



What's All the Buzz? Bites, Stings and Other Itchy Things

Skin, Bones, Hearts, and Private Parts 2024

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- No conflicts to disclose
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Learning Objectives:

- Identify common and life-threatening allergy-mediated skin conditions utilizing presenting symptoms and classic physical exam findings
- Discuss confirmatory diagnostic testing in suspected allergic skin diseases
- Outline effective management strategies for allergic skin conditions including urticaria, atopic dermatitis, and contact dermatitis



- **25-year-old female presents to ED-Fast Track**
- Complains of itchy rash that began 1 hour ago on her arms and chest

History

- **When did it start?**

- About an hour ago, maybe a few minutes more

- **What were you doing at the time?**

- Eating lunch at Panera: fish sandwich, fries, milkshake
- About 15 minutes after I started eating, I began to notice my skin felt funny and itchy, then I noticed the rash and my friend who was with me said I needed to come over here right away

- **Is it getting worse?**

- I think it is spreading from my face to my chest and arms
- It is getting really itchy, almost intolerable

- **Associated symptoms?**

- No not much, except I feel a little lightheaded or dizzy
- No coughing, SOB, abdominal pain, N/V

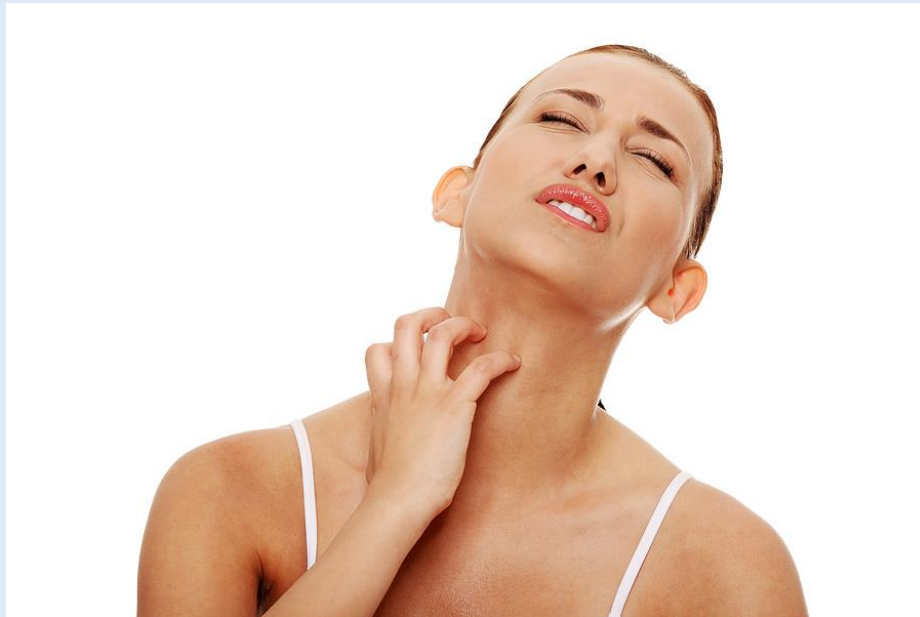
More History

- **Any recent illness?**
 - I have a little sinus congestion, but I think it is just my allergies
- **Any new exposures (medications, topical products)?**
 - New Hawaiian Tropic sunscreen last week
- **Have you ever had something like this before?**
 - Not really, had a little rash with a bee sting once, but it went away after a few hours
- **Any travel?**
 - No recent travel outside the country
- **Anyone else sick at home/work?**
 - Everyone's allergies are bothering them, but no severe illnesses
- **History of atopy?**
 - SAR, parents and sister with atopy, no asthma

Additional Helpful Information

- Current medications
 - Seasonale OCP
 - Zyrtec for SAR 10 mg at bedtime
 - Vitamin D3 800 IU daily
- Allergies to medications
 - NKDA
- PMH
 - T&A in 1992 for repeated infections, snoring, mouth-breathing
 - SAR – began in grade school, seems to be a little worse in Florida than in New York where she grew up
- FH
 - Father, 55 yo, hypertension, chronic sinus infections, mild kidney dz
 - Mother, 50 yo, psoriatic arthritis and psoriasis, eczema as child, hypertension
 - Younger sister, age 22, with SAR, acne, PCOS
 - No FH of DM, cancer, or other significant illnesses

I am really, really itchy, can't you give me something NOW?



Please, please, please, please, please, please, please, please, please, please, please, please,

Physical Exam

- Vitals

- Temp 99 degrees F oral, HR 105, RR 22, BP 100/60 mmHg
- Ht 5'5", Wt 120 #, BMI 19.9

- Skin – see next slide

- HEENT

- NC/AT, PERRL, conjunctiva clear, TMs clr, sl nasal congestion b/l with clear/white d/c, no sinus tenderness, no edema to lips, post o/p and oral mucosa with erythema, no exudate or ulcers

How Would You Describe This?



Physical Examination

- Neck
 - Supple, no LAD, no thyroid enlargement or masses
- Respiratory
 - Very faint wheeze in posterior lung fields b/l on forced expiration, no stridor, no retractions or increased WOB, no rales or rhonchi
- CV
 - Tachycardia, no abnormal rhythm, no murmurs, S1 and S2 are present, no S3 or S4, no gallops, clicks, or rubs
- Extremities
 - Rash noted on arms and legs, no lesions on palms and soles, no edema

Specialized Exam Techniques

- What do you call this reaction, and how was it made?



Specialized Exam Techniques

- What do you call this reaction, and how was it made?

DERMATOGRAPHISM – we wrote on her, stroked her skin with tongue depressor



What is Your Diagnosis?

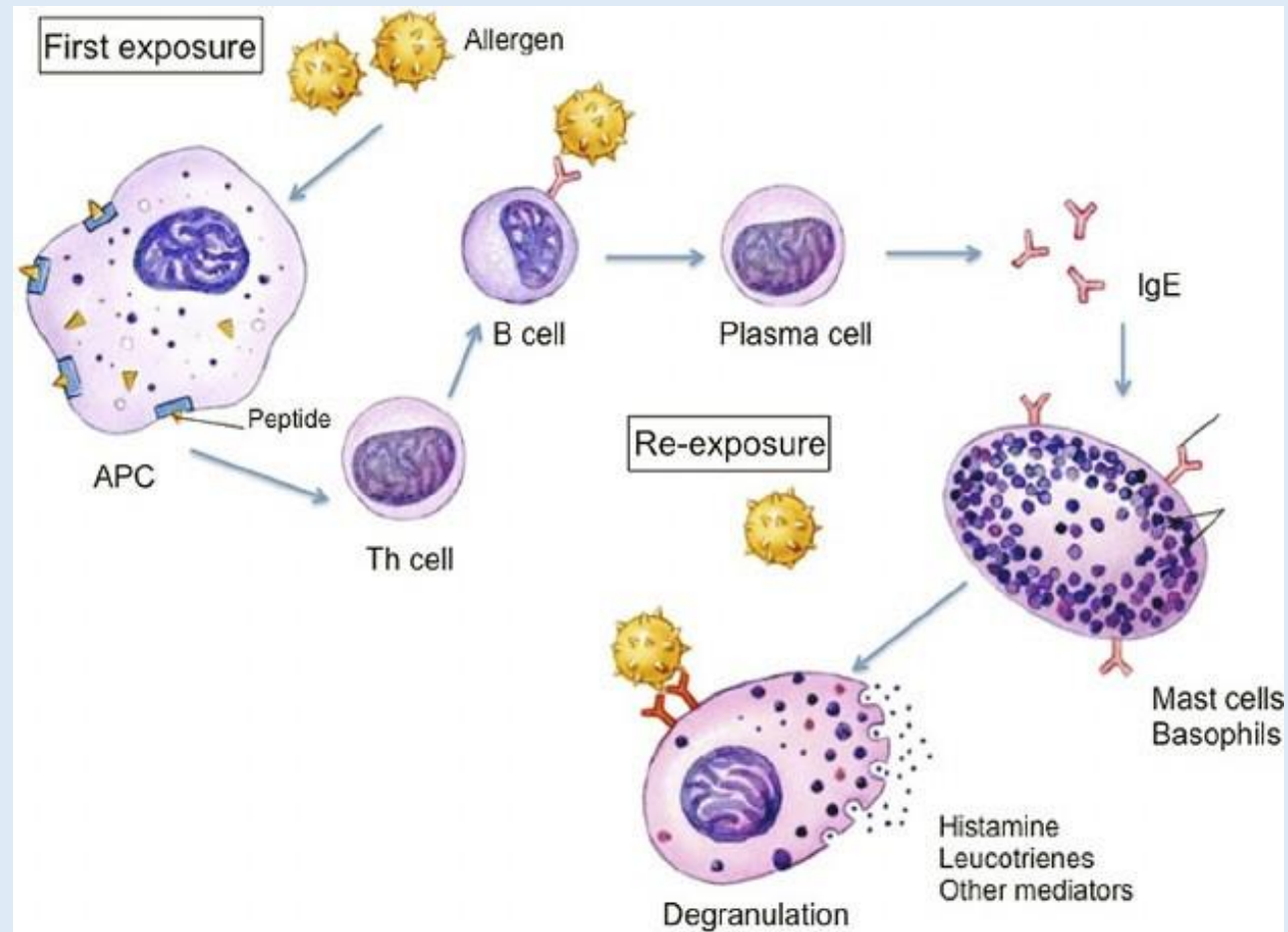
What is Your Diagnosis?

- Acute urticaria
- Allergic reaction
- Wheezing or bronchospasm

Why?

- Quick onset
- Classic lesions
- History of atopy in self and family
- Eating at restaurant

IgE-mediated Reactions

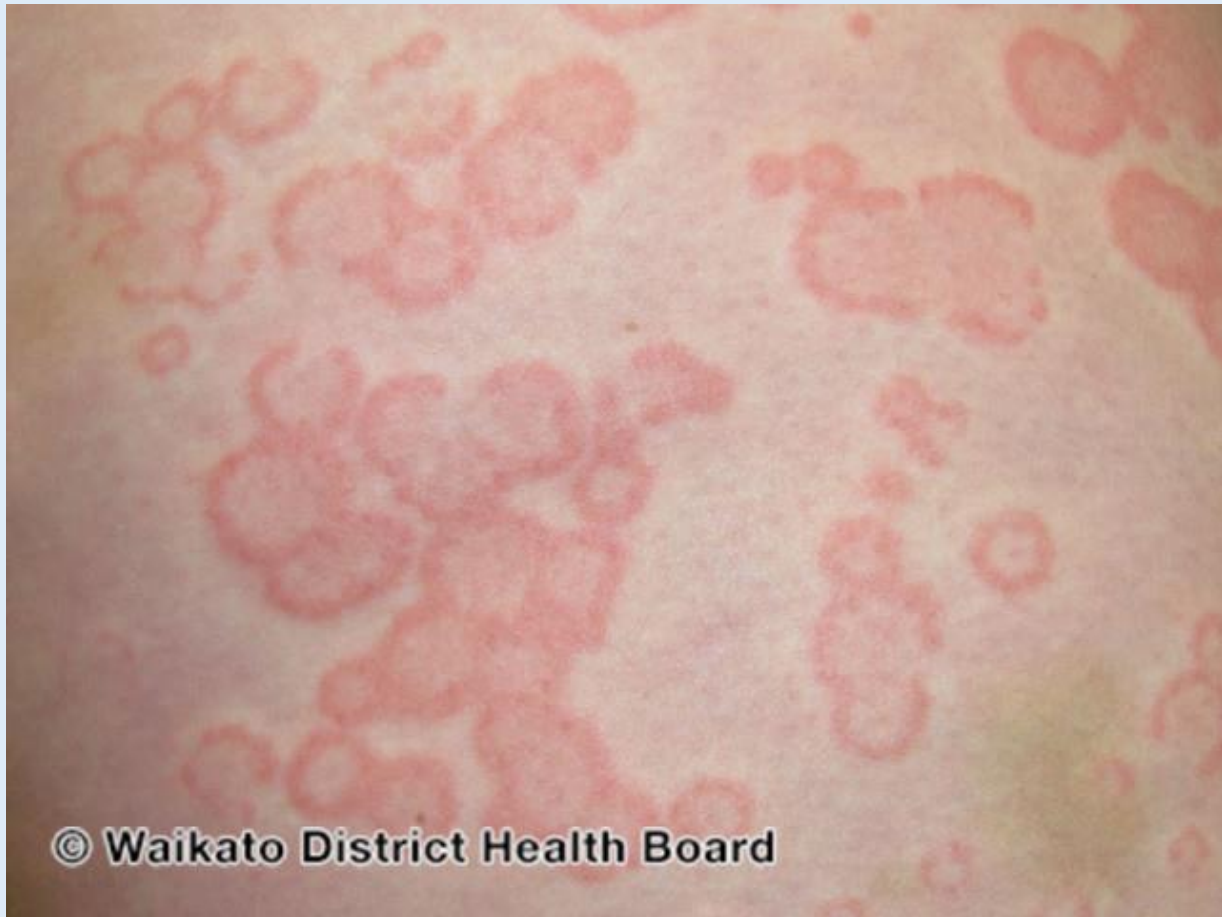


APC, antigen-presenting cell; IgE, immunoglobulin E; Th, T-helper [cell].

Credit: [Gaurab Karki, Microbiologist Kathmandu, via Online Biology Notes.](#)

Characteristics of Urticaria

- Can occur anywhere on the body
- Patients report intense pruritis, stinging, pins and needles
- Lesions are round to polymorphic, can grow rapidly and coalesce
 - “Puddle in a sea of erythema”
 - “Splash-shaped”
- Well-circumscribed
- Pale to brightly erythematous
- Individual lesions appear quickly (within minutes) and resolve within 24 hrs leaving no residual lesions





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© Waikato District Health Board



Type I Hypersensitivity Reactions: Common Causes

- Food (3%)
 - Big 8: peanuts, tree nuts, dairy, egg, wheat, soy, fish, shellfish
- Infection (49%)
- Hymenoptera venom
 - Bees and wasps
- Latex
 - Especially in persons who work in healthcare with lots of exposure
- Medications (5%)
- Idiopathic (up to 50%)

Labs and Diagnostic Testing in Acute Urticaria

- Acute cases - usually clinical diagnosis
- Allergy referral
 - Skin prick tests
 - Serum protein specific IgE level
 - Oral challenges
- Anaphylaxis
 - Urinary or serum histamine
 - Serum tryptase

Food Allergies: Skin Prick Testing

- Useful screening test with commercial extracts from food with stable proteins
- High rate of false-positives
- Wheals and flares are measured



Food Allergy Diagnostic Testing: IgE Specific Antibody Testing

Food	>95% Positive		~50% Negative	
	sIgE	SPT	sIgE	SPT wheal (mm)
Egg white	≥7 ≥2 if age <2 y	≥7	≤2	≤3
Cow's milk	≥15 ≥5 if age <1 y	≥8	≤2	
Peanut	≥14	≥8	≤2 = history of prior reaction ≤5 = no history of prior reaction	≤3
Fish	≥20			

TABLE 1

Positive predictive value of food-allergen-specific IgE levels by ImmunoCAP

ALLERGEN	SPECIFIC IgE (KU/L)	POSITIVE PREDICTIVE VALUE
Cow's milk (age > 2 years) (age ≤ 2 years)	15	95%
	5	95%
Egg (age > 2 years) (age ≤ 2 years)	7	98%
	2	95%
Fish	20	100%
Peanuts	14	100%
Soybean	30	73%
Tree nuts	15	95%
Wheat	26	74%

Limitations: majority of the data initially accrued in pediatric populations; food allergy not validated by double-blind, placebo-controlled oral food challenge in all cases; statistical tools used to calculate positive predictive values not identical in all studies

ADAPTED FROM SAMPSON HA. UPDATE ON FOOD ALLERGY. J ALLERGY CLIN IMMUNOL 2004; 113:805-819, WITH PERMISSION FROM ELSEVIER.

Sampson HA, et al. Food allergy: A practice parameter update—2014, Journal of Allergy and Clinical Immunology, Volume 134, Issue 5, 2014, Pages 1016-1025.e43, ISSN 0091-6749, <https://doi.org/10.1016/j.jaci.2014.05.013>.

<http://www.sciencedirect.com/science/article/pii/S0091674914006721>

Who should be tested with serum IgE?

- All individuals with severe, persisting, or recurrent possible “allergic symptoms”
- Individuals with need for continuous prophylactic treatment
 - To include: infants, children with cutaneous disease, persistent GI symptoms, recurrent wheezing, otitis, rhinitis, or asthma
- To determine feasibility and safety of an oral challenge

Labs and Diagnostics in Chronic Urticaria (> 6 wks)

- Skin biopsy - vasculitis
- CBC with differential
- ESR/CRP
- TSH
- LFTs
- Urinalysis

Medication Orders for Our Pt

Medication Orders for Our Pt

- Cetirizine 10 mg PO once
 - H1 blocker
- Famotidine 20 mg PO once
 - H2 blocker
- Prednisone 40 mg PO once
 - Corticosteroid

- How long until she should feel better?

Treatment of Acute Urticaria

- Antihistamines
 - First generation – might not be our first choice – WHY?
 - Second generation
- H2-Blockers - maybe
- Corticosteroids
 - Methylprednisolone
 - Prednisone
 - Dexamethasone

You Re-check Patient in 15 minutes

- Hives seem to be lightening

BUT

- She reports numbness and tingling in her lips and tongue, tightness in her chest, and a feeling of lightheadedness

How Would You Describe this Skin Finding?



How Would You Describe this Skin Finding?



Angioedema

Characteristics of Angioedema

- Primarily affects the face, lips, mouth, upper airways, extremities
 - Areas where there is loose tissue
 - Spares dependent areas
 - Often asymmetric
- Localized non-pitting edema
- May be painful and warm
- Develops rapidly, but takes up to 72 hours to resolve
- It may be a sign of an advancing/deeper allergic reaction
 - Leaking of plasma cells into the mucosa or skin
 - Urticaria that occurs in the deeper layers of the skin and mucosa

Could This Be Anaphylaxis?

- Acute onset of illness
 - With the involvement of skin, mucosal tissue or both and at least one of the following:
 - Respiratory compromise
 - Reduced blood pressure
 - Evidence of end-organ dysfunction
- If pt is known to have allergy than just 2 of the following:
 - Involvement of skin or mucous membranes
 - Respiratory compromise
 - Reduced BP or end-organ dysfunction
 - Persistent GI symptoms
- Low BP is KEY
 - Adults: < 90 mm Hg systolic

Next Steps

- Re-check vital signs – BP 90/60 mmHg
 - Hypotension is key to a diagnosis of anaphylaxis
- ECG monitoring
 - NSR, HR 110
- Oxygen
- IV access and fluids
- Respiratory exam
 - Increased wheezing noted, pulse ox 94%
- Cardiac exam

Additional Medications?

Additional Medications Needed

- Epinephrine
- Bronchodilator

Additional Medications

- Intramuscular injection of Epinephrine
 - See dosing on next slide
- Inhaled Beta₂-agonist
 - Albuterol Inhalation Solution 0.5%
 - 2.5 mg (0.5mL in 2.5mL of sterile normal saline)
 - Nebulized



Epinephrine Dosing

- 1:1000 dilution contains 1 mg/ml
- Weight calculated dosage 0.01 mg/kg
- Intramuscular Injection in lateral thigh
 - > 12 years 0.3-0.5mg 0.5 ml of 1:1000
 - 6-12 years 0.25 mg 0.25 ml of 1:1000
 - 6 mo to 6 yrs 0.12 mg 0.12 ml of 1:1000
 - Under 6 mo 0.05 mg 0.05 ml of 1:1000
- Auto-injectors
 - < 25 kg 0.15 mg
 - > 25 kg 0.30 mg

Follow-up

- Your patient is monitored in the ED for the next 4-6 hours
- Angioedema resolves
- Wheezing disappears
- Hives fade
- BP stabilizes at 110/70 mmHg, HR 88, RR 18
- Discharged with instructions to
 - Avoid any food that was eaten at Panera and follow-up with Allergist/Immunologist
 - Rx for self-injectable Epinephrine
 - Rx for oral corticosteroid for 3-5 days
 - Prednisone 40 mg in morning for 3 days
 - Instructions to continue OTC antihistamine for 3-5 days
 - Cetirizine 10-20 mg PO QHS/BID for 5 days

Treatment of IgE-Mediated Allergies Day-by-Day

- Avoidance of triggers
 - avoidance of aspirin, NSAIDs, alcohol is recommended
- Self-injectable epinephrine (multiple)
- Allergy Action Plan
- Medical alert jewelry

- Oral immunotherapy
 - Peanut allergen powder

- Omalizumab – monoclonal antibody that binds to IgE and blocks it from binding to its receptors **

**<https://www.nejm.org/doi/full/10.1056/NEJMoa2312382>

DEVICE	DETAILS	AVERAGE COST FOR A 2-DEVICE PACKAGE	ASSISTANCE PROGRAMS
Brand name autoinjector epinephrine	Available in 0.15-mg and 0.3-mg prefilled syringes	\$395-610	Savings card, patient assistance program, school programs
Generic autoinjector	Same as above	\$300	
Smaller rectangular epinephrine autoinjector	Credit card sized with audio cues Available in 0.1-, 0.15-, and 0.3-mg dosing Smaller needle size	\$4,900	Free for commercial insurance, patient assistance program
Epinephrine kits	Ampules or vials of epinephrine with needle and syringes	\$20	

Newer Therapies

- OIT – Oral Immunotherapy
 - Daily small doses of antigen to induce tolerance
 - Total and specific IgE levels decrease over time
 - May have to continue indefinitely to maintain tolerance
 - Best evidence for milk, peanut (oral and epicutaneous peanut patch)
- Omalizumab
 - Anti-IgE therapy that decreases total available IgE and fills receptor sites on mast cells and basophils to decrease the patient's response to antigen exposure
 - Subcutaneous injection with dosing and interval based on pt weight and IgE levels (usually every 2-4 weeks, 150-375 mg)

New Guidelines for Introducing Foods

LEAP and LEAP-On Purposeful Early Feeding

- Introduce highly allergenic foods (CM, hen's egg, peanut, tree nuts, fish, and shellfish) when children are at least four months and developmentally ready to consume complimentary foods
- Begin with cereals, fruits, vegetables to ensure readiness
- Then add one of the allergenic foods at home with an oral antihistamine available
- If there is no reaction, the food can be introduced in gradually increasing amounts
- Also acceptable is the referral to allergist and SPT for patients with a confirmed IgE-mediated allergy, moderate to severe atopic dermatitis, family history of atopic dermatitis

[https://www.annallergy.org/article/S1081-1206\(16\)31164-4/fulltext](https://www.annallergy.org/article/S1081-1206(16)31164-4/fulltext)

Addendum guidelines for the prevention of peanut allergy in the United States: Report of the National Institute of Allergy and Infectious Diseases—sponsored expert panel. Togias, Alkis et al., Annals of Allergy, Asthma & Immunology, Volume 118, Issue 2, 166 - 173.e7, Feb 2017

18-year-old female cross country runner presents to Urgent Care for evaluation of a diffuse and pruritic rash

- It began on the forearms 3-4 days ago as shown several hours after taking a run with her dog on a wooded trail, but has since spread to the face, neck and torso.
- The patient denies exposure to any new products, foods, or any change in her routine.



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043822H



What is Your Diagnosis?

What is Your Diagnosis?

- Contact Dermatitis

Dermatitis – Irritant and Allergic

- Delayed, Type IV hypersensitivity immunologic reaction
- Risk factors
 - Occupational exposures – health professionals, chemical industry, beauticians/hairdressers, machinists, construction workers
 - Adults most typically affected
 - Comorbidities – atopic dermatitis

What allergen is most likely responsible for this localized contact dermatitis presentation?



What allergen is most likely responsible for this localized contact dermatitis presentation?



History

- Location and duration
- Size of lesions
- Itching
- Prior episodes
- Occupational or non-occupational exposure
- New chemicals, including detergents, creams, household cleaners
- Cosmetics including makeup, shampoo, body wash
- Previous treatment and response to treatments
- Foreign objects such as jewelry, buttons
- New food exposure or preservatives

ACD/ICD

- Intensely pruritic rash
- Papular, vesicular, bullae
- Pattern of exposure of allergen
 - Linear – poison ivy
 - Round – buttons, earrings

ACD



Which of the following would be the most appropriate management for moderate ACD (like the patient with poison ivy)?

- A. Methylprednisolone dose pack
- B. Prednisone 40 mg per day for 4 days then 20 mg per day for 4 days and then 10 mg for 4 days
- C. Topical pimecrolimus 1% cream twice daily for 7 days
- D. Topical mometasone cream four times daily to affected areas for 7 days
- E. Cetirizine 10 mg twice daily for 7-10 days

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Allergic Contact Dermatitis Treatment

- Epicutaneous patch testing if unsure of source or need confirmation
- Avoidance
- Medium to high-potency topical corticosteroids
- Topical emollients
- Cool compresses or oatmeal baths
- Systemic corticosteroids if moderate to severe
 - Especially important in plant-derived etiology as rebound dermatitis is common (may need 2-3 weeks of steroid with taper)

Patch Testing



Avoidance

- 2 computer-generated databases available in US
- List products that are free of the suspected allergens
 - Contact Allergen Management Program/CAMP – American Contact Dermatitis Society <https://www.contactderm.org/>
 - Mayo Clinic's SkinSAFE Database <https://www.skisafeproducts.com/>
- Nickel spot test – dimethyl-glyoxime test

The screenshot shows the SkinSAFE website interface. At the top, there is a search bar labeled "Search SkinSAFE" and a "Sign In or Register" link. Below the search bar, the text "For Skin Health Professionals" is displayed. The main heading is "Generate Safe Shopping Lists for Your Patients". A sub-heading reads: "It only takes seconds to input allergens and generate a shopping list for your patients. We've even put together preset lists of allergens to pick from based on the most popular patch tests." Below this, there is a "New Shopping List" section with a "Start Over" button and several action buttons: "Edit Allergens", "Save to Presets", "Print Shopping List", and "Save Patient & Send". A section titled "Excluded Allergens" lists: "Bactracin, Cobalt Chloride, Formaldehyde, neomycin sulfate, nickel sulfate, Quaternium-15, Triclorolol 21 Phalate". Below that, it says "Skin Safe - 5657 Matching Products". A search bar for "Search Products in THIS Patient's List" is present. Below the search bar, there is a table with columns for "Category", "Sub-Cat", "Brand", "OTC / Rx", and "Sort". The table lists two products: "3M Avagard Foaming Hand Antiseptic" and "3M Cavilon Antifungal Cream, 3M Pharmaceuticals".

A 49-year-old pt presents for evaluation of painful swelling on her right hand and forearm that began a few hours ago after she thinks she may have been bitten by “something” while pulling weeds in the garden.



How would you describe these in your medical documentation?

3 cm x 4 cm oval area of erythema and induration/edema on the right forearm, center area with vesicle or small ulceration with some serous weeping, erythematous flare or darkening on distal aspect. No streaking noted.

Right hand with warmth and edema over dorsal surface from 5th-3rd fingers in metacarpal area, no discrete lesion or discharge noted.

What is Your Diagnosis?

What is Your Diagnosis?

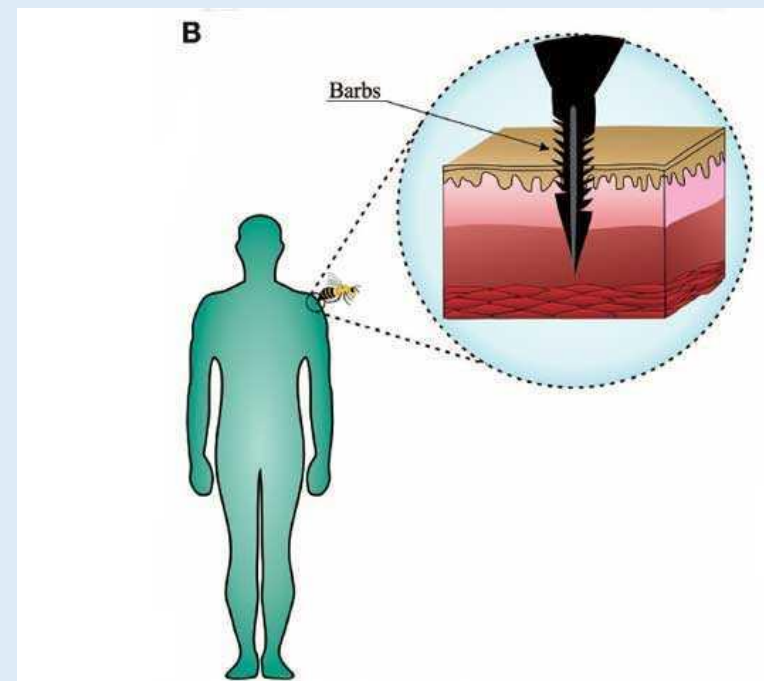
- Hymenoptera sting (s) – local reaction, probable bumble bee due to multiple stings from one insect

Hymenoptera

- More than 100,000 species
- 3 clinically relevant groups
 - *Apidae* (honeybees and bumblebees)
 - *Vespidae* (wasps, yellow jackets, hornets)
 - *Formicidae* (ants)
- Stings generally occur by accidental contact or proximity to a disrupted nest
 - 62 deaths each year
- 5 categories of sting reactions
 - Local
 - Large local or regional
 - Systemic
 - Delayed hypersensitivity
 - Massive envenomation

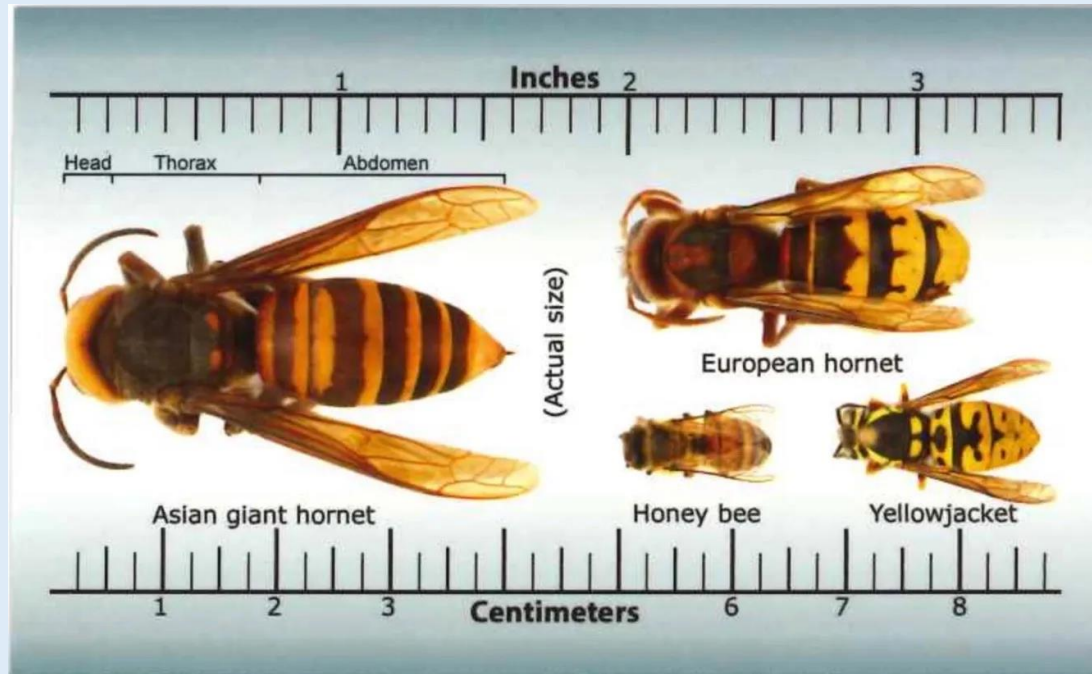
Apidae (Bees)

- Most commonly encountered - bees
- Typically docile and only sting when threatened or provoked
- Honeybees leave stinger in skin and die shortly after
- Bumblebee stingers do not detach, permitting multiple stings
- Most venom is injected within the first 60 seconds
- Remove barbed stinger as quickly as possible



Vespidae (Wasps, Yellow Jackets, Hornets)

- More aggressive than bees and are universally capable of multiple stings
- Multi-organ failure and death are more common with hornet stings



Formicidae (Stinging Ants)

- Fire ants are the most common stinging ant in North America
- Known to swarm and sting the lower extremity in clusters
- Causes immediate and delayed-hypersensitivity reactions



Local Reactions (most common)

- Clinical Manifestations
 - Painful
 - Small area of edema at sting site surrounded by erythematous flare
- Management
 - Supportive care
 - Ice or cool compresses
 - Analgesics, topical lidocaine, antihistamines, topical corticosteroids
- Time Course
 - Minutes to hours
 - Resolves after approximately 24 hours

Large Local or Regional Reactions

- 19% of reactions, carries 5-10% risk of future systemic reaction
- Clinical Manifestations
 - Area of erythema > 10 cm (3.94 in) with erythema and induration involving contiguous parts of the body as the sting site
- Management
 - Supportive care
 - Oral corticosteroids
 - > 12 yo Prednisone 40-60 mg per day for 3-5 days
 - < 12 yo Prednisone 1-2 mg per kg per day for 3-5 days
- Time Course
 - Several days to 1 week after sting



Systemic Reactions

- 1-3% of reactions
- Clinical Manifestations
 - IgE-mediated
 - Generalized angioedema or facial swelling
 - Urticaria
 - Respiratory distress of wheezing
 - Abdominal pain, N/V
 - Flushing, shock
- Management
 - Epinephrine
 - Corticosteroids
 - Antihistamines
- Time Course
 - Rapid onset, seconds to minutes



Delayed Hypersensitivity

- Clinical Manifestations
 - Serum sickness – fever, rash/hives, polyarthrititis or polyarthralgias
 - Skin rashes, vasculitis, DIC
 - Glomerulonephritis
 - Neuropathy, cerebral edema
 - Arthritis
- Management
 - Supportive care
 - Corticosteroids
- Time Course
 - 3 days to 2 weeks after envenomation

Massive Envenomation

- Clinical Manifestations
 - Rhabdomyolysis
 - Acute renal or hepatic failure
 - Hemolysis
 - MI
 - Pancreatitis
 - Seizures
- Management
 - Supportive care
- Time Course
 - Dose dependent

Arthropods that Bite Humans

- Mosquitos
- Ticks
- Kissing bugs
- Bed bugs
- Black flies
- Horse and deer flies
- Sand flies
- Stable flies
- Biting midges
- Fleas
- Centipedes
- Biting mites
- Chiggers
- Lice
- Spiders



Human Host Factors

- 20% of the population accounts for 80% of the bites
- Attractive Factors
 - Blood type
 - Metabolic rate
 - Amount of CO₂ released
 - Body temperature
 - Clothing types and colors
 - Amounts of volatile organic compounds (VOCs) emanating from human skin
 - Presence of ketones or lactic acid signaling a malnourished, weakened or physically exhausted host
 - Eating bananas

Mechanisms of Injury

- Punctures made by mouth parts – piercing/sucking (most human bites), chewing, sponging
- Lesions result from host's immune reaction to the arthropod's salivary secretions or venom
- Two methods for obtaining blood
 - Obtaining blood directly from capillaries or small veins
 - Lacerating blood vessels and feeding from the resulting pool of blood

Types of Reactions

- Local reaction
 - Inflammatory reaction at the site of the punctured skin
 - Appears within minutes
 - Pruritic local erythema and edema
- Papular urticaria
- Systemic allergic reactions

Papular Urticaria



- Clusters of itchy red papules most often on legs and other uncovered areas such as forearms and face (0.2–2 cm in diameter)
- Central punctum
- May present as crops of fluid-filled blisters
- A new bite may provoke reactivation of old ones
- The spots remain for days to weeks and can leave post-inflammatory pigmentation or hypopigmented scars, especially if they have been scratched deeply
- Common with flea bites and more common in children or in those who have moved to a new area

6-month-old male with a facial and body rash for the past several weeks, seems itchy, not sleeping well at night, both parents with seasonal allergies, just began solid food supplementation to breast feeding



How would you document this in the medical record?

What is Your Diagnosis?

How would you document this in the medical record?

Erythematous papules and plaques with scale on the cheeks and periorally, sparing the vermillion border. Scattered xerosis with rough skin and erythematous scaling patches and plaques on torso.

What is Your Diagnosis?

Atopic Dermatitis

What area of the body would be spared in this patient and could help to confirm your suspected diagnosis?

What area of the body would be spared in this patient and could help to confirm your suspected diagnosis?

- Diaper area
 - Moist most of the time
 - Keep away from scratching hands

Atopic Dermatitis

- Intermittent or persistent course
- Onset most common by 5 years of age
- ~5-20% of school-aged children
- **~10% of adults**



INFANTS



TODDLERS/PRESCHOOLERS



SCHOOL-AGE CHILDREN



ADULTS

Atopic Dermatitis: The Facts

- **Pathogenesis:** Genetic defects allow weakened epidermal barrier, immune hypersensitivity with increased T-cell response and elevated IgE levels, increased sensitivity to *S. aureus* superantigens
- **Atopic Triad** = AD, Allergies, Asthma
 - FH of atopy

Atopic Dermatitis Diagnosis

Essential Features [must be present]

- Pruritus
- Eczema (acute, subacute, chronic)
 - Typical morphology and age-specific patterns
 - Facial, neck, and extensor involvement in infants/children
 - Current or previous flexural lesions in any age group
 - Sparing the groin and axillary regions
 - Chronic or relapsing history

Important Features [adds support to diagnosis]

- Early age of onset
- Atopy
 - Personal and/or family history
 - IgE reactivity
- Xerosis



Basic Management

- Skin care: moisturizers, warm baths, antiseptic measures
- Anti-inflammatory agents
 - Topical corticosteroids (TCS)
 - Overall good safety profile
 - Potential side effects: purpura, telangiectasia, striae, focal hypertrichosis, skin atrophy; systemic exposure
 - Topical phosphodiesterase inhibitor – crisaborole 2% ointment
 - Topical calcineurin inhibitors (TCI)
 - Tacrolimus (0.03%, 0.1%); pimecrolimus (1%)
 - No risk for cutaneous atrophy
 - Potential side effects: local reactions (stinging and burning)
 - Black box warning, long-term safety not established (malignancy?)
 - Topical Janus Kinase inhibitor (JAK) – ruxolitinib 0.75%, 1.5% cream

Eichenfield LF, et al. *J Am Acad Dermatol*. 2014;71:116-32.

UTD – Treatment of atopic dermatitis (eczema). Accessed 5/29/23 at

[https://www.uptodate.com/contents/treatment-of-atopic-dermatitis-](https://www.uptodate.com/contents/treatment-of-atopic-dermatitis-eczema?search=treatment%20of%20atopic%20dermatitis&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1)

[eczema?search=treatment%20of%20atopic%20dermatitis&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1](https://www.uptodate.com/contents/treatment-of-atopic-dermatitis-eczema?search=treatment%20of%20atopic%20dermatitis&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1)

POEM for self-completion and/or proxy completion

Patient Details: _____

Date: _____

Please circle one response for each of the seven questions below about your/your child's eczema. If your child is old enough to understand the questions then please fill in the questionnaire together. Please leave blank any questions you feel unable to answer.

1. Over the last week, on how many days has your/your child's skin been itchy because of the eczema?

No days 1-2 days 3-4 days 5-6 days Every day

2. Over the last week, on how many nights has your/your child's sleep been disturbed because of the eczema?

No days 1-2 days 3-4 days 5-6 days Every day

3. Over the last week, on how many days has your/your child's skin been bleeding because of the eczema?

No days 1-2 days 3-4 days 5-6 days Every day

4. Over the last week, on how many days has your/your child's skin been weeping or oozing clear fluid because of the eczema?

No days 1-2 days 3-4 days 5-6 days Every day

5. Over the last week, on how many days has your/your child's skin been cracked because of the eczema?

No days 1-2 days 3-4 days 5-6 days Every day

6. Over the last week, on how many days has your/your child's skin been flaking off because of the eczema?

No days 1-2 days 3-4 days 5-6 days Every day

7. Over the last week, on how many days has your/your child's skin felt dry or rough because of the eczema?

POEM for self-completion and/or proxy completion

How is the scoring done?

Each of the seven questions carries equal weight and is scored from 0 to 4 as follows:

No days	= 0
1-2 days	= 1
3-4 days	= 2
5-6 days	= 3
Every day	= 4

Note:

- If one question is left unanswered this is scored 0 and the scores are summed and expressed as usual out of a maximum of 28
- If two or more questions are left unanswered the questionnaire is not scored
- If two or more response options are selected, the response option with the highest score should be recorded

What does a poem score mean?

To help patients and clinicians to understand their POEM scores, the following bandings have been established (see references below):

• 0 to 2	= Clear or almost clear
• 3 to 7	= Mild eczema
• 8 to 16	= Moderate eczema
• 17 to 24	= Severe eczema
• 25 to 28	= Very severe eczema

Do I need permission to use the scale?

Whilst the POEM scale is protected by copyright, it is freely available for use and can be downloaded from: www.nottingham.ac.uk/dermatology. We do however ask that you register your use of the POEM by e-mailing cebck@nottingham.ac.uk with details of how you would like to use the scale, and which countries the scale will be used in.

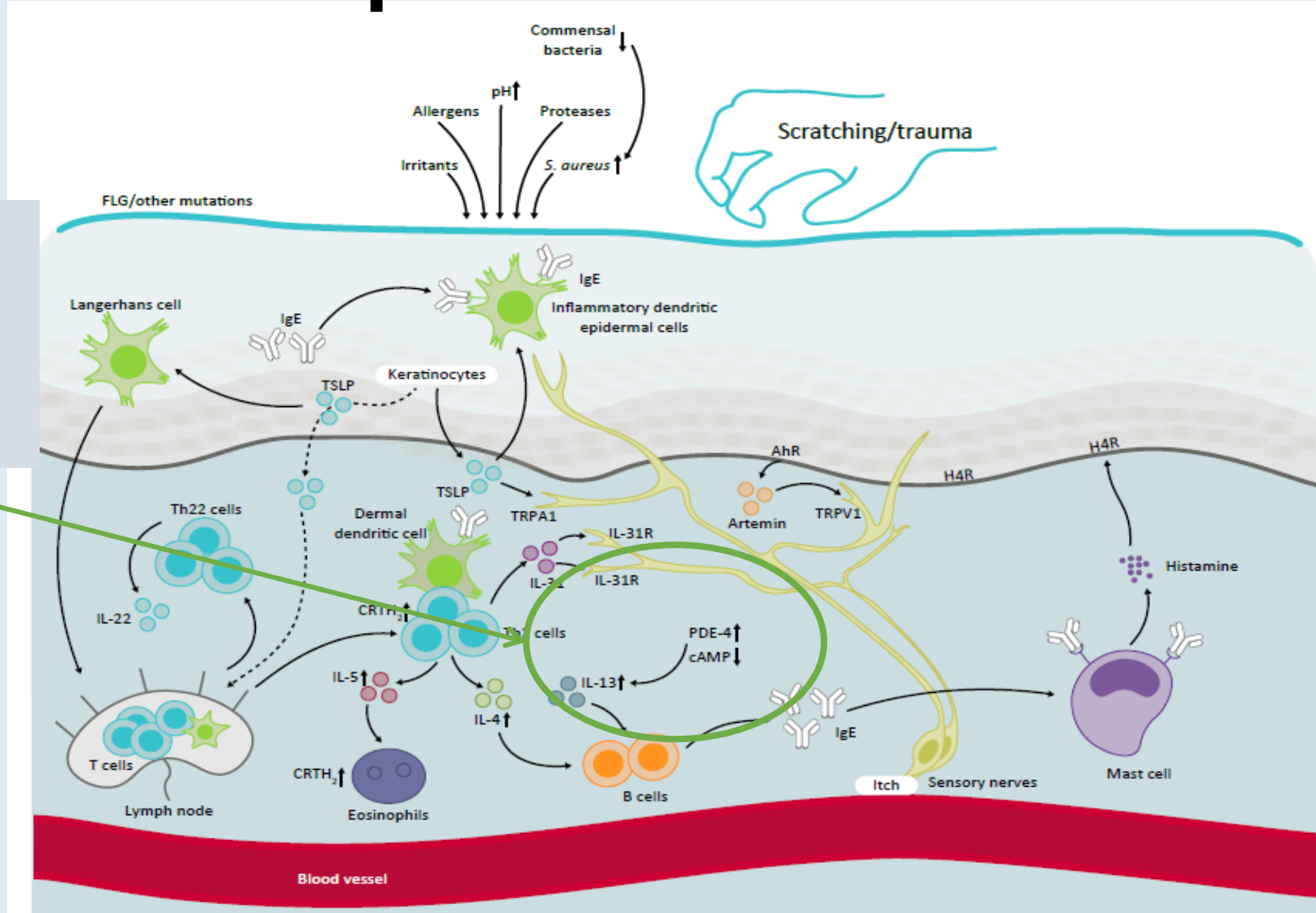
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Crisaborole: Phosphodiesterase 4 Inhibitor

Targeting PDE-4 reduces the production of proinflammatory mediators in AD



Adapted by Infograph-ed, LLC from Paller AS, et al. *J Allergy Clin Immunol*. 2017;140:633-643.

FDA. https://www.accessdata.fda.gov/drugsatfda_docs/label/2016/207695s000lbl.pdf. Accessed April 2, 2018.

Crisaborole

- Phosphodiesterase 4 inhibitor; targeting PDE-4 reduces the production of pro-inflammatory mediators in AD
- FDA approved December 2016
- For topical treatment of mild-to-moderate AD in patients ≥ 6 months of age
- Ointment, 2%; apply twice daily to affected areas

Ruxolitinib cream 1.5%

- Opzelura
- Selective inhibitor of Janus kinase 1 and Janus kinase 2, thereby suppressing cytokine signaling (IL-4, IL-5, IL-13, IL-22, IL-23, IL-31, thymic stromal lymphopoietin – multiple ones at once)
- Better with itch (within 36 hours of application) and plays a part in improving the skin barrier
- Used in pts 12 year of age and older with mild to moderate AD
 - 8 weeks continuous, 44 weeks intermittently
- Applied BID to affected areas on up to 20% BSA

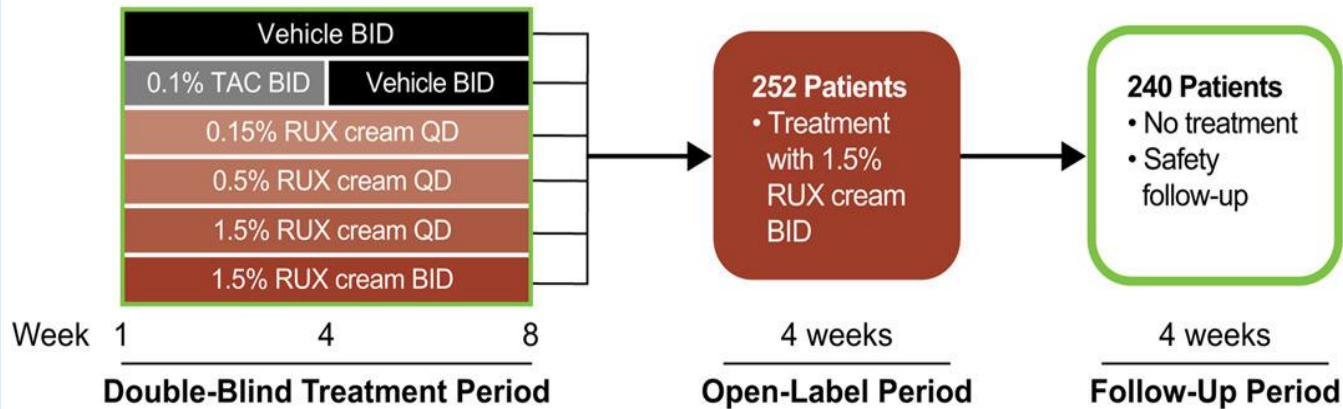


Ruxolitinib Cream Demonstrates Both Anti-Inflammatory and Rapid Antipruritic Efficacy

307 Patients

- Aged 18–70 years with active AD
- History of AD ≥ 2 years
- IGA score of 2 or 3
- BSA involvement of 3%–20%

Randomized 1:1:1:1:1

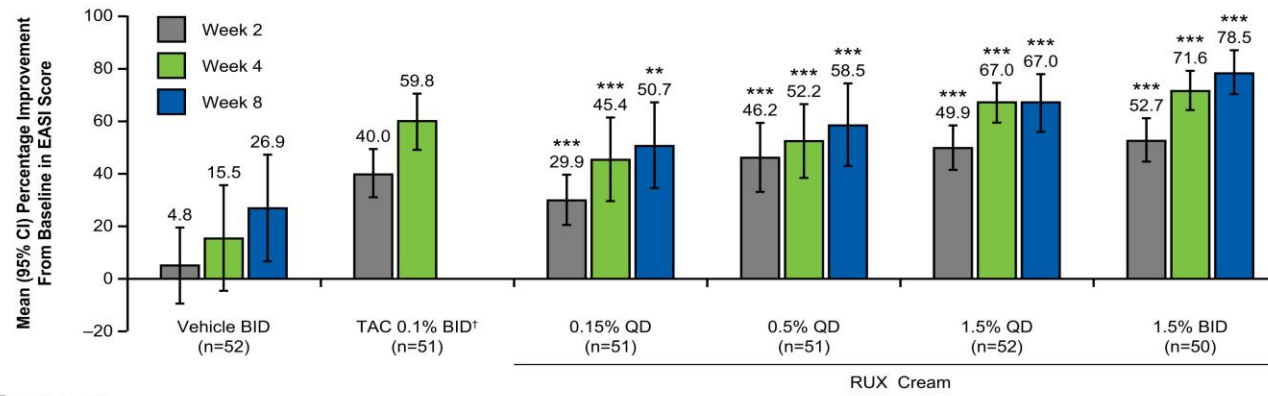


Outcomes Following Ruxolitinib Treatment

- 1.5% RUX cream BID vs vehicle at Week 4: EASI score, 71.6% vs 15.5% ($P < 0.0001$); IGA response, 38.0% vs 7.7% ($P < 0.001$)
- 1.5% RUX cream BID vs triamcinolone acetonide at Week 4: EASI score, 71.6% vs 59.8%; IGA response, 38.0% vs 25.5%
- Itch NRS reductions of -1.8 vs -0.2 ($P < 0.0001$) at 36 hours with 1.5% RUX cream BID vs vehicle
- Unremarkable safety profile with no notable systemic effects and good tolerability

AD, atopic dermatitis; BID, twice daily; BSA, body surface area; EASI, Eczema Area and Severity Index; IGA, Investigator's Global Assessment; NRS, numerical rating scale; QD, once daily; RUX, ruxolitinib; TAC, triamcinolone acetonide cream

A EASI Scores



B Clinical Images

Head/neck

Patient 1: Baseline

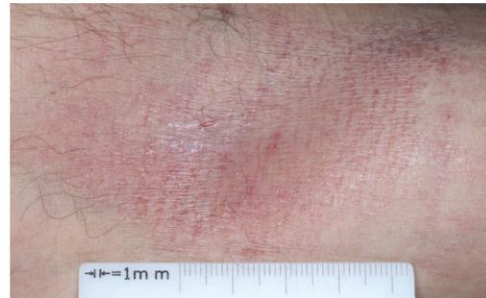


Patient 1: Week 4



Antecubital fossa

Patient 2: Baseline



Patient 2: Week 4

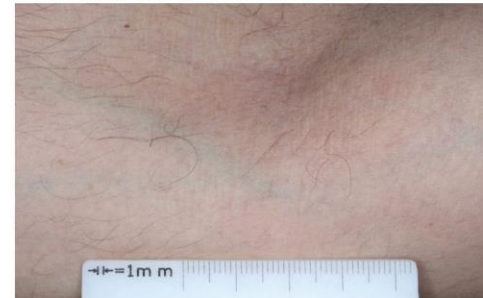
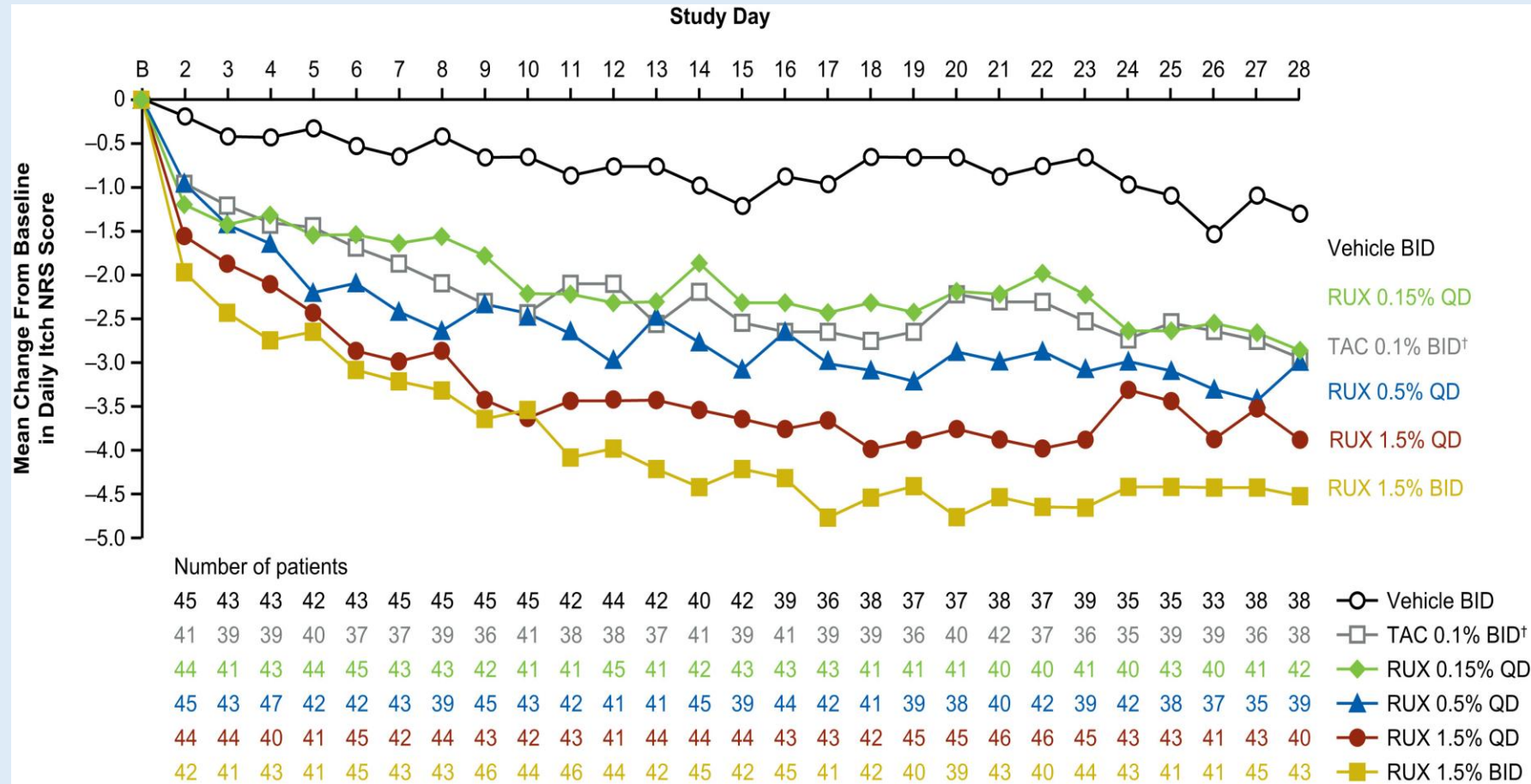


Fig 5



- TRuE-AD1 and TRuE-AD2 multinational phase III studies provide further support



A 34-year-old woman has longstanding AD

- She is in your clinic today for an acute worsening of her disease over the past week
 - She has had increased pruritus and now has multiple painful areas within the involved skin
 - She always bathes with gentle cleansers, and has been applying petrolatum jelly and TCS (triamcinolone acetonide, 0.1% ointment) without improvement



Secondary *S. aureus* Infections in AD

- Common complication in patients with AD
- **Purulent exudate and pustules on skin examination** may suggest a diagnosis of secondary bacterial infection over inflammation from dermatitis
- Systemic antibiotics **ARE** appropriate with clinical evidence of bacterial infection in patients with AD, in addition to standard treatments including TCS

Step-Care Management of AD

Mild

Severe

	Non-lesional		Moderate	
Maintenance Treatment	<p>BASIC MANAGEMENT Skin Care</p> <ul style="list-style-type: none"> Moisturizer, liberal and frequent (petrolatum-based moisturizer) Warm baths or showers using non-soap cleansers, usually once daily and followed by a moisturizer (even on clean areas) <p>Trigger Avoidance</p> <ul style="list-style-type: none"> Proven allergens and common irritants (eg, soaps, wool, temperature extremes) Consider comorbidities 	<p>BASIC MANAGEMENT Skin Care</p> <ul style="list-style-type: none"> Moisturizer, liberal and frequent (choice per patient preference) Warm baths or showers, usually once daily and followed by moisturizer (even on clear areas) <p>Antiseptic Measures</p> <ul style="list-style-type: none"> Dilute bleach bath (or equivalent) \leqx/week according to severity (especially with recurrent infections) Antibiotics, if needed <p>Trigger Avoidance</p> <ul style="list-style-type: none"> Proven allergens and common irritants (eg, soaps, wool temperature extremes) Consider comorbidities 	<p>BASIC MANAGEMENT + TOPICAL ANTI-INFLAMMATORY MEDICATION <i>Apply of areas of previous or potential symptoms (aka flare)</i></p> <p>Maintenance TCS</p> <ul style="list-style-type: none"> Low potency 1x-2x daily (including face) Medium potency 1x-2x weekly (except face) <p>OR Maintenance TCI (pimecrolimus, tacrolimus)</p> <ul style="list-style-type: none"> 1x-2x daily 2x-3x weekly (not an indicated dosage) <p>OR Crisaborole 2% 2x daily</p>	<p>BASIC MANAGEMENT + REFERRAL to AD Specialist</p> <p>Phototherapy</p> <p>Dupilumab</p> <p>Systemic Immunosuppressants</p> <ul style="list-style-type: none"> Cyclosporine A Methotrexate Mycophenolate mofetil Azathioprine Corticosteroids <p>Consider acute tx for some patients to help gain control:</p> <ul style="list-style-type: none"> Wet wrap therapy Short-term hospitalization
Acute Treatment	<p>Apply TCS to Inflamed Skin</p> <p>Low to medium potency TCS 2x daily for 3-7 days beyond clearance [Consider TCI, crisaborole]</p>	<p>Apply TCS to Inflamed Skin</p> <p>Medium to high potency TCS 2x daily for 3-7 days beyond clearance [Consider TCI, crisaborole] If not Resolved in 7 Days, Consider </p>	<ul style="list-style-type: none"> Non-adherence Infection Misdiagnosis Contact allergy to medications 	<ul style="list-style-type: none"> Referral

Other Treatments

- Oral Antihistamines
 - Short-term, intermittent use for sleep loss secondary to pruritus
 - Use in conjunction with topical therapies
- Phototherapy
 - Second Line
 - Can be used as maintenance therapy in those with chronic disease
 - NB-UVB
 - BB-UVB
 - PUVA
 - UVAB
- Dupilimab
- Tralokinumab
- Abrocitinib
- Upadacitinib

Dupilumab

- Human monoclonal IgG4 antibody, inhibits IL-4 and IL-13 signal transduction through competitively binding to the shared α subunit of the IL-4 receptor
- Patients ages 6 months of age and older with moderate-to-severe AD; can be used with or without TCS
- Pts with $>10\%$ of BSA with lesions or lesions in problem areas like face, hands, and feet
- SQ injection; initial dose of 600 mg (two 300 mg injections; different sites), followed by 300 mg every other week for adults 18+, weight-tiered dosing for infants to adolescents
- Biologics: cost considerations

Tralokinumab

- Fully human monoclonal anti-IL-13 antibody
- SQ injection of 300 mg every other week

Abrocitinib

- Oral Janus kinase 1 (JAK1) selective inhibitor
- 100 mg or 200 mg dosed once daily

Upadacitinib

- Oral selective Janus kinase (JAK) inhibitor
- 15 mg or 30 mg dosed once daily

Lots More New Meds to Market

- Lebrikizumab- SQ injectable monoclonal antibody that binds to IL-13
- Brepocitinib – topical tyrosine kinase 2/janus kinase 1 (JAK1) inhibitor that blocks IL12 and IL23 pathways

Atopic Dermatitis Action Plan

Patient Name: _____

Date: _____

Use your action plan as a guide for how your health care team wants you to manage your AD, and what to do when your condition changes

	Mild Signs/Symptoms	Moderate Signs/Symptoms	Severe Signs/Symptoms
Bathing or showering			
Daily skin-care routine			
Symptom management			
Additional information			
Support strategies			

Selected References/Resources

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- Hoy, SM. Ruxolitinib Cream 1.5%: A Review in Mild to Moderate Atopic Dermatitis, *American Journal of Clinical Dermatology* (2022) 24:143-151.

A localized reaction to a bee sting that reaches this diameter is considered a large local reaction.

What is the dose of epinephrine in an auto-injector for an adult?

Allergic contact dermatitis from the rhus allergen that affects >20% of the body surface area is best treated with what medication?

List 4 topical preparations that can be used in the treatment of atopic dermatitis.