# Health Effects of Antihistamines, Steroids, & Decongestants

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# Disclosures

- Sanofi Pharmaceuticals - Medical Consultant and Advisory Board
- AAAAI - Board Member of Division Directors Committee and DEI Committee
- ACAAI - Board Member of Food Allergy Committee and Population Health Committee

# Objectives

- Identify therapeutic necessity for antihistamines
- Counsel and review short term and long term health effects of antihistamines
- Identify therapeutic necessity for steroids
- Counsel and review short term and long term health effects of steroids
- Identify therapeutic necessity for decongestants
- Counsel and review short term and long term health effects of decongestants

# Antihistamines

- Blocks the effect of histamine (allergy, gastric acid secretion, and wakefulness)
- Characterized by Receptor Type
  - H1 Receptor Antagonist (includes 1st and 2nd generations)
  - H2 Receptor Antagonist
  - H3 Receptor Antagonist
  - H4 Receptor Antagonist

# Antihistamines

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- Characterized by Receptor Type
  - **H1 Receptor Antagonist (includes 1st and 2nd generations)**
  - **H2 Receptor Antagonist**
  - H3 Receptor Antagonist - CNS Related Conditions
  - H4 Receptor Antagonist - Immune Modulation/Experimental

# H1 Receptor Antagonists

- **Main Use:** Allergic Conditions, Anaphylaxis Adjunct, Motion Sickness
- **Examples:** 1st Gen (Diphenhydramine, Hydroxyzine, Chlorpheniramine), 2nd Gen (Cetirizine, Fexofenadine, Levocetirizine, Loratadine)
- **Health Benefits:**
  - ↓ Allergy Symptoms (rhinitis, urticaria, conjunctivitis)
  - Relieve itching (atopic dermatitis, urticaria)
  - Adjunct to Anaphylaxis with Epinephrine

# H1 Receptor Antagonists

- **Health Side Effects:**
  - 1st Gen - drowsiness, sedation, impaired cognition
  - Anticholinergic Effects - dry mouth, urinary retention, constipation, blurry vision
- Counsel on choosing 2nd Gen > 1st Gen
- Counsel on avoiding Benadryl

# H2 Receptor Antagonists

- **Main Use:** Reduce Stomach Acid Secretion, Urticaria Adjunct
- **Examples:** Famotidine
- **Health Benefits:**
  - Improve symptoms of GERD, peptic ulcers, dyspepsia
  - Adjunct therapy with antihistamines for urticaria

# H2 Receptor Antagonists

- **Health Side Effects:**
  - Headache
  - Diarrhea
  - Dizziness
  - Rare - confusion/renal impairment

| Receptor Target | Examples | Main Uses | Key Health Effects / Side Effects |
|---|---|---|---|
| **H1 (Allergy & Itching)** | 1st Gen: Diphenhydramine, Hydroxyzine, Chlorpheniramine<br>2nd Gen: Cetirizine, Loratadine, Fexofenadine | Allergic rhinitis, urticaria, eczema itching, anaphylaxis adjunct, motion sickness | ↓ Allergy symptoms, ↓ itch.<br>1st gen: sedation, drowsiness, confusion, anticholinergic effects (dry mouth, urinary retention).<br>2nd gen: less sedating, safer for long-term use. |
| **H2 (Stomach Acid)** | Famotidine, Nizatidine, (Ranitidine—withdrawn) | GERD, peptic ulcer, dyspepsia, Zollinger-Ellison syndrome | ↓ Acid production.<br>Side effects: headache, diarrhea, rare confusion in elderly/renal impairment. |
| **H3 (Brain / CNS)** | Pitolisant | Narcolepsy, sleep-wake regulation, investigational for ADHD & Alzheimer's | Promotes wakefulness & cognition.<br>Side effects: insomnia, headache, anxiety. |
| **H4 (Immune / Inflammation)** | Investigational (no FDA-approved yet) | Studied in asthma, autoimmune disease, chronic pruritus | ↓ Inflammation & itch via immune modulation.<br>Still experimental; not widely available. |

# Steroids

- Synthetic versions of cortisol, a hormone produced by the adrenal glands
- **Main Use:** Anti-inflammatory and Immunosuppressive properties
- Oral vs Topical vs Nasal vs Inhaled
- Classification depends on route, potency (topical), and clinical use

# Steroids - Oral (Systemic)

- **Classification by Duration of Action:**
  - Short Acting (t ½ : 8-12 hours): Hydrocortisone, Cortisone
  - Intermediate Acting (t ½ : 12-36 hours): Prednisone, Prednisolone, Methylprednisolone, Triamcinolone
  - Long Acting (t ½ : 36-72 hours): Dexamethasone, Betamethasone

# Steroids - Oral (Systemic)

- **Short Term Health Effects (Days to Weeks):**
  - Increased appetite and weight gain
  - Mood changes and insomnia
  - Fluid retention and elevated BP
  - Elevated blood sugar
- **Long Term Health Effects (Months to Years):**
  - Endocrine: Adrenal suppression, Cushingoid features (moon face, buffalo hump)
  - Metabolic: Osteoporosis, diabetes, muscle wasting
  - Immune: Increased infection risk
  - Ophthalmologic: Cataracts, glaucoma
  - Cardiovascular: HTN, dyslipidemia
  - Dermatologic: Skin thinning, bruising, poor wound healing
  - Psychiatric: Mood swings, depression, psychosis

# Steroids - Topical

- **Classification by Potency:**
  - Class I
    - Super potent: Clobetasol propionate 0.05%
  - Class II
    - Potent: Fluocinonide 0.05%
  - Class III-V
    - Moderate: Triamcinolone acetonide 0.1%
  - Class VI-VII
    - Mild/Least Potent: Hydrocortisone 1-2.5%

# Steroids - Topical

- **Local Health Effects:**
  - Skin atrophy (thinning)
  - Striae (stretch marks)
  - Telangiectasias (small dilated vessels)
  - Perioral dermatitis or acneiform eruptions
  - Hypopigmentation
  - Delayed wound healing
- **Systemic Health Effects (Children, Large Surface Area, Under Occlusion):**
  - HPA (hypothalamic-pituitary axis) suppression
  - Cushingoid features (rare)
  - Growth suppression in children (rare)

# Steroids - Nasal

- They are considered topical steroids as they are used for anti-inflammatory effects on the nasal mucosa
- Steroid-based treats congestion, pressure (anti-inflammatory) and nasal polyps
  - Antihistamine-based treats drainage, sneeze, and nasal itch
- **Classification by Generation and Systemic Absorption**
  - 1st Generation (Higher Systemic Absorption)
    - Beclomethasone dipropionate
    - Triamcinolone acetonide
    - Flunisolide
  - 2nd Generation (Lower Systemic Absorption)
    - Fluticasone propionate / furoate
    - Mometasone furoate
    - Budesonide
    - Ciclesonide

# Steroids - Nasal

- **Local Health Effects**
  - Nasal irritation, dryness, burning
  - Epistaxis from septal irritation
  - Sore throat and cough
  - Septum perforation (chronic improper use)
  - Impaired wound healing (using too soon after surgery)
- **Systemic Health Effects**
  - Minimal systemic absorption (low risk of adrenal suppression)
  - Hypothalamic Pituitary Adrenal (HPA) axis suppression
  - Growth suppression (uncommon)
  - Glaucoma and cataracts

# Steroids - Inhaled

- Reduces airway inflammation and bronchial hyperresponsiveness
- Reduces asthma exacerbations and can improve lung function
- **Classification (potency/dose equivalence)**
  - Low-Medium Potency
    - Beclomethasone
    - Ciclesonide
    - Budesonide
  - Medium-High Potency
    - Fluticasone propionate
    - Mometasone
  - High Potency
    - Fluticasone furoate

# Steroids - Inhaled

- **Local Health Effects**
  - Dysphonia (hoarseness)
  - Oropharyngeal candidiasis (thrush)
  - Sore throat, cough, and throat irritation
- **Systemic Health Effects (Rare at standard doses)**
  - Adrenal suppression
  - Reduced bone mineral density leading to osteoporosis
  - Cataracts, Glaucoma
  - Mild growth velocity suppression in children (dose-dependent and not progressive)
  - Skin thinning/bruising
- Spacer use for Adults and Children

| Category | Examples | Main Use | Mechanism | Therapeutic Benefits | Adverse Effects (Local/Systemic) |
|---|---|---|---|---|---|
| **Oral corticosteroids** (systemic) | Prednisone, Prednisolone, Dexamethasone, Methylprednisolone | Severe asthma/COPD exacerbations, autoimmune disease, IBD, lupus, transplant immunosuppression | Systemic glucocorticoid receptor activation → broad cytokine & immune cell suppression | Strongest anti-inflammatory effect; rapid symptom control | **Systemic**: weight gain, Cushingoid features, hypertension, hyperglycemia, osteoporosis, adrenal suppression, infection risk, mood changes, growth suppression in kids |
| **Topical corticosteroids** (dermatologic) | Hydrocortisone, Triamcinolone, Betamethasone, Clobetasol | Eczema, psoriasis, dermatitis, lichen planus | Local glucocorticoid receptor binding in skin | ↓ Redness, itching, inflammation | **Local**: skin atrophy, striae, telangiectasias, perioral dermatitis. **Systemic** (rare, if potent/large area/long duration): HPA suppression |
| **Nasal corticosteroids** (intranasal) | Fluticasone, Mometasone, Budesonide, Beclomethasone, Ciclesonide | Allergic rhinitis, chronic rhinosinusitis, nasal polyps | Local glucocorticoid receptor activation in nasal mucosa | ↓ Congestion, sneezing, rhinorrhea, itching; ↓ polyp size | **Local**: nasal irritation, epistaxis, sore throat, rare septal perforation. **Systemic**: minimal, rare growth velocity reduction in kids |
| **Inhaled corticosteroids** (ICS) | Fluticasone, Budesonide, Beclomethasone, Mometasone, Ciclesonide | Asthma (maintenance), COPD (with LABA if severe) | Local anti-inflammatory action in airways | ↓ Airway inflammation, ↓ exacerbations, improved asthma control | **Local**: oral thrush (candidiasis), dysphonia, sore throat, cough. **Systemic** (rare at usual doses): adrenal suppression, ↓ bone mineral density, cataracts, growth suppression in children (mild, dose-dependent) |

# Decongestants

- **Main Use:** nasal congestion by acting as indirect sympathomimetics by mimicking norepinephrine by causing vasoconstriction
- Pseudoephedrine
  - Sympathomimetic amine ($\alpha$ and $\beta$ adrenergic agonist)
  - Vasoconstriction of nasal mucosa ➔ reduce swelling/congestion
- Phenylephrine
  - Primarily an $\alpha$1 adrenergic agonist
  - Less effective than Pseudoephedrine
- Oxymetazoline
  - Primarily an $\alpha$ adrenergic agonist
- Therapeutic Effects for Both
  - Relieve nasal congestion, reduce eustachian tube dysfunction

# Decongestants

- **Health Effects:**
  - Cardiovascular: ↑BP, Tachycardia, Palpitations, Arrhythmias
  - CNS: Nervousness, Restlessness. Anxiety, Agitation, Insomnia, Tremor
  - GU: Urinary Retention (especially in those with BPH)
  - Other: Dry mouth, Headache, Dizziness, Rebound Congestion, Rhinitis Medicamentosa

# Decongestants

- **Contraindications:**
  - HTN
  - Heart Disease
  - Glaucoma (narrow angle)
  - BPH
  - On MAO inhibitors for medications (risk of hypertensive crisis)

| Feature | Oral Decongestants (Pseudoephedrine, Phenylephrine) | Topical Decongestants (Oxymetazoline, Phenylephrine) |
|---|---|---|
| **Route** | Systemic (pill or liquid) | Local (nasal spray or drops) |
| **Onset of Action** | Slower (30–60 min) | Rapid (within 5–10 min) |
| **Duration** | Longer (4–12 hours depending on formulation) | Shorter (4–12 hours depending on agent, e.g., Afrin 12 hr) |
| **Mechanism** | Sympathomimetic amines → systemic vasoconstriction | Local α-adrenergic agonists → local nasal vasoconstriction |
| **Efficacy** | Provides moderate relief of nasal congestion | Strong, immediate relief of nasal congestion |
| **Systemic Side Effects** | ↑ Blood pressure, tachycardia, palpitations, insomnia, anxiety, urinary retention | Minimal systemic effects if used properly |
| **Local Side Effects** | None, specific (systemic exposure instead) | Nasal dryness, burning, stinging |
| **Rebound Congestion** | No | Yes → **rhinitis medicamentosa** if used >3 days |
| **Contraindications** | HTN, arrhythmias, glaucoma, BPH, hyperthyroidism, MAOI use | Not for prolonged use (>3 days), caution in kids <6 without guidance |
| **Best Use Case** | Longer-term symptom relief, patients with frequent congestion | Quick relief for acute severe nasal congestion (e.g., before bed, flying, sinus infection flare) |

# Resources for Patients and Providers

- American College of Allergy, Asthma, and Immunology [ACAAI] (https://acaai.org/allergies/allergic-conditions/)
- American Academy of Allergy, Asthma, and Immunology [AAAAI] (https://www.aaaai.org/tools-for-the-public)