Asthma is the most common, potentially serious medical condition to complicate pregnancy. In fact, asthma affects almost 7 percent of women in their childbearing years. Well-controlled asthma is not associated with significant risk to mother or fetus. Although uncontrolled asthma is rarely fatal, it can cause serious maternal complications including high blood pressure, toxemia and premature delivery. Fetal complications of uncontrolled asthma include increased risk of stillbirth, fetal growth retardation, premature birth, low birth weight and a low Apgar score at birth.

Asthma can be controlled by careful medical management and avoidance of known triggers, so asthma need not be a reason for avoiding pregnancy. Most measures used to control asthma are not harmful to the developing fetus and do not appear to contribute to either spontaneous abortion or congenital birth defects.

Although the outcome of any pregnancy can never be guaranteed, most women with asthma and allergies do well with proper medical management by physicians familiar with these disorders and the changes that occur during pregnancy.

What is asthma and what are its symptoms?
Asthma is a condition characterized by obstruction in the airways of the lungs caused by spasm of surrounding muscles, accumulation of mucus, and swelling of the airway walls due to the gathering of inflammatory cells. Unlike individuals with emphysema who have irreversible destruction of their lung cells, asthmatic patients usually have a condition that can be reversed with vigorous treatment.

Individuals with asthma most often describe what they feel in their airways as a “tightness.” They also describe wheezing, shortness of breath, chest pain, and cough. Symptoms of asthma can be triggered by allergens (including pollen, mold, animals, feathers, house dust mites and cockroaches), environmental factors, exercise, infections and stress.

What are the effects of pregnancy on asthma?
When women with asthma become pregnant, a third of the patients improve, one third worsen, and the last third remain unchanged. Although studies vary widely on the overall
effect of pregnancy on asthma, several reviews find the following similar trends:

• Women with severe asthma are more likely to worsen, while those with mild asthma are more likely to improve.

• The change in the course of asthma in an individual woman during pregnancy tends to be similar on successive pregnancies.

• Asthma exacerbations are most likely to appear during the weeks 24 to 36 of gestation, with only occasional patients (10 percent or fewer) becoming symptomatic during labor and delivery.

• The changes in asthma noted during pregnancy usually return to pre-pregnancy status within three months of delivery.

Pregnancy may effect asthmatic patients in several ways. Hormonal changes that occur during pregnancy may effect both the nose and sinuses, as well as the lungs. An increase in the hormone estrogen contributes to congestion of the capillaries (tiny blood vessels) in the lining of the nose, which in turn leads to a “stuffy” nose in pregnancy (especially during the third trimester). A rise in progesterone causes increased respiratory drive, and a feeling of shortness of breath may be experienced as a result of this hormonal increase. These events may be confused with or add to allergic or other triggers of asthma. Spirometry and peak flow are measurements of airflow obstruction (a marker of asthma) that help your physician determine if asthma is the cause of shortness of breath during pregnancy.

**Fetal monitoring**

For pregnant women with asthma, the type and frequency of fetal evaluation is based on gestational age and maternal risk factors. Sonography (ultrasound) can be performed before 12 weeks if there is concern about

During a severe asthma attack in which symptoms do not quickly improve, there is risk for significant maternal hypoxemia, a low oxygen state. This is an important time for fetal assessment; continuous electronic fetal heart rate monitoring may be necessary along with measurements of the mother’s lung function. Fortunately during labor and delivery, the majority of asthma patients do well, although careful fetal monitoring remains very important. In low risk patients whose asthma is well-controlled, fetal assessment can be accomplished by 20 minutes of electronic monitoring (the admission test). Intensive fetal monitoring with careful observation is recommended for patients who enter labor and delivery with severe asthma, have a non-reassuring admission test or other risk factors.

**Avoidance and control**

The connection between asthma and allergies is common. Most asthmatic patients (75 to 85 percent) will test allergic to one or more allergens such as: pollens, molds, animals, feathers, house dust mites and cockroaches. Pet allergies are caused by protein found in animal dander, urine and saliva. These allergens may trigger asthma symptoms or make existing symptoms worse.

Other non-allergic substances may also worsen asthma and allergies. These include tobacco smoke, paint and chemical fumes, strong odors, environmental pollutants (including ozone and smog) and drugs, such as aspirin or beta-blockers (used to treat high blood
pressure, migraine headache and heart disorders).

Avoidance of specific triggers should lessen the frequency and intensity of asthmatic and allergic symptoms. Allergists-immunologists recommend the following methods:

• Remove allergy causing pets or feather pillows/comforters from the house.

• Seal pillows, mattresses and box springs in special dust mite-proof casings (your allergist should be able to give you information regarding comfortable cases).

• Wash bedding weekly in 130 degree F. water (comforters may be dry-cleaned periodically) to kill dust mites.

• Keep home humidity under 50 percent to control dust mite and mold growth.

• Use filtering vacuums or “filter vacuum bags” to control airborne dust when cleaning.

• Close windows, use air-conditioning and avoid outdoor activity between 5 and 10 a.m., when pollen and pollution are at their highest.

• Avoid chemical fumes and, most importantly, tobacco smoke.

Can asthma medications safely be used during pregnancy?

Though no medication has been proven entirely safe for use during pregnancy, your doctor will carefully balance medication use and symptom control. Your treatment plan will be individualized so that potential benefits of medications outweigh the potential risks of these medications or of uncontrolled asthma.

Asthma is a disease in which intensity of symptoms can vary from day to day, month to month, or season to season regardless of pregnancy. Therefore, a treatment plan should be chosen based both on asthma severity and experience during pregnancy with those medications. Remember that the use of medications should not replace avoidance of allergens or irritants, as avoidance will potentially reduce medication needs.

In general, asthma medications used in pregnancy are chosen based on the following criteria:

• Inhaled medications are generally preferred because they have a more localized effect with only small amounts entering the bloodstream.

• Time-tested older medications are preferred since there is more experience with their use during pregnancy.

• Medication use is limited in the first trimester as much as possible when the fetus is forming. Birth defects from medications are rare (no more than 1 percent of all birth defects are attributable to all medications).

• In general, the same medications used during pregnancy are appropriate during labor and delivery and when nursing.

Bronchodilator medication

Inhaled beta2-agonists, often called “asthma relievers” or “rescue medications,” are used as necessary to control acute symptoms. Any of the short-acting beta agonists, including metaproterenol (M etaprel, Alupent), albuterol (Proventil, Ventolin), isoetharine (Bronkometer), bitolterol (Tornalate), pirbuterol (M axair) and terbutaline (Brethaire) are considered safe in pregnancy. Albuterol, metaproterenol and terbutaline have been studied in humans. Injections of terbutaline are sometimes used to control premature labor.

A new long-acting inhaled beta agonist, salmeterol (Serevent), as well as older oral forms of albuterol (Proventil Repetab, Volmax) are available. No trials of these medications in pregnancy have been performed, and careful consideration is advised with use during pregnancy. These medications may be especially helpful for control of nighttime symptoms to ensure uninterrupted sleep.

Theophylline has extensive human experience without evidence of significant abnormalities. Newborns can have jitteriness, vomiting and fast pulse if the maternal blood level is too high. Therefore, patients who receive Theophylline should have their blood levels checked during pregnancy.

Ipratropium (Atrovent), an anticholinergic bronchodilator medication, does not cause problems in animals; however, there is no published experience in humans. Ipratropium is absorbed less than similar medications in this class, such as atropine.

Anti-inflammatory medication

The anti-inflammatory medications are preventive, or “asthma controllers,” and include inhaled cromolyn (Intal), nedocromil (Tilade), corticosteroids and leukotrine antagonists. These medications are recommended for all but mild intermittent asthma patients. Anyone requiring the use of beta2-agonists more often than three times a week, or have
Reduced peak flow readings or spirometry (lung function studies), usually needs daily anti-inflammatory medication. Inhaled cromolyn sodium is virtually devoid of side effects, but is less effective than inhaled corticosteroids. Nedocromil is a newer medication, similar to cromolyn. Although there is no reported experience with nedocromil during human pregnancy, animal data are reassuring.

Beclomethasone (Beclovent, Vanceril) is the inhaled corticosteroid of choice because of its length of time in clinical use and good safety profile in humans. Other drugs in this class, which have been available for a number of years, are triamcinolone (Azmacort) and flunisolide (AeroBid). There is limited data during human pregnancy for these drugs. Experience with the newest inhaled corticosteroids, fluticasone (Flovent) and budesonide (Pulmicort), is even more limited. Maximum benefits of all these inhalers may not be evident for several weeks.

In some cases oral or injectable corticosteroids, prednisone, prednisolone or methylprednisolone, may be necessary for a few days in moderately severe patients, or throughout pregnancy in severe cases. Some studies have demonstrated a slight increase in the incidence of pre-eclampsia, premature deliveries or low-birth-weight infants with chronic use of corticosteroids. However, they are the most effective drugs for the treatment of asthma and allergic disorders. Therefore, their significant benefit usually far exceeds their minimal risk.

Three leukotrine modifiers, zafirlukast (Accolate), zileuton (Zyflo) and montelukast (Singulair), are available. Results of animal studies are reassuring for zafirlukast and montelukast, but there are no data in human pregnancy with this new class of anti-inflammatory drugs.

Can allergy medications safely be used during pregnancy?

Antihistamines may be useful during pregnancy to treat the nasal and eye symptoms of seasonal or perennial allergic rhinitis, allergic conjunctivitis, the itching of urticaria (hives) or eczema, and as an adjunct to the treatment of serious allergic reactions including anaphylaxis (allergic shock). With the exception of life-threatening anaphylaxis, the benefits from their use must be weighed against any risk to the fetus. Because symptoms may be of such severity to effect maternal eating, sleeping or emotional well-being, and because uncontrolled rhinitis may pre-dispose to sinusitis or may worsen asthma, antihistamines may provide definite benefit during pregnancy.

Chlorpheniramine (Chlor Trimeton), tripelennamine (Pyrabenzamine) and diphenhydramine (Benadryl) have been used for many years during pregnancy with reassuring animal study data. Generally, chlorpheniramine would be the preferred choice. A major drawback of these medications is drowsiness and performance impairment in some patients. Although there have been no reports of harm with the newer non-sedating drugs including astemizole (Hismanal), fexofenadine (Allegra), loratadine (Claritin), cetirizine (Zyrtec) or the nasal spray azelastine (Astelin), human data are very limited. Loratadine and cetirizine have reassuring animal study data and may be useful if older drugs cause performance impairment or excessive sleepiness.

The use of decongestants is more problematic. The nasal spray oxymetazoline (Afrin, Neo-Synephrine Long-Acting, etc.) appears to be the safest product because there is minimal, if any, absorption into the blood stream. However, these and other over-the-counter nasal sprays can cause rebound congestion and actually worsen the condition for which they are used. Their use is generally limited to very intermittent use or regular use for only three consecutive days.

Although pseudoephedrine (Sudafed) has been used for years, and studies have been reassuring, there have been recent reports of a slight increase in abdominal wall defects in newborns. Use of decongestants during the first trimester should only be entertained after consideration of the severity of maternal symptoms unrelieved by other medications. Phenylephrine and phenylpropanolamine are less desirable than pseudoephedrine based on the information available.

An anti-inflammatory nasal spray, such as cromolyn (N asacrom), or beclomethasone (Beconase, Vancenase), a corticosteroid, should be considered in any patient whose allergic nasal symptoms last for more than a few days. These medications prevent symptoms and lessen the need for oral medications. They have a record of use for many years. Newer corticosteroid sprays including triamcinolone (N asacort, Tri-N asal), fluticasone (Flonase), budesonide (Rhinocort), flunisolide (N asarel) and mometasone (N asonex) lack pregnancy data, although their
absorption into the blood stream is so minimal as to be of doubtful risk.

**Immunotherapy and influenza vaccine**

Allergen immunotherapy (allergy shots) is often effective for those patients in whom symptoms persist despite optimal environmental control and proper drug therapy. Allergen immunotherapy can be carefully continued during pregnancy in patients who are benefiting and not experiencing adverse reactions. Due to the greater risk of anaphylaxis with increasing doses of immunotherapy and a delay of several months before it becomes effective, it is generally recommended that this therapy not be started during pregnancy.

Patients receiving immunotherapy during pregnancy should be carefully evaluated. It may be appropriate to lower the dosage in order to further reduce the chance of an allergic reaction to the injections.

Influenza (flu) vaccine is recommended for all patients with moderate and severe asthma. There is no evidence of associated risk to the mother or fetus.

**Can asthma medications safely be used while nursing?**

Nearly all medications enter breast milk, though infants are generally exposed to very low concentrations of the drugs. Hence, the medications described above rarely present problems for the infant during breast feeding. Specifically, very little of the inhaled beta agonists, inhaled or oral steroids, and theophylline will appear in mother’s milk. Some infants can have irritability and insomnia if exposed to higher doses of medication or to theophylline. Use of zafirlukast and zileuton while breast feeding is not recommended because of lack of data regarding safety. In general the lowest drug concentration in mother’s milk can be obtained by taking the necessary medications 15 minutes after nursing or three to four hours before the next feeding.

**Summary**

It is important to remember that the risks of asthma medications are lower than the risks of uncontrolled asthma, which can be harmful to both mother and child. The use of asthma or allergy medication needs to be discussed with your doctor, ideally before pregnancy. Therefore, the doctor should be notified whenever you are planning to discontinue birth control methods or as soon as you know that you are pregnant. Regular follow up for evaluation of asthma symptoms and medications is necessary throughout the pregnancy to maximize asthma control and to minimize medication risks.

This article has been prepared by the following members of the Pregnancy Committee of the American College of Allergy, Asthma and Immunology, an organization whose members are dedicated to providing optimal care to all patients with asthma, including those who are pregnant.

Myron A. Lipkowitz, RPh., M.D., Chair
Michael Schatz, M.D., Co-Chair
Terrance J. Cook, M.D.
Linda Ford, M.D.
Scott J. Frankel, M.D.
Joan Gluck, M.D.
Donald Leibner, M.D.
Joseph G. Leija, M.D.
Allan Luskin, M.D.
Debra Ortega-Carr, M.D.
Sheldon L. Spector, M.D.

The Committee acknowledges the contribution of Paul Gluck, M.D.