

Pamphlet #1: WHAT IS ASTHMA?

Introduction

Asthma is a chronic disease involving the air passageways of the lungs—the bronchial tubes. This disease causes the bronchial tubes to be overly sensitive to many different things; when exposed to these things (or “stimuli”), the bronchial tubes of persons with asthma narrow, making it difficult for air to pass freely in and out of the lungs. Persons without asthma have no such response of their bronchial tubes despite exposure to the same stimuli. Thus, persons with asthma are said to have airways that are “hyper-responsive”; and the things that set off the narrowing of their bronchial tubes are referred to as the “triggers” of their asthma.

Asthma is a chronic disease in that the tendency of the bronchial tubes to narrow abnormally in response to exposure to certain triggers is present day and night, day after day for months and years at a time and sometimes lifelong. However, many persons with asthma have long periods of time when their air passageways are normally wide open and when they feel entirely well. Not until they come in contact with some trigger to their asthma do their bronchial tubes narrow or do they experience any difficulty with their breathing. Thus, for most persons with asthma, symptoms come and go, sometimes quite rapidly, but their susceptibility to developing bronchial narrowing persists. Asthma is that persistent susceptibility.

Hyper-Responsive Air Passageways

The abnormal tendency to develop narrowing of the bronchial tubes differs in intensity among different persons with asthma. That is, among persons with asthma one finds different degrees of hyper-responsive airways. Some asthmatic persons develop severe narrowing of their bronchial tubes after only light exposure to an asthma trigger. At the opposite extreme, other persons with asthma develop only mild narrowing of their bronchial tubes following even an intense exposure to their asthma trigger. Thus, the degree of susceptibility of the bronchial tubes differs from one person with asthma to another. Equally important is the fact that in a particular person with asthma, the susceptibility to bronchial narrowing may vary over time, just as the intensity of their asthma may wax and wane. One example is seasonal variation in hyper-responsiveness of the bronchial tubes in persons with pollen allergy: during pollen season they become more sensitive to all of their triggers of asthma (not just to pollen); out of pollen season they gradually become less sensitive again. A major goal of modern asthma treatment is reducing bronchial sensitivity to as close to normal as possible.

What causes the bronchial tubes to become hyper-responsive in the first place; which is to say, what causes asthma? No one knows with certainty the answer to this question, and there may

be not one but many different causes. We likely inherit part of this tendency from our parents; it's "in our genes." However, more and more evidence suggests that in addition asthma is a special kind of inflammation of the bronchial tubes. In many, although probably not all, instances, this inflammation is the result of allergic-type reactions involving the bronchial tubes. The important point here is that even when feeling well and entirely free of symptoms, a person with asthma continues to have a low level of asthmatic inflammation in his or her bronchial tubes. There may be no detectable swelling of the tubes and no excess mucus production, but there continues to be a low level of irritation of the bronchial tubes that maintains their abnormal sensitivity. We cannot change our genes (yet!), but we can effectively reduce this inflammation in our airways.

Making Airways Less Hyper-Responsive

From these observations have come the concepts 1) asthma is a chronic inflammatory disease of the airways, and 2) the way to make the bronchial tubes of asthmatic persons less hyper-responsive is to eliminate or at least reduce the inflammation of these tubes.

Some of the triggers of asthma that can cause an abrupt narrowing of the bronchial tubes can also promote a persistent, low-level bronchial inflammation. Examples include inhalation of cigarette smoke, animal danders, dust mites, and seasonal pollens. For some persons chemicals or fumes in the workplace can cause worsened inflammation of the bronchial tubes. Removal from these "inciters" of asthmatic inflammation can lead to significant improvement in one's asthma. Thus, a change in one's home or work environment—for example, giving the pet cat away, exterminating cockroaches, or reducing dust exposure in the bedroom—can result in fewer symptoms and less need for medications to treat asthma. As the bronchial tubes become gradually less inflamed, their hyper-responsiveness to various triggers lessens.

Currently, the principal approach to reduce the inflammation of the bronchial tubes is the use of medications. To be effective, these medications need to be taken regularly. Types of medications currently available for this purpose include inhaled anti-inflammatory steroids ("corticosteroids"); tablets to block the inflammation-promoting chemicals in our bronchial tubes called leukotrienes; and injectable monoclonal antibodies ("biologics") targeting specific pro-inflammatory molecules important in the process of asthmatic inflammation.

Causes and Treatments of Bronchial Narrowing

When set off by exposure to a trigger for asthma, the bronchial tubes can narrow in two general ways. First, the muscle cells that surround the bronchial tubes in a ring-like fashion can contract, squeezing down the airways and constricting them. As you know, these muscle cells that ring the bronchial tubes are not under voluntary control; they are "involuntary" muscles, like those that constrict the pupils of your eyes or move food through your intestines. They can contract quickly (in less than one minute) and can likewise relax relatively quickly. Medicines designed to cause muscles surrounding these bronchial tubes to relax are called

"bronchodilators." Bronchodilators are most effective when inhaled directly onto the bronchial tubes. Some bronchodilators that work quickly (within as few as 3-5 minutes) are referred to as "quick relievers" or "rescue" medications.

The second way in which the air passageways can narrow in asthma is by swelling of the walls of the bronchial tubes and by clogging of the tubes with mucus. The bronchial tubes swell because the asthma trigger sets off a series of chemical reactions that causes them to fill with fluid and migrant cells. Also, the same reaction can stimulate the mucous glands that are in the bronchial tubes to make increased amounts of mucus. Anyone who has had a head cold (all of us!) knows the effect that swelling of the nasal passageways and increased nasal mucus can have on trying to breathe through one's nose. In a similar way asthmatic symptoms can be brought on by swelling and excess mucus in the bronchial tubes.

Unlike contraction of the muscles of the bronchial tubes, swelling of these tubes cannot be made to go away within a few minutes. Like a lip swollen by trauma or skin inflamed with the rash of poison ivy, it takes the body hours to days to return to the way it was before the injury or irritation; swelling of this sort quiets down only gradually.

The medicines used to relax the bronchial muscles—the bronchodilators—have no effect on the swelling of the bronchial tubes and the excess mucus production. Treatment of the inflammatory response requires anti-inflammatory medications, such as corticosteroids or "steroids." [See the pamphlets entitled, [Asthma and Inhaled Steroids](#) and [Asthma and Steroids in Tablet Form](#).] Often patients with a severe attack of asthma will report that their bronchodilator medicines "stopped working"; what they experienced is the wheezing, cough, shortness of breath, and chest tightness caused not simply by contraction of the bronchial muscles but by the swelling and mucous plugging of the bronchial tubes. It is no surprise that the bronchodilators failed to bring relief.

The Symptoms of Asthma

When the air passageways narrow, one may experience a variety of symptoms: what one feels will differ among different persons with asthma and may vary from one episode of asthma to the next. Common symptoms are cough (with or without expectoration of phlegm), wheezing (a musical, whistling sound from the chest with breathing), shortness of breath, and a sense of tightness in the chest. Some persons experience itchiness under their chin or along their throat. Congestion or dripping of the nose may be a related symptom, caused not by asthma but by allergies involving the nose. For persons with asthma, the symptoms of a respiratory infection or "head and chest cold" —namely, runny nose, cough, and chest congestion—may be difficult to distinguish from symptoms of their asthma and allergies. Helpful in this regard is a device that allows you to measure the narrowing of the air passageways, a peak flow meter (see pamphlet entitled, [Asthma and Peak Flow Monitoring](#)).

What Asthma is Not

It is worth mentioning what asthma is not. Other diseases may cause symptoms similar to asthma. Cigarette smokers may also develop cough, shortness of breath, and chest tightness as part of emphysema and chronic bronchitis. Asthma differs from emphysema and chronic bronchitis in a number of ways. Most importantly, the narrowing of the air passageways in emphysema and chronic bronchitis is permanent and largely irreversible; breathing capacity changes little from day to day or month to month. By contrast, in asthma the muscle contraction and inflammation that causes narrowing of the airways is for the most part entirely reversible. Even after a severe attack, full recovery to normal is the rule. With good treatment and self-care, one's breathing capacity can usually be maintained normal or near normal most of the time.