apply different drugs. To reduce the likelihood of confusion, the respective dosage buttons of Novolizer are coloured differently. An overdose by repeatedly activating the device is prevented by a locking mechanism. A counter displays the remaining doses available for inhalation and indicates when a refill cartridge needs to be loaded. This is prevents running out of medication, for example, when on holiday. The refilling system reduces waste and is environmentally friendly.

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Correct inhalation is ensured by a multiple feedback control mechanism:

- **See:**
  Colour change in the control window from green to red

- **Hear:**
  Clearly audible clicking sound

- **Taste:**
  Sweet taste of the sugary carrier substance (lactose)
Correct use of a dry powder inhaler with triple inhalation control, as with the Novolizer by MEDA:

1. Remove the protective cap.
2. While holding the device horizontally, press the dosage button until it stops. A distinct click is heard and the colour in the control window changes from red to green. Now release the button again.
3. Breathe out deeply, but do not breathe into the device.
4. Put your lips around the mouthpiece.
5. Inhale the powder with a deep breath. A distinct click signals correct inhalation. Continue breathing for a few seconds after hearing the click. The colour in the control window changes from green to red.
6. Hold your breath for a few seconds, and then breathe out.
7. Put the cap back on the mouthpiece.

Correct use of the inhaled medicine and the inhalation device is a major step towards successful treatment of respiratory diseases. Correct inhalation results in fewer ailments/symptoms and a better quality of life.

Whenever you have the feeling that you are having difficulties in using your inhaler, or you are unsure whether you have correctly mastered the technique, please talk to your doctor or pharmacist. For inhalation therapy, the most effective drug can only help if it arrives where it should work – in the lungs.
Scientific advice

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You can find more information on correct inhaler technique at www.admit-online.info

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