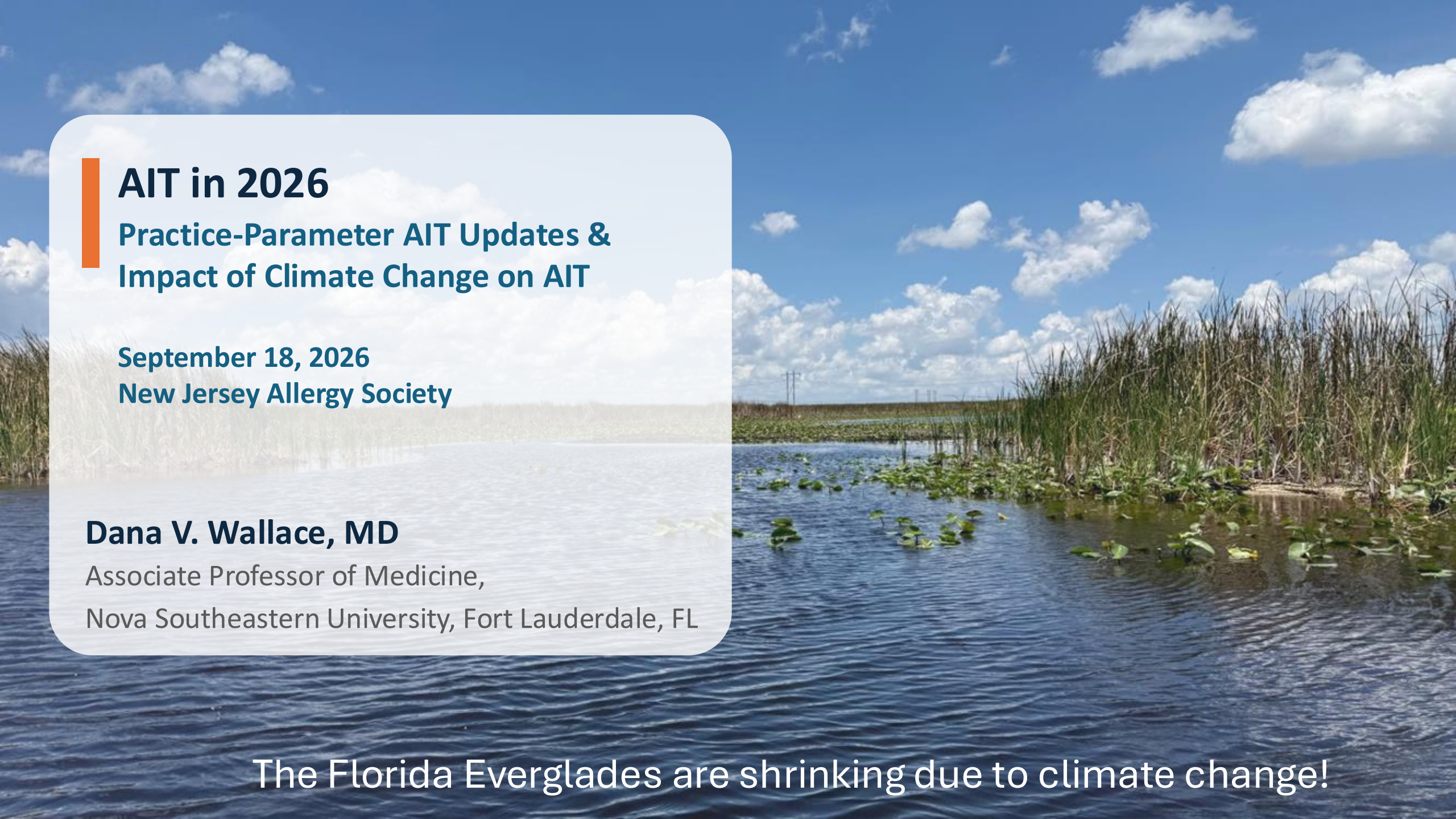




AIT in 2026

Practice-Parameter AIT Updates & Impact of Climate Change on AIT

September 18, 2026

New Jersey Allergy Society

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The Florida Everglades are shrinking due to climate change!

Disclosures for Dana Wallace, MD

- I serve on the JTFPP workgroup for developing the 4rd AIT updated traditional practice parameter
- I am an advisor for:
 - ARS
 - Aquestive
 - Bryn
 - ALK-Abello, Inc
 - Kenvue

Disclosures regarding 4th JTFPP AIT PP

- **Traditional practice parameter** — not a formal GRADE guideline — but separates strength of recommendation from certainty of evidence.
- All recommendations shown are in **DRAFT** form — under active editing and formal review by the Joint Task Force on Practice Parameters (JTFPP), AAAAI, and ACAAI.
- Wording, strength of recommendation, and certainty of evidence may change before publication.
- The parameter is North-American in scope
- Climate / pollen content is drawn from the published literature and is cited on each slide.

AITPP is currently posted for review:

<https://college.acaai.org/wp-content/uploads/2026/08/2026-Allergen-Immunotherapy-Practice-Parameter-Update.pdf>

Learning Objectives

At the conclusion of this presentation, the attendee should be able to

- List the **indications and risks** for AIT in patients
- Compare the strength of the evidence for the efficacy of **single vs. multi-allergen** and **SCIT vs. SLIT**
- Cite the evidence for the **duration of efficacy** after stopping AIT
- Debate the pros and cons of using **SLIT liquid** (drops) in the US
- Discuss the role of **share decision-making** in AIT initiation and continuation
- Describe the impact of **climate change on pollen levels and AIT**
- Advocate for **future research on AIT** to ensure the future availability of this treatment modality

Abbreviations & How to Read the Recommendations

AIT — allergen immunotherapy

SCIT — subcutaneous immunotherapy

SLIT-T — sublingual immunotherapy – tablet

SLIT-L — sublingual immunotherapy – liquid

AR / AC — allergic rhinitis / conjunctivitis

AA — allergic asthma

AD — atopic dermatitis

HDM — house dust mite

Rec — recommendation

SoR — strength of recommendation

CoE — certainty of evidence

SDM — shared decision-making

How to read each recommendation

Strength of Recommendation (SoR):

- Strong = “We recommend”
- Conditional = “We suggest”

[Utilize shared decision-making]

Certainty of Evidence (CoE):

- High → Moderate → Low → Very Low

DRAFT = wording not yet final

SoR: Conditional

CoE: Moderate

DRAFT

Roadmap

1. The 2026 JTF AIT Practice Parameter — what's new
2. Patient selection
3. Efficacy of SCIT and SLIT
4. Safety
5. Vial Preparation
6. Climate change & pollen shifts
7. Future directions



The 2026 JTF AIT Practice Parameter

What's new & how it was made



About the 2026 Update

- 4th update of the AIT Practice Parameter; emphasizes **evidence published since 2011**, weighing the totality of evidence.
- This PP builds on the 2011 parameters and is **not a comprehensive review**
- Diseases covered: **allergic rhinitis (AR), allergic asthma (AA), and atopic dermatitis (AD)**.
- Does NOT cover food or stinging-insect immunotherapy (addressed in separate parameters).
- Preference is for evidence derived from products available in North America; European modified-extract data are cited where needed.

Cross-Cutting Themes Before We Start

- **Limited** NEW evidence for **multi-allergen SCIT** — the most common approach in North America.
- Many recommendations are **conditional** and based on **low/very-low certainty**; experienced clinicians may see stronger real-world benefit.
- **Shared decision-making** (SDM) is the recurring theme — recommendations are the starting point, not the rule.
- Dose / potency terms differ worldwide: BAU, AU, mass units (μg of major allergen). This limits cross-study comparison.

Mechanism of AIT — The Original Biologic Therapy

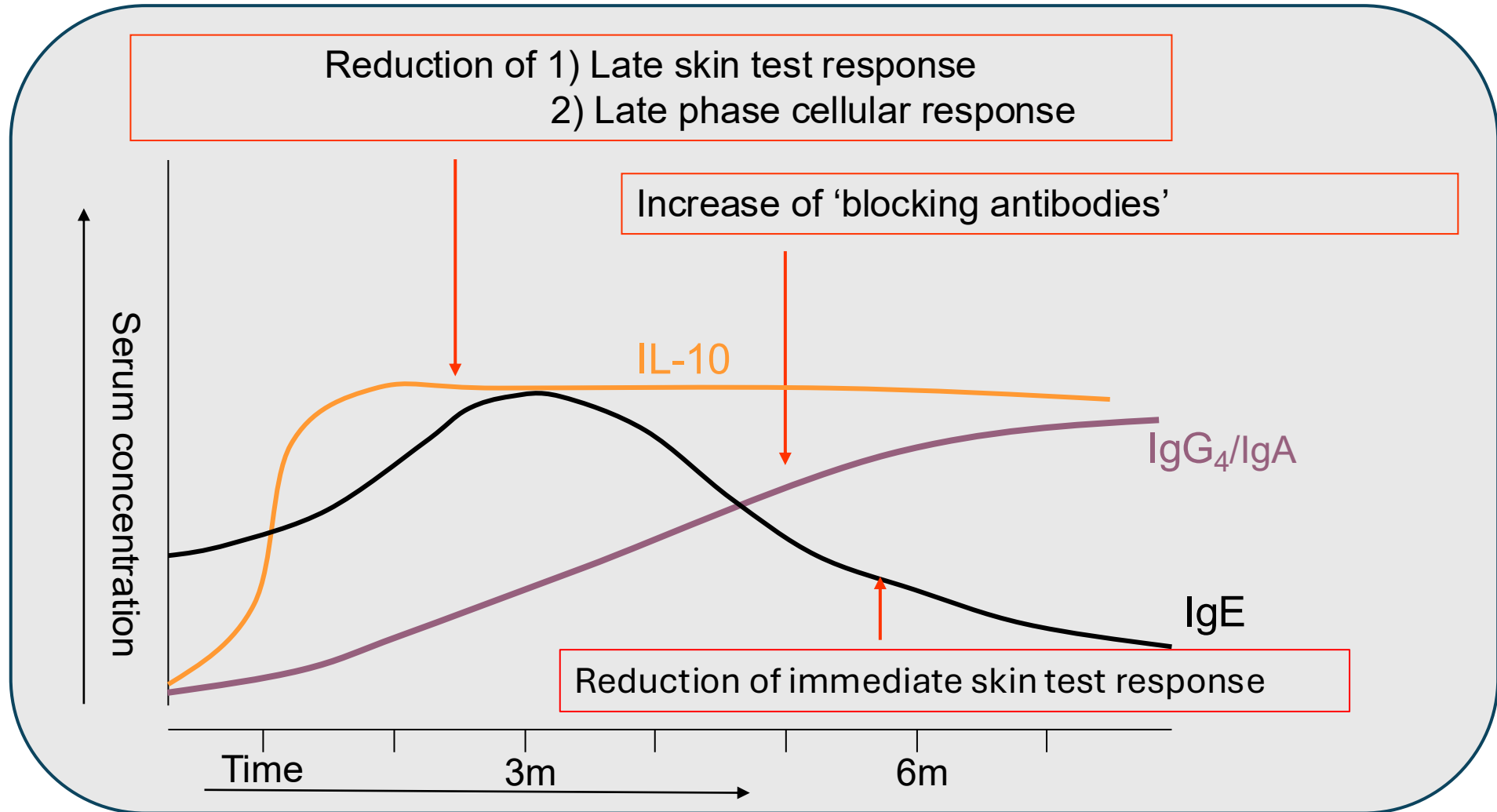
Early changes (days–weeks)

- Mast cell & basophil desensitization; ↓ early-phase reactivity
- Induction of regulatory T cells (Treg) with resultant IL-10 & TGR-β production, and regulatory B cells
- Shift away from Th2 cytokines (IL-4, IL-5, IL-13)

Sustained / disease-modifying

- ↑ Allergen-specific IgG4 'blocking' antibodies; ↓ IgE over time
- Reduced tissue eosinophil & mast cell recruitment
- Long-term tolerance persisting after a 3+ year course

Timing of Antibody & Skin Test Changes



Existing Biomarkers Do Not Guide AIT Treatment

We want a biomarker that can tell us:

- 1) Which patient will respond to AIT?
- 2) How well AIT is working?
- 3) When to stop or continue AIT!

We suggest AGAINST using immunologic markers/biomarkers (specific-IgE, skin prick test, or specific-IgG4 quantification) to predict or assess the clinical efficacy of SCIT/SLIT.

SoR: Conditional

CoE: Low

DRAFT



Indications for ALT & Patient Selection



Core Indications for AIT

We recommend AIT for allergic patients with AR, AA, and/or moderate to severe AD associated with allergen exposure and with persistent symptoms/signs despite medication and environmental control or intolerance to medications or reluctance or incapacity to implement environmental control or hesitancy to continue with long-term use of medications.

SoR: Strong

CoE: High

DRAFT

We recommend a documented shared decision-making discussion prior to AIT on the risks and benefits of AIT and the patient's preference

SoR: Strong

CoE: Low

DRAFT

AIT Across the Age Spectrum

Adults of any age, including >65 years: SCIT and SLIT should be considered when standard eligibility criteria are met.

SoR: Strong

CoE: Moderate

DRAFT

Children aged ≥ 4 years with AR: we suggest SCIT and SLIT if other eligibility criteria are met.

SoR: Conditional

CoE: Moderate

DRAFT

Use the SAME dose, dosing schedule, and duration in children as in adults.

SoR: Strong

CoE: Low

DRAFT

Prevention of Asthma & Treatment of EoE

We suggest aeroallergen SCIT and SLIT to **PREVENT** the development of **AA** in children with AR

SoR: Conditional

CoE: Moderate

DRAFT

We suggest that SCIT may be considered as an adjunct treatment option for clinically relevant aeroallergens in select patients with EoE who are poorly responsive to standard treatments and have comorbid **allergic rhinitis**.

SoR: Conditional

CoE: Very Low

DRAFT

Treatment of Atopic Dermatitis

We suggest house dust mite SCIT for children with moderate-to-severe AD (with relevant aeroallergen sensitization) who remain inadequately controlled with optimized skin-directed therapy.

SoR: Conditional

CoE: Moderate

DRAFT

We suggest house dust mite SLIT for children with moderate-to-severe AD (with relevant aeroallergen sensitization) who remain inadequately controlled with standard topical treatment.**

SoR: Conditional

CoE: Very Low

DRAFT

**** There are *no studies on SLIT-T for AD*, only European SLIT-L; thus, the results are extrapolated.**

Comorbid Urticaria & Mastocytosis

Co-existing chronic spontaneous urticaria: we suggest **NO adjustment** to the SCIT/SLIT dose for treating AR/AA.

SoR: Conditional

CoE: Very Low

DRAFT

Criteria-established **systemic mastocytosis**: we suggest **AGAINST** aeroallergen SCIT due to potential increased anaphylaxis risk.

SoR: Conditional

CoE: Very Low

DRAFT

Highly Sensitive Patients

Exercise greater caution initiating SCIT in highly sensitive patients, those with comorbidities increasing anaphylaxis severity, or who may not tolerate/respond to epinephrine.

SoR: Conditional

CoE: Moderate

DRAFT

AIT in Pregnancy

Continue SCIT or SLIT at the last tolerated dose without dose escalation during pregnancy, after shared decision-making.

SoR: Conditional

CoE: Low

DRAFT

We suggest AGAINST INITIATING SCIT during pregnancy.

SoR: Conditional

CoE: Very Low

DRAFT

Immunodeficiency, Autoimmunity & Malignancy

AIT for AR and/or AA is an OPTION in patients with primary or secondary immunodeficiency.

SoR: Conditional

CoE: Very Low

DRAFT

AIT for AR and/or AA is an OPTION in patients with comorbid autoimmune disease.

SoR: Conditional

CoE: Very Low

DRAFT

Malignancy: we suggest consultation with the patient's oncologist when initiating/continuing AIT.

SoR: Conditional

CoE: Very Low

DRAFT



Efficacy of SCIT

— *the core evidence*



Types of Allergen Extracts for SCIT — U.S. & Europe

Extract Type	Description	U.S.	Europe
Aqueous	Saline-based; no stabilizer; mixable; fast absorption; ↑ systemic-reaction risk	~60–70%	<5% (mostly venom)
Glycerinated	50% glycerin; longer shelf life; viscous; slower absorption	~30–40%	Rare
Aluminium / tyrosine adsorbed (depot)	Depot; slower release; fewer systemic reactions; not mixable	Not available	~70–80%
Allergoids	Chemically modified; ↓ allergenicity & IgE binding; rapid, safe build-up	Not available	~20%
Lyophilised	Powdered; reconstituted for use	Venom	Venom

Extract data: Dharmi 2017; Mahler 2019; Jensen-Jarolim 2021.

Recommended Maintenance Doses — Follow 2011 PP guidelines

Standardized extracts

Northern grasses (Timothy, orchard, rye, etc.)	1,000–4,000 BAU
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Bermuda grass	1,000–4,000 BAU
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Cat (hair / pelt)	1,000–4,000 BAU
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Dust mite (D. farinae / D. pteronyssinus)	500–2,000 AU
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Short ragweed	6–12 µg Amb a 1
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Non-standardized extracts

Dog (ultrafiltered)	15 µg Can f 1
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Cockroach (German)	1,000–2,000 PNU (1:10–1:40 w/v)
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Each individual mold	1,000–2,000 PNU (1:10–1:40 w/v)
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Each individual non-std. tree	1,000–2,000 PNU (1:10–1:40 w/v)
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Each specific mold and non-standardized tree is dosed individually at the indicated PNU range. BAU = bioequivalent allergy units; AU = allergy units; PNU = protein-nitrogen units; w/v = weight/volume.

Recommended maintenance doses per 2011 JTF AIT Practice Parameter (Cox L, Nelson H, et al. J Allergy Clin Immunol 2011;127(1 Suppl):S1–55).

Efficacy of SCIT is Strongest for Pollen and HDM-induced AR:

- Single Allergen has the strongest evidence
- Seasonal (pollen) allergen > perennial allergen AIT for certainty of evidence
- Adult evidence is stronger than that for children

We recommend single-allergen pollen or house dust mite SCIT for adults and children with seasonal or perennial AR when a **single allergen** is a major cause of symptoms.

SEASONAL

SoR: Strong

CoE: High (SAR adults)

CoE: Moderate (SAR children)

DRAFT

PERENNIAL

SoR: Strong

CoE: Moderate (PAR adults)

CoE: Low (PAR children)

DRAFT

SCIT for Asthma & Fungal Allergy

We suggest single-allergen SCIT for **allergic asthma** when a single allergen is likely the major contributor. [Efficacy for symptoms & medication use only]

SoR: Conditional

CoE: Low

DRAFT

Fungal (mold) SCIT may be considered in selected patients with fungal allergy.

SoR: Conditional

CoE: Very Low

DRAFT

SCIT for Animal Allergens– expanded discussion in updated PP

Cat SCIT (1000-4000 BAU) for patients with AR and/or AA and symptoms on cat exposure.

SoR: Conditional

CoE: Low

DRAFT

Dog SCIT (minimum 15 µg Can f 1 per maintenance dose) for symptomatic dog-exposed patients.

SoR: Conditional

CoE: Very Low

DRAFT

Laboratory-animal or horse SCIT for patients with occupational/recreational exposure.

SoR: Conditional

CoE: Very Low

DRAFT

SCIT & Prevention

We recommend AGAINST SCIT to prevent AR/AA in ASYMPTOMATIC (non-sensitized or sensitized but no symptoms or disease state) [**Primary prevention**]

SoR: Strong

CoE: Moderate

DRAFT

Secondary Prevention (prevention of a first allergic disease in sensitized individuals)

- AIT in preschool children may induce pro-tolerogenic mechanisms (one study only) [**No recommendation**]

We suggest SCIT in patients with AR and/or AA to help **prevent** the development of **additional sensitizations**.

SoR: Conditional

CoE: Very Low

DRAFT

AIT for Prevention of Allergic Disease — 2026 Evidence summary

Tertiary Prevention (prevention of a secondary allergic disease or long-term reduction of symptoms)

- **2007** (PAT study) Grass/tree pollen SCIT prevents asthma in children with AR/C —at 7 years following 3 years of SCIT: 48/64 (75%) SCIT group asthma free; 29/54 (54%) control group asthma-free
- **2018 SLIT-T** Timothy grass (**GAP**) study of 812 children did not show a reduction in the onset of asthma
- 2017 Meta-analysis (SLIT & SCIT) showed 2-year prevention of asthma (during or after Tx), not sustained thereafter
- 2022 Systematic review SCIT/SLIT not statistically significant
- 2024 extensive review article: Pollen AIT “probably” effective.
SCIT vs. SLIT: comparable preventive effect; **HDM** and other allergens: effect inconclusive
- Higher AIT doses associated with greater immunomodulatory effects; humoral effects favor SCIT; higher dose safety may favor SLIT
- **Multi-allergen mixtures have NOT shown a preventative effect****

Prevention of Asthma—we need more evidence!

We suggest aeroallergen **SCIT** and **SLIT** to **PREVENT** the development of **AA** in children with AR.

SoR: Conditional

CoE: Moderate

DRAFT

Duration of Efficacy After Stopping AIT: limited long-term data

SCIT: Sustained Efficacy Post-Discontinuation

- Ariano 1999 (Parietaria, 3 yr SCIT; active pts=**35**): AR symptom relief maintained at 4-yr follow-up
- Möller 2002 / Jacobsen 2007 (Grass/birch, 3 yr SCIT; active pts=**79**): Reduced asthma development at **2 yr**; sustained relief & asthma prevention at 7 yr follow-up (**PAT study**)
- **Eng 2006 (Grass, 3 yr SCIT; active pts=13): AR symptom control maintained up to 12 years post-SCIT**
- Tabar 2011 & Stelmach 2012 (HDM, 3–5 yr SCIT; active pts=**52, 41**): 50% asthma remission sustained at 2–3 yr follow-up
- Arroabarren 2015 (HDM, 5 yr vs. 3 yr; active pts. 31, **40**): 3-yr group AR and asthma improved and **remained improved 2 yrs** after discontinuation. **5-yr** group showed 30% additional improvement in AR global severity scores (but not statistically significant).

Studies cited: Möller/Jacobsen (PAT), Tabar, Stelmach, Arroabarren, Di Rienzo, Wahn, Yonekura, Zeng. SCIT follow-up 2–12 yrs; SLIT follow-up 2–5 yrs post-discontinuation.

SCIT — Duration & Long-Term Efficacy

Single-allergen SCIT (at effective doses) for a **MINIMUM of 3 years** to achieve long-term **efficacy lasting ≥ 2 years** after stopping.

SoR: Conditional

CoE: Moderate

DRAFT

AIT may be extended beyond 5 years for patients who highly value avoiding medication — with SDM— however, there is **no proven added benefit beyond 5 years**.

SoR: Conditional

CoE: Low

DRAFT

Multi-Allergen SCIT — The Evidence Gap

We suggest multi-allergen SCIT when symptoms are caused by more than one allergen.

SoR: Conditional

CoE: Low

DRAFT

Include the **SMALLEST number of relevant allergens**, each at a maintenance dose shown effective in single-allergen studies; **treat ≥ 3 years**.

SoR: Conditional

CoE: Low–Very Low

DRAFT

Repeat Testing During / After SCIT

We recommend **AGAINST routine repeat skin/sIgE testing** during or after successful SCIT solely to guide continuation/discontinuation.

SoR: Strong

CoE: Moderate

DRAFT

Repeat testing IS suggested as part of assessment **when new sensitization is suspected** after 3–5 years of partially successful SCIT.

SoR: Conditional

CoE: Low

DRAFT



Efficacy of SLIT

— *the core evidence*

SLIT-T for House Dust Mite--AR

We recommend **HDM SLIT-tablets** for HDM-allergic adults and children (≥ 5 yr) with AR, to reduce symptoms and medication use.

SoR: Strong

CoE: High

DRAFT

Inform patients that the HDM SLIT-tablet becomes effective after ~8–14 weeks of treatment.

SoR: Conditional

CoE: Moderate

DRAFT

SLIT-T for HDM — Asthma

HDM SLIT-tablets for adults and children with **mild-to-moderate** allergic asthma — reduce symptoms and ICS dose.

SoR: Strong (adults); Conditional (children)

CoE: High (adults)

CoE: Modate (children)

DRAFT

HDM SLIT-tablets to reduce asthma **EXACERBATIONS.**

SoR: Conditional

CoE: Low

DRAFT

SLIT-T for Ragweed & Trees

Ragweed SLIT-tablets for adults and children (>5 yr) with **ragweed AR** (pre-/co-seasonal or perennial).

SoR: Strong

CoE: High

DRAFT

Ragweed SLIT-tablets for mild-moderate **ragweed asthma**; treat 3–5 years.

SoR: Conditional

CoE: Modate (children)

CoE: Low (adults)

DRAFT

Birch and Japanese-cedar pollen SLIT for tree-pollen AR ± conjunctivitis (≥5 yr), where available.

SoR: Strong

CoE: High

DRAFT

SLIT-T for Grass Pollen—AR and Asthma

We recommend pre-/co-seasonal or perennial Northern-grass SLIT-tablets for grass-allergic adults and children with **AR**.

SoR: Strong

CoE: High

DRAFT

Three years of grass SLIT-T reduces **AR** symptoms for **≥2 years** after stopping (long-term efficacy).

SoR: Strong

CoE: High

DRAFT

Three years of grass SLIT-T also **reduces allergic asthma symptoms after discontinuation**.

SoR: Conditional

CoE: Low

DRAFT

Duration of Efficacy After Stopping SLIT: limited long-term data

SLIT: Sustained Efficacy Post-Discontinuation

- Di Rienzo 2003 (HDM SLIT-drops, 4–5 yr of AIT; active pts=35): At 5 yrs post cessation: Reduced asthma, medication use & improved PFT; no new sensitizations
- Wahn 2012 (5-Grass SLIT-tablet, 3 yr; **131**): Sustained AR relief (28% > placebo) at 2 yr post-treatment
- Yonekura 2021 (Japanese Cedar SLIT-tablet, 3 yr; active pts 150): 34% relative reduction in TNSMS at 2 yr follow-up
- Zeng 2023 (**HDM SLIT-drops**, 3 yr group; active pt=306: Improved CSMS & tolerance markers; only 3-yr treatment group (not 1 or 2 yr tx group) showed long-term effect at 2 yr follow-up

Key message: Both SCIT and SLIT provide sustained benefits post-discontinuation — BUT only after adequate treatment duration (≥3 years). Shorter courses are insufficient. Follow-up is rarely longer than 2 years

SLIT — Polyallergic Patients, Tablets & Liquid

Polyallergic AR: use **Single** SLIT-T with the dominant allergen; use a **limited #** of multiple SLIT-tablets.

SoR: Conditional

CoE: Low (1 tablet)

CoE: Very Low>1

DRAFT

We recommend FDA-approved **SLIT-tablets over off-label SLIT liquid**/extracts for AR and AA.

SoR: Strong

CoE: Moderate

DRAFT

SLIT-liquid (off-label in US) using single or pauci-allergen (**3 or less**) is an option for allergens **lacking a tablet**, in patients valuing fewer visits / **lower risk than SCIT** — dose within proven ranges; using extrapolated evidence.

SoR: Conditional

CoE: Low

DRAFT

SCIT vs SLIT — Which is Better?

2023 Systematic Review and Meta-Analysis — Yang & Lei, Frontiers in Immunology

50 studies, 10,813 AR children (SLIT n=4,122; SCIT n=1,852; control n=4,839)

- Only a few head-to-head trials available — both direct and indirect comparisons performed

Direct Comparison (SLIT vs. SCIT)

- **Symptom scores** (SS): No significant difference [3 studies]
- **Medication scores** (MS): No significant difference [2 studies]
- **Combined symptom/medication score** (CSMS): SLIT favored ($P < 0.0001$) [1 study]
- **Treatment-related adverse events (TRAEs): SLIT significantly safer (pooled RR 0.17; 95% CI 0.11–0.26)**
- Subset analysis: With AIT >24 months, symptom scores were significantly lower in SCIT group ($P < 0.001$)

Conclusion (indirect comparison): SLIT vs. SCIT — No difference in efficacy but SLIT is safer



Safety

— *adverse events, premedication & schedules*



SCIT Safety: Systemic Reactions, Fatalities

Systemic Reactions & Fatalities — Quantifying the Risk (US data)

- Severe anaphylaxis: 1 per million injections
- Fatal reactions: 1 per 7.2 million injections
- 10 fatalities reported in the AAAAI US survey 2008-2018

We recommend **discontinuation of SCIT after near-fatal anaphylaxis.**

SoR: Strong

CoE: Low

DRAFT

1. Bernstein DI, Epstein TEG. *Allergy Asthma Proc* 2020;41(2):108-111. 2. Epstein TG. *Ann Allergy Asthma Immunol* 2021;127(1):64-69. 3. Calabria CW. *J Allergy Clin Immunol* 2009;124:739-744. 4. Hetal S. Amin, MD, Gary M. Liss, MD, and David I. Bernstein, MD *J Allergy Clin Immunol* 2006;117:169-75.

SCIT & SLIT systemic Reactions & Fatalities — Prevention

- SCIT: Highest-risk windows: **dose build-up** (vs. maintenance)
- SCIT: Key risk factors: **uncontrolled asthma**, high degree of sensitivity, dosing errors, symptomatic season, prior systemic reaction.
- SCIT: Mitigation: **confirm asthma control** (e.g., ACT or measure peak flow), 30-minute observation, immediate epinephrine availability, well-trained staff.
- SLIT: systemic reactions are far less frequent; **no SLIT fatalities** reported across >1 billion doses.

We suggest prescribing self-administered epinephrine for patients receiving **[SCIT]** who are at higher risk for severe or fatal SRs, including those 1) with **prior anaphylaxis**, 2) with prior **delayed-onset SRs**, 3) with **severe asthma**, and 4) on **accelerated build-ups**.

SoR: Conditional

CoE: Low

DRAFT

SCIT for Moderate to Severe Asthma Patients

We suggest that in patients with **severe asthma**, treatments, including **biologic drugs**, should be considered to achieve asthma control **before initiation of SCIT**.

SoR: Conditional

CoE: Low

DRAFT

We suggest using **omalizumab** and perhaps other **biologics** to improve safety and tolerability of SCIT, especially in **patients at risk of systemic reactions**

SoR: Conditional

CoE: Moderate

DRAFT

We suggest that SCIT can be cautiously used in patients with **severe asthma** who remain well **controlled** while receiving SCIT.

SoR: Conditional

CoE: Low

DRAFT

SLIT in Asthma Patients

We suggest HDM SLIT-Ts as an option for patients with mild-to-moderate, **partially controlled asthma** (not during an active exacerbation).

SoR: Conditional

CoE: Moderate

DRAFT

We recommend **against** SLIT administration in patients with **active asthma exacerbations**.

SoR: Strong

CoE: Moderate

DRAFT

SCIT and SLIT & Cardiovascular Medications

Initiation or continuation of SCIT is an OPTION in patients on a beta-blocker, ACE-inhibitor, or ACE Receptor Blockers — after documented shared decision-making about potential risks.

SoR: Conditional

CoE: Low

DRAFT

We suggest that beta-blockers / ACE-inhibitors / ARBs may be used during SLIT after shared decision-making.

SoR: Conditional

CoE: Very Low

DRAFT

SLIT Safety — EoE

Monitor SLIT patients for symptoms suggestive of eosinophilic esophagitis (EoE); **withhold SLIT if EoE confirmed/suspected.**

SoR: Strong

CoE: Low

DRAFT

SCIT/SLIT AND Infections or Exercise—not the same

We suggest **withholding SCIT** during an **acute URI** in individuals at **higher risk**, such as those with **asthma** or a severe infection.

SoR: Conditional

CoE: Low

DRAFT

We suggest that URIs are **not a reason to withhold SLIT-T** administration.

SoR: Conditional

CoE: Very Low

DRAFT

We suggest that patients avoid vigorous exercise within **two hours after** the administration of SCIT.

SoR: Conditional

CoE: Low

DRAFT

We suggest that exercise need **not be avoided** after SLIT-T administration.

SoR: Conditional

CoE: Very Low

DRAFT

We suggest that it is reasonable to **withhold** SLIT during **acute GI infections**.

SoR: Conditional

CoE: Very Low

DRAFT

Premedication for SCIT- Conventional SCIT build-up

We recommend **AGAINST** using **H1-antihistamines** to reduce anaphylaxis risk during CONVENTIONAL (non-accelerated) SCIT build-up.

SoR: Strong

CoE: Moderate

DRAFT

Accelerated Schedules (Cluster / Rush) using SCIT & Premedication

Cluster build-up is an option in AR $\pm$ asthma — only if **asthma is not severe and is controlled**.

SoR: Conditional

CoE: Moderate

DRAFT

We recommend oral antihistamine + leukotriene-receptor-antagonist (LTRA) pretreatment during cluster or rush build-up.

SoR: Strong

CoE: Moderate

DRAFT

For 1-day rush / modified rush, we suggest antihistamine + LTRA + oral corticosteroid

SoR: Conditional

CoE: Moderate

DRAFT

We suggest **converting** from cluster to conventional at the **1:10 v/v ratio**.

SoR: Conditional

CoE: Low

DRAFT

SCIT Local Reactions

Local Reactions (LLRs)

- Occur in 26–86% of patients: itching, redness, swelling, heat at injection site
- **Local reactions have only 12% predictive value for future systemic reactions**
- For persistent large local reactions, consider:
 - Cool compress immediately post-injection
 - Pre-medication with non-sedating H1 antihistamines
 - Temporary dose adjustment if reactions are frequent or distressing

Local Reactions to SCIT (LLRs)

We recommend **AGAINST** using large local reactions (LLRs) to routinely predict the risk of subsequent systemic reactions.

SoR: Conditional

CoE: Low

DRAFT

The benefit of **routine premedication**, oral AH and/or LTRA, to prevent LLRs with **conventional build-up** or maintenance SCIT is unknown.

No recommendation

We suggest **AGAINST** routine SCIT dose adjustment for most patients with LLRs.

SoR: Conditional

CoE: Moderate

DRAFT

We suggest **AGAINST** epinephrine/antihistamine **syringe rinses** to prevent LLRs.

SoR: Conditional

CoE: Low

DRAFT

SLIT Local Adverse Effects

Local Side Effect	Approximate Frequency	Typical Duration
Oral pruritus (itching)	40–85%	Usually resolves within 4–10 days
Throat irritation	13–20%	Typically subsides within the first week
Mouth edema (swelling)	10–15%	Generally diminishes within 1–2 weeks
Lip/tongue swelling	5–10%	Often resolves within a few days
Gastrointestinal discomfort	5–10%	Usually transient; resolves within a few days; rare case reports EoE
EoE: 9 pediatric; 7 adults	14/16 drops; 2/16 tablets	Usually manifests in build-up phase; improves or resolves with discontinuation

Seidenberg, J. et al. (2009). Journal of Investigational Allergology and Clinical Immunology 19(Guidelines): 125-131. Passalacqua, G. et al. (2013). Journal of Allergy and Clinical Immunology **132**(Guidelines): 93-98. Biedermann, T (2023). et al. International Archives of Allergy and Immunology **184**(1): 1-10. Wallace, DV. Pediatric Allergen Immunotherapy in the United States: Current Practice, Safety, and Unmet Needs for Long-Term and Preventive Outcomes. Allergy and Asthma Proceedings, in press.

SLIT & Local Reactions

We suggest **AGAINST** routine pre-medication (e.g., antihistamines) before each SLIT-tablet dose to reduce local reactions.

SoR: Strong

CoE: Moderate

DRAFT

We suggest **AGAINST** administering SLIT during oral mucosal ulceration or after dental extraction.

SoR: Conditional

CoE: Low

DRAFT

Improving AIT Adherence — Why It Matters and How

Why Adherence Matters

- **Only ~30% of patients complete the recommended 3-year AIT course globally**
- Incomplete courses are insufficient for long-term disease modification and sustained post-treatment benefit

Strategies to Improve Adherence (EAACI Guidelines, Roberts et al. 2018)

- **Patient reminders** to follow AIT schedule — Recommended (III, C):
 - Text messages
 - Social media reminders
 - Phone apps and digital tools
- **Follow-up visits every 3 months** recommended to improve adherence (II, B)
- **Convenient clinic hours** no appointment clinics for AIT
- For SLIT: simplify dispensing; **provide written instructions**
- Address patient concerns about cost, time commitment, and side effects at each visit



Vial Preparation & Administration

— *compounding, storage & remote care*



Compounding Standards & Technique

We recommend adherence to USP <797>, Section 21 — the Allergy Exception — when compounding allergen-extract prescription sets.

SoR: Strong

CoE: High

DRAFT

We recommend maintaining aseptic conditions during compounding and selecting a bacteriostatic diluent.

SoR: Strong

CoE: Low

DRAFT

Choosing Allergens for the Mix

Use standardized extracts when available and follow per-allergen maintenance dosing (2011 JTF AIT PP).

SoR: Conditional

CoE: Moderate

DRAFT

Use the FEWEST allergens that adequately treat clinically relevant sensitisations; avoid redundant cross-reactive allergens so each is dosed effectively.

SoR: Conditional

CoE: Moderate

DRAFT

Formulate high-protease allergens (e.g., fungi, insects) SEPARATELY to prevent degrading other extracts.

SoR: Conditional

CoE: Moderate

DRAFT

Expiration & Storage

Assign vial expiration by the EARLIEST-expiring component; note dilute vials (e.g., 1:1000 v/v) may lose potency sooner.

SoR: Strong

CoE: Low

DRAFT

Store per manufacturer (typically 2–8 °C), keep cool in transit, prevent freezing, and use the highest feasible glycerin concentration to preserve potency.

SoR: Conditional

CoE: Low

DRAFT

Remote / Transferred Administration

Ensure remote facilities have staff trained to recognize/treat anaphylaxis, emergency equipment, and personnel onsite during dosing and the 30-min observation.

SoR: Strong

CoE: Moderate

DRAFT

Transfer a **complete information package** (consent, vial contents, schedule, dose-adjustment & gap guidance, records, USP<797>-compliant labelling).

SoR: Conditional

CoE: Low

DRAFT

Use a standardized multi-step verification protocol with **TWO patient identifiers** before every injection.

SoR: Strong

CoE: Moderate

DRAFT



Climate Change & Pollen Shifts

Why allergen immunotherapy demand is rising



Climate Change is Lengthening Pollen Seasons

North America, 1990–2018 (60 monitoring stations)¹

- Pollen season start shifted **~20 days earlier**
- Season duration extended by **~8 days**
- Annual pollen concentrations increased **+21%**
- Climate change accounts for **~50%** of season length changes
- Largest increases: Texas and Midwestern US
- Tree pollen season duration increased **+0.47 wks/yr**

+20

days earlier start

+21%

pollen concentration

+8

days longer season

~50%

due to climate change

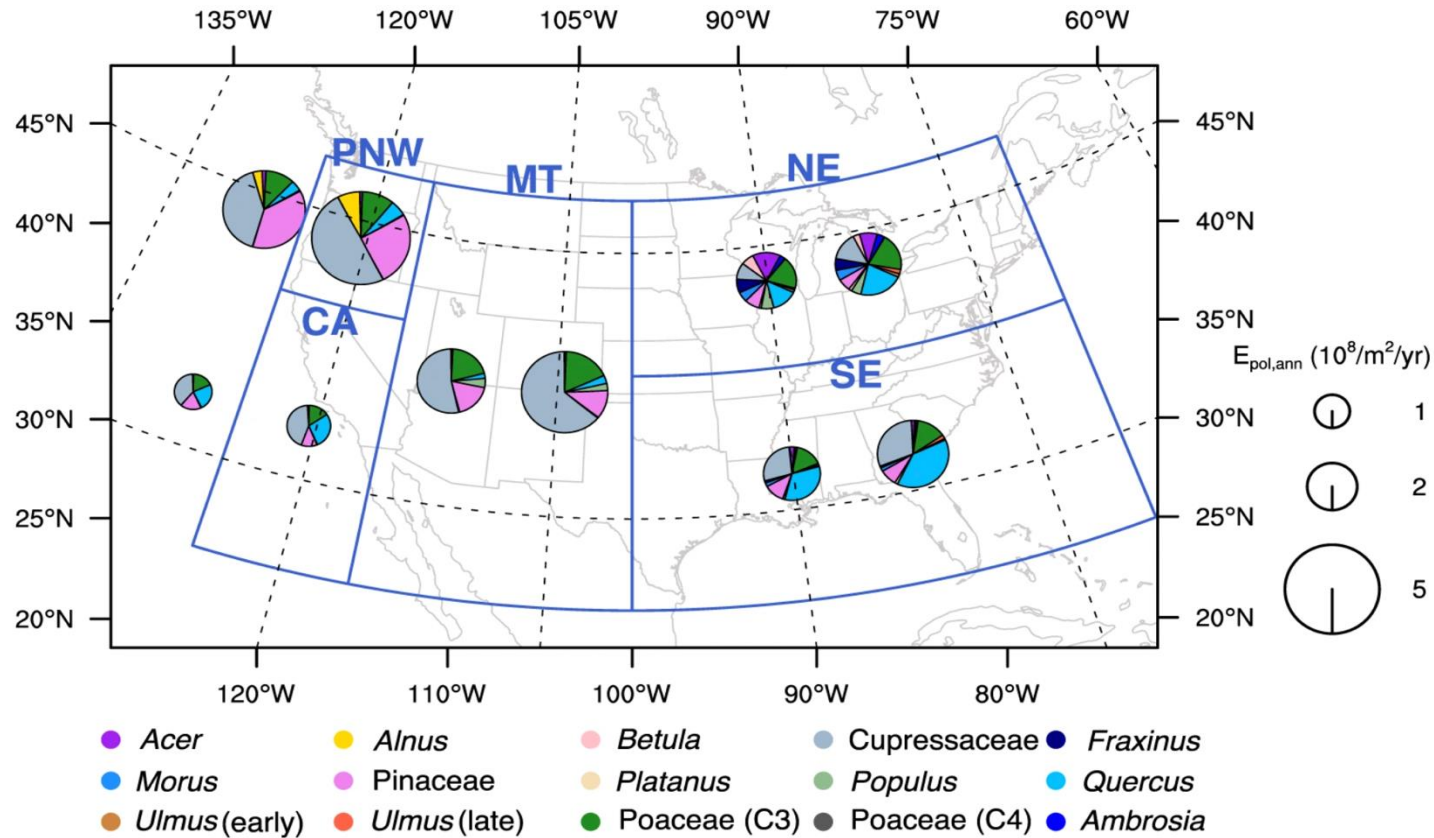
60 North American cities

- **821 site-years of data**
- **1990–2018**

1) Anderegg WRL, et al. Proc Natl Acad Sci US A. 2021;118:e2013284118. (US & Canada) 2) Zhang Y, Steiner AL. Nat Commun. 2022;13:1234. (US) 3) Paudel B, et al. Sci Rep. 2021;11:12816.(US)

Regional Variation in U.S. Pollen Predicted Response to Climate Change

Historical (1995-2014) compared to Future (2081-2100)



Pollen responses to climate change are REGIONAL. Pacific Northwest, California, Mountain, Northeast, and Southeast U.S. show distinct trajectories

Climate Change Increases Pollen Allergenicity

How Climate Change Affects Pollen Quality

- Elevated CO₂ increases plant pollen production and prolongs flowering^{1,2}
- Ragweed (Ambrosia) pollen: up to **1.7x more allergenic by 2100²**
- Temperature is an independent driver — pollen allergenicity rises with warming
- In vitro and in vivo studies confirm stronger IgE-mediated response from CO₂-exposed pollen ¹
- Air pollution (ozone, diesel) synergizes with CO₂ to further damage pollen surface proteins

1) Rauer D, et al. *Allergy*. 2021;76:1718-1730. (Germany)

2) Singer BD, et al. *Funct Plant Biol*. 2005;32:667-670. (US)

3) Wayne P, et al. *Ann Allergy Asthma Immunol*. 2002;88:279-282. (US)

1.7x

more allergenic

+CO₂

increased potency

Mechanism

Elevated CO₂ → faster plant growth
→ prolonged flowering → more pollen grains per plant

Higher temperatures → altered pollen protein expression → increased allergenic load per grain

Combined effect: more overall AND more allergenic exposure

Mold & Fungal Spores: Expanding Seasons

Fungal spore seasons are also expanding under warming — with clinical implications for allergic asthma and rhinitis

Key Findings

- Cladosporium season extended **20–60 days**
- Earlier season start AND later end — with just 1–2°C warming (Poland data)
- Alternaria: peak concentrations exceed clinical threshold (>100 spores/m³) in more locations
- Median Cladosporium peaks: $\sim 18,827$ spores/m³; Alternaria: ~ 665 spores/m³
- Mediterranean climates expected to worsen more than Northern Europe
- Mold spore season duration increased by **+0.51 wks/yr**
- Warm, dry weather accelerates and elongates mold seasons

20–60

extra days
Cladosporium
season

+0.51
wks

per year longer
mold spore season

Source: Warm & dry weather Cladosporium seasons, PMC 2022; Scientific Reports 2021

Allergy Immunotherapy: Global Overview

• Routes of AIT

SCIT (Injections)

Gold standard; up dosing + maintenance; clinic visits required

SLIT Drops

Home administration; glycerinated native extracts

SLIT Tablets

EMA/FDA approved for specific allergens (grass, HDM)

Venom IT

SCIT only; bee/wasp; highly effective

• Global Market Share

SCIT

~55–66% of global AIT market (dominant, **slower growth**)

SLIT

~34–45% market share; **fastest growing** (CAGR ~15%)

SLIT Tablets

54% of SLIT segment; drops 46%

Global market: USD ~1.95B (2024) → **USD ~4.5B (2034)**

CAGR: ~8.7%

• Evidence-Based Indications

Allergic Rhinitis

Strongest evidence; 3-year course recommended

Allergic Asthma

Reduce severity; may prevent new sensitisations

Venom Allergy

90–95% protection; lifelong in high-risk patients

Atopic Dermatitis

Benefit with aeroallergen sensitisation (emerging evidence)

AIT is used in <10% of eligible patients globally

Despite robust efficacy evidence — the most undertreated disease-modifying therapy in medicine.

Barriers to AIT Use — United States

Despite proven efficacy, **AIT is used in <10% of eligible patients worldwide** — a profound evidence-to-practice gap.

COST

U.S.: **SCIT** \$1,000–\$4,000/yr; full 3–5 yr course = **\$9,000–\$20,000** total. With insurance: \$5–\$25/visit copay. Without: full out-of-pocket.

INSURANCE COVERAGE

Most commercial plans cover SCIT; deductibles & copays remain barriers. Medicare Part D now covers grass SLIT tablets. **SLIT drops are off-label — rarely reimbursed.**

ACCESS

~7,000 allergists for 50M+ allergic Americans. HRSA projects only **48% adequacy in rural areas** by 2035 vs. 99% in metro areas. Access deserts persist in rural U.S.

ADHERENCE

SCIT adherence: **23–90%** depending on study. Distance to clinic is the **#1 dropout predictor**. **SLIT** drops: dropout rates **up to 91% over 2 yrs.**

CLINICIAN TRAINING

PCPs have limited AIT training; knowledge and confidence gaps impede referrals. Insufficient allergists to meet demand; need for PCP-level AIT education is critical.

REGULATORY

SCIT: FDA-licensed extracts; physician-compounded multi-allergen mixes standard. SLIT tablets: **4 FDA-approved products** (grass, ragweed, HDM). **SLIT drops: off-label, no FDA approval.**

In the U.S., the evidence-to-practice gap persists: rising allergy burden driven by climate change outpaces AIT access — especially in rural areas and among underserved populations.



Future Directions

— *new methods & the research agenda*



Other Methods for AIT

We recommend informing the patient when off-label immunotherapy is prescribed and documenting it in the consent form.

SoR: Strong

CoE: Low

DRAFT

If using intralymphatic immunotherapy (ILIT), it should be performed only by specialists trained in ultrasound-guided lymph-node injection, with anaphylaxis preparedness.

SoR: Conditional

CoE: —

DRAFT

Building the Evidence Base- emphasis on multi-allergen AIT

Record **OBJECTIVE outcome measures** (e.g., RCAT, TNSS, provocation tests) before and after starting AIT — especially for multi-allergen AIT — **to show real-world effectiveness.**

SoR: Conditional

CoE: Low

DRAFT

Specialty societies should invest in **real-world DATABASES/REGISTRIES** to strengthen the evidence for multi-allergen AIT safety and effectiveness.

SoR: Conditional

CoE: Low

DRAFT

Research Calls to Action

- Establish extract quality & standardization for all allergens — reproducible, standardized manufacturing.
- Help patients adhere to a 3-year course of AIT— strategies and real-world data
- Determine biomarkers & objective outcomes — to predict responders & determine required duration of treatment for maximum long-term efficacy
- Ensure safety optimization — best pre/post regimens, schedules; safest extracts.
- Provide climate-specific, personalized treatment — integrate micro-climate data.
- Continue research into innovative therapies— biologics alone or currently with AIT; novel routes, e.g., intralymphatic
- Collect real-world objective efficacy data; Collaborative registries.

Key Takeaways

- AIT is the only disease-modifying treatment for allergic respiratory disease
- Strongest efficacy evidence for SCIT: single-allergen pollen and HDM for AR
- Strongest efficacy for SLIT-T: single-allergen HDM/grass/ragweed/tree for AR
- Multi-allergen SCIT — common in the US still lacks new high-certainty evidence; dose each component based upon single-allergen efficacy data; and pursue registries.
- Most recommendations are conditional → shared decision-making is essential; (recommendations are just a starting point).
- Safety hinges on asthma control, correct SCIT dosing, 30-min observation, and recognizing SLIT-specific signals (EoE).
- Climate change is lengthening and intensifying pollen seasons.
- We need to increase access and reduce cost barriers to meet the future demands for AIT.

Thank You • Questions

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Handout for lecture will be posted under “Resources” at www.drdanawallace.com website

AITPP is currently posted for review:

<https://college.acaai.org/wp-content/uploads/2026/08/2026-Allergen-Immunotherapy-Practice-Parameter-Update.pdf>