

What triggers asthma?

It is a major task of the allergy specialist to try to define the triggers of asthma so that they can be eliminated or reduced. Allergy to allergens can best be detected by skin testing. Many other triggers must be deduced from the pattern that your asthma exhibits.

The symptoms of asthma

Asthma is a disease that undergoes marked fluctuations in severity over time. The type of symptom that asthma produces also can fluctuate from time to time. If asthma mainly involves the very small bronchial tubes then you get mainly shortness of breath and a sensation of tightness in the chest or a sensation that you can not get enough air in. If asthma involves the intermediate size bronchial tubes then you get a lot of cough and wheeze. If the main problem is in the upper part of the airway (the trachea) then you get mainly a cough without necessarily wheezing or chest tightness. Most people have a combination of all of the above symptoms during an asthma attack.

Triggers involved in short term fluctuations in asthma over the course of a day

Asthma is frequently worse after exposure to air born factors that are inhaled. It is important to distinguish between allergens and irritants. Skin testing can detect only allergens not irritants.

1. **Allergens.** These are protein substances that float in the air on microscopic (non-visible) particles. If you inhale a large dose of an allergen to which you are allergic (like animal dander or dust), you will get an asthmatic response that usually peaks within a half hour and then tends to get better over the next several hours if the exposure stops. This is called the “early phase” response. Some people also get a delayed response that peaks at 6 to 12 hours. This is more gradual in onset and in some people can be the predominant reaction. A common example of this kind of reaction is when a person is exposed to a cat while visiting friends for an evening and then has the major amount of asthma that night. Much smaller doses of allergen that are inhaled constantly every day can produce a much more chronic form of asthma that is difficult to relate to the cause.
2. **Irritants.** These include non-particulate factors such as volatile odors, cold air and irritant particles such as smoke and some irritating dusts like fiberglass. Irritants cause an asthmatic reaction very quickly within a minute usually and if the irritant is removed there is improvement very quickly within 5-10 minutes. Some doctors call asthma caused by irritants “reactive airway disease.” The sensitivity of the lungs to irritants varies a lot over time. Exposure to allergen makes the lung more sensitive to irritants.
3. **Exercise.** Exercise will bring on an asthmatic attack in some people with asthma. If such a person exercises, the lung function can go from normal to greatly reduced in a matter of 5 to 10 minutes. Some people with very mild asthma will be able to “run through” the asthma even without treatment. Some people with chronic asthma and reduced lung function will be short of breath with exercise (without the exercise reducing the lung function).
4. **Food additives.** The most common additive that causes asthma is sulfite that is added to wine and certain foods to prevent spoilage. Sulfites produce asthma fairly quickly; within 5 minutes usually. MSG also occasionally aggravates asthma. Alcohol itself will bring on asthma in certain people who do not metabolize it normally.
5. **Diurnal changes:** Regardless of the type of asthma that you have, you may be worse in the middle of the night. This pattern is seen in a significant percentage of asthmatics and can be documented by doing peak flow measurements during the night or first thing in the morning and comparing them to measurements made in the late afternoon. We do not fully understand what causes these diurnal fluctuations; in many people allergens in the bedding such as dust mites play a role. Less common is the effect of regurgitation of acid into the back of the throat at night especially in people who have hiatal hernias of the stomach. Small droplets of stomach acid are inhaled into the lungs and cause severe irritation.

Triggers involved in longer term fluctuations in asthma over many days and weeks.

1. **Viral infections.** Certain but not all viruses aggravate asthma. The typical pattern is for a person to get an upper respiratory infection that then develops into a cough and then asthma over a period of 4 to 6 days. Post viral asthma can be very persistent in some people and last for many weeks. A virus can actually make the lung much more sensitive to the factors listed above. The effects of a virus are very unpredictable and can vary from mild asthma to fairly severe prolonged asthma. Many people date the onset of their asthma to bad viral infection or a viral pneumonia. There is as yet no evidence that bacterial infections of the lungs cause asthma.
2. **Sinus Infections.** Many physicians believe that a chronic sinus infection makes asthma worse. While this is somewhat controversial, it seems likely that sinus infections do aggravate asthma in some people. This is the one instance in which antibiotics might help asthma.
3. **Allergen exposure.** There is increasing evidence that inhaling low levels of allergen over a long period of time aggravates asthma. Indoor allergens to which a person is exposed constantly are particularly important here. A cause and effect relationship is not always obvious.
4. **Reflux disease.** Acid from the stomach may regurgitate up into the esophagus and during the night especially you may inhale micro droplets of stomach acid into the trachea. This can contribute to the severity of asthma significantly. Usually you are aware of some regurgitation during the night.

The natural history of asthma over a period of years

Asthma that is allergic tends to start in most people in the young adult years of life. The allergic antibody (IgE) that causes allergic forms of asthma also peaks as a rule at this time of life. For many regardless of treatment there is gradual improvement in the asthma in the middle adult years. While this is a common pattern there are many exceptions in individuals. Asthma can start at any time of life and its overall course can be very unpredictable. As mentioned above, a severe viral infection or pneumonia can be the initial event that starts a more chronic form of asthma. Another common initiating event in more chronic asthma is a change in the environment with an increase in the allergen levels. This is seen if a person gets a cat to which s/he is allergic or starts a job where the work environment contains high levels of allergen. There is increasing evidence in recent years that the background level of allergen has an effect on the natural history of asthma. If indoor levels are chronically high, then there is a concern that the asthma will become gradually more severe and progressive.

One of the most confusing aspects of asthma over time is the variability of the effects of allergen. Even if a person has a strong skin test reaction to an allergen, the lung may become relatively insensitive to that allergen. On the other hand, there are many people who have only weak skin test reactions to an allergen such as cat dander and have severe reactions on exposure to cats.

There is a form of asthma that starts in later adult life that is not largely triggered by allergen. This is sometimes called "intrinsic asthma". In many this kind of asthma is chronic and sometimes progressive. In most cases asthma is triggered by multiple factors either simultaneously or at different times.

Exposure to cigarette smoke either from active smoking or passive indoor exposure has a deleterious effect on asthma. Evidence for this comes from a large number of different studies done in different ways. Allergic symptoms can be aggravated and it is likely that new allergies develop more readily in the presence of cigarette smoke. Chronic smoking also destroys lung tissue and after many years reduces the pulmonary reserve making a given amount of asthma much more disabling as time passes.

Allergen immunotherapy (allergy shots) is believed by many physicians to improve the allergic form of asthma over time. Most studies of allergen immunotherapy do show improvement in asthma over a 1-2 year interval.

Chronic allergic asthma over time can lead to permanent damage to the lung (called "airway remodeling"). This is different than emphysema but the overall effects can be similar. Many believe that the early use of inhaled corticosteroids prevents this complication.

Trying to figure it all out!

It should be obvious that given the complexity of the triggers and natural history of asthma, it may be difficult to determine at any given time what is causing asthma. The above factors are the basis for planning a long-term strategy for the management of asthma. Your doctor takes all of the above factors into account when planning what medication you should be on and how you should try to manipulate your environment. Asthma treatment is more successful if you and your doctor work in a collaborative manner. Your doctor depends on the input you give with respect to the beneficial and adverse effects of medication. Peak flow monitoring is often very helpful in determining the effect of medication and exactly what is happening with your asthma over weeks and months.