

Allergic Rhinitis: A Clinical Practice Update

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Objectives

- Underscore the significant burden and impact on the quality of life due to allergic rhinitis (AR)
- Outline the symptoms of AR
- Explain the pathophysiology that causes the inflammation of AR
- Review the latest research indicating the progression of allergic diseases into asthma
- Discuss the safety and efficacy of available and emerging treatments for AR

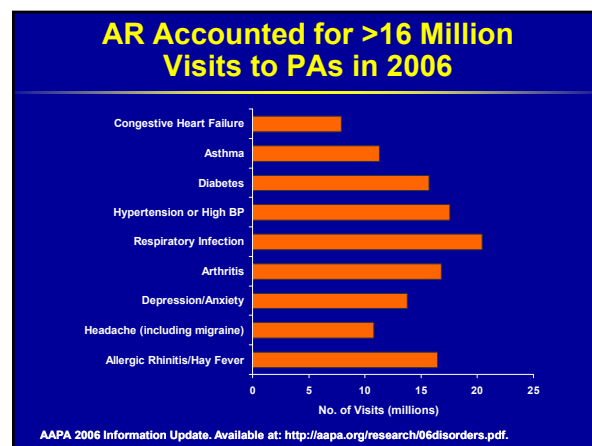
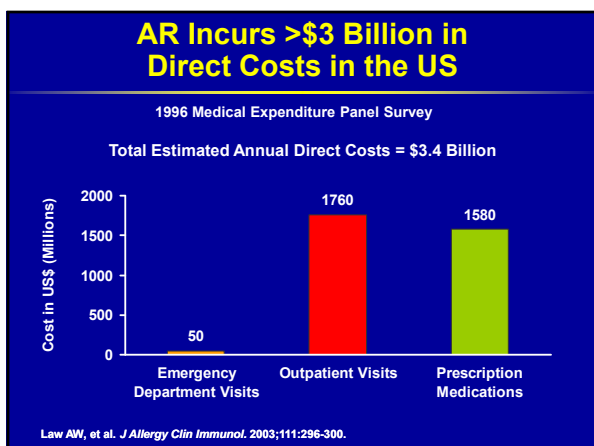
Agenda

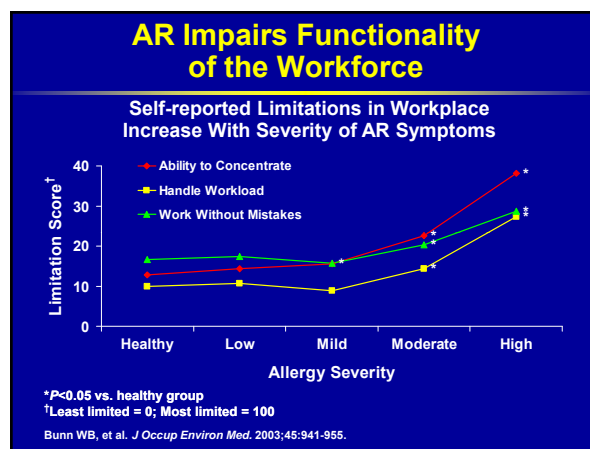
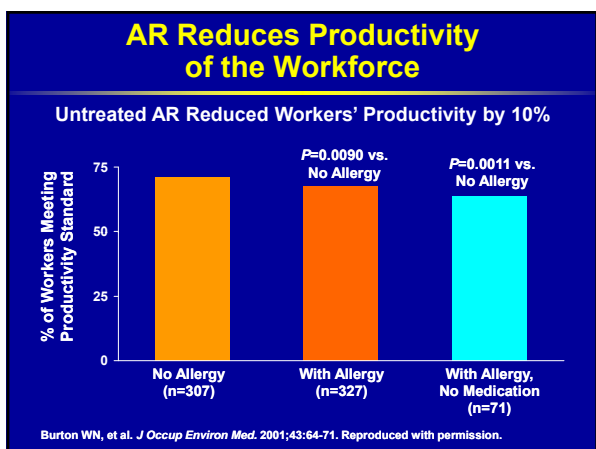
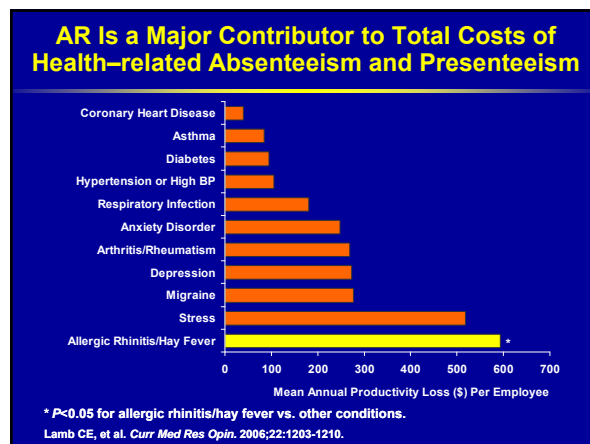
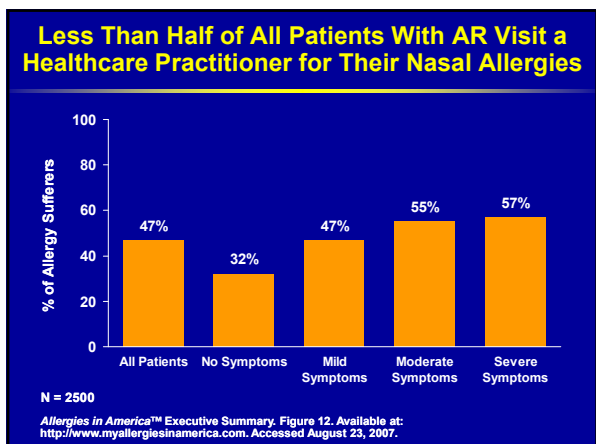
- Economic burden of AR
- Impact of AR on quality of life
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- Focus on intranasal corticosteroids
- Alternative and emerging strategies

Allergic Rhinitis (AR) Affects Many American Adults and Children

- Up to 40 million Americans affected
- 6th most prevalent chronic illness
- Prevalence estimates:
 - 1 in 5 adults (10%-30%)
 - 1 in 4 children (up to 40%)
 - Most common chronic condition in children
- Prevalence has increased substantially in recent decades in developed countries

Long A, et al. Agency for Healthcare Research and Quality. Publication No. 02-E024, May 2002.
Linneberg A, et al. *Allergy*. 2000;55:767-772.
Sibbald B, et al. *Br J Gen Pract*. 1990;40:338-340.

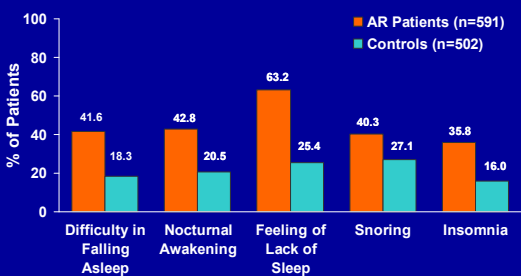




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- ### AR Imposes a Significant Burden on Quality of Life
- #### AR Is Associated With:
- Fatigue and daytime sleepiness
 - Daily activity impairment
 - Reduced work productivity
 - Impaired cognitive functioning
 - Reduced learning abilities
 - Impaired sleep
 - Impaired quality of life
- Marshall PS, et al. *Psychosom Med.* 2002;64:684-691; Stuck BA, et al. *J Allergy Clin Immunol.* 2004;113:663-668; Bousquet J, et al. *J Allergy Clin Immunol.* 2006;117:158-162; Tanner LA, et al. *Ann J Manag Care.* 1999;5(suppl 4):S233-S247; Blane PD, et al. *J Clin Epidemiol.* 2001;54:610-618; Wilken JA, et al. *Ann Allergy Asthma Immunol.* 2002;89:372-380; Marshall PS, et al. *Ann Allergy Asthma Immunol.* 2000;84:403-410; Vuorman EFPM, et al. *Ann Allergy.* 1993;71:121-126; Léger D, et al. *Arch Intern Med.* 2006;166:1744-1748.

AR Increases Prevalence of Sleep Complaints and Sleep Disorders



* P<0.001 for patients with allergic rhinitis vs. controls.
Léger D, et al. Arch Intern Med. 2006;166:1744-1748.

Untreated AR Has a Negative Impact on Cognitive Function in Adults

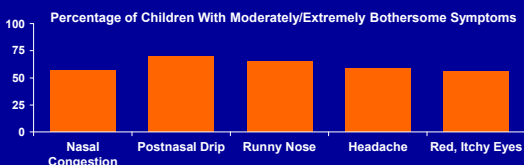
Untreated AR in adults is associated with significant decrements in:

- Sustained attention over time (vigilance)
- Working memory (solve problems mentally)
- Psychomotor speed (hand-eye coordination)
- Reasoning/computation (higher functioning)
- Divided attention (multi-tasking)

Wilken JA, et al. Ann Allergy Asthma Immunol. 2002;89:372-380.

Recent Survey Underscores Significance of Pediatric Allergies in America

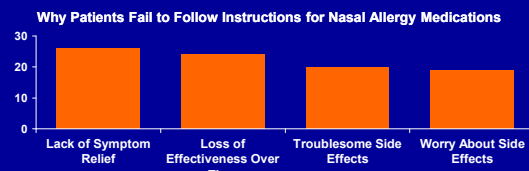
- Nationwide telephone survey: March/April 2007
 - 35,757 households contacted
 - Parents of 500 children (4 to 17 yr) with current nasal allergies reported
- One third (1/3) of parents reported children cannot tolerate nasal allergies
- 40% report child's performance at school or daycare affected



Abstract to be presented at 2007 ACAAI Annual Meeting, Dallas, TX.

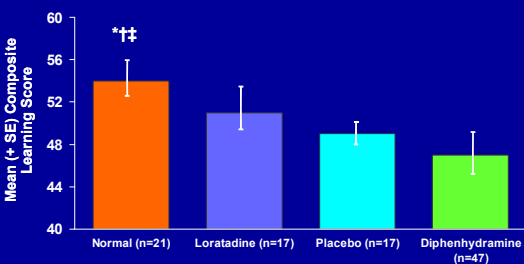
Recent Survey Underscores Significance of Pediatric Allergies in America (cont'd.)

- Pediatric medication use for nasal allergies in past 4 weeks
 - Any allergy medication: 76%
 - OTC medication: 54%
 - Rx medication: 48%
- Prior or current use of Rx nasal spray: 68%
- Parents very satisfied with child's intranasal corticosteroid: 33%



Abstract to be presented at 2007 ACAAI Annual Meeting, Dallas, TX.

AR Reduces Learning Ability in Children

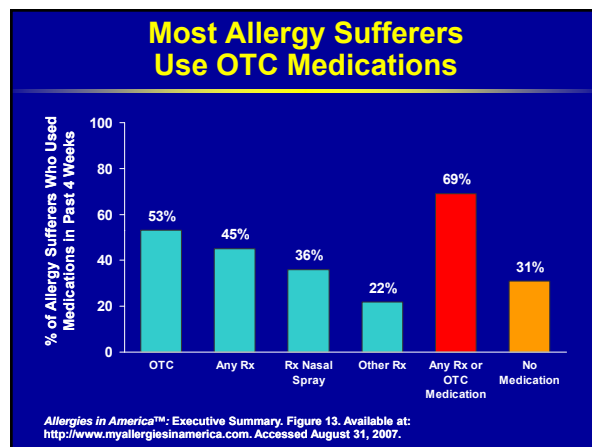
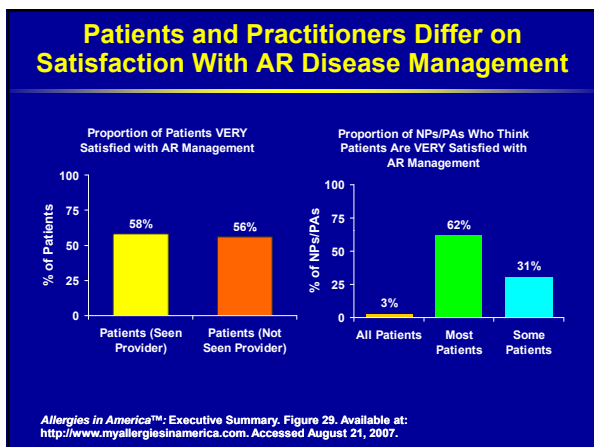
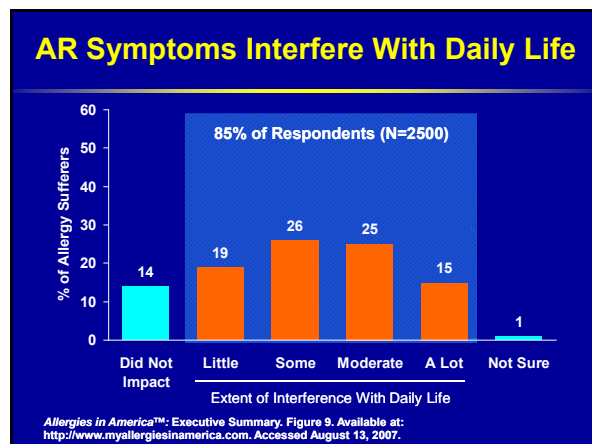
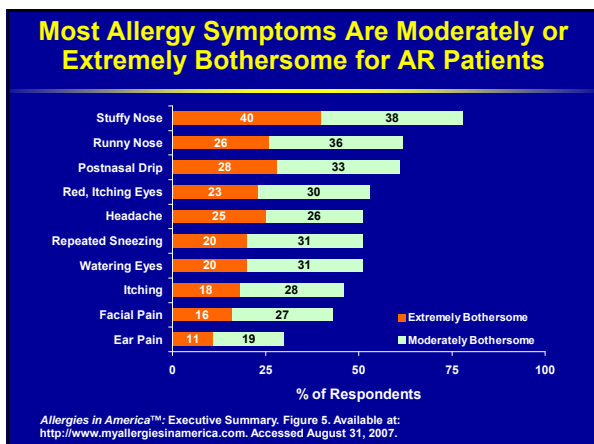


*P<0.003 vs. all atopic children.
†P=0.007 vs. atopic children receiving placebo.
‡P=0.002 vs. atopic children receiving diphenhydramine.

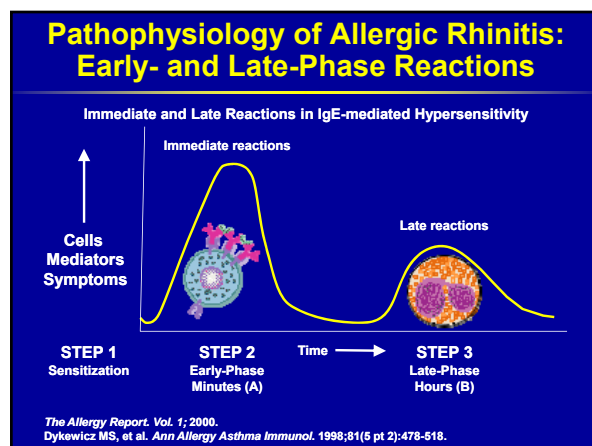
Vuurman EFP, et al. Ann Allergy. 1993;71:121-126.

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Features of Early- and Late-Phase Reactions in the Allergic Response

Early-Phase Reaction

- Occurs within minutes of allergen exposure
- Mast-cell degranulation
- Release of inflammatory mediators, eg:
 - Histamine
 - Leukotrienes
 - Prostaglandins
- Rhinorrhea, itching, edema, sneezing

Late-Phase Reaction

- Occurs within 2-4 h and lasts up to 24 h
- Gradual infiltration and activation of leukocytes, eg:
 - Eosinophils
 - Th2 cells
- Release of inflammatory mediators, eg:
 - Cytokines
 - Leukotrienes
- Congestion > rhinorrhea, itching, sneezing

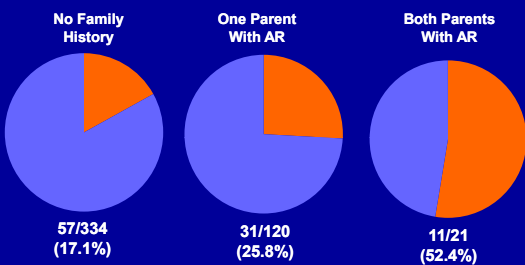
The Allergy Report. Vol. 1; 2000. Dykewicz MS, et al. Ann Allergy Asthma Immunol. 1998;81(5 pt 2):478-518.

Medical History and Physical Examination Are Essential for Diagnosis of AR

- Detailed and accurate history critical to proper diagnosis and successful treatment
 - Time course: onset, pattern
 - Symptoms
 - Effect of previous treatments (Rx and OTC)
 - Sequelae and comorbidities
 - Family history
- Physical exam: more than the nose

The Allergy Report. Volume II; 2000.

Impact of Family History on Diagnosis of AR



Total, N = 816
 No allergic diseases, n = 449 (some children had more than one allergic disease)
 Rhinitis, n = 99
 Gerrard JW, et al. *Ann Allergy.* 1976;36:10-15.

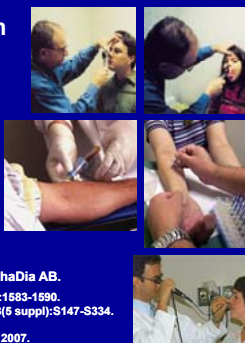
Physical Examination Should Include an Expanded HEENT Exam

Skin:	Eczema, excoriation, "shiners," Dennie-Morgan lines
Eyes:	Injection, discharge, chemosis
Ears:	Air fluid level, retraction
Nose:	Transverse crease, turbinates, mucosa, discharge, nasal polyps
Oropharynx:	Mouth breathing, palatal arch, postnasal drainage, cobblestoning
Chest:	Wheezing

The Allergy Report. Volume II; 2000. Grayson MH, Korenblat PE. Diagnostic and Therapeutic Principles in Allergy: Physical Examination. Available at: <http://www.mdscape.com>. Accessed August 22, 2007. Quillen DM, Feller DB. Am Fam Physician. 2006;73:1583-1590.

Diagnostic Tests for AR

- General ENT examination
- Allergy tests
 - Skin testing
 - Allergen-specific IgE antibody (RAST, ImmunoCap®)
- Endoscopy referral
 - Rigid
 - Flexible



RAST = radioallergosorbent testing
 RAST and ImmunoCap® are trademarks of Phadia AB.
 Quillen DM, Feller DB. *Am Fam Physician.* 2006;73:1583-1590.
 Bousquet J, et al. *J Allergy Clin Immunol.* 2001;108(5 suppl):S147-S334.
 ImmunoCap® Specific IgE Blood Test. Available at: <http://questdiagnostics.com>. Accessed August 22, 2007.



Allergy Skin Testing

Quillen DM, Feller DB. *Am Fam Physician.* 2006;73:1583-1590.

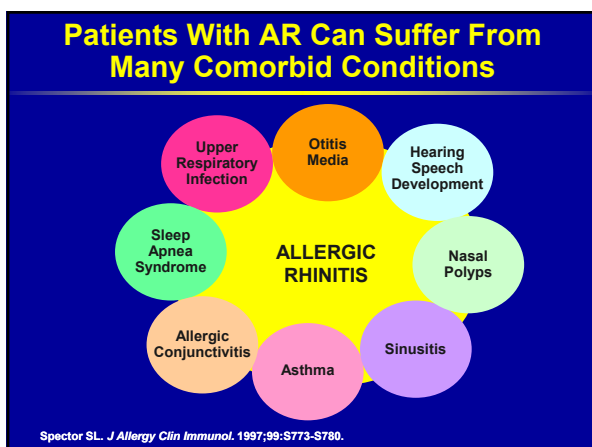
Making the Differential Diagnosis of "Rhinitis"

<p>Acute</p> <ul style="list-style-type: none"> • Viral • Bacterial 	<p>Chronic</p> <ul style="list-style-type: none"> • Seasonal vs. perennial allergic • Chronic infectious rhinosinusitis • Nonallergic • Nonallergic rhinitis with eosinophilia syndrome (NARES) • Vasomotor • Gustatory • Primary atrophic • Rhinitis medicamentosa • Associated with systemic disease • Emotional • Nasal neoplasm • Trauma
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Dykewicz MS, et al. *Ann Allergy Asthma Immunol.* 1998;81(5 pt 2):463-468.

Agenda

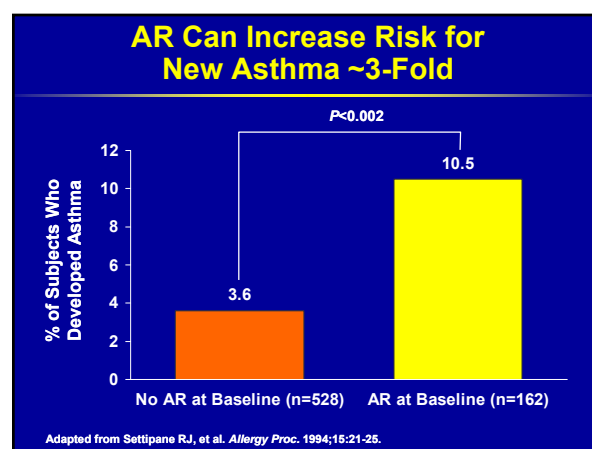
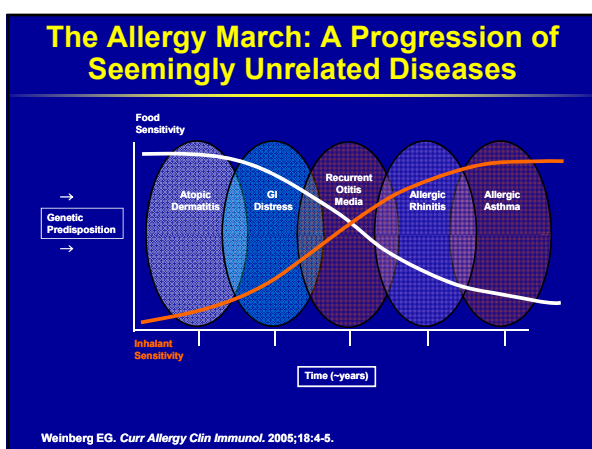
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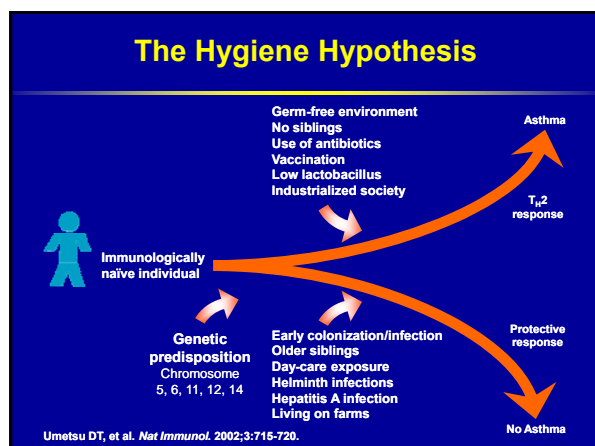


Most Patients With Asthma Have AR

- Approximately 80% of patients with asthma have AR
- Many patients with AR have asthma
- AR is associated with and also constitutes a risk factor for asthma
- Many patients with AR have increased nonspecific bronchial hyperreactivity

ARIA Pocket Guide for Physicians and Nurses, 2001; Leynaert B, et al. *Am J Respir Crit Care Med.* 2000;162:1391-1396.





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Why Aren't Our Patients Doing Better?

- Not seeking appropriate care?
- Therapy not being used?
- Therapy not effective?
- Allergen avoidance too difficult to implement?

Current Treatment Options for SAR and PAR in Adults and Children

- Allergen avoidance
- Environmental control
- Oral H₁-antihistamines
- Intranasal H₁-antihistamines
- Intranasal corticosteroids
- Intranasal cromolyn sodium
- Subcutaneous specific immunotherapy

SAR=seasonal allergic rhinitis; PAR=perennial allergic rhinitis.
Bousquet J, et al. *J Allergy Clin Immunol Suppl.* 2001;108(5 suppl):S147-S334.

Educating the Patient and Caregivers

- Education essential for maximizing compliance and outcome
 - Patient and family should understand the disease, treatment options, and potential side effects
- Consideration of patient preferences in treatment course may enhance compliance
- Follow-up visits provide opportunity for continued education and monitoring

Bousquet J, et al. *J Allergy Clin Immunol.* 2001;108(5 suppl):S147-S334.

Peak Pollen Seasons in the US

Zone	Trees	Grasses	Ragweed
1	March to June	May to August	August to October
2	March to June	May to October	August to October
3	January to May	April to October	July to December (except Florida)
4	February to May and September to January	April to November	August to December (except in the West)
5	March to June	May to October	August to October
6	March to July	May to November	July to November (except in high mountains)
7	April to June	May to September	July to October
8	March to May	May to November	Not serious at any time
9	February to June	May to November	June to November

Fireman P, Jelks M. Allergens. In: Fireman P, Slavov RG, eds. *Atlas of Allergies*. Philadelphia, Pa: JB Lippincott; 1991:2.4-2.5.

Allergen Avoidance Can Be Challenging

- Should be key to the successful management of AR

BUT...

- Often difficult to implement
- May be impractical
- Restricts daily social activities and children's play

Meltzer EO. *Allergy Asthma Proc.* 2006;27:2-8.
van Cauwenberge P, et al. *Allergy.* 2000;55:116-134.

Environmental Control Measures: Minimizing House Dust Mites

- Vigorous methods necessary; ordinary vacuuming/dusting have little effect
- Strategies for avoiding house mites
 - Encase mattress, pillow, and quilt in impermeable covers
 - Use a vacuum cleaner with a HEPA filter
 - Replace carpets with linoleum or wood, when possible
 - Replace curtains with blinds
 - Hot wash/freeze soft toys
- Use simple furnishings
 - Minimize use of upholstered furniture
 - Especially in bedrooms, family rooms
 - Plastic, leather, wood products are best
- Control humidity levels (<40%)



Bousquet J, et al. *J Allergy Clin Immunol.* 2001;108(5 suppl):S147-S334.
van Cauwenberge P, et al. *Allergy.* 2000;55:116-134.

Measures for Reducing Animal Allergens

- The ideal solution: remove pets from house
- If not possible:
 - Keep pet out of bedroom
 - Use HEPA air filtering system
 - Remove carpet and other reservoirs for allergens from bedroom
 - Encasing on mattress, box springs, and pillow
 - Wash pet weekly



van Cauwenberge P, et al. *Allergy.* 2000;55:116-134.
Bousquet J, et al. *J Allergy Clin Immunol.* 2001;108(5 suppl):S147-S334.

Cat (*Fel d 1*) Allergen Can Cause More Sensitization Than House Mites

- Unlike dust mite allergen
 - Remains airborne
 - "Sticky": binds to walls and other surfaces in buildings
- Detected in homes and buildings without cats
 - Classrooms had allergen levels that could induce sensitization
- As little as 8 µg/g fine dust may trigger sensitivity
- May take months for all allergens to decompose

Munir AK, et al. *Allergy.* 1993;48:158-163.
van Cauwenberge P, et al. *Allergy.* 2000;55:116-134.

Pharmacologic Options in AR: Antihistamines

Competitive antagonists of H₁-mediated effects

Sedating

- Chlorpheniramine, diphenhydramine, hydroxyzine
- Relieve rhinorrhea, pruritus, sneezing, and ocular symptoms
- Use limited by sedation, performance impairment, and anticholinergic effects

Nonsedating/Low-sedating

- Azelastine, cetirizine, desloratadine, fexofenadine, loratadine, levocetirizine, olopatadine
- Equally efficacious compared with sedating antihistamines
- Lack prominent CNS and anticholinergic effects
- Nonsedating: desloratadine, fexofenadine, loratadine
- Mildly sedating: cetirizine

Simons FER. *N Engl J Med.* 2004;351:2203-2017; Dykewicz MS, et al. *Ann Allergy Asthma Immunol.* 1998;81(5 pt 2):463-468; Dykewicz MS. *J Allergy Clin Immunol.* 2003;111:S520-S529.

Pharmacologic Options in AR: Decongestants

- Oral: phenylephrine, pseudoephedrine
- Intranasal: phenylephrine, xylometazoline, oxymetazoline
- α-adrenergic agents
 - Stimulate receptors to induce local vasoconstriction
 - Decrease blood volume in the nasal mucosa capacitance vessels
 - Reduce blood supply to mucosa
- Decrease mucosal edema
- Improve nasal patency

Bousquet J, et al. *J Allergy Clin Immunol.* 2001;108(5 suppl):S147-S334.
Dykewicz MS, et al. *Ann Allergy Asthma Immunol.* 1998;81(5 pt 2):478-518.
Dykewicz MS. *J Allergy Clin Immunol.* 2003;111:S520-S529.

Pharmacologic Options in AR: Intranasal Corticosteroids

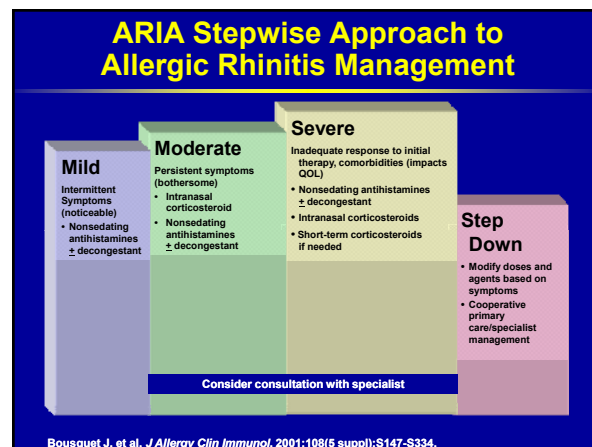
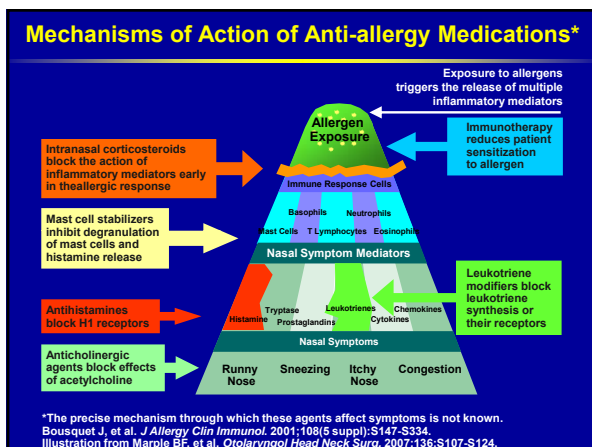
- **Topical agents**
 - Beclomethasone dipropionate
 - Budesonide
 - Flunisolide
 - Fluticasone furoate, fluticasone propionate
 - Mometasone furoate
 - Triamcinolone acetonide
- Produce anti-inflammatory effect by reducing number of eosinophils, basophils, T cells, and mast cells
- Reduce release of preformed and newly generated mediators
- Can inhibit IgE production

Bousquet J, et al. *J Allergy Clin Immunol*. 2001;108(5 suppl):S147-S334.
 Dykewicz MS, et al. *Ann Allergy Asthma Immunol*. 1998;81:478-518.
 Dykewicz MS. *J Allergy Clin Immunol*. 2003;111:S620-S629.

Pharmacologic Options in AR: Other Agents and Immunotherapy

- **Anticholinergic agents (ipratropium)**
 - Inhibit parasympathetic transmission to nasal submucosal glands and blood vessels
 - Less effective in reducing nasal congestion and sneezing than rhinorrhea
- **Leukotriene modifiers (montelukast)**
 - Inhibit leukotriene receptor activity and synthesis by inflammatory cells
 - Impact inflammatory cells recruited and activated by leukotrienes
- **Cromolyn sodium (intranasal)**
 - Stabilizes mast-cell wall to prevent degranulation
 - May also inhibit activation of inflammatory cells
- **Allergic immunotherapy**
 - Reduces inflammatory response in allergen-specific manner

Bousquet J, et al. *J Allergy Clin Immunol*. 2001;108(5 Suppl):S147-S334; Dykewicz MS, et al. *Ann Allergy Asthma Immunol*. 1998;81:478-518; Philip G, et al. *Clin Exp Allergy*. 2002;32:1020-1028.



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Currently Available Intranasal Corticosteroids

Beclomethasone dipropionate (BDP)	Beconase®, Beconase AQ®
Budesonide (BUD)	Rhinocort Aqua®
Flunisolide	Nasalide®
Fluticasone furoate (FF)	Veramyst™
Fluticasone propionate (FP)	Flonase®
Mometasone furoate (MF)	Nasonex®
Triamcinolone acetonide (TAA)	Nasacort® AQ

What Do We Know About Intra-nasal Corticosteroids?

- Most effective pharmacotherapy for AR
- Control all four major symptoms
 - Sneezing
 - Rhinorrhea
 - Itching
 - Nasal blockage
- Similar in terms of efficacy, safety, and effect on QOL vs. placebo
- Important differences can influence patient preference, compliance, and outcomes
 - Onset and duration of action
 - Magnitude of effect

Dykewicz MS, et al. *Ann Allergy Asthma Immunol.* 1998;81(5 pt 2):478-518; Bende M, et al. *Ann Allergy Asthma Immunol* 2002;88:617-623; Gross G, et al. *Ann Allergy Asthma Immunol.* 2002;89:56-62; Day J, Carrillo T. *J Allergy Clin Immunol.* 1998;102:902-908; Meltzer EO. *Allergy.* 1997;52(suppl 36):33-40.

Most AR Patients Are Satisfied With Their Intra-nasal Corticosteroid

Treatment	Very Satisfied	Somewhat Satisfied
OTC	41%	48%
Any Rx Nasal Spray	49%	39%
Intra-nasal Corticosteroids	50%	40%
Other Rx Medication	52%	38%

Allergies in America™ Executive Summary. Figure 14. Available at: <http://www.myallergiesinamerica.com>. Accessed August 31, 2007.

Intra-nasal Corticosteroids Relieve Most or All Nasal Allergy Symptoms

Relief Level	Percentage
Most	46%
Some	35%
All	15%
None	3%
Not Sure	1%

Allergies in America™ Executive Summary. Figure 15. Available at: <http://www.myallergiesinamerica.com>. Accessed August 31, 2007.

BUD Is as Effective as FP for Control of Nasal Symptoms of SAR

Treatment	% of Patients with Substantial or Total Symptom Control
Placebo	~30%
BUD 128 mcg OD	~85%
BUD 256 mcg OD	~88%
FP 200 mcg OD	~82%

OD = once daily
N = 635
4 to 6 weeks of treatment
Stern MA, et al. *Am J Rhinol.* 1997;11:323-330.

BUD and MF Are Comparably Effective in Reducing Nasal Symptoms of PAR

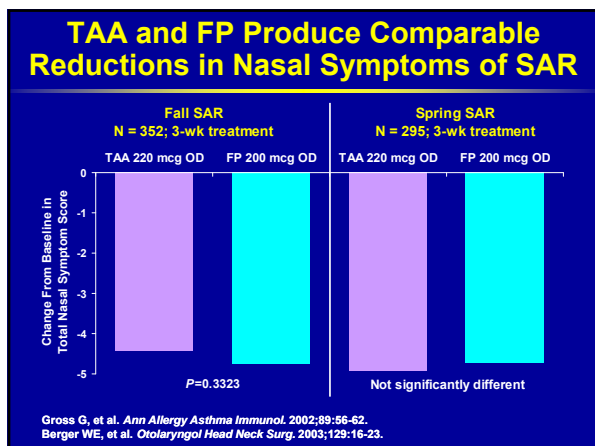
Treatment	Mean Change in Nasal Index Score
Placebo	~-0.4
BUD 128 mcg OD	~-1.2
BUD 256 mcg OD	~-1.2
MF 200 mcg OD	~-1.2

N = 438
4 weeks of treatment
Bende M, et al. *Ann Allergy Asthma Immunol.* 2002;88:617-623.

Both MF and FP Adequately Control Nasal Symptoms of PAR

Treatment	Mean % Reduction From Baseline in Total Nasal Symptom Score
Placebo	~35%
MF 200 mcg OD	~65%
FP 200 mcg OD	~62%

N = 550
Up to 12 weeks of treatment
Mandl M, et al. *Ann Allergy Asthma Immunol.* 1997;79:370-378.



What's New in Intranasal Corticosteroids: Fluticasone Furoate

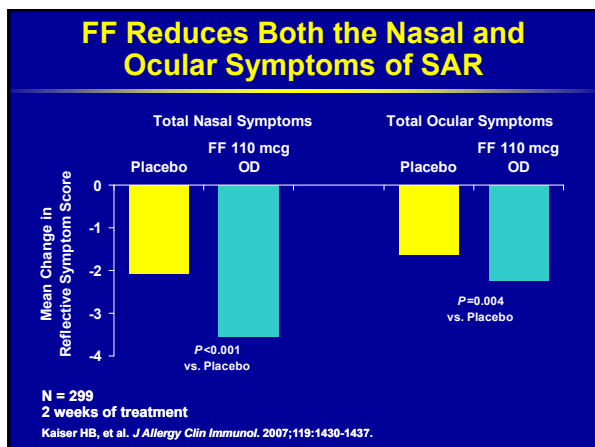
- Pharmacologic/pharmacokinetic properties differ from other glucocorticoids:
 - Highest recorded glucocorticoid receptor affinity
 - Greater respiratory tissue retention
 - Greater inhibition of eosinophilia influx into lung in animal model
- Activity associated with entire molecule; not a prodrug
- Properties of furoate ester:
 - Metabolically stable with no observed metabolism to fluticasone
 - Enhances glucocorticoid activity
 - Occupies a distinct lipophilic pocket in the receptor
- Proven clinical effectiveness for ocular symptoms of AR

Fluticasone furoate (FF)

Fluticasone propionate (FP)

Mometasone furoate (MF)

Salter M, et al. *Am J Physiol Lung Cell Mol Physiol.* 2007 Jun 15; [Epub ahead of print]; Valotis A, Hogger P. *Respir Res.* 2007;8:54; MPR. Available at: <http://prescribingreference.com>.



Unique Delivery System

Fluticasone Furoate

Other Delivery Systems

Cap
Nozzle
Mist Release Button
Window
FRONT BACK

New Delivery System Offers:

- Side actuation
- Drug delivered as fine mist
- Shorter/smaller nozzle

Martin BG, et al. *Allergy Asthma Proc.* 2007;28:216-225.

Intranasal Corticosteroids Improve Rhinoconjunctivitis QOL

- 7-point Likert scale (0 to 6): lower score = better QOL
 - Activities, emotions, practical problems, sleep
 - Eye symptoms, nasal symptoms, non-hay fever problems
- Significantly lower QOL and individual dimension scores with:
 - Budesonide (PAR)
 - FF (SAR)
 - FP (SAR)
 - MF (PAR)
 - TAA (SAR)
- No significant differences among intranasal corticosteroids in QOL improvement

Herman H. *Am J Rhinol.* 2007;21:70-79; Gross G, et al. *Ann Allergy Asthma Immunol.* 2002;89:56-62; Berger WE, et al. *Otolaryngol Head Neck Surg.* 2003;129:16-23; Kaiser HB, et al. *J Allergy Clin Immunol.* 2007;119:1430-1437.

Patients Express Preferences in Intranasal Corticosteroid Treatment

- Studies of sensory attributes
 - Medication running out of nose
 - Sneezing after use
 - Offensive medication odor
 - Treatment-related stinging and/or burning
 - Medication taste
 - Moistness in the nose or throat
- Recommended once-daily starting doses:
 - BUD = TAA > FP = MF
 - No information available on FF

Herman H. *Am J Rhinol.* 2007;21:70-79.

Safety of Intranasal Corticosteroids

- Potential concerns
 - Local adverse effects on nasal mucosa
 - Systemic activity
- Low risk for localized changes in nasal mucosal biopsy studies
 - BUD
 - FP
 - MF
- Low systemic bioavailability = low risk of systemic adverse effects
 - FP
 - MF

van Cauwenberge P, et al. *Allergy*. 2000;55:116-134.
Meltzer EO. *Allergy*. 1997;52(suppl 36):33-40.
Sallib RJ, Howarth PH. *Drug Saf*. 2003;26:863-893.

What About Systemic Corticosteroid Injections?

- IM corticosteroid injections result in prolonged corticosteroid effect, and any adverse effects are difficult to reverse
- There is a risk of avascular necrosis of the femoral head
- Expert groups advise against the use of systemic preparations for AR
- Emphasis is on recognition of AR, and education regarding the early initiation of appropriate therapy, so that treatment failures can be minimized

Nasser SMS, Ewan PW. *BMJ*. 2001;322:1589-1591.
The Allergy Report. Vol. II, 2000.

What Is Allergen Immunotherapy?

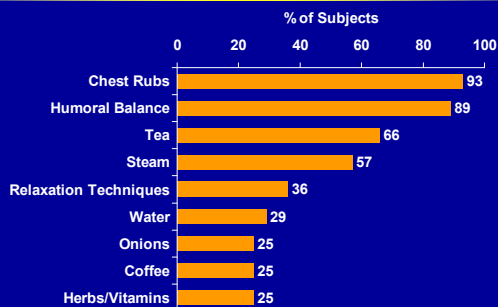
- Desensitization process
 - Includes administration of increasing doses of a specific allergen, over time, to a sensitive individual
 - Increases tolerance for the particular allergen
 - Decreases symptoms when patient comes in contact with particular allergen
 - Effective when optimally administered
- Indicated for patients unresponsive or intolerant to conventional therapy
- Generally not recommended for children <5 yr
- Should be performed by trained personnel in case of anaphylaxis

Dykewicz MS, et al. *Ann Allergy Asthma Immunol*. 1998;81(5 pt 2):478-518.
Management of Allergic Rhinitis and Its Impact on Asthma (ARIA) Pocket Guide, A Pocket Guide for Physicians and Nurses. 2001.

Agenda

- Economic burden of AR
- Impact of AR on quality of life
- Effects of AR symptoms
- Pathophysiology and diagnosis of allergic rhinitis
- Links between AR and asthma
- Practical management of AR
- Focus on intranasal corticosteroids
- **Alternative and emerging strategies**

Patient Preferences for Complementary and Alternative Medicine



George M, et al. *J Gen Intern Med*. 2006 Sep 25; [Epub ahead of print].

Emerging Therapies in AR

- Sublingual immunotherapy
 - Extracts of mite, grass, tree, ragweed allergens
 - More research needed on mechanism of action and long-term benefits
- New nasal antihistamine: olopatadine
- Monoclonal anti-IgE therapy: omalizumab

Passalacqua G, Durham SR. *J Allergy Clin Immunol*. 2007;119:881-891.
Meltzer EO, et al. *Ann Allergy Asthma Immunol*. 2005;95:600-606.
Klunker S, et al. *J Allergy Clin Immunol*. 2007 Jul 11; [Epub ahead of print].

Consider Referral to a Specialist When:

- Symptoms are prolonged
- Symptoms interfere with daily activities, sleep (QOL)
- Patient has a suboptimal response to medications
- Comorbid conditions (asthma, sinusitis, otitis media) are present
- Structural abnormalities exist
- Allergic triggers need to be identified
- Immunotherapy is to be considered
- Oral corticosteroids are required

Bousquet J, et al. *J Allergy Clin Immunol*. 2001;108(5 Suppl):S147-S334.

Summary

- AR may be associated with a substantial economic burden and is a major cause of presenteeism
- AR may have a negative impact on quality of life, resulting in impairments in sleep, cognition, daily activities, work productivity, and learning abilities
- Patients with AR often do not seek adequate treatment for their symptoms
- Despite treatment, many patients with AR experience moderate/severe symptoms
- Intranasal corticosteroids are the most effective class of drugs for the treatment of the four nasal symptoms of AR
- Future therapies for AR should address both nasal and ocular symptoms and produce minimal side effects