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APICON 2025 Workshop Manual *Foundations of* Allergy Practice

A Practical Guide for Clinicians



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CHAPTER 4

Allergen Immunotherapy

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INTRODUCTION

Allergen immunotherapy (AIT) represents a transformative and clinically significant approach in the management of IgE-mediated allergic diseases, such as allergic rhinitis, asthma, and insect venom allergies. Unlike conventional pharmacotherapy that targets symptom relief without addressing the underlying immune dysregulation, AIT seeks to alter the natural progression of allergic diseases. This disease-modifying therapy works by exposing patients to controlled doses of specific allergens, thereby fostering a state of immune tolerance and reducing the hypersensitivity associated with allergen exposure.

AIT's primary goals are to reduce clinical symptoms, decrease the reliance on symptomatic medications, and provide long-term benefits that extend beyond the treatment period. Its implementation involves a tailored approach, where factors such as patient age, allergen type, and disease severity are considered to maximize outcomes. This chapter provides a comprehensive analysis of AIT, focusing on its mechanisms of action, the types of administration, efficacy, safety considerations, and practical clinical issues encountered by healthcare professionals.

IMMUNOLOGICAL BASIS AND MECHANISMS OF AIT

AIT's efficacy in altering immune responses is founded on its multi-phase, complex modulation of both innate and adaptive immune pathways. The therapy's progression can be understood through its impact on various immune components:

Initial Immune Response Modulation

The early stages of AIT involve the repetitive exposure of the immune system to allergens, which initially triggers a controlled response. This repeated stimulation results in reduced reactivity of effector cells, particularly mast cells and basophils, which are pivotal in the immediate allergic reaction:

- *Effector cell desensitization*: Through a process of tachyphylaxis or anergy, these cells become less responsive to allergen-induced degranulation.

Tachyphylaxis refers to a diminished response following successive exposures, while anergy implies a state where cells are present but do not respond to stimulation.

- *Mediator release reduction*: The diminished activation leads to a decrease in the release of histamine, leukotrienes, and other pro-inflammatory mediators, which are responsible for the acute symptoms of allergies.

T-cell Modulation and Regulatory Influence

Central to the Success of AIT is the Shift it Induces in T-cell Response

- *Tolerogenic dendritic cell (DC) activation*: AIT prompts the formation of specialized dendritic cells that capture and process allergens. These cells migrate to lymph nodes where they promote the differentiation and proliferation of regulatory T cells (Tregs).
- *Role of tregs*: Regulatory T cells play a crucial role in suppressing allergic responses. They secrete cytokines such as IL-10 and TGF-β, which have multiple immunosuppressive functions:
- *IL-10*: Inhibits the activity of Th2 cells, which are central to allergic responses. It also suppresses mast cells and basophils, leading to reduced mediator release.
- *TGF-β*: Encourages the production of IgA and supports mucosal immunity, further protecting against allergen-induced inflammation.
- *Th1/Th2 balance shift*: AIT shifts the immune profile from a Th2-dominant (allergy-prone) state to a more balanced or Th1-dominant state. This transition is marked by an increase in Th1 cytokines, such as interferon-gamma (IFN-γ), which counteracts Th2-driven inflammation.

Antibody Response and Ig Class Switching

AIT influences the production and class switching of immunoglobulins:

- *IgG4 production*: AIT stimulates B cells to produce IgG4, a noninflammatory antibody subtype that competes with IgE for allergen binding sites. This blocking mechanism prevents IgE from cross-linking on the surface of mast cells and basophils, which is essential for preventing the degranulation process.
- *Mucosal IgA*: The therapy also promotes the secretion of allergen-specific IgA, enhancing mucosal defense and preventing allergen entry into the systemic circulation.
- *Reduced IgE sensitization*: Although specific IgE levels may initially rise at the onset of AIT, a gradual decline is typically observed as treatment continues, reflecting a dampened allergic sensitization state.

Long-term Immunological Changes

Over the course of months to years, AIT leads to the stabilization of these immune changes, resulting in long-lasting clinical benefits:

- *Sustained tolerance*: The reduction in Th2 cell activity continues beyond the treatment period, contributing to a sustained state of allergen tolerance.

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TABLE 1: Simplified representation of immune modulation in AIT.		
Phase	**Mechanism**	**Outcome**
Early phase	Effector cell desensitization	Reduced mediator release
Adaptive phase	Tregs and Bregs activation, IgG4 production	Suppressed Th2 activity
Long-term effects	Shift from Th2 to Th1 response	Sustained allergen tolerance

- *Cytokine environment normalization*: The levels of Th2 cytokines such as IL-4, IL-5, and IL-13 decrease, which correspondingly reduces eosinophilic inflammation and other allergy-related activities in target organs (e.g., nasal mucosa, lungs).
- *Effector cell anergy*: Th2 cell anergy, apoptosis, or selective deletion has been proposed as underlying mechanisms contributing to the reduction in allergen-specific responses.

AIT's effectiveness stems from its multi-faceted approach to reprogramming the immune system to reduce reactivity to allergens. By promoting the development of regulatory pathways and enhancing the production of blocking antibodies, AIT shifts the balance away from allergic inflammation toward immune tolerance. **Table 1** summarizes immunological mechanisms of AIT. The combined effects on innate and adaptive immunity establish AIT not only as a treatment for immediate symptom control but as a long-term strategy for modifying the course of allergic diseases.

CLINICAL INDICATIONS AND PATIENT SELECTION

Allergen immunotherapy has a well-established role in the treatment of various IgE-mediated allergic conditions, especially when conventional pharmacological management does not provide sufficient symptom control or when long-term benefits are desired. Careful patient selection and thorough evaluation are crucial to optimize outcomes and minimize potential risks. This section details the key indications for AIT, outlining the criteria for patient inclusion and the specific allergic conditions it effectively addresses.

Allergic Rhinoconjunctivitis

Allergic rhinoconjunctivitis (ARC) is one of the most common allergic conditions affecting both children and adults, often associated with a significant reduction in quality of life due to persistent symptoms such as sneezing, nasal congestion, runny nose, and itchy eyes.

AIT is particularly recommended for:

- *Patients with moderate to severe ARC*: Individuals who continue to experience substantial symptoms despite adherence to maximal medical therapy (e.g., antihistamines, intranasal corticosteroids).
- *Seasonal and perennial allergens*: ARC triggered by pollens (seasonal) or perennial allergens (e.g., house dust mites, animal dander) can both be

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managed with AIT. Studies have shown that AIT not only mitigates symptoms during active allergen exposure but also provides sustained relief after the treatment course is completed.

Key Benefits

- Long-term reduction in symptom severity.
- Decreased reliance on symptomatic medications.
- Potential prevention of new sensitizations and progression to asthma.

Allergic Asthma

AIT can be a valuable addition to the management plan for patients with allergic asthma, especially when environmental allergens are a known trigger:

- *Criteria for inclusion*: Patients with controlled asthma (e.g., mild-to-moderate severity) who demonstrate a clear correlation between allergen exposure and asthma exacerbations.
- *Clinical outcomes*: Evidence supports that AIT can enhance asthma control, reduce the frequency of exacerbations, and improve lung function. Importantly, AIT has been shown to prevent the progression from allergic rhinitis to asthma, a critical consideration in pediatric populations where early intervention may alter the disease trajectory.

Special Considerations

AIT should be initiated with caution in patients with asthma; pretreatment evaluations (e.g., peak expiratory flow rate) and ongoing monitoring are necessary to avoid exacerbations.

Contraindications include uncontrolled asthma due to the higher risk of severe systemic reactions.

Hymenoptera Venom Allergy

For individuals at risk of systemic reactions following insect stings, venom immunotherapy (VIT) is the gold standard treatment:

- *Indications for VIT*: Patients with a documented history of systemic allergic reactions to stings from bees, wasps, or other stinging insects. Diagnostic confirmation involves specific IgE testing or skin prick test (SPT) using venom extracts.
- *Clinical efficacy*: VIT has a proven efficacy rate of up to 95% in preventing future systemic reactions, making it a life-saving treatment for those with severe reactions, including anaphylaxis.
- *Duration and maintenance*: VIT is generally continued for 3–5 years, with some cases requiring longer durations based on the patient's risk profile and response to therapy.

Key Point

VIT should be administered under strict medical supervision due to the risk of severe anaphylaxis during treatment.

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Atopic Dermatitis

Atopic dermatitis (AD), a chronic inflammatory skin condition, may be exacerbated by aeroallergen exposure in sensitized patients:

- *Indications*: AIT is considered for patients whose AD is directly linked to aeroallergen sensitization and who have not responded adequately to conventional treatment options (e.g., topical steroids, immunomodulators).
- *Evidence and limitations*: Although some studies support the efficacy of AIT in improving AD symptoms by reducing flare-ups related to allergen exposure, the overall evidence varies, and further large-scale, high-quality research is needed to solidify these findings.

Key Considerations

Detailed patient history and diagnostic evaluation, including specific IgE measurement and SPT, are essential to establish the relationship between aeroallergen sensitization and AD severity.

AIT should be combined with standard AD management practices for optimal results.

Diagnostic and Patient Evaluation

Proper identification of sensitizing allergens is critical for the success of AIT. The following diagnostic tools are commonly used:

- *Skin prick test*: Quick, cost-effective, and reliable for detecting immediate hypersensitivity reactions to various allergens.
- *Specific IgE testing*: Offers a quantitative assessment of sensitization, aiding in the confirmation of the allergen source when SPT results are ambiguous or when skin testing is not feasible (e.g., in patients with extensive skin conditions).

Key Point

A thorough review of the patient's medical history, including symptom patterns and potential allergen exposure, enhances the diagnostic accuracy and selection of appropriate allergens for AIT.

AIT is an effective, long-term treatment strategy for select patients with IgE-mediated allergic diseases. Its benefits extend beyond symptom control to potential disease modification and progression prevention. **Table 2** summarizes

TABLE 2: Summary of indications for AIT.

Condition	Criteria for AIT
Allergic rhinoconjunctivitis	Moderate-to-severe symptoms, SPT positive, clinical correlation
Allergic asthma	Controlled asthma with identified allergen trigger
Hymenoptera venom allergy	Documented systemic reaction history post-sting, confirmed by diagnostic tests
Atopic dermatitis	Aeroallergen sensitization with inadequate response to conventional therapy

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the indication of AIT. However, its application requires meticulous patient selection, accurate diagnosis, and close clinical monitoring to ensure safety and optimize outcomes.

TYPES OF AIT AND ADMINISTRATION ROUTES

Allergen immunotherapy encompasses two primary administration routes: (i) Subcutaneous immunotherapy (SCIT), and (ii) Sublingual immunotherapy (SLIT). Each approach has distinct protocols, benefits, and safety considerations, making them suitable for different patient needs and clinical scenarios. This section elaborates on these types, detailing their administration, safety, and efficacy profiles.

Subcutaneous Immunotherapy

SCIT is the traditional and most extensively studied form of AIT. It involves the administration of allergen extracts through injections into the subcutaneous tissue. The process consists of two main phases.

Build-up Phase

- *Objective*: To gradually increase the patient's tolerance to the allergen by administering incrementally higher doses.
- *Protocol*: Typically starts with very small allergen doses that are administered weekly or bi-weekly. The dose is gradually increased over several months until reaching the optimal maintenance dose.
- *Duration*: This phase usually lasts 3–6 months, depending on the protocol (e.g., conventional, rush, or cluster). Rush and cluster protocols expedite the build-up phase but require close monitoring due to higher risk of systemic reactions.

Maintenance Phase

- *Objective*: To maintain the desensitization achieved during the build-up phase.
- *Protocol*: Injections are spaced at longer intervals, usually every 2–4 weeks, for a period of 3–5 years.
- *Outcome*: Long-term reduction in allergy symptoms and improved quality of life are often observed, with benefits persisting after treatment cessation.

Safety Considerations for SCIT

- *Risk of systemic reactions*: SCIT is associated with a risk of systemic reactions, including anaphylaxis. Hence, it must be administered in a clinical setting where appropriate emergency care is available.
- *Observation period*: Patients are monitored for at least 30 minutes post-injection to ensure any adverse reaction can be promptly managed.
- *Premedication*: In some cases, pretreatment with antihistamines or corticosteroids may be advised to mitigate the risk of reactions.

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- *Efficacy of SCIT*: SCIT has been proven effective in the treatment of allergic rhinitis, allergic conjunctivitis, and allergic asthma. Studies have shown that it can significantly decrease symptom scores, reduce medication use, and even prevent the progression from allergic rhinitis to asthma in children.

Sublingual Immunotherapy

SLIT emerged as a patient-friendly alternative to SCIT and involves placing allergen extracts under the tongue, where they are absorbed through the oral mucosa. The process for SLIT includes:

Initial Dose and Titration

- *Supervision*: The first dose is typically administered under medical supervision to monitor for any immediate reactions.
- *Titration*: Once the initial dose is tolerated, patients can continue treatment at home, enhancing convenience and compliance.

Daily Administration

- *Protocol*: SLIT is administered daily throughout the build-up and maintenance phases. This consistent exposure helps maintain desensitization.
- *Duration*: The treatment generally spans 3–5 years, similar to SCIT, to achieve long-term efficacy.

Safety Profile of SLIT

- *Local reactions*: SLIT has a favorable safety profile, with most side effects being mild and limited to the oral cavity (e.g., itching, swelling, or mild throat irritation).
- *Systemic reactions*: Rarely, systemic allergic reactions can occur but are significantly less frequent compared to SCIT. This lower risk allows for at-home administration after initial monitoring.
- *Patient suitability*: SLIT is particularly suitable for children and patients who prefer avoiding injections.
- *Efficacy of SLIT*: SLIT has shown strong evidence of efficacy in treating allergic rhinitis and conjunctivitis, with ongoing research supporting its role in allergic asthma management. Clinical trials have demonstrated that SLIT can provide sustained benefits post-treatment, contributing to the reduction of symptoms and the need for medication.

Special Protocols and Considerations

Customized Protocols

- *Rush and cluster protocols*: These accelerated protocols for SCIT reduce the build-up phase from months to days or weeks, offering quicker desensitization. However, they come with a heightened risk of systemic reactions and require intensive monitoring.

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- *Ultrarush protocols*: Used mainly for VIT, these protocols rapidly escalate doses in a very short timeframe to provide quick desensitization, crucial for patients with a high risk of anaphylaxis following insect stings.

Patient Factors

- *Age considerations*: SLIT is particularly favorable for pediatric patients due to its non-invasive nature. SCIT, while effective, can be challenging for younger children due to the need for repeated injections.
- *Comorbid conditions*: Patients with stable, well-controlled asthma may benefit from AIT, but uncontrolled asthma poses a contraindication, particularly for SCIT due to an increased risk of adverse reactions.
- *Adherence and education*: Patient education is vital to ensure adherence, particularly with SLIT, which requires daily administration at home.

A comparative overview of SCIT and SLIT is being highlighted in **Table 3** along with their respective benefits and considerations. Both SCIT and SLIT offer unique advantages in AIT, catering to different patient preferences and clinical needs. While SCIT provides strong efficacy across multiple allergic conditions, its administration in a controlled setting is necessary due to the risk of severe reactions. SLIT, on the other hand, provides greater convenience and a favorable safety profile, making it suitable for home use and appealing to a broader patient base. Careful consideration of patient-specific factors, including age, preference, and comorbidities, guides the choice between SCIT and SLIT, ensuring optimal treatment outcomes.

EFFICACY OF AIT: EVIDENCE FROM CLINICAL STUDIES

Allergen immunotherapy has been extensively researched over the past few decades, demonstrating significant efficacy in the treatment of various IgE-mediated allergic conditions. Both SCIT and SLIT have been validated through numerous clinical trials and meta-analyses, highlighting their effectiveness in

TABLE 3: Key comparisons between SCIT and SLIT.

Parameter	SCIT	SLIT
Route	Subcutaneous injection	Oral (sublingual)
Setting	Clinical setting (initially required)	Home administration after initial supervision
Frequency	Weekly to bi-weekly during build-up; monthly for maintenance	Daily throughout the treatment period
Safety profile	Risk of systemic reactions, including anaphylaxis	Mostly mild, localized reactions
Long-term benefits	Proven for allergic rhinitis, conjunctivitis, and asthma	Proven for allergic rhinitis and conjunctivitis; ongoing studies for asthma
Patient compliance	May have lower compliance due to clinical visits	Higher compliance due to home administration

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reducing symptoms, decreasing the need for medication, and providing long-term benefits that extend beyond the treatment period.

SCIT and SLIT Efficacy

Evidence supporting the efficacy of SCIT and SLIT comes from an extensive body of randomized controlled trials (RCTs) and systematic reviews. A comprehensive 2017 meta-analysis reviewing over 160 studies on SCIT for ARC found that SCIT significantly reduced both symptom scores and the use of symptomatic medication. Key findings include:

- *Allergic rhinoconjunctivitis*: Patients undergoing SCIT experienced a marked reduction in symptoms such as nasal congestion, sneezing, and itchy eyes. This reduction translated into an improved quality of life and less reliance on antihistamines and corticosteroids.
- *Allergic asthma*: A separate meta-analysis that included 98 studies showed that SCIT improved asthma control and reduced exacerbations. Patients exhibited better lung function and fewer emergency visits or hospital admissions related to asthma complications.
- *Sublingual immunotherapy*: SLIT studies conducted in Europe and the US mirrored the positive outcomes observed with SCIT. SLIT has proven particularly effective in reducing symptoms of allergic rhinitis and, in some studies, has shown promising results in managing allergic asthma, albeit with ongoing research for broader asthma efficacy data.

Clinical Trials and Notable Studies

- *Randomized controlled trials*: Large-scale RCTs have demonstrated that both SCIT and SLIT significantly reduce clinical symptoms associated with allergic conditions. For instance, SLIT trials involving grass pollen and house dust mite allergens confirmed substantial decreases in symptom severity and medication use across age groups.
- *Pediatric populations*: The efficacy of AIT in children has been particularly notable. The PAT (Pediatric Allergic Therapy study, one of the most influential long-term studies, illustrated that children receiving SCIT for allergic rhinitis had a reduced risk of developing allergic asthma. This preventive effect persisted years after the treatment had ceased, suggesting that AIT not only manages existing symptoms but also modifies the disease course.

Long-term Benefits of AIT

One of the standout features of AIT is its potential to provide long-lasting effects that endure after the treatment concludes. Unlike conventional therapies that offer only temporary relief, AIT can lead to a sustained state of immune tolerance:

- *Persistent symptom relief*: Clinical trials indicate that patients often continue to experience reduced allergic symptoms for years after completing AIT. This is attributed to the immunological changes induced during therapy, including the increased production of Tregs and allergen-specific IgG4 antibodies.

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- *Prevention of disease progression*: The PAT study revealed that SCIT could prevent the natural progression of allergic rhinitis to asthma in children, a significant finding considering that early intervention can alter the long-term disease trajectory. This outcome highlights the potential of AIT to modify disease pathways and reduce the burden of chronic allergic conditions.
- *Reduction in new sensitizations*: Evidence suggests that AIT may also lower the risk of developing new allergen sensitizations, thus broadening its preventive role in allergic diseases.

Supporting Evidence from Systematic Reviews and Meta-analyses

- *Standardized outcome measures*: Systematic reviews have underscored the importance of standardized endpoints, such as combined symptom and medication scores (CSMS), to evaluate AIT efficacy comprehensively. Meta-analyses that incorporated CSMS demonstrated consistent reductions in both components, providing robust evidence for AIT's effectiveness.
- *Longitudinal studies*: Studies tracking patients for multiple years post-treatment have reported that AIT's benefits can last well beyond the active treatment phase. The enduring impact on symptom control and quality of life reinforces AIT's status as a disease-modifying therapy.

Comparative Efficacy of SCIT and SLIT

While both SCIT and SLIT are effective, their comparative efficacy has been a topic of interest:

- *Efficacy in allergic rhinitis and asthma*: Direct comparison studies have found that SCIT and SLIT both significantly reduce symptoms of allergic rhinitis and have beneficial effects on asthma control. SCIT is often associated with more pronounced improvements due to its higher dose of allergen delivery. However, SLIT's ease of use and better safety profile make it a preferred option for many patients, especially children and those averse to injections.
- *Meta-analytical findings*: A 2020 meta-analysis comparing the two modalities noted that while SCIT generally provided greater reductions in symptom scores, SLIT was still highly effective and favored for its home administration and lower risk profile.
- *Long-term outcomes*: Both SCIT and SLIT have shown sustained benefits post-treatment, with some studies reporting that SLIT's effects continue for at least 2 years after completion. SCIT, on the other hand, has shown long-term symptom relief extending up to several years, depending on the treatment regimen and patient adherence.

Efficacy in Special Populations and Conditions

AIT's application extends to various allergic conditions beyond allergic rhinitis and asthma:

- *Food allergies*: While SCIT is not commonly used for food allergies due to safety concerns, oral immunotherapy (OIT) has emerged as a related form of AIT for desensitization to food allergens. Meta-analyses involving OIT

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for peanut and milk allergies show significant desensitization rates but also highlight an increased risk of adverse reactions.

- *Venom allergy*: Venom immunotherapy remains the most effective treatment for preventing severe systemic reactions following insect stings, with efficacy rates approaching 95%. Its success underscores the potential of AIT in life-threatening allergy management.
- *Atopic dermatitis*: While not a primary indication, AIT has been explored for AD linked to aeroallergen sensitization. Some studies report symptom improvement, though results are less consistent compared to ARC and asthma.

AIT has firmly established its role in the long-term management of IgE-mediated allergies, with a wealth of evidence from clinical studies supporting its efficacy as shown in **Table 4**. Both SCIT and SLIT provide significant reductions in symptoms and medication use, contribute to lasting immune tolerance, and offer potential preventive effects against disease progression. While SCIT remains the gold standard with proven results in severe cases, SLIT offers a convenient, effective alternative for broader patient adherence and safety.

SAFETY PROFILE AND ADVERSE REACTIONS

The safety profile of AIT is a crucial aspect that clinicians must consider during treatment planning and administration. Although AIT is effective in managing and modifying the course of allergic diseases, it carries a risk of adverse reactions. Understanding these risks and their management is essential for ensuring patient safety and improving treatment outcomes. This section provides a detailed examination of the safety profiles and management strategies for SCIT and (SLIT).

SCIT Safety

SCIT is associated with a well-documented risk of both local and systemic reactions. The safety profile varies based on the phase of treatment, patient-specific factors, and adherence to administration protocols.

Local Reactions

- *Presentation*: Common local reactions include redness, swelling, pain, and warmth at the injection site. These reactions are typically mild and resolve without intervention within a few hours.
- *Frequency*: These reactions are more common during the build-up phase when doses are being increased and the body is adjusting to allergen exposure.

TABLE 4: Data on AIT efficacy.

Study type	No. of studies	Key outcomes
Allergic rhinoconjunctivitis (MA)	160	Reduced symptoms and medication use
Allergic asthma (MA)	98	Improved control, reduced exacerbations
Food allergy (MA)	31	Demonstrated desensitization, albeit with increased risk

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Systemic Reactions

- *Types*: Systemic reactions can range from mild (e.g., generalized urticaria, nasal congestion) to severe, including anaphylaxis, which may manifest with respiratory distress, hypotension, and multisystem involvement.
- *Incidence*: Systemic reactions occur in approximately 0.1–0.2% of SCIT injections, with a higher incidence reported during the build-up phase. However, they can occur at any point in the treatment, even during the maintenance phase.
- *Management*: Due to the risk of systemic reactions, SCIT must be administered in a clinical setting equipped for emergency response. Immediate administration of epinephrine and supportive measures, such as oxygen and intravenous fluids, are critical for managing anaphylaxis.

Prevention and Risk Mitigation

- *Patient selection*: Contraindications such as uncontrolled asthma or a history of severe anaphylaxis without clear allergen identification must be considered before initiating SCIT.
- *Pre-treatment assessment*: Evaluating patients for asthma control, including peak expiratory flow rate (PEFR) testing, helps identify those at higher risk for adverse events.
- *Observation periods*: Patients should be observed for at least 30 minutes post-injection to monitor for immediate systemic reactions. This observation period allows healthcare providers to administer prompt treatment if necessary.
- *Premedication*: Antihistamines can be used prophylactically to reduce the severity of local reactions. This approach may be particularly useful in patients prone to large local reactions.

SLIT Safety

SLIT is generally considered safer than SCIT, with a lower risk profile that allows for home administration after the initial supervised dose. However, it is not without its potential side effects.

Local Reactions

- *Common presentations*: Localized side effects include oral pruritus, mild throat irritation, and swelling of the lips or tongue. These reactions are typically mild, transient, and self-limiting.
- *Frequency*: Local reactions are more common in the early stages of treatment and often decrease as the patient continues therapy and builds tolerance.

Systemic Reactions

- *Rare but possible*: Although significantly less common than in SCIT, systemic reactions to SLIT can occur. However, severe reactions such as anaphylaxis are exceedingly rare, with no fatalities reported in clinical trials or real-world data.

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Foundations of Allergy Practice

A Practical Guide for Clinicians

Salient Features

- *Comprehensive foundations:* Offers a thorough introduction to allergy science, exploring key concepts such as atopy, sensitization, and the historical milestones shaping modern allergy understanding
- *Patient-centered diagnosis:* Emphasizes the critical role of detailed history-taking and clinical methods for accurate diagnosis, particularly in airway allergies such as asthma and allergic rhinitis
- *Practical diagnostic tools:* Provides an in-depth guide to the skin prick test (SPT), detailing its procedure, reliability, and significance as a cornerstone in allergy diagnostics
- *Advanced treatment strategies:* Explores the transformative potential of allergen immunotherapy, equipping practitioners with tools to achieve long-term relief and improved immune responses in patients
- *Region-specific insights:* Focuses on aeroallergens in India, addressing the country's unique environmental and ecological challenges, with tailored diagnostic and management strategies for clinicians

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