Rhinitis is a group of disorders characterized by inflammation and irritation of mucous membranes of the nose. These disorders may be infectious, allergic, or inflammatory in origin, or acute, chronic, nonallergic, or allergic. Viral rhinitis, a nonallergic condition, is a viral infection characterized by nasal congestion, rhinorrhea, sneezing, sore throat, and general malaise.\(^1\)

Allergic rhinitis is the most common cause of rhinitis.\(^2\) Its prevalence is high in the general population and is increasing. Allergic rhinitis is subdivided into seasonal allergic rhinitis (SAR) and perennial allergic rhinitis (PAR), according to the type of allergen and the occurrence of symptoms during the year.\(^3\)

**Etiology**

Viral rhinitis can be caused by as many as 200 different viruses including rhinoviruses, coronaviruses, adenovirus, respiratory syncytial virus (RSV), influenza virus, and parainfluenza virus. Adults in the United States suffer approximately 1 billion viral rhinitis infections—essentially, the common cold—each year. Children have about 6 to 10 colds a year, averaging 22 million lost school days annually. Adults average two to four colds a year, although the range varies widely. Women, especially those aged 20 to 30 years, suffer from more colds than men.\(^4\) The National Institute of Allergy and Infectious disease attributes this possibility to the higher incidence of contact with younger children. People older than 60 have less than one cold a year.\(^5\) Rhinoviruses cause an estimated 30% to 35% of all adult colds, and are most active in early fall, spring, and summer. Scientists believe coronaviruses cause a large percentage of all adult colds, which occur most frequently in the winter and early spring. There is no evidence that exposure to cold weather or becoming chilled or becoming chilled or overheated causes colds.\(^6\) Although viral rhinitis is generally benign and self-limited, patients remain susceptible throughout their lives because of the numerous serologic types of rhinoviruses.\(^3\)

Allergic rhinitis in the United States is found in an estimated 20% of the population, which translates into approximately 40 million people.\(^2\) An estimated 20% of these cases are SAR, 40% are PAR, and 40% are mixed.\(^6\) Allergic rhinitis occurs in persons of all races. Onset of allergic rhinitis is common in childhood. The main age of onset is 8 to 11 years, but it may occur in persons of any age. In 80% of cases, allergic rhinitis develops by age 20. The prevalence of allergic rhinitis has been reported to be as high as 40% in children, subsequently decreasing with age.\(^2\) Although allergic rhinitis is not a life-threatening condition, complications can occur and the condition can significantly impair quality of life. The total direct and indirect cost of allergic rhinitis was recently estimated to be $5.3 billion per year.\(^2\)

**Pathophysiology**

The pathophysiology of allergic rhinitis is complex. There is a strong genetic component to the allergic response, which involves a complex interaction of inflammatory mediators and an immunoglobin E (IgE)-mediated response. The IgE coats the surface of the mast cells, which allows the specific allergen protein to bind to the IgE. This leads to an immediate and delayed release of mediators including histamine, tryptase, chymase, kinins, and heparin.\(^7\) These mediators are capable of recruitment and activation of inflammatory cells, including eosinophils, that leads to the onset of typical nasal symptoms.\(^3\) The allergic response occurs in both early and late phases. Early-phase response occurs within minutes of exposure to the allergen, and tends to produce sneezing, itching, and clear rhinorrhea. Late-phase response occurs 4 to 8 hours after allergen exposure, and is characterized by congestion, nasal obstruction, fatigue, malaise, irritability, and possible neurocognitive deficits.\(^6\) Allergic rhinitis involves
Diagnosing Rhinitis: Viral and Allergic Characteristics

The diagnosis of rhinitis presents a challenge to clinicians to determine the cause of the nasal symptoms. A complete and detailed medical history is the first step to a correct diagnosis. Important elements include the nature, duration, frequency, and length of symptoms; possible triggers for symptoms; response to medications; co-morbid conditions; family history of allergic diseases; environmental exposures; occupational exposures; and effects on quality of life.2 The frequency and duration of symptoms; response to medications; co-morbid conditions; and effects on quality of life.2 Allergic rhinitis and sinusitis are frequently associated with allergic rhinitis, and thick and purulent secretions are associated with sinusitis. (see Pathophysiologic Processes in Rhinitis and Sinusitis). The nose should also be examined for any physical deviation or septal perforation which may be blocking the sinus opening into the nasal cavity. If any masses such as polyps or tumors are discovered, the patient might need surgical intervention. Ears are examined by performing an otoscopy to look for tympanic membrane retraction, air-fluid levels, or bubbles. Eyes and ocular exam may reveal findings of injections and swelling of the palpebral conjunctivae with excess tear production. The otopharynx is examined for tonsillar hypertrophy or lymphoid tissue on the posterior pharynx, which is commonly observed with allergic rhinitis. The neck is examined for evidence of lymphadenopathy or thyroid disease. The lungs should show characteristics similar to asthma, such as bronchial tightness and wheezing, and the skin must be evaluated for possible atrophic dermatitis.2

When the history and physical exam suggest an allergic etiology for the symptoms, skin allergen-specific IgE antibody testing should be performed. Allergy skin testing, or immediate hypersensitivity testing, is an in vivo method of determining immediate hypersensitivity to specific allergens. An allergen is introduced into the skin by placing a drop of extract on the skin and scratching, pricking, or puncturing a needle through the skin.2 A positive reaction is evident by a small, raised reddened area in the area of the inoculation.1 False or negative results may occur because of improper technique, use of over-the-counter allergy medications, or improper preparation of allergen solution.1 Therefore, the interpretation of positive or negative allergy skin testing must include the history, physical, and any lab test results.

If the patient cannot undergo skin testing, a radioallergosorbent (RAST) test allows the measurement of specific IgE to individual allergens in a sample of blood. The amount of specific IgE produced to a particular allergen approximately correlates with the allergic sensitivity to that substance.2 The advantage of performing a RAST test includes the reduced risk of systemic reaction and the stability of antigens, and will not be affected by allergy medications the patient may have taken. Disadvantages of RAST testing include the lack of immediate results and a higher cost.1

### Diagnosing Rhinitis

Diagnosis

The diagnosis of rhinitis presents a challenge to clinicians to determine the cause of the nasal symptoms. A complete and detailed medical history is the first step to a correct diagnosis. Important elements include the nature, duration, frequency, and length of symptoms; possible triggers for symptoms; response to medications; co-morbid conditions; family history of allergic diseases; environmental exposures; occupational exposures; and effects on quality of life.2 The frequency and duration of symptoms; response to medications; co-morbid conditions; and effects on quality of life.2 Allergic rhinitis and sinusitis are frequently associated with allergic rhinitis, and thick and purulent secretions are associated with sinusitis. (see Pathophysiologic Processes in Rhinitis and Sinusitis). The nose should also be examined for any physical deviation or septal perforation which may be blocking the sinus opening into the nasal cavity. If any masses such as polyps or tumors are discovered, the patient might need surgical intervention. Ears are examined by performing an otoscopy to look for tympanic membrane retraction, air-fluid levels, or bubbles. Eyes and ocular exam may reveal findings of injections and swelling of the palpebral conjunctivae with excess tear production. The otopharynx is examined for tonsillar hypertrophy or lymphoid tissue on the posterior pharynx, which is commonly observed with allergic rhinitis. The neck is examined for evidence of lymphadenopathy or thyroid disease. The lungs should show characteristics similar to asthma, such as bronchial tightness and wheezing, and the skin must be evaluated for possible atrophic dermatitis.2

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### Categories and Causes

<table>
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<tr>
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<tr>
<td>Vasomotor</td>
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<td>• Abuse of nasal decongestants</td>
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<td>(rhinitis medicamentosa)</td>
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<td>• Psychological stimulation</td>
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<td>• Use of oral contraceptives</td>
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<td>• Hypothyroidism</td>
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Treatments
Viral rhinitis treatment includes supportive measures such as resting, drinking plenty of fluids, gargling with warm salt water, using throat sprays or lozenges for a scratchy or sore throat, using petroleum jelly externally for a raw nose, and taking analgesics or other over-the-counter cold medicines and decongestants. Nonprescription cold remedies may relieve some cold symptoms, but will not prevent or even shorten the length of viral rhinitis. Antibiotics are not recommended for viral rhinitis, as antibiotics do not kill viruses. Despite research into viral chemotherapy, there are no effective antiviral therapies for prevention or treatment of viral rhinitis. Rather, prevention should be the main focus. The single and most effective preventative measure is hand washing with soap and water. When water is not available, CDC recommends using alcohol-based products to disinfect hands.

There are three basic approaches to the management of allergic rhinitis: environmental controls/avoidance therapy, pharmacotherapy, and allergen immunotherapy. Surgical intervention is not indicated for allergic rhinitis, but may be needed for chronic or complicating conditions such as rhinosinusitis, severe septal deviation, nasal polyps, or other anatomical abnormalities.

Environmental controls or avoidance therapy is the first-line therapy for allergen rhinitis. Avoidance therapy begins by identifying the allergens and making every effort to remove or avoid the allergens. This includes a strong patient education component. Some recommendations include remaining indoors or rolling windows up during pollen season, the use of air conditioners, air cleaners, humidifiers and dehumidifiers, and removal of wall-to-wall carpet, blinds, down-filled blankets, feather pillows, and stuffed animals. Other common sources of allergens include visible molds, cigarette smoke, pets, and cockroaches. Measures to control or reduce these allergens from the household can reduce the severity of symptoms. Environmental irritant triggers for some individuals might include temperature or weather changes. Unfortunately, environmental controls are not always practical or effective, and supplemental medical management is usually required.

Pharmacotherapy needs to be individualized to the patient depending on symptoms, degree of impairment of quality of life, and the specific allergens. SAR often allows a prophylactic regimen prior to the onset of the same season in the following year. PAR typically requires daily and frequent year-round therapy. Pharmacotherapy options include antihistamines, decongestants, leukotriene receptor antagonists, nasal corticosteroids, mast cell stabilizers, intranasal anticholinergic agents, and systemic leukotriene inhibitors. Although pathophysiologic processes are similar in rhinitis and sinusitis, they affect different structures. (A) In rhinitis, the mucous membranes lining the nasal passages become inflamed, congested, and edematous. The swollen nasal conchae block the sinus openings and mucus is discharged from the nostrils. (B) Sinusitis is also marked by inflammation and congestion, with thickened mucus secretions filling the sinus cavities and occluding the openings.
and allergy immunotherapy. Most guidelines recommend that antibiotics should not be used for acute rhinitis.8

■ Treatment Options

First-generation antihistamines

The older first-generation histamine receptor type 1 (H1) antagonists, such as diphenhydramine (Benadryl), are effective in reducing most symptoms of allergic rhinitis, but they produce a number of adverse effects. Side effects include drowsiness, confusion, dizziness, and anticholinergic effects. H1 blockers bind selectively to H1 receptors preventing the actions of histamines at these sites.1 First-generation antihistamines can be used as needed, but adverse effects limit their usefulness when taken on a daily basis.2 The first-generation antihistamines are less expensive compared to the second-generation, but cause a higher rate of drowsiness.5 These may be bought without a prescription.

Second-generation antihistamines

Second-generation antihistamines are preferred by most patients due to the nonsedating effect. These nonsedating antihistamines compete with histamine for H1 receptor sites in the blood vessels, gastrointestinal tract, and respiratory tract. This inhibits physiologic effects that histamine normally induces at the H1 receptor sites. The second-generation antihistamines do not cross the blood-brain barrier and do not bind to cholinergic receptors, causing less sedation.1 This medication category helps to control symptoms of allergic rhinitis such as sneezing, rhinorrhea, and itching, but do not significantly improve nasal congestion.2 The second-generation oral antihistamines currently available in the United States are cetirizine (Zyrtec), levocetirizine (Xyzal), desloratadine (Clarinex), fexofenadine (Allegra), and loratadine (Claritin). Only cetirizine causes drowsiness more frequently than a placebo, making this generation an attractive first-line treatment for rhinitis.2

Decongestants

Adrenergic agents stimulate vasoconstriction of mucosal vessels by directly activating alpha-adrenergic receptors of the respiratory mucosa and reducing local blood flow, fluid exudation and mucosal edema.1 They are used topically or orally. Pseudoephedrine (Sudafed) is an oral agent. Examples of topical adrenergic decongestants include naphazoline (Priva), oxymetazoline (Afrin, Neo-Synephrine 12-hour), phenylephrine (Neo-Synephrine), tetrahydrozoline (Tyzine), and xylometazoline (Otrivin). Oral or topical agents are used alone or in combination with antihistamines to treat nasal congestion. Adverse effects of this category of medication include insomnia and anxiety. They are contraindicated in patients with narrow-angle glaucoma, urinary retention, severe hypertension, marked coronary artery disease, or during the first trimester of pregnancy.9 Patients should limit the use of these medications to a few days to avoid rebound congestion.

Leukotriene receptor antagonist

An alternative to oral antihistamine to treat allergic rhinitis is montelukast (Singulair), which has been approved in the United States for treatment of SAR and PAR. This medication binds with cysteinyl leukotriene receptors, thus reducing early and late-phase bronchoconstriction released by mast cells and eosinophils.2 Leukotriene receptor antagonists are excellent choices for initial therapy in patients with mild allergic rhinitis symptoms.7

Nasal corticosteroids

Intranasal corticosteroids benefit all four major nasal symptoms of allergic rhinitis (sneezing, itching, rhinorrhea, and congestion). The mechanism of action includes the decreasing number and activity of inflammatory cells, resulting in decreased nasal inflammation.2 Evidence-based literature reviews show that these are more effective and frequently less expensive than nonsedating antihistamines. Corticosteroid sprays may also shrink nasal polyps, providing an improved nasal airway and delaying or eliminating the need for endoscopic sinus surgery.3 These sprays include mometasone (Nasonex), beclomethasone (Beconase AQ), and budesonide (Rhinocort Aqua). Local adverse effects are limited to minor irritation or nasal bleeding, which resolve with temporary discontinuation. Safety during pregnancy has not been established with this group of medications. The nasal steroids can be used as needed, but seem to be maximally effective when used on a daily basis as maintenance therapy.2

Mast cell stabilizers

Cromolyn sodium nasal solution (Nasalcrom), now available over the counter, is effective in some patients for prevention and treatment of allergic rhinitis and is associated with minimal side effects. The mechanism of action is to produce mast cell stabilization and antiallergic effects that in-
Asthma exhibits degranulation of mast cells. They have no direct anti-inflammatory or antihistamine effects. Significant effects may not be observed for 4 to 7 days after taking this medication.7

**Intranasal anticholinergic agent**
The intranasal anticholinergic agent ipratropium (Atrovent Nasal Spray) is used for reducing rhinorrhea in patients with allergic and nonallergic perennial rhinitis with no other significant symptoms.9

**Antibiotics**
Most guidelines recommend that antibiotics should not be used for rhinitis, as there is no evidence that antibiotics reduce the duration of acute purulent rhinitis. The natural history of acute rhinitis shows that clear and purulent rhinitis lasts about 2 weeks. The current recommendation is to watch and see, and use antibiotics only when symptoms have persisted long enough to concern the patient.8 However, if the practitioner should prescribe an antibiotic, the first-line for most adults should be amoxicillin.10 This decision to prescribe antibiotics should take into account the benefits, risks, and harms of both treating and not treating the patient.4

**Allergy immunotherapy**
The benefit of allergy immunotherapy has been established in instances of allergic rhinitis that are clearly due to sensitivity to common pollens, molds, or household dust. Indications for immunotherapy include allergic rhinitis, a desire to avoid long-term use, potential adverse effects, or costs of medications, and the lack of control of symptoms by avoidance or use of medications. Allergen immunotherapy has the potential to alter the allergic disease course after 3 to 5 years of therapy, and may also be considered to be a potential preventive measure.1 Immunotherapy consists of repeated weekly subcutaneous injections of gradually increasing concentrations of allergen until minimal symptoms are seen over two consecutive seasons.9 These regular injections of the allergen help the body adjust to the antigen.7 The patient must understand what to expect and the importance of continuing therapy for several years.1 The mechanism of action of this form of treatment is not yet fully understood, but observations indicate that a change in serum antibody levels, reduced sensitivity to allergen injected, and an alteration in the characteristics of T lymphocytes suggest a response of the local immune system to allergen.11

Injections can be uncomfortable and can cause minor adverse reactions such as injection site swelling. Local skin reactions occur often and may persist for 1 to 3 days.9 Systemic reactions are uncommon and anaphylaxis is found in less than 1% of patients receiving immunotherapy. However, the risk for systemic and potentially fatal anaphylaxis exists.1 For this reason, the injections should not be administered by a lay person or by the patient.

The patient should remain at the treatment site for 30 minutes after the injection for observation of possible reactions. The contraindications for immunotherapy include the use of beta-adrenergic blockers; presence of pulmonary, cardiac disease, or organ failure; inability of the patient to recognize or report signs of systemic reaction; nonadherence of the patient to other therapeutic regimens; inability to monitor the patient for at least 30 minutes; and absence of equipment to respond to allergic reaction if one occurs.1

**Antibiotics should not be used for rhinitis, as there is no evidence that antibiotics reduce the duration of acute purulent rhinitis.**

This treatment should not be initiated during pregnancy. Pregnant patients already receiving immunotherapy should not have their doses increased.10 Sublingual immunotherapy is presently being studied as a viable alternative to injection immunotherapy. Trials so far have shown few adverse reactions and are generally better accepted by patients, making this mode of administration a viable option in the future.11

**Surgical Management**
Allergic rhinitis can develop into chronic rhinosinusitis or have associated complications, such as nasal polyps, chronic sinusitis, or middle-ear infections that may require surgical intervention. Nasal surgical procedures are concerned with two factors: adequate ventilation to accessory spaces and adequate drainage. Corrective procedures relieve obstruction, ensure drainage, resect tumors, or control bleeding (epistaxis).12 Historically, the procedure of choice for the chronic rhinosinusitis patient was the Caldwell-Luc, but it was determined that fine nasal cilia continues to propel sinus contents to the natural nasal ostium. This nasal ostium is not dissected during the traditional Caldwell-Luc procedure, which may result in limited relief of the patient’s symptoms postoperatively.13 Functional endoscopic sinus surgery (FESS) is presently the most common surgical procedure performed for treating chronic rhinosinusitis that fails medical treatment.13 FESS allows the surgeon direct visualization of the paranasal sinuses and anatomy of the lateral nose.13 This technique uses telescope technology with sinoscopes of 2.7 mm and 4 mm in diameter with 0, 25, 30, 70, and 120 degree viewing.
angles. The telescopes connect to a light cable to provide illumination in difficult-to-see areas of the sinus. Specialized endoscopic sinus instruments and microdebriders were designed to operate within the narrow space of the nasal cavities. FESS allows the opening of the nasal ostium to occur with minimal bleeding. The postoperative dressing might include only a sponge for nasal drainage.

A new surgical treatment option available for the allergic rhinosinusitis patient is the balloon catheter device, which is used to perform the sinusotomy (opening of the nasal ostium). The balloon catheter device is specifically for the otorhinolaryngologist to use during functional endoscopic sinus surgery. This system is based on a flexible catheter and wire technology specifically designed to navigate the sinus anatomy with minimal trauma. Fluoroscopy is used to assist with the correct positioning of the catheter, and it is gradually inflated. This gently restructures the blocked ostium allowing the return of normal sinus drainage and function. There is little to no disruption to the mucosal lining. A study recently concluded that the balloon catheter technology appears safe and effective in relieving ostial obstruction. This option reduces some of the complications observed with traditional FESS in which mucosa tissue is incised presenting increased risk for postoperative bleeding and infection.

REFERENCES

INSTRUCTIONS
Diagnosing Rhinitis: Viral and Allergic Characteristics

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Diagnosing Rhinitis: Viral and Allergic Characteristics

General Purpose: To provide NPs with an overview of the diagnosis and treatment of viral and allergic rhinitis. Learning Objectives: After reading the preceding article and taking the following test, you will be able to: 1. Describe the etiology, pathophysiology, and diagnosis of viral and allergic rhinitis. 2. Discuss treatment options for viral and allergic rhinitis.

1. Viral rhinitis is a condition that
   a. is characterized by bronchial congestion.
   b. is a nonallergic condition.
   c. is an allergic viral infection.
   d. is usually chronic in nature.

2. Which of the following is the most common cause of rhinitis?
   a. nonallergic rhinitis
   b. bacterial rhinitis
   c. viral rhinitis

3. Which demographic statement about viral rhinitis infections in the U.S. is true?
   a. Men suffer from more colds than women.
   b. Adults average four to six viral infections per year.
   c. Adults over 60 years average four to five colds per year.
   d. Children average six to ten colds per year.

4. Which percentages of allergic rhinitis (seasonal allergic rhinitis [SAR], perennial allergic rhinitis [PAR], or mixed) in the U.S. are accurate?
   a. 10% is SAR; 30% is PAR; 60% is mixed
   b. 20% is SAR; 10% is PAR; 70% is mixed
   c. 20% is SAR; 40% is PAR; 40% is mixed
   d. 30% is SAR; 30% is PAR; 40% is mixed

5. SAR is mainly caused by
   a. outdoor allergens
   b. viruses
   c. indoor allergens
   d. bacteria

6. Which of the following is not a mechanical cause of rhinitis?
   a. deviated septum
   b. cocaine
   c. hypertrophied turbinates
   d. tumor

7. Thin and watery nasal mucus secretions are most frequently associated with
   a. chronic sinusitis
   b. acute sinusitis
   c. acute rhinitis
   d. allergic rhinitis

8. Skin allergen-specific IgE antibody tests may give false results due to any of the following except
   a. use of over-the-counter allergy medications.
   b. improper technique.
   c. recent exposure to an allergen.
   d. improper preparation of allergen solution.

9. The radioallergosorbent (RAST) test
   a. is performed by placing a drop of extract on the skin and pricking a needle through it.
   b. is an in vivo method of determining immediate hypersensitivity to specific allergens.
   c. measures specific IgG to individual allergens in a sample of mucus.
   d. measures specific IgE to individual allergens in a sample of blood.

10. Treatment for acute viral rhinitis may include all except
   a. throat sprays.
   b. analgesics.
   c. antibiotics.
   d. over-the-counter decongestants.

11. The single and most effective way to prevent viral rhinitis is
   a. taking a preventative course of an antibiotic after a known exposure.
   b. hand washing with soap and water.
   c. a semi-annual vaccination.
   d. taking a course of an antiviral nasal spray.

12. Environmental controls or avoidance therapy for allergic rhinitis can reduce the severity of symptoms.
   a. are reliably effective in eliminating symptoms.
   b. eliminates the need for medical management in the majority of cases.
   d. do not have any effect on the degree of symptoms.

13. Second-generation antihistamines can cross the blood-brain barrier.
   a. cause significant drowsiness.
   b. cause significant drowsiness.
   c. significantly improve nasal congestion.
   d. help control sneezing and rhinorrhea.

14. Decongestants are appropriate therapy for patients with which comorbidity?
   a. narrow angle glaucoma
   b. diabetes
   c. severe hypertension
   d. marked coronary artery disease

15. Which of the following is not an advantage of leukotriene receptor antagonists such as montelukast?
   a. It reduces bronchoconstriction.
   b. It is an alternative to oral antihistamines.
   c. It is useful for mild allergic rhinitis symptoms.
   d. It is a nasal inhalant.

16. Which of the following medications has no direct anti-inflammatory effect?
   a. Cromolyn sodium nasal solution (Nasalcrom)
   b. mometasone (Nasonex)
   c. beclomethasone (Beconase AQ)
   d. budesonide (Rhinocort Aqua)

17. Which statement about antibiotic use for rhinitis is true?
   a. Evidence shows that antibiotics should be ordered for rhinitis lasting 2 weeks.
   b. If needed, erythromycin is the antibiotic of choice for adults.
   c. Most patients improve in about 2 weeks without antibiotics.
   d. Antibiotics are effective in decreasing the duration of acute purulent rhinitis.

18. Allergy immunotherapy can be administered by the patient at home.
   a. may alter the allergic disease course after 3 to 5 years of therapy.
   c. is safe to initiate during pregnancy.
   d. consists of repeated monthly subcutaneous injections.

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