
Fact Sheet

Asthma

Yesterday

- Asthma was a poorly understood disease. Patients complained of not being able to breathe, but there were no effective treatments and severe episodes could easily lead to death.
- People with asthma were often unable to pursue life's normal activities. Asthma was especially difficult for children, who often had to forego routine playtime—and participation in sports or other rigorous events was usually impossible.
- Scientists gained their first understanding of asthma physiology in the 1950s when they discovered that the difficulties patients experienced in breathing were due to smooth muscle constriction in the airway of the lungs.
- Researchers also learned that the airways of asthma sufferers were hyperresponsive—thousands of times more sensitive to a variety of chemicals, environmental factors, and pollutants than airways of normal subjects.
- Gradually, the pivotal role of the immune system in asthma was discovered and asthma was rightfully classified as an inflammatory disease.
- The first successful treatments—bronchodilators to ease airway constriction and steroids to suppress airway inflammation—were developed and remain in use to this day.

Today

- Although treatment of asthma has dramatically improved, the prevalence of asthma in the United States has increased since the 1980s. In 2002, it was over 30 million—the majority under 18 years of age.
- The National Asthma Education and Prevention Program (NAEPP) was initiated by the NIH in 1989 1) to raise awareness of patients, health professionals, and the public that asthma is a serious chronic disease 2) to ensure the recognition of symptoms of asthma by patients, families, and the public and the appropriate diagnosis by health professionals, and 3) to ensure effective control of asthma by encouraging a partnership among patients, physicians, and other health professionals through modern treatment and education programs.

- Education programs, such as the NAEPP, revolutionized the way patients live with their asthma. The programs successfully encourage patients to take an active role in managing their asthma by helping them recognize the warning signs of an asthma attack, take steps to treat it, and avoid conditions and environmental agents that may trigger their asthma in the first place.
- Researchers established that secondhand smoke can trigger asthma episodes and increase the severity of attacks. Secondhand smoke is also a risk factor for new cases of asthma in preschool aged children who have not already exhibited asthma symptoms.
- Through the Childhood Asthma Research and Education (CARE) network, NIH-funded investigators are making progress in our understanding and treatment of asthma. CARE network trials evaluated asthma treatment options, including newer bronchodilators known as long-acting β agonists and leukotriene receptor antagonists. Thanks to the CARE network, we now have better information on how to treat asthma in children and adults. For example, studies show that children respond best to inhaled corticosteroids, whereas adults generally respond best when a long-acting β agonist is given along with the inhaled corticosteroids.
- NIH institutes are partnering to conduct the Inner-City Asthma Study, a long-term project that includes seven asthma centers across the country. The study enrolled more than 900 children, ages 5 to 7, with moderate to severe asthma. The goal of the study is to develop and implement a comprehensive, cost-effective intervention program aimed at reducing asthma incidence among children living in low socioeconomic areas. Researchers developed an effective intervention program that targets six major classes of allergens that trigger asthma symptoms – dust mites, cockroaches, pet dander, rodents, passive smoking and mold.
- Studies supported by the NIH continue to elucidate the genetic factors influencing asthma development, severity, and potential response to treatment. For example, a particular genotype was identified, which does not respond as well to long-acting β agonists. Studies also found genes that are differentially expressed between children with or without asthma.

- Recent studies of the complex interplay of genetic and environmental factors that lead to allergic response and asthma are focusing on the role of immune cells, specifically those known as Th2 cells, in enhancing allergic sensitization and contributing to the development of asthma.
 - *Personalized treatments.* Based on individualized results of comprehensive genetic susceptibility analyses, physicians will be able to accurately predict an individual's risk profile, environmental triggers, severity of symptoms, and response to treatment options.
 - *Preemptive approaches.* Researchers have already demonstrated in mice that allergic sensitization in the immune system can be negated by using immunostimulatory compounds. With such treatment tools in hand, physicians will one day be able to determine an infant's susceptibility to developing asthma in response to certain environmental agents, and take preemptive measures by altering the environment and ultimately, even the immune system.
- Tomorrow**
- The NIH is poised to make major discoveries in the prediction of asthma, to personalize individual treatments, and to use this information to preempt disease.**
- *Predicting asthma.* The genetic susceptibility component of asthma will be clearly identified using gene chip microarrays—or even newer, more sensitive technologies—which will lead to early detection and improved treatments tailored to the individual's risk profile.