

ASTHMA
IN YOUNG
CHILDREN

Hans Bisgaard
Professor of Paediatrics



Thanks to Heather Spears for the engaging and beautiful drawings of children with asthma. Thanks to the parents, and to the children that were models for the drawings at the Paediatric Wards at the Copenhagen University Hospital and the Gentofte County Hospital.

Finally thanks to the pharmaceutical company AstraZeneca for sponsoring the publication of this book.

1st edition from 1989 is published in 27,000 copies.

2nd edition from 1994 is published in 20,000 copies.

3rd edition from 2002, 1st issue, is published in 5,000 copies

4th edition published on www.dbac.dk in August 2005

Hans Bisgaard, MD, DMSci

Professor of Paediatrics

Danish Paediatric Asthma Centre

Copenhagen University Hospital

Denmark

www.dbac.dk

www.copsac.com

August 2005

© Hans Bisgaard and Astra Zeneca A/S

ISBN 87-88354-17-2



CONTENT

INTRODUCTION	7
ASTHMA OR WHEEZY BRONCHITIS	8
THE LUNGS	11
SYMPTOMS	13
CAUSES	17
TREATMENT	18
SYMPTOM TO RELIEVE	20
PREVENTIVE MEDICINES	22
HOW TO GIVE MEDICINE	29
PREVENTION	32
CAN A CHILD OUTGROW ASTHMA?	34
ECONOMIC HELP	37
ATOPIC ECZEMA	39



INTRODUCTION

Asthma is the most common chronic disease in young children, and it has unfortunately become more common. Sadly, the symptoms are often overlooked or underdiagnosed. In recent years, it has become increasingly clear that asthma can and should be treated – even when it occurs in very young children. It is vital that parents understand the disease, not only how to detect its symptoms but also how it is treated. The child is totally dependent on his parents' understanding of the disease. If parents don't realize that their child has symptoms of asthma, the child will not get

treatment and, thereby, risks a deteriorating quality of life. And if the parents don't understand the treatment, there is a risk that they won't follow through with it, resulting in the same serious consequences for the child. It is, therefore, imperative that parents and other care-givers learn just what asthma is.

This book explains what is known today about asthma in young children, and how it is treated. The more insight parents have into this disease, the better they can understand their child's reactions and the better they can help.



ASTHMA OR WHEEZY BRONCHITIS

Usually the illness, which we call asthma in older children, is called wheezy bronchitis in very young children. The word asthma covers attacks of breathing difficulty, while bronchitis means that the child produces excessive mucus in his or her air passages. But the treatment is exactly the same for both conditions. One might say that asthma and asthmatic bronchitis are simply different degrees of the same illness. We have, therefore, chosen simply to discuss asthma in this book. By asthma then, we mean children with symptoms of asthma who are helped by asthma treatment.

Many young children outgrow their asthma in the course of a few years. Asthma in young children has a great deal in common with asthma in older children. But there are also many problems that are particular to the very young child. First and foremost, the symptoms are harder to detect and to follow. Lung function can be measured in older children, but not in the very young. Also, it is difficult to give medicine to very young children. Because of the special problems, treatment of young children with asthma has often been poor.





THE LUNGS

Every time we breathe, air streams through a fine net of hair-thin air tubes and into millions of tiny air sacs in the lungs. Here, oxygen is absorbed into the blood while, simultaneously, carbon dioxide is eliminated into the air we exhale. The air tubes are surrounded by muscles and, inside, they are lined by a mucus membrane. This membrane is covered in turn by a thin layer of mucus, and by minute hair-like cells which constantly vibrate to guide the mucus up through the air passages. If, for example, dust gets into the lungs with inhaled air, it will be caught in the mucus and carried back up and out of the lungs. This is the way the lungs are cleaned.

WHAT HAPPENS IN THE LUNGS WHEN YOU HAVE ASTHMA?

In asthma, the air passages constrict during an attack. This constriction is caused both by cramping of the muscles that surround the air tubes, and by inflammation of the mucus membrane that lines the tubes. The inflammation

causes the membrane to swell and to produce more mucus. The air passages are, thus, blocked – just as the nose becomes stopped up when you have a cold. Very young children experience asthma symptoms more often than older children do. This is probably because their air passages are smaller and more easily blocked.

We don't know the cause of inflammation of the air passages, but it is not due to either bacteria or virus. We do know that asthmatic inflammation is chronic; that is, inflammation is present even when the child is not having an attack. And we know that this may harm the air passages. If children with asthma do not receive effective treatment, in the long run, they risk chronically poor lung function. Thus, asthma can be a serious lung condition which demands treatment.





S Y M P T O M S

WHICH SYMPTOMS DO WE NEED TO BE AWARE OF?

Asthma symptoms vary widely. Children can have some periods with serious symptoms, and other periods when their lungs function quite normally. In between, they may have mild symptoms that are hard to detect. Most of the time, the child is fine and his or her lungs function normally. Persistent coughing can be a sign of asthma. As a rule, the cough will be worst at night but, typically, it also appears when the child laughs, yells, screams or cries. When children are going through periods of asthma attack, they sleep poorly. They are, therefore, often out of sorts and irritable. Sick children have little appetite. This is also true of children with chronic asthma.

Strenuous activity often brings on asthma symptoms. A result of this is that asthmatic children frequently lose interest in play and other physical activities. Little children don't complain about breathing problems. Their symptoms may easily go undetected because young children can seldom understand or explain themselves. This means that children can live with 'hidden' – and thus untreated – asthma. They accept problems that grown-ups would never tolerate, so parents must learn to interpret the small signs of asthma. If parents learn to detect the early signs, it is often possible to recognize when an attack is on the way – before it brings on labored, wheezing, whistling breathing. Children react differently. Some become nervous and restless when an attack is on its way. Others become unnaturally quiet. Here, parents must learn to recognize their child's reactions.

A COLD OR ASTHMA?

Asthma in children may produce wheezing, whistling sounds in the lungs during breathing. This can be difficult to distinguish from the rattling breathing noises of the common cold. In both cases, breathing may sound like a coffee machine that is stopped up. And the situation is not helped by the fact that asthma symptoms are often brought on by a cold. Asthma comes from the lungs, while a cold is situated in the nose and the upper air passages. It can, therefore, sometimes help to place your ear on the child's chest and listen for wheezing and whistling in the lungs' small air tubes, just as a doctor does with his stethoscope.

SYMPTOMS OF A SERIOUS ATTACK

During a serious attack, it is clear that the child is having difficulty breathing. His or her breathing is wheezy and whistling and, in the worst cases, the child strains with his entire upper body to breathe. You can see how the skin over the clavicle and below the ribs is sucked in each time the child inhales. If the symptoms are this severe, the child must be taken to a doctor. If the child is running a fever, and breathing becomes rapid and noisy, he or she may be suffering from pneumonia and, again, must be seen by a doctor. Pneumonia can easily take hold when asthma is inadequately treated. A child who does not receive effective asthma treatment can risk contracting one case of pneumonia after another, with the result that the child doesn't thrive. The child may grow more slowly and the lungs may be damaged.





CAUSES

Allergy can provoke asthma symptoms, but it is uncommon that young children with asthma also suffer from allergies. The older the children are, the more common it is for allergies to contribute to their asthma symptoms. Asthma and allergy are, in fact, two different illnesses. A good many asthmatic children have no allergies, and many allergic children never develop asthma. But if a child has asthma, it can be worsened by allergies.

Asthma is a lung disease with chronic inflammation of the air passages and allergy may make asthma worse.

Allergy can be described as an error in the immune system, which reacts abnormally to benign foreign proteins (allergens) such as grass pollen. Battle-ready allergy attack-cells explode and release a cascade of substances (for example, histamines and leukotriene) which can bring on an asthma attack and worsen inflammation in the air passages.

When young children have allergies that affect the air passages, these are often allergies to dust mites, animal dander and pollen. Other allergies are less common. Young children can also have food allergies. Typically, food allergies produce many symptoms, such as asthmatic eczema, urticaria, chronic runny noses, persistent digestive problems or colic. Milk and eggs are the most common foods that cause this type of allergy.

But, if the child shows only asthma symptoms, it is unlikely that food allergies are to blame. Nor do chemical dyes and preservatives in food products cause asthma. A prick test of the skin, or a blood test, can determine whether a child is allergic to particular substances and, if so, what they are. It is worth noting that it is quite possible to do a skin prick test on a young child. Very young children are more seldom allergic than older children. But the test itself is reliable even for the youngest of children.

If the child is allergic, parents must discuss with their doctor how best to protect the child.

A bad cold is the most common cause of asthma symptoms. The common cold virus irritates the air passages and provokes an asthma attack. This is the reason that the child suffers most of his or her attacks in the autumn and winter, when it's high season for colds. Similarly, the disease often appears when the child begins attending kindergarten (or other institutions) where it is nearly impossible to avoid catching many colds. Irritants are substances that cause irritation of the air passages and, thereby, provoke an attack. These can include – for example – tobacco smoke, air pollution, fumes, automobile exhaust, strong odors (perfumes), dust, and cold air.

Strenuous physical activity often produces coughing and breathing difficulties. Most children react by avoiding overly strenuous games. If children experience symptoms during strenuous activity, it doesn't mean that they should be kept quiet in order to avoid attacks. They should be treated properly, so that they are not disabled by their illness.



T R E A T M E N T

Many young children outgrow their asthma. But until this happens, it is vital to prevent and relieve their symptoms. The goal of treatment is to make the child symptom-free. Firstly, parents must rid the environment of the things that can provoke attacks and, secondly, the child must be given the proper medicines. Today, young asthmatic children can be treated both effectively and safely with drugs, but common-sense guidelines for the child's environment are still a large part of the treatment.

THE ENVIRONMENT

Tobacco is the most important environmental cause of asthma in young children. And it is also one of the few that can, in fact, be prevented. The lung capacity of infants is reduced if the parents smoke. If the child is forced to be a passive smoker, his or her risk of developing asthma, allergies and infections rises. It is simply unacceptable to expose children with sick lungs to passive smoking at home or in day care. It is unacceptable if children have to take extra drugs because their parents, or others in their daily lives, expose them to tobacco smoke. It is not enough to limit smoking to separate rooms. There should be no smoking allowed anywhere in the child's home.

Virus infections worsen and prolong the illness. Viruses spread quickly in places where there are many children. Therefore, in severe cases, you sometimes need to keep the child at home to protect him or her from viruses in daycare institutions.

Allergies If the child suffers from allergies, parents should consult the doctor about how the child's environment may be adapted.

MEDICINE

Asthma treatment consists of two types of medicine: medicine to relieve the symptoms of asthma attacks, which the child should be given whenever symptoms appear; and preventative medicine, which the child should be given every day. In mild cases of asthma, the reliever medicine may be sufficient.

MEDICINE

FOR SYMPTOM RELIEVE

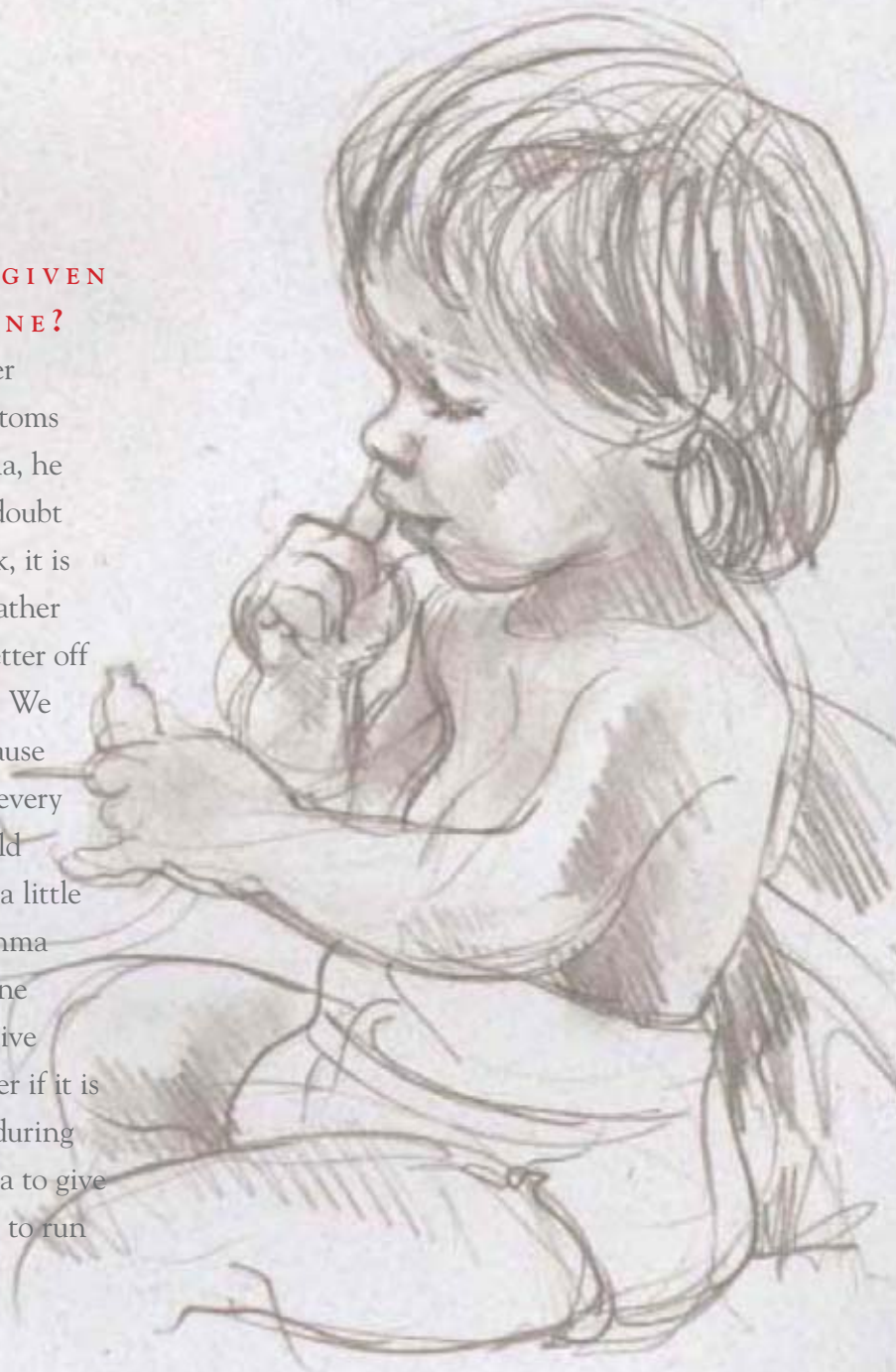
(EX AIROMIR[®], VENTOLINE[®] AND SALBUVENT[®])

Symptom-relieving medicines (rescue treatment) such as Albuterol, Ventolin or Airomir work in the course of a few minutes after inhalation. They cause the muscles surrounding the air tubes to relax and enlarge, giving more room in the air passages for air to flow through. This also makes it easier to cough up mucus from the air passages. If the medicine is taken in liquid form, it takes between 30 minutes and one hour to start working. A few children experience brief side effects in the form of restlessness, trembling hands and heart palpitations in the first hour after they take the medicine. This is unpleasant but completely harmless. The medicine does not carry any risk of

addiction, dependency or any other side effects, even when used over a long period of time. The medicine works for only a few hours, since the substance breaks down rapidly in the body. You can, therefore, give your child medicine every four to six hours around the clock without any risk of overdose. During severe attacks, it may prove that the medicine is not sufficient even if it is given every four hours. This can be a sign that the attack is getting worse. If it becomes necessary to continue the medicine (every fourth hour) for more than 24 hours, you should contact your doctor. This is not to say that it is dangerous to take so much medicine, but simply that the child may need extra treatment, perhaps in the hospital.

WHEN SHOULD THE CHILD BE GIVEN SYMPTOM-RELIEVING MEDICINE?

Reliever treatment should be taken whenever needed. This means whenever asthma symptoms occur. If the child shows symptoms of asthma, he should be given the medicine. If you are in doubt about whether your child is having an attack, it is better to give the medicine once too often rather than not often enough. The child will be better off having the medicine than having an attack. We rarely see children who are hospitalized because they have received too much medicine but, every day, hospitals admit many children who could have managed at home if they had received a little more medicine. The everyday control of asthma is fundamentally based on the use of medicine to relieve attacks. It is always best to try to give medicine well in time, because it works better if it is given before an attack than it does if given during an attack. For example, it may be a good idea to give the child medicine before he or she goes out to run and play.

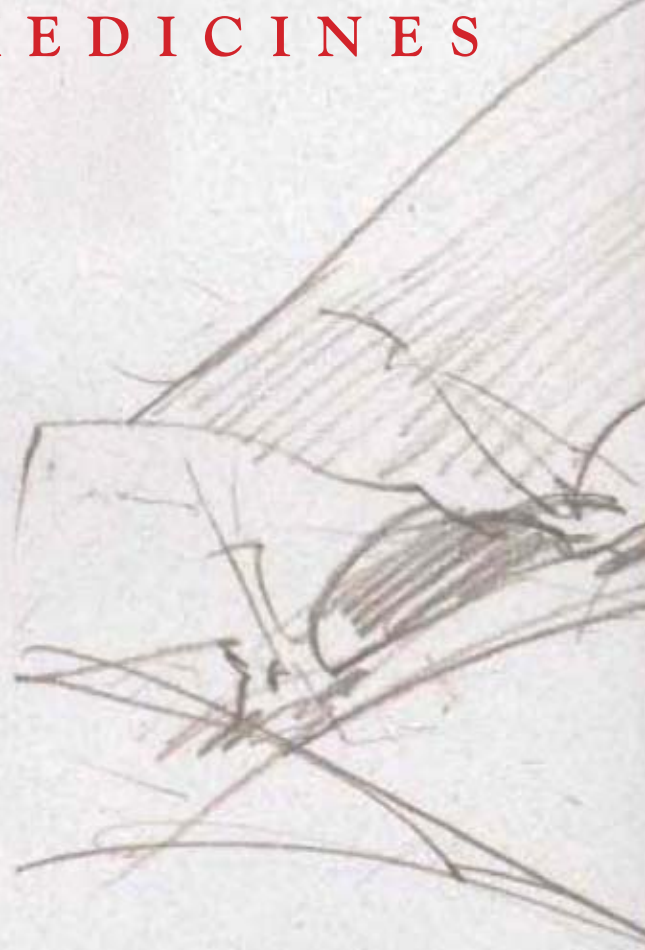


P R E V E N T I V E M E D I C I N E S

Medicine for relieving the symptoms of an attack (described above) has no effect on asthmatic inflammation. If treatment is limited to such rescue treatment – it is like painting over rust.

It is very important to treat not just the symptoms, but also the cause – the underlying asthmatic inflammation. Such inflammation can be treated with steroids.

Cortisone is a vital steroid, which is produced in the adrenal glands and which, among other things, serves to control chronic inflammation in the body. Steroids like cortisone are, thus, used to treat many chronic inflammatory conditions, such as arthritis, and have also been used for many years to treat the asthmatic inflammation in the lungs.





**LOCAL STEROID (E.G.,
PULMICORT® AND FLIXOTIDE®)**

Topical steroids are not the same thing as cortisone. They work as well to suppress asthmatic inflammation, but they have the special quality of being rapidly broken down in the body. So when topical steroids are inhaled they work only topically where they are needed, namely in the lungs, and have no effect on the rest of the body. This is why they are called topical steroids. It is important to differentiate between – on the one hand, steroids like cortisone which are given by injection or pills and which have effects throughout the body – and on the other hand, topical steroids which are inhaled and work only in the lungs.

Topical steroids reduce swelling in the air tubes so that air passages open up to allow easier breathing. Simultaneously, the air tubes become less sensitive so that the child is less prone to attacks.

Side effects are very few. Only a small number of children suffer a trivial and temporary hoarseness and thrush in the mouth. Unfortunately, there are some parents who are more afraid of side effects of steroids than they are of the disease. The result

can be an unreasonably poor quality of life for their children. Only in very large doses -above recommended – is there a small risk of the side effects one sees in patients who have undergone cortisone treatment over long periods of time. On the other hand, if parents – out of fear of side effects – give their children too little medicine, the child risks the damaging after effects of poorly treated asthma. In fact, the development of topical steroids has contributed to a markedly improved treatment of children with asthma. Topical steroid treatment of asthma is a safe treatment that we have more than thirty years' experience with. In order to ensure that the child is treated as well as possible, with the least possible amount of medicine, the child should be seen by a doctor regularly. Remember that steroids are preventative medicine. That means that it can take several weeks before they take full effect. It can be hard to remember to give the child medicine if you can't see any beneficial effect right away, but regular treatment is imperative for good results.



**STEROID TABLETS
(EX. PREDNISOLON®) OR
INJECTIONS (EX. SOLUMEDROL®)**

In very severe cases of asthma, cortisone-like steroids can be given in the form of pills or injections for short periods with no side effects. This treatment can often relieve and shorten a severe attack. Large doses of this drug, over long periods of time – months – can have side effects. Some children grow more slowly while they are taking the medicine, but still they usually catch up again as soon as the treatment stops. Prednisolon treatment also tends to increase the appetite, so children typically gain weight. This side effect also disappears when the treatment is finished.

ANTI-LEUKOTRIENE (SINGULAIR®)

Anti-leukotriene blocks one of the substances (leukotriene) produced in asthma and hay fever, in the same way that anti-histamines block histamine. Anti-leukotriene, therefore, works against both asthma and hay fever. While anti-leukotriene is less effective than topical steroids, it can control some elements of the asthmatic inflammation unchecked by steroids. Particularly, it seems effective in virus induced symptoms, where steroids on the other hand have no or only little effects. It can also be used as a complement to topical steroids in children whose asthma does not respond adequately to topical steroids alone. Anti-leukotriene can thus work to reduce the amount of steroids needed for treatment. Anti-leukotriene is given as preventive therapy in the form of a chewable tablet that is taken once a day. Its effect begins within a few hours and lasts for 24 hours.

Anti-leukotriene has no side effects.

OTHER TREATMENTS

Cough medicines do not help against asthmatic coughing. Coughing is often a symptom of asthma and must, therefore, be treated with asthma drugs.

Penicillin is equally ineffective against asthma, but may be used if the child has developed pneumonia as a complication of asthma.

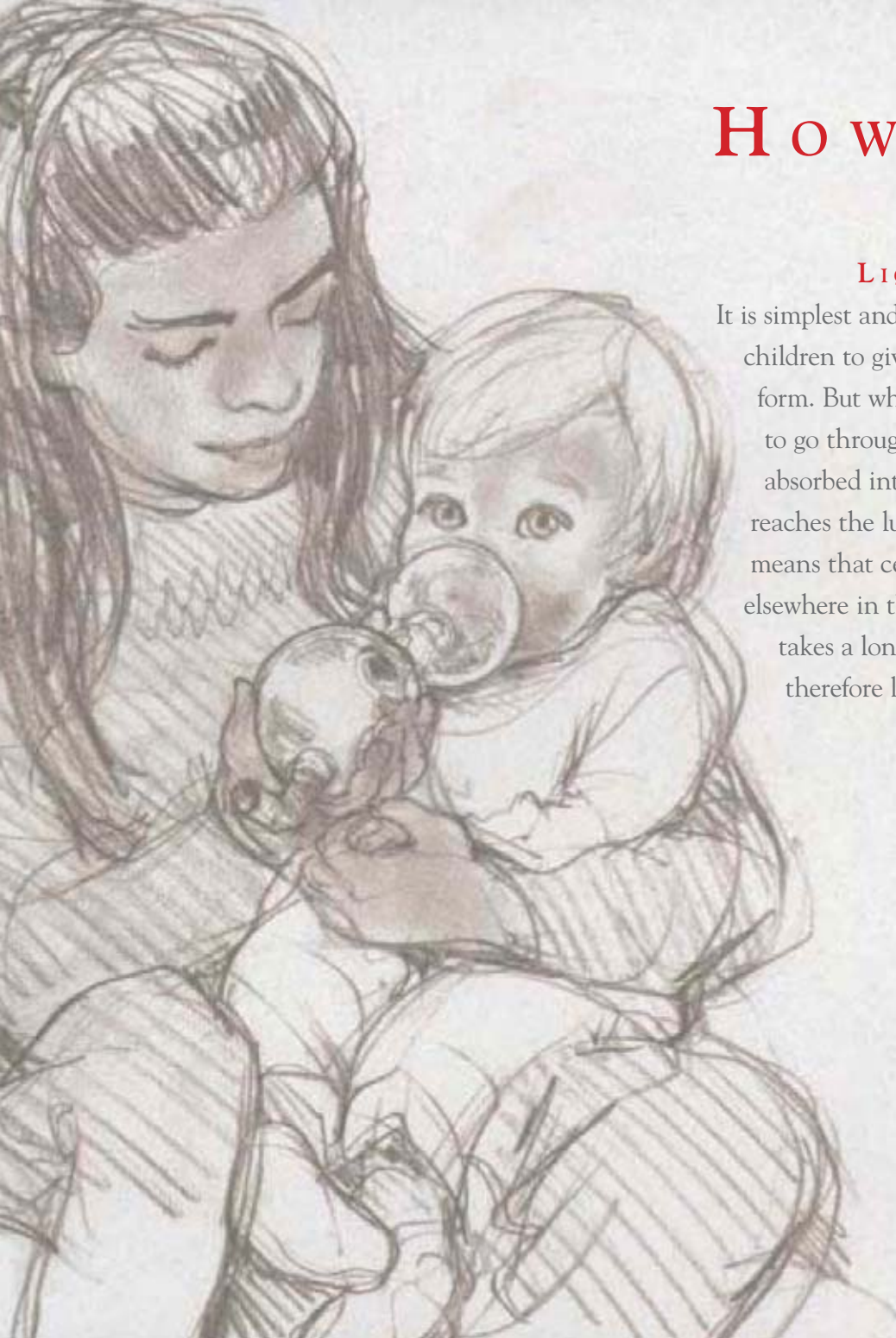
Alternative treatments are sought by many, but there is no evidence that these methods work. If you still prefer alternative treatments, it is important to continue giving the child the medicines that have been prescribed by the medical doctor as well.



HOW TO GIVE

LIQUIDS, TABLET

It is simplest and most acceptable to young children to give medicine in liquid or tablet form. But when you swallow medicine, it has to go through the stomach and then be absorbed into the bloodstream before it reaches the lungs in a much diluted form. This means that certain drugs may cause side effects elsewhere in the body- and, second, the drug takes a longer time to begin working and is therefore less useful for acute treatments.



M E D I C I N E S

INHALERS

Inhaled medicine has the advantage of direct delivery into the sick lungs therefore needing lower doses of medicine and providing a rapid effect. There are three types of inhalers: sprays with spacers, dry powder inhalers, and nebulizers.

SPRAY WITH SPACER

A spray with a spacer is an effective device for delivering medicine to the lungs. The spray creates a puff of tiny medicine droplets inside the spacer. The child inhales calmly from the spacer for a period of about $\frac{1}{2}$ minute and is, thereby, sure to inhale the medicine.

Young children need special, small spacers with face masks. Here, it is important that the mask fits tightly to the child's face, which most children will naturally resist to begin with. But, after a while, nearly all children accept the mask – partly because they can tell that the treatment works, and partly because there is really nothing

uncomfortable about it. There is no resistance within the apparatus, and the child breathes the medicine in from the spacer along with fresh air which streams into the spacer when the child inhales. Some sprays can cause a little brief coughing though, due to the solution in which the medicine is dissolved.

Always remember to shake the spray well before use; otherwise, there is a risk that there won't be any medicine in the puff from the spray. If the child is supposed to have more than 1 puff of medicine each time, or needs several kinds of medicine, remember to spray only 1 puff into the spacer at a time. This means that you spray 1 puff into the spacer and let the child inhale from the spacer for $\frac{1}{2}$ minute; then you spray the next puff into the spacer and let the child inhale from the spacer again for $\frac{1}{2}$ minute.

There are various spacers on the market with widely differing degrees of effectiveness. So you shouldn't switch spacers lightly, as this can change

the dosage that reaches the lungs. If the spacer is made of plastic, a large part of the medicine can go to waste because static electricity makes it stick to the sides of the spacer. Modern spacers are made of metal to avoid this risk and to ensure a more precise dose of the medicine.

In the beginning it may be necessary to hold the child tightly for the $\frac{1}{2}$ minute it takes to give the medicine. The spray must be shaken, and should only be sprayed after the child has begun to breathe through the mask.

If you are afraid that the child has not actually received any medicine, it is usually best to repeat the treatment. Children over the age of 3-4 years can use the mouthpiece of the spacer valve, so that the facemask can be dispensed with. But you need to be make sure that the child doesn't 'cheat' by breathing through the nose. You can check this by keeping an eye on whether the exhalation valve moves.

DRY POWDER INHALERS

The dry powder inhaler works well for children who can (and will) inhale strongly enough. Many children can do this if they want to, but they don't always want to. So most children under the age of 6 are best served by treatment with the spray and spacer, because it doesn't demand their cooperation to the same extent.

NEBULIZERS

Nebulizers are used in the hospital for patients with acute asthma. The advantage of this apparatus is that it creates a large cloud of medicine, so that a sick child does not need either to inhale or to have a tight mask over his or her nose and mouth. For home use, vaporizers are both impractical and outdated, because they are slow, expensive and clumsy. The drug delivery is imprecise and with a significant waste of medicine.



P R E V E N T I O N

The most efficient thing we can do to prevent asthma is to protect children from passive smoking. We know that children who are passive smokers on a daily basis have poorer lung function and more sensitive lungs than others. They, therefore, run a greater risk of developing asthma. They suffer more often from infections and have a higher risk of allergies. If the child has an increased risk of asthma and allergy (child's parents or siblings have asthma or allergies), the child should avoid substances which

are most likely to provoke allergies – for example, animal dander and dust mites. For such children, cow's milk should also be avoided during the first 4 months after birth and, if the mother cannot nurse her child, a suitable infant formula (e.g., Nutramigen[®] and Profylac[®]) should be substituted. Since allergy is seldom an important contributor to asthma in young children, it is more worthwhile to concentrate on preventing infections in the child's air passages. Crowded daycare institutions increase the incidence of infection. Contagious

diseases spread less easily outdoors than indoors. Good hygiene (especially, washing hands) in the family and in the institution is a tried and true advice.



CAN A CHILD OUTGROW ASTHMA?

Many young children outgrow their illness, but some will continue to have asthma their whole life. The risk that the disease will not disappear is greatest if the child's parents or siblings have allergic illnesses. There is also an increased risk in children with

eczema, and in children whose asthma attacks are frequent and severe. It is also probable that insufficient treatment of asthma increases the risk of prolonged lung problems.







ECONOMIC HELP

Parents of children with asthma can, according to the Danish Law on Social Service § 28, seek reimbursement for necessary extra expenditures incurred while caring for the child at home. In certain cases, it is also possible to seek compensation for loss of income due to absence from work, if it is most appropriate that the child be cared for in his or her own home. Local commune offices can advise you regarding these regulations and conditions.



ATOPIC ECZEMA

Atopic eczema is also known under other names such as atopic dermatitis or Prurigo Besnier. About one child in 6-7 suffers from atopic eczema. Like asthma, atopic eczema typically occurs in families with illnesses such as asthma, allergies, hay fever and eczema. Asthma and atopic eczema often appear in the same children but, still, only every 5th child with atopic eczema gets asthma.

Eczema often appears in the second half of the first year of life, and most children outgrow it before they reach school age. It is usually a dry, red, scaly eczema. Later, the skin becomes thickened and wrinkled or cracked. It often starts in the face, but the most common location predicting persistent eczema is eczema on the arms and joints. The child can be extremely irritated by itching that can disturb the sleep and well being.

The reason for eczema is unknown, except for the fact that it can be inherited.

Allergies can contribute to eczema – particularly allergies to food such as milk and eggs – but allergies to dust mites, animal dander and pollen are seldom important. Allergies can worsen eczema, but they are never the sole cause. That means that eczema should always be treated. Treatment consists, in part, of moisturizing creams and, in part, of topical steroids (hormone creams). When a child has eczema, the skin is very dry and needs moisturizing cream several times a day and after every bath. There are many different types of moisturizing creams available. Always use an unperfumed moisturizing cream. The higher the fatty content, the better it will work.

The skin is also sensitive to irritation – for example from wool. Cotton is well tolerated. Heat and sweat aggravate itching. Too frequent



bathing can dry out the skin. Soaps should be mild and non-perfumed to avoid the development of allergies. In most cases, eczema improves greatly in the summer and during trips to warm, sunny climates. Still, there are a few who actually get worse in the summer, probably because of

sweat. Sometimes an upsurge occurs because of a bacterial infection and it is necessary to treat the infected eczema with antibiotics. For the most part, neither bacteria nor virus are at fault. But eczema is an inflammation of the skin, just as asthma is an inflammation of the air ways. So the treatment for eczema is also topical steroids. With proper use, this is an effective treatment without side effects.

Like asthmatic children, many children with eczema suffer unnecessarily from their illness because of their parents' fear of treatment with topical steroids. Topical steroids are divided into 4 groups. The mildest (group 1) can be purchased

over-the-counter without prescription because, in practice, they are without side effects. Group 1 is preferred for thin skin, e.g. the face and throat, and for very mild eczema. The strongest (group 4) is not normally used for young children. Group 2 is adequate to treat most young children with eczema. Group 3 can be used when eczema worsens.

Topical steroids are available as creams (not particularly greasy and used for moist eczema), salves (greasy like Vaseline and used for very dry eczema), and creams with a high fat content (between creams and salves). These topical steroids should be applied in a thin layer. If the treatment is interrupted weekly by a pause, this is an effective treatment with no side effects. Only a long-term overuse of topical steroids can produce side effects such as thin skin. It is best to attack eczema 'aggressively' – that is, to keep it away rather than to wait and see if it will disappear by itself. This means that you should watch out

for upsurges (e.g., reddening of the skin, the appearance or worsening of rashes and itching). If you keep a constant watch for upsurges of eczema and treat them promptly, you will use less medicine in the long run than you would if you are too 'careful' and too slow to react. Continue the treatment until the eczema disappears or, in any case, until it is no longer red – then continue with moisturizing cream.

