More Than Skin in the Game - The Pharmacists Role in Treating Psoriasis and Psoriatic Arthritis
Geoffrey Wall, PharmD, FCCP, BCPS

Home Study Webcast Activity Handout
4 slides per page
More Than Skin in the Game –

The Pharmacists Role in Treating Psoriasis and Psoriatic Arthritis

ACTIVITY DESCRIPTION
Psoriasis is more than just a cosmetic skin disease. Psoriasis is a distressing and painful autoimmune disease associated with significant emotional and physical daily burden. Over time, psoriasis can lead to other serious conditions such as diabetes, heart disease, depression, and psoriatic arthritis (PsA). As many as 30% of psoriasis patients develop psoriatic arthritis. Even with a wide range of pharmacologic options available, evidence indicates that treatment remains inadequate and patient satisfaction low. This knowledge-based activity will review the pathophysiology of psoriasis and PsA, compare and contrast the current and emerging treatment options and identify opportunities for pharmacists to improve the patient care, satisfaction with care and outcomes.

TARGET AUDIENCE
The target audience for this activity is pharmacists, pharmacy technicians, and nurses in hospital, community, and retail pharmacy settings.

LEARNING OBJECTIVES
After completing this activity, the pharmacist will be able to:
• Outline the etiology and pathophysiology for plaque psoriasis and psoriatic arthritis (PsA).
• Compare and contrast the current and emerging targeted therapies for psoriasis and PsA.
• Identify the pharmacist's role in educating patients on the disease, adverse effect management, expectations of therapy, and the importance of adherence in patient satisfactions and outcomes.

After completing this activity, the pharmacy technician will be able to:
• Identify the causes and presentation of plaque psoriasis and psoriatic arthritis (PsA).
• Compare and contrast the current and emerging targeted therapies for psoriasis and PsA.
• Identify referral opportunities for pharmacist consultation regarding the disease, adverse effect management, expectations of therapy, and the importance of adherence in patient satisfactions and outcomes.

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Dr. Geoffrey C. Wall is a Professor, Department of Clinical Sciences, College of Pharmacy at Drake University and Director of the Drake Drug Information Center. His clinical practices include the Internal Medicine and Medical Intensive Care Teaching Services at Iowa Methodist Medical Center in Des Moines, IA. Dr. Wall received his Bachelor of Science in Pharmacy from the University of Utah in 1992 and his Doctor of Pharmacy from Idaho State University in 1998. He completed an ASHP-accredited Internal Medicine Specialty Residency at Scott and White Memorial Hospitals and Clinics in 1999. He is Board-Certified in Pharmacotherapy. He is a Fellow of the American College of Clinical Pharmacy. Dr. Wall has written a number of peer-reviewed papers and textbook chapters on a variety of topics, and has designed or participated in several clinical trials. His research interests include drug treatment of gastrointestinal disorders, clinical evaluation of drug allergy, pulmonary pharmacotherapy, and rheumatologic disorders.

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More than Skin in the Game –
The Pharmacists Role in Treating Psoriasis and Psoriatic Arthritis

Educational Objectives

- Outline the etiology and pathophysiology for plaque psoriasis and psoriatic arthritis (PsA).
- Compare and contrast the current and emerging targeted therapies for psoriasis and PsA.
- Identify the pharmacist’s role in educating patients on the disease, adverse effect management, expectations of therapy, and the importance of adherence in patient satisfactions and outcomes.

What Is Psoriasis?

- A common, genetic, autoimmune skin disease
- Characterized by well-circumscribed areas of thick, red, scaly skin
- From the Greek “psoros” meaning “rough, scabby”
- Term first used (along with “lepra”) by Hippocrates (460-377 BC) in Corpus Hippocraticum
- von Hebra first to distinguish psoriasis from leprosy in 1841
Scope of Psoriasis

- 5 million to 7 million Americans have it
- 150,000 to 260,000 new cases/year – mean age at presentation is 28 years
- 1.7 million treated – 600,000 of them for moderate/severe disease
- 400 psoriasis-related deaths/year
- (toxicity of medications > suicide)

US Economic Burden of Psoriatic Disease

- An estimated $135 billion per year (2013 US dollars)
  - $63.2 billion of direct costs
  - $35.4 billion of indirect costs
  - $36.4 billion due to medical comorbidities
- Main direct/indirect drivers of cost:
  - Medical appointments and treatments
  - Reduced work productivity (absenteeism and presenteeism)
  - Treatment of comorbidities
  - Reduced quality of life
- Long-term cost-effectiveness models for systemic and biologic drugs are needed to develop algorithms for treatment selection
- Research gap: cost-effectiveness of therapies and accounting for all relevant aspects of disease burden

Psychosocial Burden of PsO

- Depression/anxiety (body image concerns, social stigmatization)
- Sleep disorders
- Suicidal ideation
- Occupational productivity disruptions
- Cognition and pain nociception
  - Pain and depression (when reported as concomitant concerns) are more predictive of increased disability and reduced quality of life in rheumatic diseases than radiographic joint damage and disease activity

Functional Effects of Psoriasis Comparisons With Other Diseases

<table>
<thead>
<tr>
<th>Mental Functioning</th>
<th>Physical Functioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>Congestive Heart Failure</td>
</tr>
<tr>
<td>Lung Disease</td>
<td>Psoriasis</td>
</tr>
<tr>
<td>Psoriasis</td>
<td>Type 2 Diabetes</td>
</tr>
<tr>
<td>Arthritis</td>
<td>Lung Disease</td>
</tr>
<tr>
<td>Congestive Heart Failure</td>
<td>Myocardial Infarction</td>
</tr>
<tr>
<td>Heart Failure</td>
<td>Arthritis</td>
</tr>
<tr>
<td>Myocardial Infarction</td>
<td>Depression</td>
</tr>
<tr>
<td>Type 2 Diabetes</td>
<td></td>
</tr>
<tr>
<td>Healthy Adults</td>
<td>Healthy Adults</td>
</tr>
</tbody>
</table>

N=317 patients with psoriasis and 826 patients with other chronic diseases. SF-36, short-form health survey with 36 questions (lower scores indicate worse patient-reported outcomes).


PsO/PsA: Classification and Pathophysiology

PsO Coverage and Severity

Comorbidities Associated with PsO

1. Obesity/metabolic syndrome
2. Psoriatic arthritis (PsA)
3. Autoimmune diseases
4. Psychiatric diseases
5. Cardiovascular disease
6. Sleep apnea

➢ All statistically validated

Comorbidities Associated with PsO

7. Renal disease
8. Personal behaviors (eg, smoking)
9. Cancer/lymphoma
10. Nonalcoholic steatohepatitis (NASH)
11. Chronic obstructive pulmonary disease (COPD)
12. Increased mortality

➢ All statistically validated
PsO is a Systemic Disease with Multiple Cardiovascular and Metabolic Comorbidities

3 KEY POINTS:
- Patients with moderate to severe PsO have a reduced life expectancy of approximately 5 years because of CVD
- Increased prevalence of traditional CV risk factors:
  - Hypertension
  - Cigarette smoking
  - Dyslipidemia
  - Diabetes mellitus
  - Obesity
- Systemic inflammation plays a role in the development of CVD, as happens in other diseases, such as rheumatoid arthritis (RA)

PsO and the Metabolic Syndrome: Clinical Trial Phase II+III Data

- 9 Phase II and III studies evaluated PsO
- 5 pharmaceutical companies provided data
- Total subjects enrolled: 10,722

Findings:
- Mean age: 44.7 ± 12.3 years
- 67.2% male
- Avg. weight = 90 kg
- Avg. BMI = 30.6 kg/m²

Underlying Causes of Death for Patients with PsO

<table>
<thead>
<tr>
<th>Cause of Death, n=418*</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circulatory System Disease</td>
<td>163</td>
<td>39.0</td>
</tr>
<tr>
<td>Neoplasm</td>
<td>119</td>
<td>28.5</td>
</tr>
<tr>
<td>Respiratory System Disease</td>
<td>31</td>
<td>7.4</td>
</tr>
<tr>
<td>Digestive/Nutritional/Metabolic Disorder</td>
<td>21</td>
<td>5.0</td>
</tr>
<tr>
<td>Gastrointestinal Disease</td>
<td>17</td>
<td>4.1</td>
</tr>
<tr>
<td>Injury, Poisoning, or Other Certain External Causes of Death</td>
<td>15</td>
<td>3.6</td>
</tr>
<tr>
<td>Gastrointestinal Disease</td>
<td>11</td>
<td>2.6</td>
</tr>
<tr>
<td>Nervous System/Sense Organs Disease</td>
<td>10</td>
<td>2.4</td>
</tr>
<tr>
<td>Infectious Disease</td>
<td>9</td>
<td>2.2</td>
</tr>
<tr>
<td>Mental Disorder</td>
<td>8</td>
<td>1.9</td>
</tr>
<tr>
<td>Musculoskeletal System/Connective Tissue Disease</td>
<td>6</td>
<td>1.4</td>
</tr>
<tr>
<td>Other**</td>
<td>4</td>
<td>1.0</td>
</tr>
</tbody>
</table>

*Among 9499 individuals noted to have PsO there were 1611 individuals identified. Using Statistics Canada mortality file for 1993–2005, it was possible to determine underlying cause of death for 418 (74.5%) of these individuals.

Case 1.1

This is NOT a poll question

- You work as a pharmacist for a large PBM that works with insurance companies that cover approximately 150,000 patients. One of your jobs includes reviewing PA requests and today you are going over a request by a Dermatologist who is requesting secukinumab for a PsO patient. The patient apparently has had significant PsO for over 2 decades with between 25 and 50% of her BSA covered by PsO lesions. She has gained 35 pounds in the last 5 years and has just been diagnosed with diabetes type 2 and hypertension. She is currently taking metformin, prednisone 10mg daily and lisinopril.
Case 1.2

This is NOT a poll question

- According to the record she has tried and failed numerous medications for PsO including topical steroids, phototherapy, methotrexate (severe nausea prevents her from taking the MTX pills), etanercept and adalimumab.
- Reviewing the literature you find that secukinumab was superior to etanercept in PASI 75 scores. No pharmacoeconomic studies exist comparing the cost effectiveness of secukinumab to other therapies.

What should you recommend be done with this PA?
- A. Allow the use of secukinumab
- B. Recommend use of infliximab instead
- C. Deny use of secukinumab until PE studies are completed

Case 1.3

This is NOT a poll question

- What if a study found a net 0.25 QALY gain of secukinumab over etanercept at the same cost?
- Are patients with PsO at higher risk for CAD than controls? Does controlling PsO symptoms decrease their risk for CAD?
- How can excessive nausea with oral MTX be treated?

Psoriatic Arthritis (PsA)

- Affects approximately 6%–40% of patients with psoriasis, depending on population
- Typically develops 7–10 years after psoriasis onset

Psoriatic Arthritis

<table>
<thead>
<tr>
<th>Clinical Feature</th>
<th>Psoriatic Arthritis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Males=Females</td>
</tr>
<tr>
<td>Most common joint pattern</td>
<td>Oligoarticular/polyarticular (asymmetric)</td>
</tr>
<tr>
<td>DIP joint</td>
<td>High</td>
</tr>
<tr>
<td>Dactylitis</td>
<td>High</td>
</tr>
<tr>
<td>Enthesitis</td>
<td>Medium</td>
</tr>
<tr>
<td>Spondylitis</td>
<td>Medium</td>
</tr>
<tr>
<td>Sacroiliitis</td>
<td>Asymmetric</td>
</tr>
<tr>
<td>Eye symptoms</td>
<td>Low</td>
</tr>
<tr>
<td>Skin/nail lesions</td>
<td>High</td>
</tr>
<tr>
<td>Rheumatoid factor positive</td>
<td>Does not occur</td>
</tr>
</tbody>
</table>

Psoriatic Arthritis (PsA)

Onset:
- Onset occurs in patients between 30–50 years of age
- PsO usually precedes onset of PsA by an average of 5–10 years in approximately 80% of patients
- PsA can precede the development of PsO in approximately 10% of cases by as much as 10–15 years
- Simultaneous onset of both PsA and PsO occurs in up to 11%–15% of patients
- What is the true incidence of PsA in the PsO population?
  - 20%? 30%? 40%?

The Many Faces of PsA

- Dactylitis
- Enthesitis
- Skin and Joints
- Arthritis Mutilans

Joint disease usually presents 5–10 years after skin. Dermatologists invariably see these patients first!

PsA Subtypes

1. Dactylitis
   - Diffuse swelling of a digit may be acute, with painful inflammatory changes or chronic changes where the digit remains swollen despite the disappearance of acute inflammatory changes
   - Also referred to as “sausage digit”
   - Recognized as one of the cardinal features of PsA, occurring in up to 40% of patients
   - Affects fingers and toes equally

PsA Subtypes

2. Asymmetric Oligoarthritis
   - Prevalence varies from 14%–70%
   - Pattern most commonly seen at presentation

PsA Subtypes

3. Symmetric Arthritis
   - The prevalence varies from 3%–63%
   - Smaller joints of the hands and feet, in addition to larger joints, are involved
   - Female predominance
   - Difficult to clinically differentiate from RA
   - Patients demonstrate greater evidence of erosions
PsA Subtypes

4. DIP Joint Arthritis
- DIP joint involvement occurs in PsA more frequently than in other forms of inflammatory arthritis
- DIP-predominant arthritis affects an estimated 1%–16% of patients with PsA
- Frequently associated with dactylitis and nail dystrophy

Image used with permission from Dr. Alan Menter.

Note: These 5 subtypes frequently co-exist in combination.

PsA Subtypes

5. Arthritis Mutilans
- Affects an estimated 5% of PsA cases
- Female preponderance
- Associated with long disease duration
- Telescoping digits and flail joints are associated with extensive osteolysis and joint instability

PsA and Enthesopathy

- Entheses are the regions at which a tendon, ligament, or joint capsule attaches to bone
- Overexpression of TNF-α, conceivably induced by microtrauma, a subclinical infection, or both, leads to osteitis and enthesal inflammation

Guidelines of Care for the Management of Psoriasis and Psoriatic Arthritis
A. Menter, Chair
Pediatric Plaque Psoriasis

Topical Agents

*UVB phototherapy (NB or BB) as monotherapy*
*UVB phototherapy + methotrexate*

First Line
- Adalimumab (Humira)
- Cyclosporine
- Etanercept (Enbrel)
- Infliximab (Remicade)
- Methotrexate
- PUVA

The majority of medications listed are not approved for children.

Adult Males With Plaque Psoriasis

Topical Agents

UVB Available
- Adalimumab (Humira)
- Cyclosporine (CSA)
- Etanercept (Enbrel)
- Infliximab (Remicade)
- Methotrexate (MTX)
- Ustekinumab (Stelara)

UVB Not Available
- Biologic + UVB
- CSA + MTX
- MTX + Biologic
- UVB + Biologic

New Biologics Approved Since Guidelines Published

WCBP With Plaque Psoriasis

Topical Agents

UVB Available
- Biologic + UVB
- Isotretinoin + biologic
- MTX + biologic
- MTX + CsA

UVB Not Available
- Biologic + UVB
- Isotretinoin + biologic
- MTX + biologic
- MTX + CsA

Common Topical Therapies

- **Corticosteroids**
  - Central to therapy for most patients
  - Lower potency agents for face, intertriginous areas, and sites with thin skin
  - Mid-high potency agents initially
    - Class I corticosteroids, 2–4 weeks
    - Taper use with clinical response
    - Adverse effects can limit use

- **Retinoids**
  - Tazarotene (Tazorac, Avage)
  - Steroid-sparing adjuvant
  - Teratogenic/pregnancy category X

- **Calcineurin inhibitors**
  - Tacrolimus (Protopic), pimecrolimus (Eidel)
  - Useful for facial and intertriginous psoriasis
  - Black box warning regarding malignancy

- **Vitamin D analogs**
  - Steroid-sparing adjuvants
  - Do not exceed 100 g/week due to risk of hypercalcemia
Case 2.1

This is NOT a poll question

- A 25-year-old woman with a several-year history of psoriasis presents for evaluation. Recently she has noted significant worsening with the onset of colder weather. She has used over the counter (1%) hydrocortisone cream with limited response. She believes that her psoriasis is "ruling her life" because she goes to great lengths to avoid clothing that exposes her psoriasis. She also has started to avoid athletic activities she previously enjoyed, such as tennis, because of concerns of exposing her psoriasis to others and what their reactions may be.
- The patient is married, with no children to date, however she and her partner would like to start attempting conception this year. She is currently using oral contraceptive pills, does not smoke, and drinks one to two glasses of red wine daily. There are no joint symptoms.

Case 2.2

This is NOT a poll question

- Cutaneous examination shows multiple erythematous, well-demarcated plaques with overlying silvery scale involving the elbows, knees, periumbilical area, and back. BSA involved with psoriasis is 4%. The scalp, nails, and mucosal surfaces are uninvolved. There is no evident joint swelling, tenderness, or enthesitis.
- A topical agent is recommended for this patient. What agent would you select?
  - A. Fluocinonide 0.05% Cream
  - B. Hydrocortisone 2.5% Cream
  - C. Calcipotriene 0.005% Cream

Case 2.3

This is NOT a poll question

- Would tazarotene be an option for this patient?
- What if the patient had significant facial PsO lesions?
- At what point do you consider topical therapy to have failed?

Traditional Systemic Agents Used in the Treatment of PsA

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Clinical Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSAIDs</td>
<td>Effective for alleviation of mild inflammation associated with mild joint involvement</td>
</tr>
<tr>
<td>Leflunomide</td>
<td>Antimetabolite effective for joint disease; minor benefit for skin disease</td>
</tr>
<tr>
<td>Sulfasalazine</td>
<td>Mildly effective for joint; seldom for skin disease</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>Orally, intramuscular, or intra-articular</td>
</tr>
<tr>
<td>Methotrexate (+FOLIC ACID DAILY)</td>
<td>Does not delay radiographic progression of disease</td>
</tr>
<tr>
<td>Cyclosporine</td>
<td>Effective in measures of joint disease activity, but not proven to delay radiographic progression of disease</td>
</tr>
<tr>
<td>Apremilast (Otezla)</td>
<td>Moderately effective</td>
</tr>
</tbody>
</table>

**TNF-α Antagonists in PsA**

- All 4 agents give very similar ACR 20 responses at 12–14 weeks (ie, approximately 60%)
- **Note:** MTX, NSAIDs, and low-dose prednisone permitted during PsA clinical studies

**Current Pharmacologic Therapy: Anti-TNFα**

- Adalimumab (Humira), infliximab (Remicade), certolizumab pegol (Cimzia), etanercept (Enbrel), and golimumab (Simponi)
- Useful therapy for many patients with PsO or PsA
  - However, a substantial group of patients do not clinically improve with these agents
  - Heterogeneous response to TNFα blockade
  - Biomarkers for anti-TNFα response needed: pharmacogenomic testing?
- **Discontinue** a biologic agent upon the event of a serious infection until the infection is resolved
- Do **NOT** continue the biologic with the infection treatment

**Anti-TNFα for PsO and PsA**

<table>
<thead>
<tr>
<th>Name</th>
<th>Dosing/administration</th>
<th>Adverse effects</th>
<th>Agent-specific comments</th>
<th>Class-specific comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infliximab (Remicade)</td>
<td>w/ or w/o methotrexate; IV infusion: 5 mg/kg at 0, 2, and 6 weeks followed by 5 mg/kg Q8W</td>
<td>BBW*: headaches, dizziness, nausea/vomiting/diarrhea (NVD)</td>
<td>• Has approved biosimilar</td>
<td>BBW*: increased risk of serious infection, which may result in hospitalization or fatality. Lymphoma and malignancies have been reported in children and adolescents receiving anti-TNFα, which can result in reactivation of latent tuberculosis, screen for hepatitis B and C, C/1 in CHF and diseases such as multiple sclerosis.</td>
</tr>
<tr>
<td>Certolizumab pegol (Cimzia)</td>
<td>SQ: 400 mg at 0, 2, and 4 weeks; followed by 400 mg Q4W</td>
<td>BBW*: headaches, dizziness, NVD</td>
<td>• Lowest wholesale acquisition cost in anti-TNFα class</td>
<td>N/A</td>
</tr>
<tr>
<td>Etanercept (Enbrel)</td>
<td>w/ or w/o methotrexate; 50 mg QW; options available for twice weekly</td>
<td>BBW*: headache, dizziness, NVD</td>
<td>• Often used 1st line after traditional DMARDs due to familiarity with anti-TNFα agents</td>
<td>BBW*: hypertension, rash</td>
</tr>
<tr>
<td>Adalimumab (Humira)</td>
<td>w/ or w/o methotrexate; SQ: 40 mg Q2W</td>
<td>BBW*: headache, dizziness, NVD</td>
<td>• Good for patients with comorbidities like Crohn's or UC</td>
<td>BBW*: increased risk of serious infection, which may result in hospitalization or fatality. Lymphoma and malignancies have been reported in children and adolescents receiving anti-TNFα, which can result in reactivation of latent tuberculosis, screen for hepatitis B and C, C/1 in CHF and diseases such as multiple sclerosis.</td>
</tr>
<tr>
<td>Golimumab (Simponi)</td>
<td>w/ or w/o methotrexate; SQ: 50 mg once a month</td>
<td>BBW*: hypertension</td>
<td>• Has approved biosimilar</td>
<td>Good for patients with comorbidities like Crohn's or UC</td>
</tr>
</tbody>
</table>

*Anti-TNFα black boxed warning (BBW): increased risk of serious infection, which may result in hospitalization or fatality. Lymphoma and malignancies have been reported in children and adolescents receiving anti-TNFα, which can result in reactivation of latent tuberculosis, screen for hepatitis B and C, C/1 in CHF and diseases such as multiple sclerosis.*

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<td>w/ or w/o methotrexate; SQ: 50 mg once a month</td>
<td>BBW*: hypertension</td>
<td>• New formulation under review</td>
<td>Good for patients with comorbidities like Crohn's or UC</td>
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*Anti-TNFα black boxed warning (BBW): increased risk of serious infection, which may result in hospitalization or fatality. Lymphoma and malignancies have been reported in children and adolescents receiving anti-TNFα, which can result in reactivation of latent tuberculosis, screen for hepatitis B and C, C/1 in CHF and diseases such as multiple sclerosis.*
Current Pharmacologic Therapy: Anti-IL-17A: Secukinumab (Cosentyx)

• Targeting IL-17 works downstream to provide greater selectivity
• ERASURE and FIXTURE
• Two phase 3, double-blind, 52-week trials
• N=738 patients in ERASURE study and N=1306 patients in FIXTURE study
• 150 mg or 300 mg SQ once weekly for 5 weeks, then every 4 weeks, placebo, or (FIXTURE study only) etanercept 50 mg SQ twice weekly for 12 weeks, then weekly
• PASI 75 rates higher with secukinumab vs placebo or etanercept
  - ERASURE study: 71.6% and 81.6% with secukinumab vs 4.5% with placebo
  - FIXTURE study: 67.0% and 77.1% with secukinumab vs 44.0% with etanercept and 4.9% with placebo
  - P<0.001 for each secukinumab dose vs comparators
• Infection more common vs placebo; similar infection rate between biologics

Current Pharmacologic Therapy: Anti-IL-12/23: Ustekinumab (Stelara)

• Targeting IL-12/23 works upstream in the pathology of PsA
• PHOENIX 1 and PHOENIX 2
• Phase III, double-blind, placebo-controlled study, 52-week trials
• N=766 and N=1230 patients with moderate to severe PsO
• 45 mg (n=255) or 90 mg (n=256) at weeks 0 and 4 and then every 12 weeks
• Every 12 weeks is effective for most patients with moderate to severe PsO
• Dose intensification to once every 8 weeks with 90 mg may be needed to elicit a full response in patients who only partially respond to the initial regimen

Secukinumab vs Ustekinumab: CLEAR trial

• 52-week, double-blind, head-to-head comparative study
• 676 subjects were randomized 1:1 to SC injection of secukinumab 300 mg or ustekinumab 45/90 mg* per label
• Secukinumab sustained superior efficacy vs ustekinumab
  - ≥90% improvement in Psoriasis Area and Severity Index (PASI 90)
  - 76% vs 61% (P<0.0001) secukinumab vs ustekinumab, respectively
  - Clearing skin to week 52
  - Greater improvement in quality of life
  - Favorable and comparable safety profile

*45 mg for subjects ≤100 kg and 90 mg for subjects >100 kg
### Cost Reduction Strategies for PsA
- Early and accurate diagnosis
- Improve patient utilization of effective pharmacotherapies
- Effectively manage comorbidities and disease state/pharmacotherapeutic sequelae
- Minimize complications

### Early and Accurate Diagnosis of PsA
- Multidisciplinary collaboration regarding treatment/referral
- Reduce clinical inertia
- Utilize multiple screening tools available
  - PEST, TopAS, PASE, PASQ, EARPP
- Follow CASPAR criteria and GRAPPA guidelines to identify the most appropriate therapy based on a patient's individual domain(s) of clinical presentation
- Utilize “treat to target” approach with selected therapeutic regimen
- Regular monitoring and adjustment of therapy (if necessary) to control disease activity

### Manage Comorbidities and Minimize Complications to Reduce Costs
- Pharmacist-driven Medication Therapy Management (MTM)
  - Patient education on psoriatic disease
  - Factors that contribute to complications and overall health
  - Ability to identify comorbidities via patient interviews and medication history or fill history evaluations
- Value of biologics in managing psoriatic disease
  - Patient education regarding importance of compliance to therapy
  - Provide effective counseling regarding management of adverse effects

### Pharmacoeconomics of PsA Treatment
- Limited published data
  - US studies especially lacking data
  - Some UK data
- Difficult to compare/assess costs because:
  - Heterogeneity of presentation of disease
  - Overlap between PsO and PsA
  - Overlap between PsA and spondyloarthropathy (SpA)
  - Rapidly changing drug landscape
Emerging Therapies for PsO and PsA

IL-12/IL-23 Inhibition in PsO

IL-12
- Heterodimeric pleiotropic cytokine (p40 and p35 subunits)
- Produced by dendritic cells, macrophages, and B cells
- Multiple effects on T cells and natural killer cells

IL-23
- Heterodimeric pleiotropic cytokine (p40 and p19 subunits)
- Released by dendritic cells
- Essential for Th17 lymphocyte differentiation

*Ustekinumab (Stelara) is a human monoclonal antibody directed against the p40 sub-unit of IL-12 and IL-23; **Guselkumab (Tremfya) blocks IL-23

Other Potential Areas to Target PsO and PsA

- IL-6 Inhibition
  - Potent pro-inflammatory cytokines involved in inflammation, especially in joints
  - Clazakizumab

- JAK Inhibitors
  - Already approved for RA with recent approval for PsA
  - Tofacitinib (Xeljanz)

- More IL-23 blockers
  - Tildrakizumab (Ilumya), Risankizumab

- Selectins
  - Neihulizumab

IL-17A Inhibition in PsO

IL-17A
- One of 6 members of the IL-17 family
- Involved in psoriasis immunopathogenesis at the keratinocyte level
- Produced by Th17 and Tc17 cells
- Pro-inflammatory effects on keratinocytes, macrophages, and endothelial cells
- Induces expression of neutrophil, T-cell, and dendritic-cell chemokines

*Ixekizumab (Taltz) is a humanized IgG4 monoclonal antibody against IL-17A; †Secukinumab (Cosentyx) is a fully human IgG1κ monoclonal antibody against IL-17A; ^Brodalumab (Siliq) is an IL-17 receptor antagonist
Ixekizumab (Taltz) for Psoriasis

- Second IL-17 drug approved for PsO and PsA in the United States
- Also administered by SC injection
  - Recommended dose is 160 mg (two 80 mg injections) at week 0
  - 80 mg at weeks 2, 4, 6, 8, 10, and 12; then 80 mg every 4 weeks
  - Similar safety as secukinumab (Cosentyx)

Ixekizumab (Taltz) : Efficacy

- Based on three phase 3 RCTs (the UNCOVER series)
- UNCOVER-3 with short-term and extension arms

<table>
<thead>
<tr>
<th>UNCOVER 3 @ Week 12</th>
<th>Placebo</th>
<th>Etanercept</th>
<th>Ixekizumab Q2W</th>
<th>Ixekizumab Q4W</th>
</tr>
</thead>
<tbody>
<tr>
<td>PASI 75</td>
<td>7.3%</td>
<td>53.4%</td>
<td>87.3%</td>
<td>84.2%</td>
</tr>
<tr>
<td>sPGA 0/1</td>
<td>6.7%</td>
<td>41.6%</td>
<td>80.5%</td>
<td>75.4%</td>
</tr>
<tr>
<td>PASI 90</td>
<td>3.1%</td>
<td>25.7%</td>
<td>68.1%</td>
<td>65.3%</td>
</tr>
<tr>
<td>PASI 100</td>
<td>0</td>
<td>7.3%</td>
<td>37.7%</td>
<td>35%</td>
</tr>
<tr>
<td>sPGA 0</td>
<td>0</td>
<td>8.6%</td>
<td>40.3%</td>
<td>36%</td>
</tr>
</tbody>
</table>

UNCOVER-3 Extension Study: Ixekizumab (Taltz) vs Etanercept (Enbrel)

- At week 12, patients entered an open-label extension phase
  - Patients continued on or were switched to ixekizumab 80 mg every 4 weeks to complete a total of 108 weeks of treatment
  - Patients prescribed etanercept had a 4-week washout period from weeks 12 to 16
  - At week 60, patients could increase their dose of ixekizumab to 80 mg every 2 weeks at the investigator’s discretion

Results Summary

- 1346 patients were randomized
- At baseline:
  - Mean PsO duration was 18.1 years
  - PASI score 20.9
  - Percentage of BSA involved was 28.3%
- At week 12, a PASI 75 score was achieved in:
  - ≈90% of ixekizumab patients
  - 55% of etanercept patients
  - <10% of placebo patients
- By week 36, >90% of patients in each of the 4 groups achieved PASI 75
  - The rate remained stable through week 108
**Ixekizumab (Taltz): Safety**

- Similar to secukinumab (Cosentyx)
- Most common:
  - Nasopharyngitis, diarrhea, and upper respiratory infections
- Screen for tuberculosis before treatment
- Exacerbations of Crohn’s disease seen during trials
  - IL-17 may actually be protective in gut mucosa
- Skin yeast infections
- Injection-site reactions
- No live vaccines

**Guselkumab (Tremfya)**

- IL-23 blocker approved in Fall 2017
  - Selectively blocks IL-23 by targeting the p19 sub-unit
- FDA approved for mild to moderate PsO
- Given as SQ injection of 100 mg at weeks 0 and 4, and then every 8 weeks thereafter
- Cost, monitoring, and ADRs similar to other IL-23 blockers

**Clinical Safety and Efficacy**

- VOYAGE 1 was a phase 3, randomized, double-blind, placebo-controlled, multicenter, active comparator study in patients with moderate to severe PsO
- Patients were randomized 1:2:2 to:
  - Placebo at weeks 0, 4, and 12 followed by crossover to guselkumab 100 mg at weeks 16 and 20, then every 8 weeks through week 44
  - Guselkumab 100 mg at weeks 0 and 4, then every 8 weeks through week 44
  - Adalimumab 80 mg at week 0, 40 mg at week 1, then 40 mg every 2 weeks through week 47

**Baseline Characteristics**

- 837 patients with a mean duration of PsO of 17.5 years were randomized as follows:
  - 20.9% had been treated with a biologic
  - 78.1% had moderate to severe scalp disease
  - 55.8% had moderate to severe fingernail disease
  - A particular focus of this study was fingernail involvement
  - 58.0% had moderate to severe hands and/or feet disease
Results Summary

• 48 week study (n=837)
• The proportion of patients who achieved a score of absence of disease or very mild disease and ≥2 grade improvement in the scalp-specific Investigator’s Global Assessment score from baseline at week 16 was: (all P<0.01)
  • 83.4% for guselkumab (Tremfya)
  • 70.3% for adalimumab (Humira)
  • 14.5% for placebo
• Significantly more patients treated with guselkumab than adalimumab achieved this same endpoint at weeks 24 and 48

Results Summary

• At week 48, a fingernail Physicians Global Assessment score of clear or minimal was achieved by:
  • 74.7% of patients treated with guselkumab (P=0.038)
  • 61.8% of patients treated with adalimumab
• The mean percent improvement from baseline in the Nail Psoriasis Severity Index at week 16 was significantly greater with guselkumab and adalimumab than placebo
  • There was no difference between guselkumab and adalimumab at weeks 24 or 48

Results Summary

At week 48:

<table>
<thead>
<tr>
<th>Adverse event</th>
<th>Guselkumab (Tremfya)</th>
<th>Adalimumab (Humira)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adverse event</td>
<td>73.9%</td>
<td>74.5%</td>
</tr>
<tr>
<td>Serious adverse event</td>
<td>4.9%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Nasopharyngitis</td>
<td>25.2%</td>
<td>22.2%</td>
</tr>
<tr>
<td>Infection requiring antibiotic treatment</td>
<td>16.4%</td>
<td>18.0%</td>
</tr>
</tbody>
</table>

Tildrakizumab (Ilumya)

• IL-23 blocker similar to others discussed
• Approved in the United States and Europe for mild to severe PsO
• Other studies ongoing in PsA and other inflammatory diseases

Focus on reSURFACE2

- In reSURFACE 2, participants received tildrakizumab 200 mg, tildrakizumab 100 mg, placebo, or etanercept 50 mg (etanercept 50 mg was given twice weekly) at weeks 0, 4, and 16
- Second part of reSURFACE2 focused on partial or no responders to placebo or etanercept
  - Defined as partial (PASI ≥50 to <75) or no response (PASI <50) to etanercept 50 mg at week 28
- At week 28, 120 of 313 patients treated with etanercept were partial or nonresponders and were switched to tildrakizumab 200 mg
  - Tildrakizumab was continued until week 52

Results Summary

- At week 52 (20 weeks on tildrakizumab 200 mg):
  - PASI 75 was achieved in 81.4%
  - PASI 90 in 41.6%
  - PASI 100 in 15.9%
  - Physicians Global Assessment of 0 or 1 (clear or minimal) in 68.5%

Safety of This Part of reSURFACE2

- During the retreatment phase with tildrakizumab, 51.7% of the 120 patients experienced an adverse event
  - A serious adverse event was observed in 5 patients (4.2%)
  - Nasopharyngitis was the most common adverse event, occurring in 11.7%
  - Bronchitis and upper respiratory tract infection occurred in 5.8% and 5.0% of patients, respectively

Risankizumab

- Humanized IgG1 monoclonal antibody that selectively inhibits IL-23 by specifically targeting p19
- Given by SQ injection at weeks 0, 4, and 16
- Not yet FDA approved
Clinical Efficacy and Safety

- One study published to date comparing risankizumab to ustekinumab (Stelara) in moderate to severe PsO
- The primary end point was a 90% or greater reduction from baseline in the PASI 90 at week 12
  - N=166 patients at 32 study sites
  - PASI 90, 77% risankizumab vs 40% ustekinumab
    - P<0.001
  - Improvements over ustekinumab in most secondary outcomes, including QoL

Safety

- Generally well tolerated
  - Similar ADRs between risankizumab and ustekinumab at end of the study
  - Low discontinuation rate in all arms
  - Nasopharyngitis was most commonly reported ADR
- However...
  - Short-term study with low n, may not be able to detect serious ADRs
  - Infections and other precautions will probably have to be followed

Case 3.1

This is NOT a poll question

- A 37-year-old obese woman presents with widespread plaque psoriasis for more than 20 years for which a wide variety of therapies have been used. In addition to topical steroids and vitamin D analogs, she had received more 2 years of NB-UVB with her last phototherapy treatment being 3 years previously. The NB-UVB was not effective in adequately controlling her psoriasis. Medical history is significant for hypertension, dyslipidemia, and noninsulin-dependent diabetes mellitus, features consistent with the diagnosis of metabolic syndrome. She reports drinking one ounce of alcohol daily for the past 12 years.

Case 3.2

This is NOT a poll question

- Her current medications include metformin, rosuvastatin, fenofibrate, olmesartan, and an oral contraceptive. She has mildly elevated liver enzymes thought to be caused by a combination of her obesity (steatohepatitis) and her alcohol intake. On examination, she has thick psoriatic plaques are found on her trunk, extremities, and scalp involving 35% of her BSA.
- What next medication could be considered in this patient?
  A. Methotrexate
  B. Cyclosporine
  C. Adalimumab
Case 3.3  
This is NOT a poll question

- What factors make MTX a good option or would make your cautious in its use?
- Can anything be done to prevent MTX induced liver toxicity?
- Why would Cyclosporine be a good option for the patient?
  - What adverse effects would you have to monitor for?
- Assuming the patient has insurance that would allow a biologic to be affordable, what pre-drug screening and preventative measures should be accomplished?

Tofacitinib (Xeljanz) Oral Janus Kinase (JK) Inhibitor

<table>
<thead>
<tr>
<th>Cytokine</th>
<th>Effects on the immune system</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL-2</td>
<td>Stimulate the proliferation and differentiation of Th, Tc, B, and natural killer (NK) cells</td>
</tr>
<tr>
<td>IL-4</td>
<td>Induce the differentiation of Th0 to Th2</td>
</tr>
<tr>
<td>IL-7</td>
<td>Induce immunoglobulin switching, Induce Th0 to Th2</td>
</tr>
<tr>
<td>IL-9</td>
<td>Promote the development, proliferation, and survival of T, B, and NK cells</td>
</tr>
<tr>
<td>IL-15</td>
<td>Promote the proliferation, cytotoxicity, and cytokine production of NK cells</td>
</tr>
<tr>
<td>IL-21</td>
<td>Enhance T and B cell function</td>
</tr>
</tbody>
</table>

> Tofacitinib is a novel, small-molecule, oral JAK inhibitor—NOT A BIOLOGIC
> Tofacitinib inhibits JAK1, JAK2, and JAK3 in vitro with functional cellular specificity for JAK1 and JAK3 over JAK2. Importantly, tofacitinib directly or indirectly modulates signaling for an important subset of pro-inflammatory cytokines including IL-2, -4, -7, -8, -15, and -21


Tofacitinib (Xeljanz) —OPAL Beyond

- Phase 3 study of tofacitinib in patients with PsA who had failed at least 1 TNF-blocker
  - Defined as CASPAR based on diagnosis of PsA and inadequate response to at least 1 TNF inhibitor (either lack of efficacy or the occurrence of an adverse event)
  - 6-month RCT of various regimens of tofacitinib in PsA
  - Various escalations of drug from 5 mg to 10 mg or de-escalation from 10 mg to 5 mg
- Outcomes:
  - 3-month endpoints were the percentage of patients who had met ACR20 as well as significant improvement in Health Assessment Questionnaire—Disability Index (HAQ-DI) scores from baseline


Tofacitinib (Xeljanz)

- First JAK inhibitor approved in the United States
- FDA approved for RA
  - Approved for PsA in December 2017 based on the OPAL studies
  - Oral tablet formulation
  - Despite not being a biologic, there are similar safety warnings for infection in product information
  - 5 mg BID or 11 mg daily (XR) for PsA

[19]


Clinical Results and Safety

• Primary outcome
  • At 3 months, the rates of ACR 20 response were 50% with the 5 mg dose of tofacitinib and 47% with the 10 mg dose of tofacitinib, as compared with 24% with placebo (P<0.001 for both)
  • Improvement in scores similar with HAQ-DI
  • Benefits as early as 2 weeks
  • However, fewer ACR 50 and ACR 70 responses

• Safety
  • Overall similar ADR and serious ADR rates between arms
  • 10 mg tofacitinib arm did have more ADRs
  • Serious herpes infections reported more frequently in the tofacitinib arm

Case Study 4.1  This is NOT a poll question

• History: An obese, 55-year-old Caucasian man with psoriasis for 12 years presented with an 8-month history of painful and swollen joints in the hands, feet, and knees; bilateral heel pain; and morning stiffness of approximately 2-hour duration, unresponsive to nonsteroidal anti-inflammatory drugs (NSAIDs). On physical examination, he had psoriatic plaques on the knees, elbows, genitals, and scalp. The majority of his fingernails showed pitting and onycholysis. Joint evaluation demonstrated multiple tender and swollen joints including the second and third metacarpal-phalangeal joints of both hands; the second, third, and fourth distal interphalangeal joints bilaterally; and both knees. Dactylitis (“sausage digit”) was present on multiple digits in both the hands and the right fourth toe along with a tender and swollen right Achilles tendon. Rheumatoid factor was negative and C-reactive protein was elevated.

Case Study 4.2  This is NOT a poll question

• MTX at 25 mg given orally once weekly along with daily 1 mg of folic acid for 12 weeks failed to adequately control either the joint or skin disease. Etanercept was introduced with continued use of MTX once weekly. The patient’s arthritis and skin disease have not improved after 3 months of therapy. What would be the next therapy you would suggest?
  • A. Secukinumab
  • B. Ustekinumab
  • C. Infliximab

Case Study 4.3  This is NOT a poll question

• How would you monitor for improvement? For adverse effects?
• If the patient had a history of ulcerative colitis would that change your drug selection? If so, how?
• The patient’s PBM calls and wants to know why the patient is being prescribed another biologic for “a simple skin disease”. What is your reply? Are biologic drugs cost-effective for PsO or PsA?
Clazakizumab

- Monoclonal antibody with high affinity and specificity for IL-6
- Not yet FDA approved, but studies ongoing for several indications
- Currently 1 Phase IIb study in PsA

Clinical Efficacy and Safety

- Patients with PsA and an inadequate response to NSAIDs and/or DMARDs were randomized to receive placebo or clazakizumab at various doses q4weeks
- Concomitant methotrexate use allowed, then required
  - Primary outcome
    - ACR20 improvement
    - Numerous secondary outcomes

Clinical Efficacy and Safety

- 24 week study, n=140, dose ranging
- Primary outcome
  - 29.3% ACR20 in placebo with 52.4% clazakizumab (P=0.039)
    - No significant improvements at other doses
    - Modest improvement in most secondary outcomes, including PASI scores
- Safety
  - No differences in discontinuation between groups
  - Overall, similar ADRs between groups
  - Again, small n with short duration makes safety analysis difficult

Selectins

- A new class of biologic drugs that selectively block only late-stage activated T cells
  - These are T cells associated with inflammation but NOT infection or cancer surveillance
  - Thus, at least theoretically, they are safer than other biologics
  - The effects of drug on these T cells may be more long-lasting
Neihulizumab

- Also known as AbGn 168h
- One of the first selectins to have clinical studies completed in humans
- Phase-IIb clinical trial in PsA underway
- Also being studied for a variety of other chronic inflammatory disorders

Summary of Agents Discussed

<table>
<thead>
<tr>
<th>Biologic</th>
<th>MOA</th>
<th>Dosage</th>
<th>Safety</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ixekizumab</td>
<td>IL-17 Antagonist</td>
<td>SQ 160/80 mg</td>
<td>Yeast infections, IBD flares</td>
<td>TB screening, no live vaccines</td>
</tr>
<tr>
<td>Guselkumab</td>
<td>IL-23 Antagonist</td>
<td>SQ 100 mg</td>
<td>General infections</td>
<td>TB screening, no live vaccines, good data on fingernail PsO</td>
</tr>
<tr>
<td>Tildrakizumab</td>
<td>IL-23 Antagonist</td>
<td>SQ 100 mg</td>
<td>General infections</td>
<td>TB screening, no live-vaccines</td>
</tr>
<tr>
<td>Risankizumab</td>
<td>IL-23 Antagonist</td>
<td>Not yet approved</td>
<td>General infections</td>
<td>TB screening, no live-vaccines</td>
</tr>
<tr>
<td>Tofacitinib (Xeljanz)</td>
<td>JAK Inhibitor</td>
<td>Oral 5 mg or 11 mg</td>
<td>Herpes infections</td>
<td>TB screening, no live-vaccines</td>
</tr>
<tr>
<td>Clazakizumab</td>
<td>IL-6 Antagonist</td>
<td>Not yet approved</td>
<td>General infections</td>
<td>TB screening, no live-vaccines</td>
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<tr>
<td>Neihulizumab</td>
<td>Activated T-Cell Blocker</td>
<td>Not yet approved</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Case 5.1

This is NOT a poll question

- A 45 year old male is referred from outpatient clinic to a hospital dermatology department with well dermacated erythematous scaly annular plaques, scattered on his trunk, face and scalp, which is not responding to psoriasis treatment including topical therapies, phototherapy, methotrexate, and etanercept. He was stopped on etanercept 4 months into treatment because of a severe urinary tract infection that led to hospitalization. Since then he has declined further treatments with injectable biologics.

Case 5.2

This is NOT a poll question

- Physical exam reveals an slightly obese male with skin lesion as described previously. He also has signs of finger joint swelling and enthesitis on both extremities. He is a 1 ppd smoker (he uses e-cigarettes) and drinks alcohol only occasionally.

- What therapy would you recommend in this patient?
  - A. Tofacitinib
  - B. Prednisone
  - C. Ixekizumab
Case 5.3

This is NOT a poll question

- What if the patient had a history of genital herpes infections?
- What if the patient had demonstrated significant PsO fingernail involvement?
- How could you convince the patient that biologics may be safe for him to take?

Formulary Considerations and Cost-Effectiveness: Focus on New Biologics

Ixekizumab (Taltz) vs Etanercept (Enbrel)

- Authors used UNCOVER comparative efficacy trials
  - Used transitional probabilities and treatment response rates to create a Markov model
  - Willingness-to-pay (WTP) threshold of $150,000 per quality adjusted life year (QALY)
- Results
  - Ixekizumab every 4 weeks was US$28,681 less expensive than biweekly etanercept, and US$21,375 less expensive and 0.006 QALY less effective than ixekizumab every 2 weeks—a savings of US$28.7 and US$21.4 million per 1000 patients, respectively

Is Dose Reduction a Possibility in Controlled PsO and PsA?

- Being studied in other diseases, such as RA
- Small reports suggest it may be feasible in well-controlled patients BUT
  - Concern about drug Ab development and loss of effectiveness if the drug is needed again
- Obviously potential to save money
- Current prospective pragmatic study underway in patients with PsO
Biosimilars in PsO and PsA

- Will undoubtedly affect formulary selection and price in the coming years
- Specialty pharmacists can play a role in:
  - Educating providers who may not be aware of what biosimilars are
  - Monitoring patients being switched from innovator to biosimilar for ADRs or loss of effect
- Remember that biosimilars are usually granted all the indications of the innovator product without having clinical trial data in every disease
  - This makes post-marketing monitoring of biologics crucial

The Benefit of Early Referral

- Patients with PsO may have joint symptoms or early PsA that goes unnoticed
- Patients with arthritis may have nail or other types of PsO
- Active screening in patents can aid in early diagnosis and treatment
  - Cross training of sub-specialists
  - Screening for PsA using the PEST tool for providers
  - Pharmacists can also administer this and ask about other PsO symptoms

Ongoing PsO Management: Role of the Pharmacist

- Monitor disease progression and drug safety
  - Identify signs and symptoms of PsA
  - Vaccinations
- Educate patients about the disease
  - Emphasize the importance of treatment adherence
  - Discuss treatment options
- Assess treatment responses and adverse effects
- Ensure appropriate patient monitoring

Community Pharmacy and PsO

- Recent small UK study with 7 community pharmacies and 47 patients
  - In-depth counseling on use of medications
  - Assisted in selection of self-care products
  - Referral to higher level of care
    - Found that pharmacist intervention improved self-care index ($P<0.001$) and QOL ($P<0.001$)
Newer Data on Biologics and Psoriasis

• Medicare Claims Analysis published
  • 2009—2012 Medicare Parts A, B, and D
  • 2707 patients initiating adalimumab (Humira) (40.0%), etanercept (Enbrel) (37.9%), infliximab (Remicade) (11.7%), and Ustekinumab (Stelara) (10.3%)
  • At 12 months after initiation of therapy:
    • 38% were adherent and 46% discontinued treatment, with 8% switching to another biologic and 9% later restarting biologic treatment
    • Risk factors for discontinuation included female sex and low income

Strategies to Promote Adherence

• Provide information to patients about PsO
  • Including expected time to effect
  • Recognize psychosocial effects
  • Provide written instructions for medication use
  • Explain potential adverse effects
  • Encourage patients to take an active role in treatment planning and tailoring
  • Work with timing to infusion centers, etc

Patient Support Programs and Impact on Medication Adherence

• Support groups and programs can serve many purposes:
  • Access to medications aids and adherence to clinic visits and pharmacy
  • Connection to other patients may improve QOL
  • Educational resources
  • Whether such groups improve medication adherence in PsA and PsO has not been systematically studied
  • One small study found a telephone-based (text message) reminder system improved adherence in patients with PsO

Systematic Review of Adherence Factors

• 11 studies reviewed PsO adherence risk factors
  • First systematic review to examine factors associated with adherence across several immune-mediated inflammatory diseases and across multiple treatment types
  • Practical barriers (eg, frequent traveling, forgetfulness, cost) made nonadherence more likely
  • Number of doses and IV route found to be negatively associated with adherence
Live Vaccines Generally Contraindicated in Immunosuppressed Patients

- Herpes zoster
- Influenza—quadrivalent influenza vaccine live, intranasal (FluMist) only
- MMR*
- Rotavirus
- Typhoid—oral only
- Varicella
- Vaccinia (smallpox)
- Yellow fever

*MMR, measles, mumps, rubella (vaccine)

Conclusion

- Pharmacists play critical roles in:
  - Monitoring PsO progression
  - Educating patients about the disease and treatments
  - Evaluating treatment outcomes
  - Promoting appropriate patient monitoring
- Available biologics require particularly vigilant monitoring for rare but serious adverse effects
- Long-term adverse effects (infection, malignancy) are unknown with newer biologics
- Ongoing assessment of therapeutic efficacy and adverse effects is essential to optimize outcomes
- Helping assess and treat other diseases/risk factors that these patients have—often a dermatologist is their only health care provider

Additional Resources

- National Psoriasis Foundation
  - https://www.psoriasis.org/
- Psoriasis Resource Library
  - https://www.psoriasisconnect.com
- British Association of Dermatologists Psoriasis Center
  - www.bad.org.uk/healthcare-professionals/psoriasis
- Psoriasis and Psoriatic Arthritis Alliance (UK)
  - www.papaa.org/
- AAD Guidelines for Psoriasis and Psoriatic Arthritis
  - https://www.aad.org/education/clinical-guidelines

Q&A:
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1. CJ is a patient with severe plaque psoriasis (PsO) and early signs of psoriatic arthritis (PsA). He has found methotrexate to be ineffective in achieving significant improvement in skin lesions or joint swelling. He asks the pharmacist what therapy would be beneficial to him for treating both disease states. Which of the following therapies is approved for both psoriasis and psoriatic arthritis?
   a. Risankizumab
   b. Tofacitinib (Xeljanz)
   c. Guselkumab (Tremfya)
   d. Secukinumab (Cosentyx)

2. Which of the following experimental therapies for PsO or PsA blocks interleukin-6 (IL-6)?
   a. Neihulizumab
   b. Tofacitinib
   c. Clazakizumab
   d. Risankizumab

3. As a specialty pharmacist, you counsel your patients receiving biologics for several diseases, including PsO. As a patient receives her SQ injections of Ustekinumab (Stelara), she remarks that it has been difficult to use the injector because several of her finger joints ache. You suspect that she may also be developing PsA. What rapid screening questionnaire may help you determine if referral is needed?
   a. PASI-70
   b. PEST
   c. CASPAR
   d. ACR Criteria

4. Which of the following strategies may hold promise for reducing formulary costs while maintaining effective treatment in PsO and PsA?
   a. Multiple biologics used at very low doses
   b. Ultraviolet treatment with tofacitinib (Xeljanz)
   c. Restriction of non TNF drugs to patients who have failed at least two of this class
   d. Dose reduction of biologics in stable patients
5. Which of the following statements is true concerning the functional burden of PsO?
   a. Studies suggest that mental functioning with PsO is worse than patients with Type 2 diabetes
   b. Studies suggest that physical functioning of patients with PsO is near all healthy adults
   c. As a superficial skin disease functional burden of PsO is low compared to most other diseases
   d. Suicide attempts are rare in patients with PsO

6. Which of the following is the number one cause of death in PsO patients in the U.S.?
   a. Infection
   b. Cardiovascular disease
   c. Cancer
   d. Drug toxicity

7. What is the prevalence of PsA in PsO patients?
   a. 10%
   b. 20%
   c. 30%
   d. 40%

8. Which of the following statements is true concerning Tumor Necrosis Alpha antagonists for psoriatic arthritis for (PsO)?
   a. Only etanercept (Enbrel) is approved for PsO
   b. Infliximab (Remicade) is safe to use in a patient with concomitant PsO and heart failure
   c. The FDA has recently strengthened warnings about fungal infections with these drugs
   d. Ustekinumab (Stelara) is more selective for Tumor Necrosis Factor in joints that then other TNF-Alpha antagonists
9. A patient with severe PsO (25% of BSA) with significant fingernail involvement has failed methotrexate and etanercept (Enbrel) due to lack of efficacy. Which of the following newer drugs has been studied specifically in nail PsO and might be a reasonable option for the patient?
   a. Guselkumab (Tremfya)
   b. Ixekizumab (Taltz)
   c. Tildrakizumab (Ilumya)
   d. Ustekinumab (Stelara)

10. A patient with PsA recently started tofacitinib (Xeljanz) as she is very needle-phobic and does not want to try any injectable drug for this condition. One month into oral tofacitinib therapy, she develops a fever, fatigue and a significant number of vesicles on her lips and around her eyes. What potential infection could this be that was found to be more common in tofacitinib clinical studies?
   a. Hepatitis A
   b. HIV
   c. Herpes
   d. Epstein-Barr

11. A patient with PsO taking Methotrexate and folic acid presents to your pharmacy for a refill. She asks if you have time to look at her left hand. You note that the 3rd digit is swollen compared to the other fingers making that finger have a 'sausage' like appearance. What type of PsA manifestation might the patient be experiencing?
   a. Dactylitis
   b. Asymmetric Oligoarthritis
   c. Arthritis Mutilans
   d. Gouty Arthritis

12. A patient with a large BSA of the skin affected by PsO is prescribed a vitamin D analog cream by his family physician. You note that you will have to dispense 3 45g tubes to fill the prescription. What adverse effect should you contact the prescriber about with this amount of drug?
   a. Skin thinning
   b. Infection
   c. Hypercalcemia
   d. Hives at the application site
13. Tacrolimus (Protopic) ointment would be particularly helpful for PsO lesions in what area of the body?
   a. Trunk
   b. Face
   c. Legs
   d. Arms

14. Which of the following TNF agents has an FDA approved biosimilar agent for use in the U.S.?
   a. Infliximab (Remicade)
   b. Etanercept (Enbrel)
   c. Certolizumab (Cimzia)
   d. Tofacitinib (Xeljanz)

15. In the UNCOVER trial series the IL-17 drug Ixekizumab (Taltz) was found to be superior in efficacy to what other biologic drug in PsO patients?
   a. Infliximab (Remicade)
   b. Etanercept (Enbrel)
   c. Certolizumab (Cimzia)
   d. Tofacitinib (Xeljanz)

16. Which of the following biologics works in PsO by blocking IL-23?
   a. Adalimumab (Humira)
   b. Tofacitinib (Xeljanz)
   c. Certolizumab (Cimzia)
   d. Guselkumab (Tremfya)

17. In studies looking at PsO patient adherence to biologic drugs what factor has NOT been shown to decrease adherence?
   a. Patient distance to clinic or infusion center
   b. Cost of biologics
   c. Intravenous route
   d. A drug that is given only once yearly
18. A 66 year old patient with PsA receiving etanercept (Enbrel) from your pharmacy asks about the herpes zoster vaccine. His brother recently had a bout of facial shingles that was very painful and the patient would like to avoid something similar. What is your reply?
   a. Zostavax (Herpes Zoster Vaccine) is contraindicated in him because it is a live vaccine, but the recombinant herpes zoster vaccine, Shingrix, may be a good option.
   b. He is a candidate for the inactive vaccine but must receive two extra doses due to being on etanercept (Enbrel)
   c. If the patient had chickenpox (varicella) as a child, he does not need the vaccine
   d. He is a candidate for the vaccine (live or inactivated) as any other patient over 60 years old would be

19. A 2017 study conducted in the United Kingdom found that regular pharmaceutical care provided to PsO patients by community pharmacists improved which outcome?
   a. Efficacy of biologic drugs
   b. Adherence
   c. Quality of life
   d. Patient cost out of pocket

20. A new class of biologic drugs termed selectins has the potential to improve symptoms in several inflammatory diseases including PsO. Which of the following selectin drugs has been studied in this disease state?
   a. Clazakizumab
   b. Risankizumab
   c. Tildrakizumab (Ilumya)
   d. Neihulizumab