Ocular Allergy

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&

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Rutgers University
Disclosures

• Dr. Leonard Bielory:
  - Consultant: Allergan, Bausch and Lomb
  - Clinical Trial: Allergan

• Dr. Paige Wickner:
  - No financial disclosures
  - Clinical trial: Genentech
Case 1

- **Cc:** Itchy eyes
- **HPI:** 37 yo female
  - Progressively worsening seasonal allergies
  - Mid April–mid May extreme ocular itching, congestion, fatigue, sinus headaches
  - Poor relief despite cetirizine, loratidine, naphcon A, azelastine nasal spray, fluticasone nasal spray and ketotifen fumarate drops
  - Wears contacts while at work as a dentist w/ special glasses to visualize root canals
  - Avoids hazelnuts and peaches
Case 1 cont:

- **PmHx:** none
- **Shx:** hamster at home, nonsmoker
- **Fhx:** 2 children in good health, brother and mother with seasonal allergies
- **All:** NKDA
- **Meds:** see HPI
Case 1 cont:

- **Physical Exam:**
  Genl- NAD, pleasant, conversant.
  VSS-
  HEENT-
  Eyes- see photo, allergic shiner, no abnormality with lid eversion
  OP clear without erythema, edema or mucositis, neck supple with no LAD.
  Nares patent, moderate turbinate swelling bl and copious clear rhinorrhea
  CV- RRR, no m/r/g
  Resp- CTA, no ronchi/rales, wheezing
  Abd- soft, NT, ND, no HSM
  Extr- No clubbing/cyanosis or edema
  Skin- areas of dryness with faint erythema in antecubital fossae bl
Photo courtesy of Dr. Michael Raizman
Case 1 question 1:

• What is the most likely diagnosis for this patient?
  a. seasonal allergic rhinoconjunctivitis
  b. perennial allergic rhinoconjunctivitis
  c. vernal keratoconjunctivitis
  d. atopic keratoconjunctivitis
A simple and rapid diagnostic algorithm for the detection of ocular allergic diseases.
Mantelli, Flavio; Lambiase, Alessandro; Bonini, Stefano
Current Opinion in Allergy & Clinical Immunology. 9(5):471-476, October 2009.
DOI: 10.1097/ACI.0b013e3283303ea2

Table 1  Diagnostic features for the different forms of allergic conjunctivitis

<table>
<thead>
<tr>
<th>Feature</th>
<th>SAC</th>
<th>PAC</th>
<th>AKC</th>
<th>VKC</th>
<th>GPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>20–40</td>
<td>20–40</td>
<td>Less than 5 or 20–50</td>
<td>Less than 10</td>
<td>Any</td>
</tr>
<tr>
<td>Sex</td>
<td>M = F</td>
<td>M = F</td>
<td>M more than F</td>
<td>M more than F</td>
<td>M = F</td>
</tr>
<tr>
<td>Season</td>
<td>Spring, fall</td>
<td>Perennial</td>
<td>Any</td>
<td>Spring, fall or perennial</td>
<td>Any</td>
</tr>
<tr>
<td>Red eye</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Itchy eye</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Photophobia</td>
<td>Frequent</td>
<td>Frequent</td>
<td>Constant</td>
<td>Intense</td>
<td>Mucous</td>
</tr>
<tr>
<td>Secretion</td>
<td>Watery</td>
<td>Watery</td>
<td>Variable</td>
<td>Oedema</td>
<td>Filamentary</td>
</tr>
<tr>
<td>Eyelid involvement</td>
<td>Oedema</td>
<td>Oedema</td>
<td>Dermatitis</td>
<td>Oedema</td>
<td>Oedema</td>
</tr>
<tr>
<td>Corneal involvement</td>
<td>No</td>
<td>No</td>
<td>Late severe</td>
<td>Limbal, SPK, shield ulcer (10%)</td>
<td>Uncommon (SPK)</td>
</tr>
<tr>
<td>Papillae</td>
<td>Small</td>
<td>Small</td>
<td>Frequent</td>
<td>Giant</td>
<td>Giant</td>
</tr>
<tr>
<td>Serum IgE</td>
<td>78%</td>
<td>78%</td>
<td>Constant</td>
<td>Variable</td>
<td>Constant</td>
</tr>
<tr>
<td>Eosinophils in scraping</td>
<td>25%</td>
<td>43%</td>
<td>Typical</td>
<td>Typical</td>
<td>Frequent</td>
</tr>
<tr>
<td>Conjunctival goblet cells</td>
<td>Increased</td>
<td>Increased</td>
<td>Reduced</td>
<td>Increased</td>
<td>Variable</td>
</tr>
<tr>
<td>Prick / RAST</td>
<td>+</td>
<td>+</td>
<td>+ (aspecific)</td>
<td>+ (55%)</td>
<td>+/−</td>
</tr>
<tr>
<td>Association with other allergic diseases</td>
<td>Rhinitis</td>
<td>Rhinitis</td>
<td>Dermatitis Asthma Rhinitis</td>
<td>Variable</td>
<td>Rhinitis</td>
</tr>
<tr>
<td>Personal/family history of atopic diseases</td>
<td>Frequent</td>
<td>Frequent</td>
<td>Constant (95%)</td>
<td>Frequent</td>
<td>Frequent</td>
</tr>
<tr>
<td>Response to topical antiallergic drugs</td>
<td>Typical</td>
<td>Typical</td>
<td>Low</td>
<td>Low</td>
<td>Variable</td>
</tr>
<tr>
<td>Response to topical corticosteroids</td>
<td>Constant</td>
<td>Constant</td>
<td>Constant</td>
<td>Constant</td>
<td>Constant</td>
</tr>
</tbody>
</table>

SPK, superficial punctate keratitis.
Table 2. Noninfectious conjunctivitis [7,18,28,29,31,32,34-36].

<table>
<thead>
<tr>
<th>Type</th>
<th>Common ocular features</th>
<th>Related factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAC/PAC</td>
<td>Pruritus, injection, epiphora, chemosis Serous, stringy or mucoid discharge Papillae on superior tarsal conjunctiva ‘Allergic shiners’</td>
<td>Allergic rhinitis Atopy</td>
</tr>
<tr>
<td>VKC</td>
<td>Papillae on superior tarsal conjunctiva Trantas’ dots (Horner’s points) at limbus Ropy, mucoid discharge</td>
<td>Youth and male gender Hot, dry climate ± Atopy</td>
</tr>
<tr>
<td>AKC</td>
<td>Pruritus, burning Atopic dermatitis of eyelids</td>
<td>Atopy</td>
</tr>
<tr>
<td>GPC</td>
<td>Contact lens use Injection, burning, pruritus, increased lens awareness Mucus coating on contact lenses Papillae (&gt; 0.3 mm) on superior tarsal conjunctiva</td>
<td>± Atopy</td>
</tr>
<tr>
<td>TFD</td>
<td>Injection, pruritus/burning, gritty sensation Symptoms that worsen throughout the day</td>
<td>Autoimmune disease (e.g., CVD, RA, SS) Viral disease (e.g., HIV, HCV, CMV) Anticholinergic medication DM Aging, menopause Graphic user interfaces (e.g., computer screens)</td>
</tr>
</tbody>
</table>

AKC: Atopic keratoconjunctivitis; CMV: Cytomegalovirus; CVD: Collagen vascular disease; DM: Diabetes mellitus; GPC: Giant papillary conjunctivitis; PAC: Perennial allergic conjunctivitis; RA: Rheumatoid arthritis; SAC: Seasonal allergic conjunctivitis; SS: Sjögren’s syndrome; TFD: Tear film dysfunction; VKC: Vernal keratoconjunctivitis.
Case 1 question 2

• The major cell involved in the pathogenesis of allergic conjunctivitis is:
  a. eosinophil
  b. neutrophil
  c. mast cell
  d. basophil
Mast cells

- 50 million mast cells in the eye
- In healthy eye, most in substantia propria
- In allergic state, in more superficial layers
- Eye rubbing degranulates mast cells

Greiner, 1985

Slide courtesy of Dr. Stephen Foster, MERSI
Table 5. Differential Diagnosis of Conjunctivitis.

<table>
<thead>
<tr>
<th>Predominant Cell Type(s)</th>
<th>Signs</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chemosis</td>
<td>Lymph Node</td>
</tr>
<tr>
<td>Allergic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAC</td>
<td>Mast cell, EOS</td>
<td>+</td>
</tr>
<tr>
<td>PAC</td>
<td>Mast cell, EOS</td>
<td>+/−</td>
</tr>
<tr>
<td>VKC</td>
<td>Lymph, EOS</td>
<td>+/−</td>
</tr>
<tr>
<td>AKC</td>
<td>Lymph, EOS</td>
<td>+</td>
</tr>
<tr>
<td>GPC</td>
<td>Lymph, EOS</td>
<td>+/−</td>
</tr>
<tr>
<td>Infectious</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacterial</td>
<td>PMN</td>
<td>+/−</td>
</tr>
<tr>
<td>Viral</td>
<td>PMN, mono, lymph</td>
<td>+/−</td>
</tr>
<tr>
<td>Chlamydial</td>
<td>Mono, lymph</td>
<td>+/−</td>
</tr>
<tr>
<td>Immunologic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact dermatococonjunctivitis</td>
<td>Lymph</td>
<td>−</td>
</tr>
<tr>
<td>Angioedema</td>
<td>Mast cell</td>
<td>++</td>
</tr>
<tr>
<td>Staphylococcal blepharitis</td>
<td>Mono, lymph</td>
<td>+/−</td>
</tr>
<tr>
<td>Nonspecific</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tear film dysfunction</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Corneal abrasion</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Chemical</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Nasolacrimal obstruction</td>
<td>PMN if secondary infection</td>
<td>−</td>
</tr>
</tbody>
</table>

Abbreviations: AC, allergic conjunctivitis; AKC, atopic keratoconjunctivitis; EOS, eosinophils; GPC, giant papillary conjunctivitis; PAC, perennial allergic conjunctivitis; PMN, polymorphonuclear leukocytes; SAC, seasonal allergic conjunctivitis; VKC, vernal keratoconjunctivitis. *If cornea is involved.
Case 1 wrap up:

- Skin testing showed positives to:
  - prick level: weed mix, cat, ragweed, tree, alternaria, mugwort, oak, birch
  - intradermal level: grass mix, plantain, penicillium, dog
- Patient begun injection immunotherapy with significant improvement in subsequent spring
Case 2:

- **CC**: sent from the ophthalmologist for assistance
- **HPI**: 21 yo male severe eye disease past 2 years.
  - Visual acuity has fluctuated
  - Extreme pruritus, periorbital rash which has failed to respond to multiple medications
  - Symptoms began in L eye with discharge and a droopy eyelid
  - No contact lens use past 9 months.
  - Symptoms improve significantly when he is in Boston as opposed to his home in North Carolina.
- **ROS**: discomfort, itching, mucoid discharge, redness, photophobia, dyspnea
Case 2 cont.

- **PMhx:**
  - eczema - poor sleep due to pruritis
  - asthma - poorly controlled on mometasone furoate and formoterol fumarate dihydrate (Dulera) with daily albuterol use
  - active tobacco use (2 pack years)
  - allergic rhinitis - on IT x 9 months to trees, dust and pollen with outside allergist in NC
Case 2 cont:

- **Shx:** Active duty in army in NC x 1.5 years, no pets at home. Has only lived in US.
- **Fhx:** Mother, sister and grandparents w/ environmental allergies and asthma. Arthritis in mother and grandparents.
- **All:** NKDA
- **Meds:** Cyclosporine 100mg QAM/50mg hx x 3-4 months, sirolimus 4mg daily x 3-4 months, cetirizine 10mg BID, monteleukast 10mg daily, triamcinolone 0.1% topical therapy
Case 2 cont:

- **Physical Exam:**
  Genl- NAD, pleasant, conversant. Speaks in a manner that seems almost restricted by facial tightening of skin
  HEENT- Eyes: see photos OS: 3+ giant papillae, OS cornea: superficial punctate keratitis centrally around 2 o’clock, limbal hypertrophy
  OP clear without erythema, edema or mucositis, neck supple with no LAD. Nares patent, mild mucosal irritation and scant clear rhinorrhea
  Resp- CTA, no ronchi/rales, wheezing
  Skin- eczematous patches behind knees bl and in antecubital fossa. Evidence of excoriation without superinfection

- **Labs/Data:**
  - IgE 1001, nl CBC, nl PFTs
  - ANA negative, SS-A, SSB negative
  - Patch test (TRUE test) negative except mild positive to thimerosal
Photo courtesy of Dr. Michael Raizman, M.D.
Case 2 question 1

- Which of the following is an indication to refer to ophthalmology?
  a. Pain
  b. Photophobia
  c. Lack of red reflex
  d. Initiation of long term steroids
  e. All of the above
Case 2 cont:

- Additional opthalmic medications tried: alcaftadine, acetylcysteine, elestat, patanol, cromolyn, bepreve, durezol and predfort
- He has received injections of supratarsal Kenalog starting Aug 2011
Case 2 question 2:

- Which one of these ocular agents is a pure antihistamine?
  a. levocabastine
  b. olpatadine
  c. ketotifen
  d. azelastine
# Table of ocular therapies

<table>
<thead>
<tr>
<th>Therapeutic Intervention</th>
<th>Clinical Rationale</th>
<th>Pharmaceutical Agents</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoidance</td>
<td>Effective, simple in theory, typically difficult in practice</td>
<td>NA</td>
<td>&gt;30% symptom improvement</td>
</tr>
<tr>
<td>Cold compresses</td>
<td>Decrease nerve C-fiber stimulation, reduce superficial vascodilation</td>
<td>NA</td>
<td>Effective for mild-to-moderate symptoms</td>
</tr>
<tr>
<td>Preservative-free tears</td>
<td>Lavage, dilutional effect</td>
<td>Artificial tears</td>
<td>Extremely soothing, recommend refrigeration to improve symptomatic relief, inexpensive OTC, safe for all ages, comfortable, use as needed</td>
</tr>
<tr>
<td><strong>Secondary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Topical antihistamine and decongestants</td>
<td>Antihistamine relieves pruritus, vasoconstrictor relieves injection</td>
<td>Antazoline/pheniramine</td>
<td>No prescription required, quick onset, more effective than systemic antihistamines, limited duration of action, frequent dosing required</td>
</tr>
<tr>
<td>Topical antihistamine and mast cell stabilizer</td>
<td>Single agent with multiple actions, has immediate and prophylactic activity, eliminates need for 2-drug therapy, comfort enhances patient compliance</td>
<td>Olopatadine/azelastine/epinastine/oriptopine/alfaclidine</td>
<td>Twice daily dosing, dual acting agents, antihistamine, mast cell stabilizer, inhibitor of inflammatory mediators, more effective at relieving symptoms than other classes of agents, longer duration of action, safe and effective for 3 years and older</td>
</tr>
<tr>
<td><strong>Tertiary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Topical mast cell stabilizers</td>
<td>Safe and effective for allergic diseases, specially those associated with corneal changes</td>
<td>Cromolyn/iodoamide</td>
<td>Cromolyn relieves mild-to-moderate symptoms of vernal keratoconjunctivitis, vernal conjunctivitis, vernal keratitis. Iodoamide is highly potent.</td>
</tr>
<tr>
<td>Topical antihistamines</td>
<td>Relieves signs and symptoms of pruritus and erythema</td>
<td>Levocabastine/medastin</td>
<td>Dosing 1–4x daily, safe and effective for ages 3 years and older</td>
</tr>
<tr>
<td>Topical NSAIDs</td>
<td>Relieves pruritus</td>
<td>Ketorolac/Acular</td>
<td>Stinging and/or burning on instillation experienced up to 40% of patients</td>
</tr>
<tr>
<td><strong>Ancillary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral antihistamines</td>
<td>Mildly effective for pruritus</td>
<td>Loratadine/lexofenadine/orizinate</td>
<td>May cause dry eyes, worsening allergy symptoms; may not effectively resolve the ocular signs and symptoms of allergy</td>
</tr>
</tbody>
</table>

**Abbreviations:** NSAID, nonsteroidal anti-inflammatory drug; NA, not applicable; OTC, over the counter.
AC Patients Often Report Both Ocular Itching and Dryness

Pts. With Clin. Signif. Itching (n = 194)

Pts. With Clin. Signif. Dryness (n = 247)

N = 112 (57.7%)

Approx 60% of patients reporting clinically significant itching also reported clinically significant dryness

Approx 45% of patients reporting clinically significant dryness also reported clinically significant itching.


Pts. With Clin. Signif. Itching (n = 194)

Pts. With Clin. Signif. Dryness (n = 247)

N = 112
(45.3%)
Patients with a history of AC...

• Approx. 40% may report clinically significant symptom of dryness

• Approx. 60% of patients with clinically significant itch may also report clinically significant dryness

Case 3

- **Cc:** swollen and red eyes
- **HPI:** 46 yo female
  - Lifelong history of asthma
  - Animal dander sensitivities s/p IT in high school
  - Significant worsening of periorbital redness and swelling since delivering her triplets 7 years ago
  - Patient has been tried on antihistamines including doxepin and hydroxyzine, multiple courses of systemic steroids, topical steroids and local steroid injections without relief of symptoms.
  - She feels her symptoms flare around her menstrual cycles
- **ROS:** pruritus, burning, stinging of eyes, emotional distress over appearance
Case 3 cont:

- **PmHx:**
  - PCOS
  - Hashimoto’s thyroiditis
  - Eczema - see HPI
  - Allergic rhinitis - s/p IT to animal dander, mild fall symptoms
  - Asthma - last hospitalization in college, maintained on advair
  - Pre-eclampsia during delivery of triplets
Case 3 cont:

• **Soc Hx:** Relocated during her pregnancy. No pets. No smoking. Works playing the horn.

• **Fam Hx:**
  - three 7-year-old sons with asthma
  - mother with RA
  - father with eczema, Guillain-Barre syndrome.

• **All:** NKDA

• **Meds:** cefadroxil 500 mg b.i.d. (x1 week), CellCept 1500 mg b.i.d. (x3 weeks), desoximetasone 0.05% cream as directed, hydrocortisone butyrate 0.1% b.i.d., hydroxyzine 25 mg to 50 mg at bedtime, and prednisone 20 mg QD, UV therapy
Case 3 cont:

- **PE notable for:**
  Eyes- see photos, sclerae anicteric, PERRL, lid inversion normal
  Nares patent
  Resp- CTA, no ronchi/rales, wheezing
  Skin- supra and infraorbital mild edema OU, well demarcated peri orbital erythema

- **Labs:**
  - Chem 20, CPK nl, ANA nl
  - CBC with differential unremarkable, absolute eosinophils 520
  - IgE 225, remainder of immunoglobulins and SPEP wnl
  - HIV negative, flow cytometry normal cell subsets
Photos courtesy of Dr. Michael Raizman, M.D.
Case 3: Question 1

• What would you do next?
  a. skin test for environmental allergens
  b. increase immunosuppression
  c. patch test
  d. skin test for progesterone hypersensitivity
Patch testing

- Results of patch testing at 96 hours are as follows:
  - Cosmetic Series: 1+ octyl gallate, ?dodecyl gallate.
  - Bakery Series: 1+ vanillin.
  - Textile Series: No positives.
  - Dental Series: No positives.
### Percutaneous (Prick) Allergy Test

**Date:** 02-14-**MD:** Wicken, RN: Murchison

**MAOI or beta-blocker use?** Y N

**Start time of the test:** 10:30 AM

**Abbreviations:**
- HS= Hollister Stier
- BWH= Brigham and Women's Hospital
- Device: HS Quintest

<table>
<thead>
<tr>
<th>Substance</th>
<th>D. Farinae HS 30,000 AU/ml</th>
<th>D. Pteronyssinus HS 30,000 AU/ml</th>
<th>Grass Mix #4 HS 100,000 BAU/ml</th>
<th>Plantain HS 1:20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control HS</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>N</td>
</tr>
<tr>
<td>P. Ocellatum</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hormodendrum</td>
<td></td>
<td>X</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Control HS 6806 FD</td>
<td></td>
<td>X</td>
<td>X</td>
<td>N</td>
</tr>
<tr>
<td>Cat Pelt HS 10,000 BAU/ml</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Dog Hair/Dander</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Cat Pelt</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Alternaria</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Histamine</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

**Results:**
- Environmental control discussed
- MD reviewed with patient

### Intradermal Allergy Test

**Date:** 02-14-**MD:** Wicken, RN: Murchison

**MAOI or beta-blocker use?** Y N

**Start time of the test:** 11:10 AM

**Abbreviations:**
- HS= Hollister Stier
- BWH= Brigham and Women's Hospital

<table>
<thead>
<tr>
<th>Substance</th>
<th>D. farinae HS 300 AU/mL</th>
<th>D. Pteronyssinus HS 300 AU/mL</th>
<th>Grass Mix #4 HS 1,000 BAU/mL</th>
<th>Plantain HS 500 PNU/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control HS</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>P. Ocellatum</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Hormodendrum</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lamb's Quaker Weed</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Cat Pelt</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Dog Hair/Dander</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Feather Mix</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mugwort HS 1:20</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>B HW Tree Mix</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Alternaria</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Histamine</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Oak</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Birch</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Aspergillus fum</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Results:**
- Longest diameter of wheal (W) and flare (F) measured in millimeters at 15 minutes.
- N indicates negative
- Line through box indicates test not performed

**Medical Record Copy**

06/01/14 (6/1)
Skin Testing

Prick

- Histamine
  - Time: 9:10
  - Control: N

- Prapagestone, Benzyl Alcohol
  - Time: 50 x 10^4
  - Control: N

Intradermal

- Control
  - Time: 10:10
  - N

- Prapagestone: 1:100
  - Time: 10:20
  - N

- Benzyl Alcohol
  - Time: 10:20
  - N

- Prapagestone: 1:10
  - Time: 10:55
  - N

- Benzyl Alcohol
  - Time: 10:55
  - N

Reviewed by: MD

RN: [Signature]
Case 3 outcome/follow up

• Started Xolair
• Able to wean off of prednisone
• Continues on cellcept, topical therapies
• Considering starting immunotherapy although rhinitis symptoms and asthma at present well controlled