Prevalence of Diagnosed Musculoskeletal Disorders

Millions of Cases in US (% Population) *

- Osteoarthritis: 21
- Rheumatoid arthritis: 2.2
- Musculoskeletal soft-tissue disease: 49.8
- Psoriatic arthritis: 1
- Ankylosing spondylitis: 0.3
- Other systemic connective-tissue disease: 0.6

*Data for 1995
Percent of Adults With Chronic Joint Symptoms Who Have Never Seen a Health Provider, 2001

Source: Centers for Disease Control and Prevention
Musculoskeletal Problems in a Primary Care Office

- Degenerative: Osteoarthritis
- Inflammatory: Rheumatoid arthritis
  Seronegative spondyloarthropathy
- Non-articular: Fibromyalgia
Principle

• Every arthritis has a specific target tissue:
  – **Osteoarthritis**: articular cartilage
  – Rheumatoid arthritis: synovium
  – Seronegative spondyloarthropathy: enthesis
NORMAL

- capsule
- cartilage
- synovium
- bone

OSTEARTHRITIS

- thickened capsule
- cyst formation and sclerosis in subchondral bone
- shelving 'fibrillated' cartilage
- osteophytic lipping
- synovial hypertrophy
- altered contour of bone
Principle

- Every arthritis has a specific pattern of joint distribution:
  - Osteoarthritis: symmetrical pattern involving mechanical degradation of hyaline cartilage
Osteoarthritis: Heberden’s nodes
Osteoarthritis
First carpometacarpal joint
Osteoarthritis: hip
Osteoarthritis: knee
Principle

• Every arthritis has a specific target tissue:
  – Osteoarthritis: articular cartilage
  – Rheumatoid arthritis: synovium
  – Seronegative spondyloarthropathy: enthesis
RA Synovium
Synovitis

- Swelling is confined to the area of the joint capsule
- Synovial thickening feels like a firm sponge
Principle

- Every arthritis has a specific pattern of joint distribution:
  - Osteoarthritis: symmetrical pattern involving mechanical degradation of hyaline cartilage
  - Rheumatoid arthritis: symmetrical synovitis
Rheumatoid arthritis: Joint Distribution

- Symmetric polyarthritis
- Corresponds to the distribution of synovial lined joints
- Note absence of axial involvement except at C1-2
RA Symmetrical synovitis
RA: Atlantoaxial subluxation
RA: finger deformities
RA: hand deformities
RA: wrist
RA: extensor tendon rupture
RA: knee swelling and popliteal cyst
RA: feet
RA: foot deformities
RA: severe hand deformity
The value of X-rays in Rheumatoid Arthritis

- For a Symmetric polyarthritis that satisfies ARA Criteria for rheumatoid arthritis:
  - Perform X-rays of the hands and feet
  - Repeat them at 1 year or sooner if the disease is not controlled
Radiographic Progression of Joint Erosions
How fast is joint damage progressing?

A. Soft-tissue swelling, no erosions
B. Thinning of the cortex on the radial side and minimal joint space narrowing
C. Marginal erosion at the radial side of the metacarpal head with joint space narrowing
25% of patients in an Early Arthritis Clinic already had erosions at the First Visit

474 patients seen in an early RA clinic; 141 had definite or probable RA
Joint Erosions Occur Early in RA

- Up to 93% of patients with < 2 years of RA may have radiographic abnormalities
- Rate of progression is significantly more rapid in the first year than in the second and third years
- Radiographic changes in the feet are important indicators of disease progression in RA

MRI Delineated Occult Erosions

High-Quality X-ray

MRI

Images courtesy of Charles Peterfy, MD, PhD; same patient, same area of the hand.
Rheumatoid factor develops over time

<table>
<thead>
<tr>
<th>Duration of RA (months)</th>
<th>% positive RF</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>33</td>
</tr>
<tr>
<td>6</td>
<td>55</td>
</tr>
<tr>
<td>12</td>
<td>76</td>
</tr>
<tr>
<td>&gt;12</td>
<td>88</td>
</tr>
</tbody>
</table>
Anti-CCP antibody (cyclic-citrullinated peptide)

- ELISA assay based on filaggrin or synthetic peptide
- Sensitivity 60%, specificity >100%
- Present in early and preclinical disease
- Correlates with increased risk for progressive joint damage
- Does not correlate with fluctuation of RF
HLADR4: DRB1*0401, DRB1*0404 (AA 67-74)
“Shared Epitope”
Smoking leads to anti-CCP only in the context of SE+

<table>
<thead>
<tr>
<th>Smoking</th>
<th>SE</th>
<th>Anti-CCP⁺</th>
<th>Anti-CCP⁻</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>No</td>
<td>18</td>
<td>34</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>17</td>
<td>30</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td>58</td>
<td>44</td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>67</td>
<td>24</td>
</tr>
</tbody>
</table>

Conclusion: Smoking only leads to anti-CCP in context of SE

P < 0.05
Principle

• Every arthritis has a specific target tissue:
  – **Osteoarthritis**: articular cartilage
  – **Rheumatoid arthritis**: synovium
  – **Seronegative spondyloarthropathy**: enthesis
Seronegative spondyloarthropathies

- Ankylosing spondylitis
- Psoriatic arthritis
- Reiter’s Syndrome and reactive arthritis
- Arthritis of inflammatory bowel disease

Characteristics:
- Negative rheumatoid factor
- Spinal involvement and sacroiliitis
- Asymmetric oligoarthritis
- Sausage digits
Enthesopathy
Spinal Ligaments
Every arthritis has a specific pattern of joint distribution:

- Osteoarthritis: symmetrical pattern involving mechanical degradation of hyaline cartilage
- Rheumatoid arthritis: symmetrical synovitis
- Seronegative spondyloarthropathy: asymmetric inflammation of enthesis and synovium
Seronegative spondyloarthritis

- Axial Involvement
- Large joints
- Asymmetric pattern
Spinal inflammation
Spinal inflammation
Individual parameters of the inflammatory back pain criteria

1. Morning stiffness of >30 minutes' duration
2. Improvement in back pain with exercise but not with rest
3. Awakening because of back pain during the second half of the night only
4. Alternating buttock pain

The criteria are fulfilled if at least 2 of the 4 parameters are present. Sensitivity 70.3% Specificity 81.2%

HLA-B27 determination useful in this setting (>80% +)

Rudawaleit M, Arthritis Rheum 2006; 54:569
Sacroiliac Joint Fusion
Spinal Fusion: syndesmophytes
Spinal Fusion: syndesmophytes
The bamboo spine
Spinal Immobility
Peripheral arthritis: enthesopathy
Peripheral arthritis: enthesopathy
Peripheral arthritis: enthesopathy
Peripheral arthritis: enthesopathy
RA Symmetrical synovitis
Peripheral arthritis: asymmetry
Rheumatoid arthritis: synovitis
The sausage digit
The sausage digit
What distinguishes psoriatic arthritis from rheumatoid arthritis?

- Asymmetry
- Spine involvement
- Sausage digits
- Absence of nodules
- Psoriasis may be subtle and easy to miss
Fibromyalgia

A clinical syndrome characterized by chronic widespread pain and tenderness to palpation at specific body sites.
The Paradox of Fibromyalgia: No target tissue

- Normal passive range of joint motion
- Minimal mechanical disability
- Absence of muscle weakness or atrophy
- Normal ESR
- Normal radiographs, electromyogram, etc.
Fibromyalgia more prevalent than rheumatoid arthritis

Number of patients in the US (in millions)
ACR Fibromyalgia Criteria

From History: widespread pain of 3 months duration

From Examination: tender points defined by digital palpation with a force of 4 kg pain experienced in at least 11 of 18 tender point sites

Map of 18 Possible Tender-Points in Fibromyalgia

The Tender Point: Key to Fibromyalgia Diagnosis

- Excessively tender, discrete area of soft tissue
- Palpated with thumb or first two fingers
- Palpation pressure: ~ 4 kg/cm, enough to whiten nail

Tender-Point Palpation: I. Head

- Insertion of suboccipital muscle
Tender-Point Palpation: IV. Neck and Chest

- Lower sternomastoid
- Second costochondral junction
Tender-Point Palpation: II. Upper Back

- Mid upper trapezius
- Origin of supraspinatus
Tender-Point Palpation: V. Arms

- Lateral epicondyle
Tender-Point Palpation: III. Lower Back

- Upper outer buttock quadrant
Tender-Point Palpation: VI. Legs

- Prominence of greater trochanter
- Medial fat pad of the knee
Fibromyalgia tender points
Fibromyalgia tender points
<table>
<thead>
<tr>
<th>Criterion</th>
<th>% positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Widespread Pain</td>
<td>97.6</td>
</tr>
<tr>
<td>Tenderness 11 of 18 tender points</td>
<td>90.1</td>
</tr>
<tr>
<td>Fatigue</td>
<td>81.4</td>
</tr>
<tr>
<td>Morning stiffness &gt; 15 minutes</td>
<td>77.0</td>
</tr>
<tr>
<td>Sleep disturbance</td>
<td>74.6</td>
</tr>
<tr>
<td>Parasthesias</td>
<td>62.8</td>
</tr>
<tr>
<td>Headache</td>
<td>52.8</td>
</tr>
<tr>
<td>Anxiety</td>
<td>47.8</td>
</tr>
<tr>
<td>Dysmenorrhea</td>
<td>40.6</td>
</tr>
<tr>
<td>Sicca symptoms</td>
<td>35.8</td>
</tr>
<tr>
<td>Prior depression</td>
<td>31.5</td>
</tr>
<tr>
<td>Irritable bowel syndrome</td>
<td>29.6</td>
</tr>
<tr>
<td>Urinary urgency</td>
<td>26.3</td>
</tr>
<tr>
<td>Raynaud’s phenomenon</td>
<td>16.7</td>
</tr>
<tr>
<td>Criterion</td>
<td>% positive</td>
</tr>
<tr>
<td>------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Fatigue</td>
<td>100</td>
</tr>
<tr>
<td>Low grade fever</td>
<td>96</td>
</tr>
<tr>
<td>Allergy</td>
<td>65</td>
</tr>
<tr>
<td>Pharyngitis</td>
<td>57</td>
</tr>
<tr>
<td>Adenopathy</td>
<td>48</td>
</tr>
<tr>
<td>Mild arthralgia</td>
<td>39</td>
</tr>
<tr>
<td>Headache</td>
<td>35</td>
</tr>
<tr>
<td>Psychoneurosis</td>
<td>35</td>
</tr>
<tr>
<td>Mild myalgia</td>
<td>30</td>
</tr>
<tr>
<td>Weight loss &gt;5kg</td>
<td>22</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>22</td>
</tr>
<tr>
<td>complaints</td>
<td>Tachyarrhythmia</td>
</tr>
<tr>
<td>Sleep disturbance</td>
<td>13</td>
</tr>
<tr>
<td>Peripheral neuropathy</td>
<td>9</td>
</tr>
</tbody>
</table>
Syndromes That Overlap with Fibromyalgia

The neurologist sees chronic headache, the gastroenterologist sees IBS, the otolaryngologist sees TMJ syndrome, the cardiologist sees costochondritis, the rheumatologist sees fibromyalgia, and the gynecologist sees PMS.
The Fibromyalgia Complex: Affective Spectrum disorder

- Chronic Fatigue Syndrome
- Fibromyalgia
- Irritable bowel syndrome
- Migraine and tension headaches
- Multiple allergies syndrome
- Multiple chemical sensitivity
ANA: speckled pattern

15-23% of FMS and CFS patients have a positive ANA
Conclusions

- Examine the whole patient
- Identify the target tissue and joint distribution
- Recognize synovitis
- Interpret laboratory studies in the context on the clinical picture