



Exploring Arthritis & Occupational Hand Injuries

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Osteoarthritis

- Osteoarthritis (OA) is the most common form of arthritis. It is strongly associated with aging and typically affects the knee, hip, spine, great toe, and hands
- Osteoarthritis can be defined pathologically, radiographically, or clinically, and the choice of definition can substantially affect prevalence estimates



Osteoarthritis

- Every articular joint affected
- Prevalence and Symptoms Depends on:
 - Specific Joint
 - Genetic Predisposition
 - Health(Obesity . . .)
 - Post-Traumatic Etiology
 - Environmental Factors
 - Work Condition



Joint Degeneration and Injury in Hand

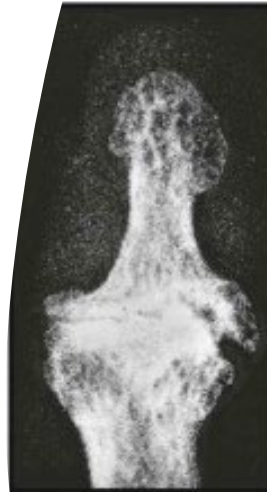
- Degenerative Joint Disease in the Hand:
 - Distal Interphalangeal (DIP)
 - Thumb Basal Joint (CMC Thumb)
 - Proximal Interphalangeal (PIP)
- Relationship between degenerative OA and occupational activities have been reported
- Evidence to support association is poor

Definition of Osteoarthritis

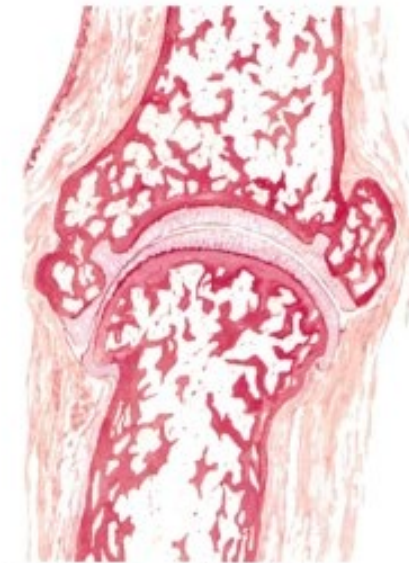
- **Pathologic**
- Radiologic
- Clinical

Osteoarthritis: Digits

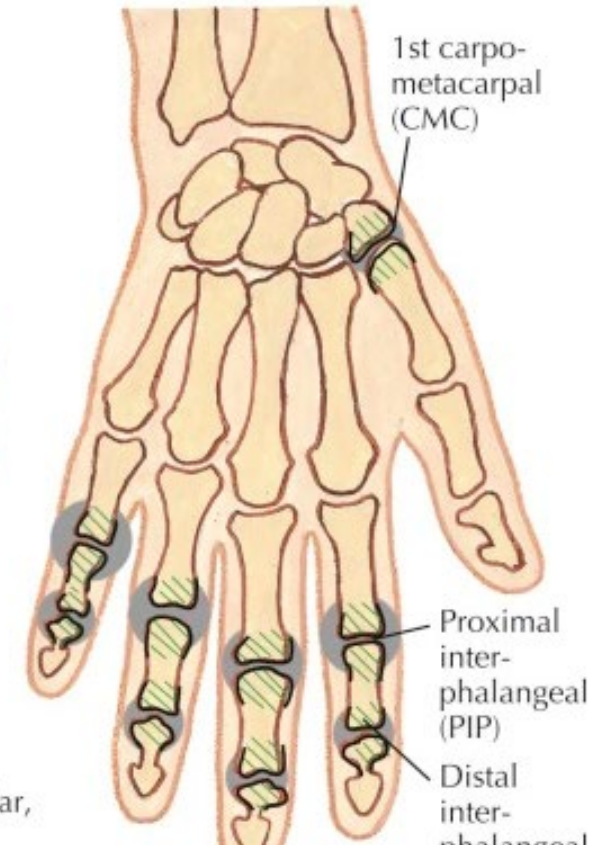
- The age-standardized prevalence of hand osteoarthritis in general population:
 - 44.2% in women
 - 37.7% in men



Radiograph of distal interphalangeal joint reveals late-stage degenerative changes. Cartilage destruction and marginal osteophytes (Heberden nodes)



Section through distal interphalangeal joint shows irregular, hyperplastic bony nodules

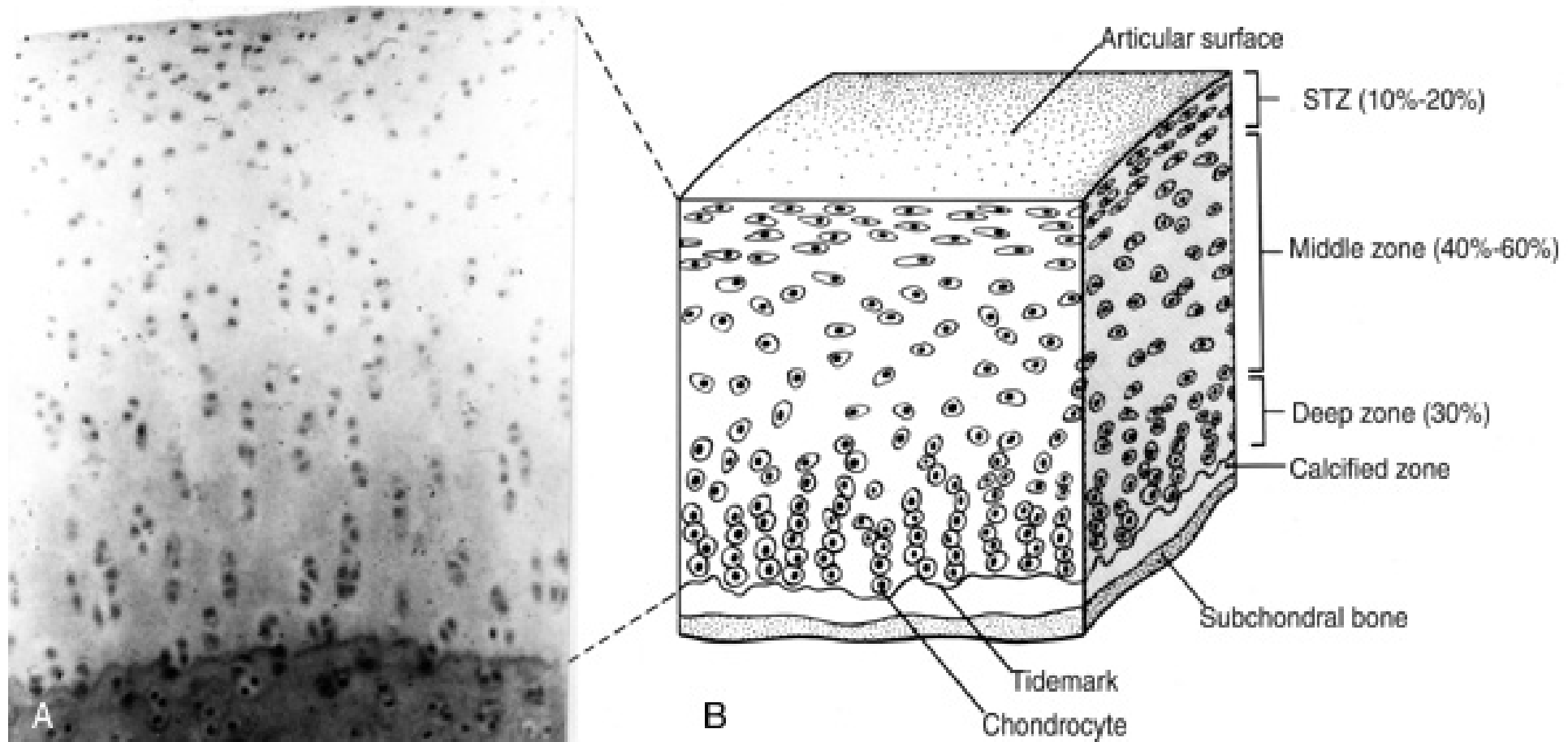


1st carpometacarpal (CMC)

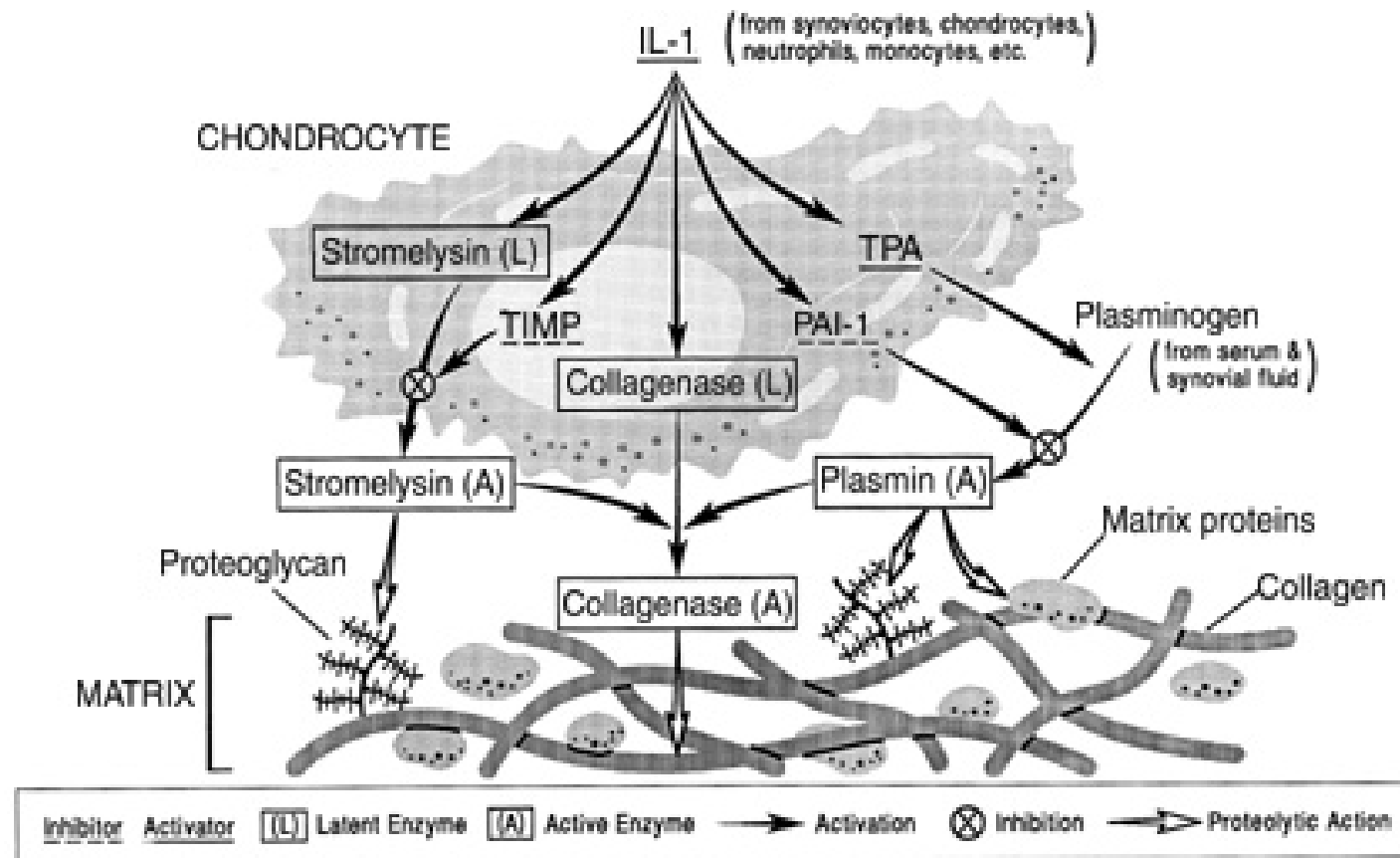
Proximal interphalangeal (PIP)

Distal interphalangeal

Normal Cartilage



Osteoarthritis: Pathogenesis



Osteoarthritis: Pathology

Joint degeneration that affects all aspects of the joint

Thinning and fibrillation of the cartilage

Loss of joint space

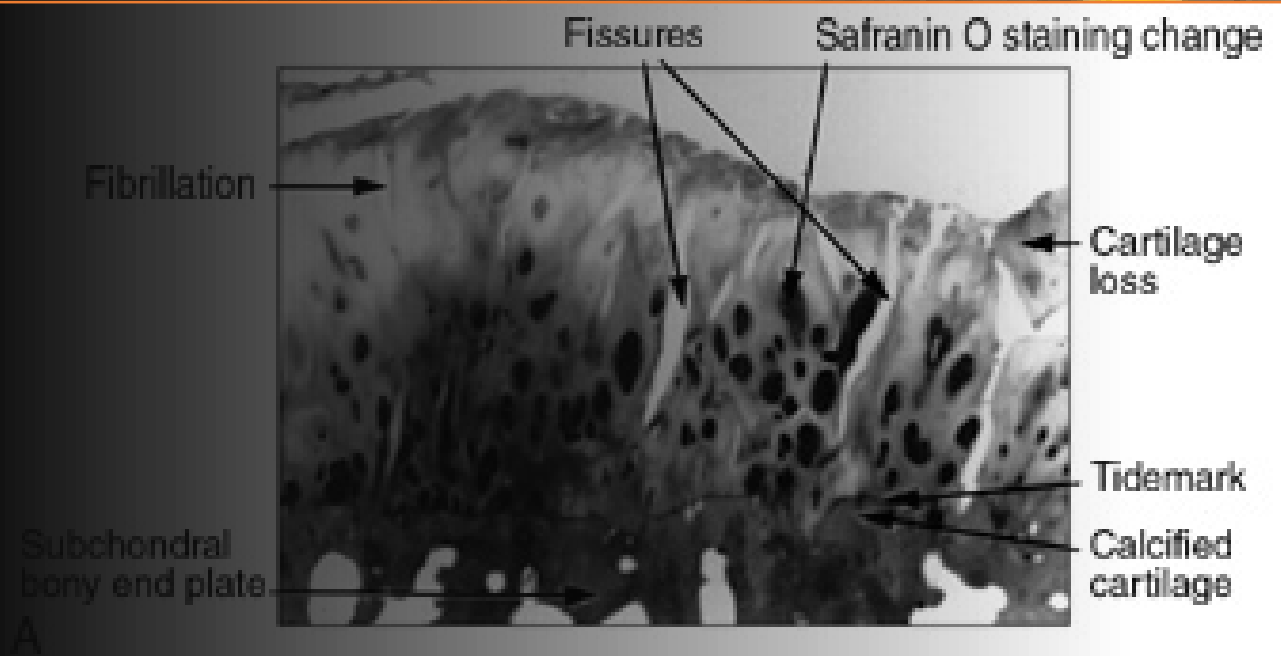
Osteophyte formation

Subchondral bony sclerosis, subchondral cysts

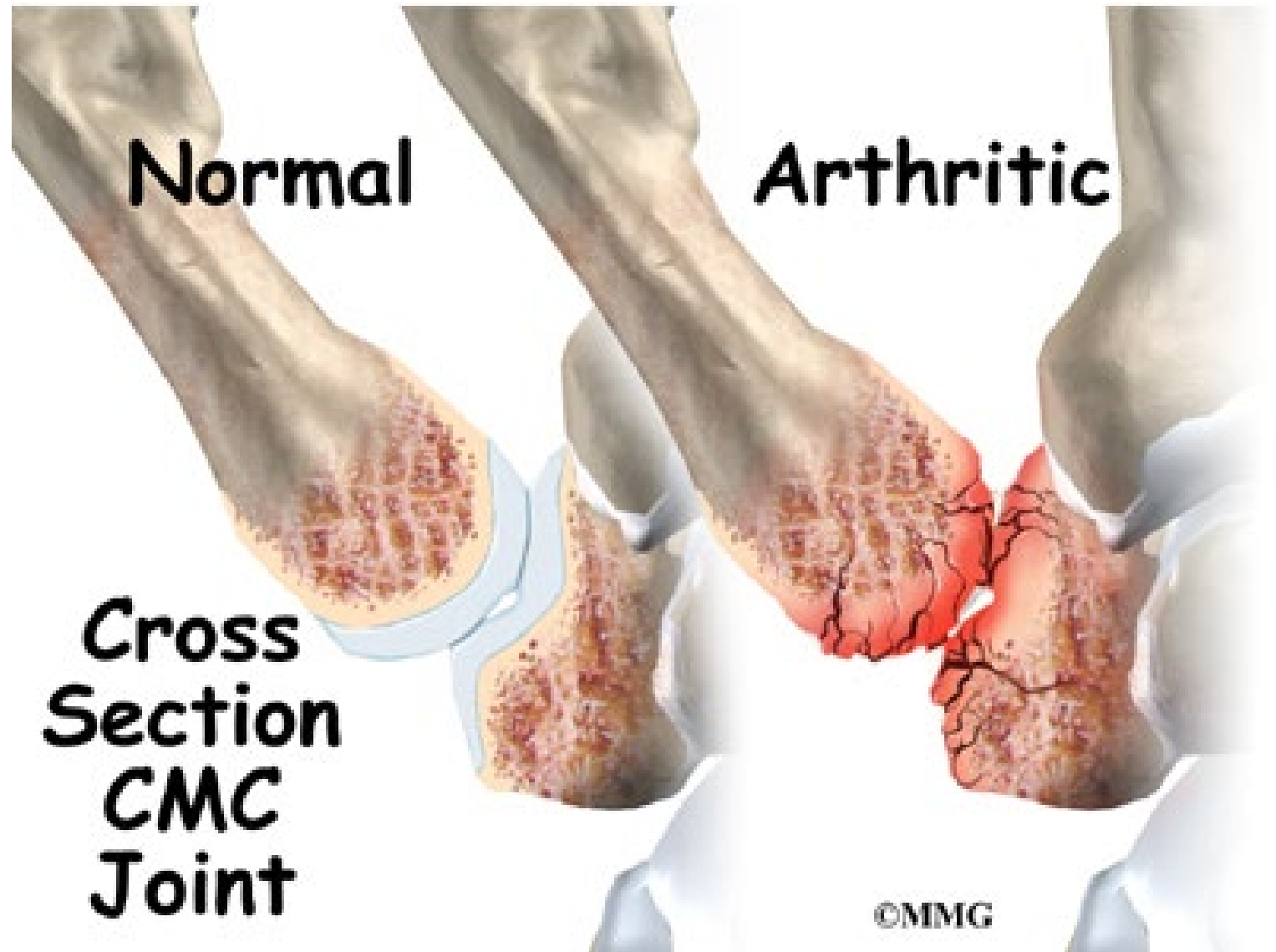
Degradation of synovium and ligaments

End stage OA with significant joint deformity

Cartilage Degeneration



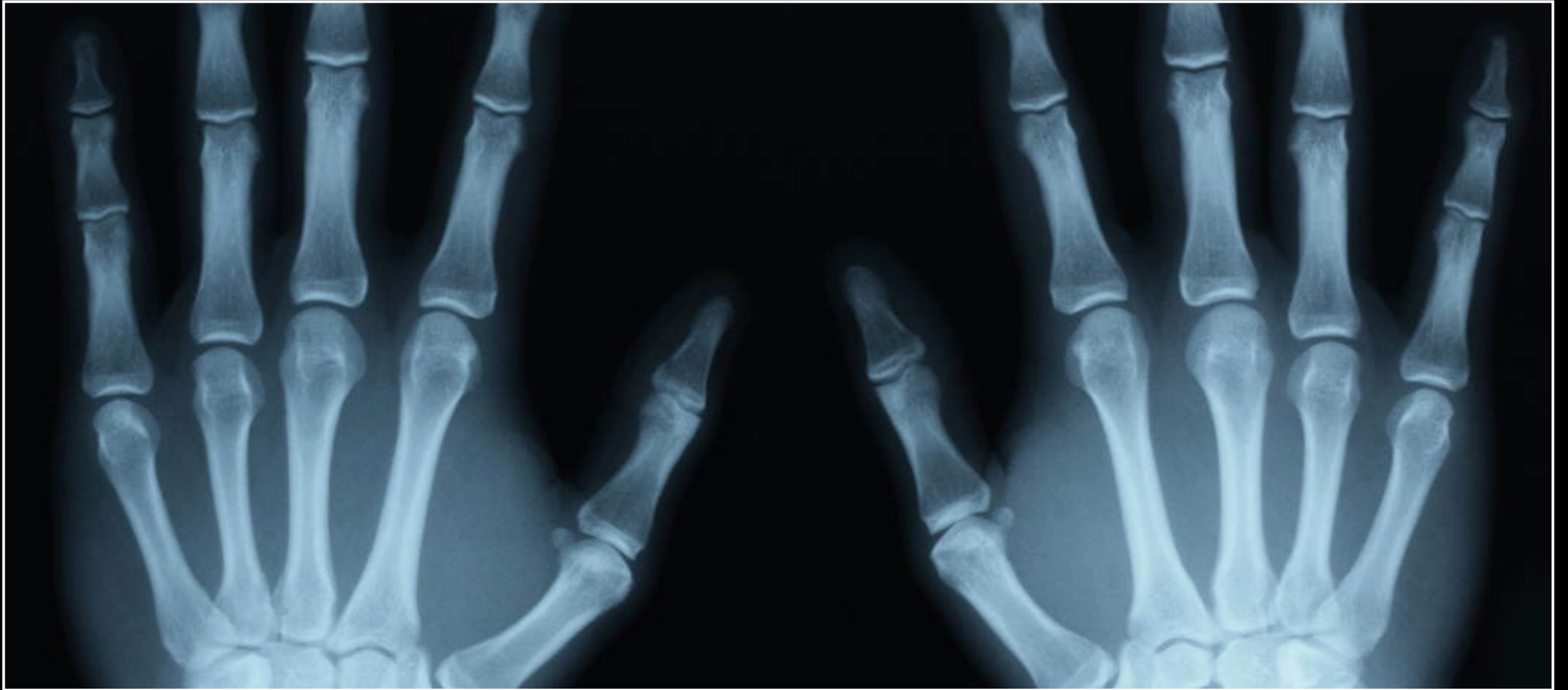
End Stage Arthritis



Definition of Osteoarthritis

- Pathologic
- **Radiologic**
- Clinical





Radiograph Hand: Normal



Radiographs

Radiographic Arthritis

Grade	Classification	Description
0	Normal	No features of osteoarthritis
1	Doubtful	Minute osteophyte, doubtful significance
2	Minimal	Definite osteophyte, unimpaired joint space
3	Moderate	Moderate diminution of joint space
4	Severe	Joint space greatly impaired with sclerosis of subchondral bone



Definition of Osteoarthritis

- Pathologic
- Radiologic
- **Clinical**



Arthritis: Clinical definition

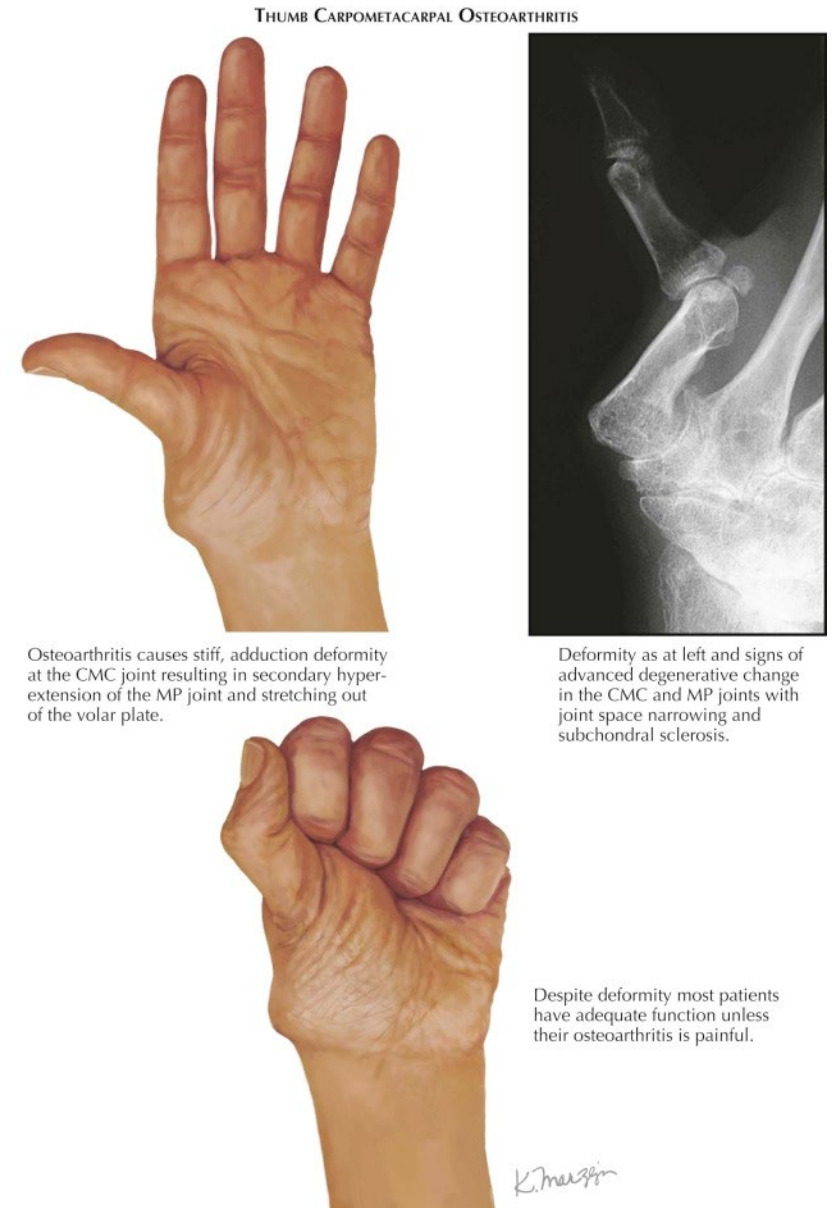
- Clinical OA is usually defined by abnormalities on physical examination consistent with OA, such as Heberden or Bouchard nodes in the hand
- Symptomatic OA is usually defined as the presence of joint symptoms such as pain, aching, or stiffness, in a joint with radiographic OA
- Onset of pain can be
 - Gradual
 - Sudden
 - **Post-traumatic**
- Early on, may not have visible nodes, joint appears normal on exam – but may be symptomatic

Basal Joint Arthritis: Thumb

Extremely common

Earlier onset in Women

50% of women at age 50 will show radiographic evidence of basal joint arthritis



Stages of Thumb CMC Joint Degeneration



Osteoarthritis vs. Inflammatory arthritis

- Inflammatory:
- Disease where the body attacks its own joints:
- Rheumatoid
- Psoriatic
- Gout/Pseudogout
- Associated with another condition



Treatment



Treatment for Primary Osteoarthritis

- Nonsurgical treatment is the mainstay of treatment
 - Warm Soaks
 - Anti-inflammatories
 - Corticosteroids

Surgical treatment is indicated when there is persistent pain and disability despite conservative measures

Treatment

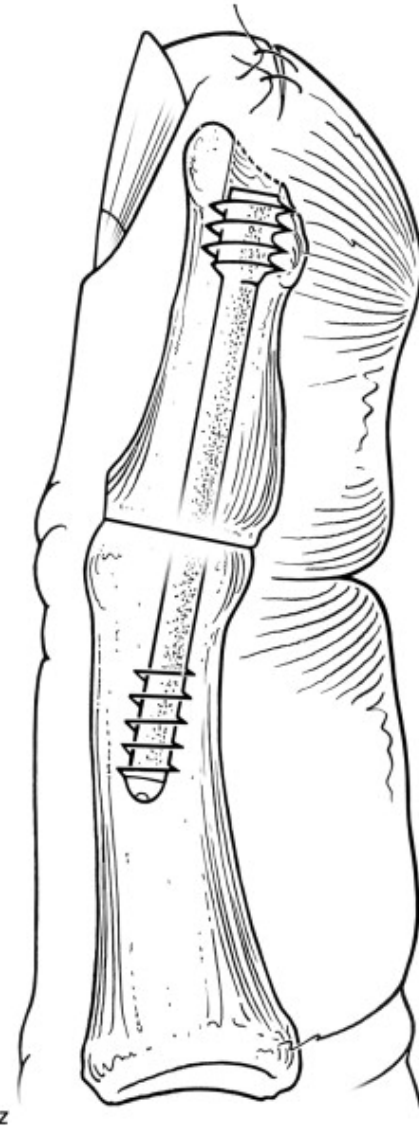
- Pain relief is the primary goal with any surgical treatment
 - Regaining full motion is not always possible
 - Gaining motion, but with continued pain, does not add any benefit
 - Treatment decision takes several factors into account

Surgical Treatment
DIP

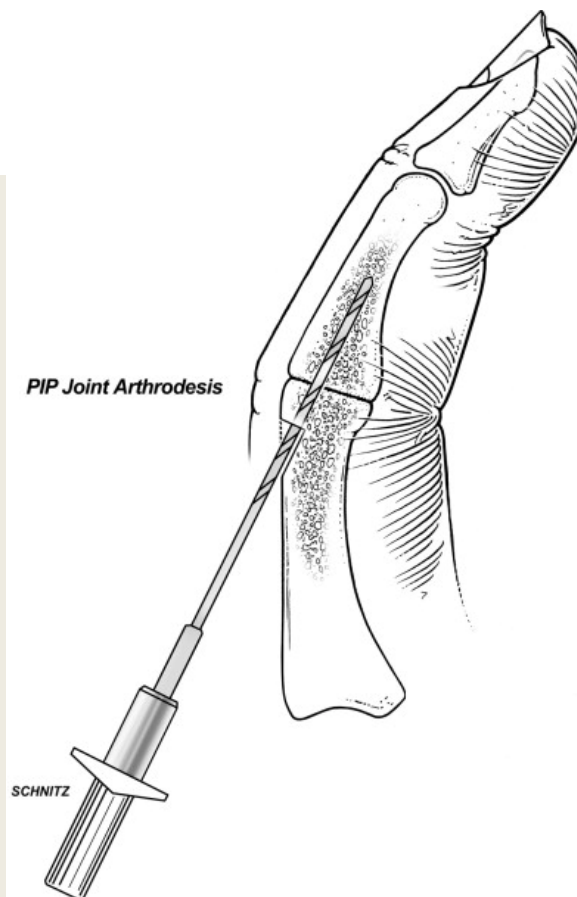
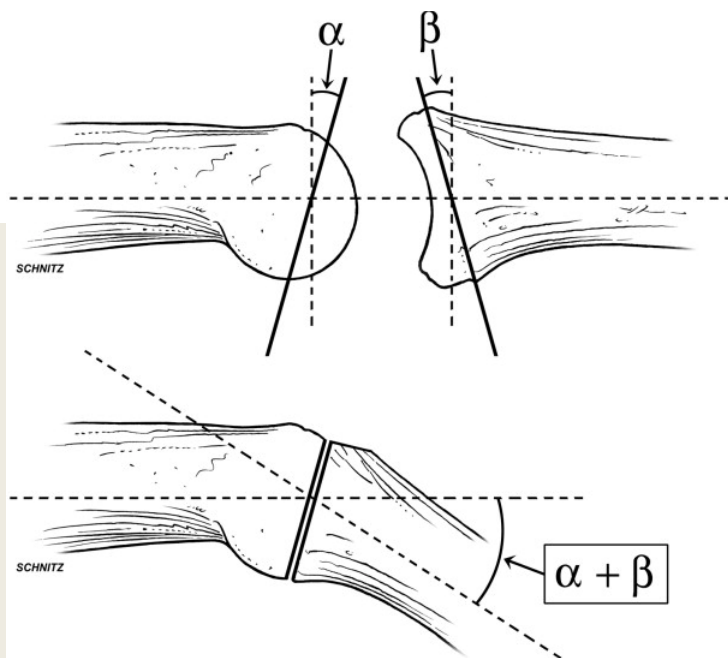
Debridement

Arthrodesis

Arthrodesis of DIP joint using Herbert Screw fixation



Arthrodesis



Arthrodesis

Arthrodesis: Advantages

- Pain relief
- Provides stability
- Corrects deformity

Loss of motion is a
substantial
disadvantage

- Affects grip

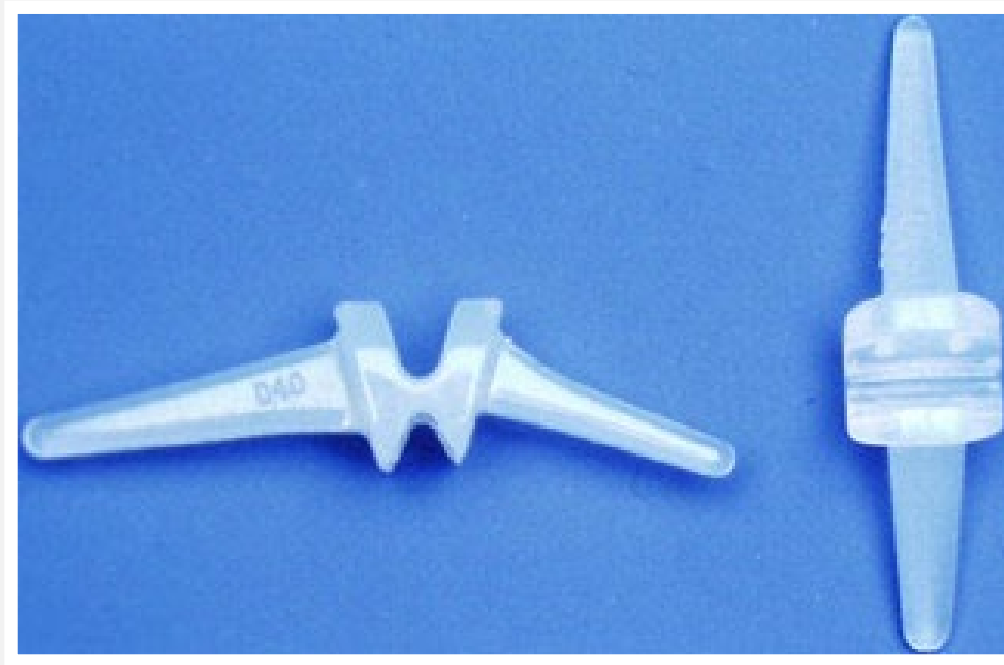
PIP Joint Replacement

Previous metallic and hinged designs had shortcomings

- Significant bony resection
- Violated the stabilizing ligaments
- Too much constraint – loosening and failure

New generation implants address these shortcomings

PIP Joint Replacement: Silicone Implants



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Surface Replacement





Treatment: Thumb Basal Joint with Trapeziectomy

Post-Traumatic Arthritis

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- Differs from osteoarthritis:
 - Isolated joint arthrosis resulting from defined injury
 - Occurs specifically to injured joint before onset of typical arthritis
 - Develops after acute direct injury to the joints
 - History of physical trauma
 - Results in immediate or long-term late symptoms of arthritis
 - Swelling
 - Joint effusion
 - Acute and chronic pain

Post-Traumatic Arthritis

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- Causes:
 - Fractures
 - Dislocations
 - Articular contusion and injury
 - Poorly treated fracture/joint injury
 - Joint penetrating injury
 - Infection

Post-Traumatic Arthritis

- Differentiate from aggravation of underlying arthritis diagnosis
- Relate a specific traumatic event to the early and unusual development of arthritis in a specific joint
- Key: Document with radiographs at the time of injury:
 - Recommendation: Any significant injury to hand, document with radiographs:
 - Joint injuries resulting in post-traumatic arthritis usually have radiographic findings
 - Can also document substantial pre-existing arthritis

Occupational Arthritis

Concept of occupational related arthritis has been studied extensively

Mixed conclusions

Some job demands do appear to result in arthritis localized to a particular joint

Some Industrial workers are more likely to develop arthritis in their hands than are control groups without similar repetitive occupational demands

Environmental variables are unique to each occupation and avocational activity, making their risk difficult to stratify

Evidence in Literature

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- [J Hand Surg Am.](#) 2007 Apr;32(4):459-65.
 - **Osteoarthritis of the thumb carpometacarpal joint in women and occupational risk factors: a case-control study.**
 - [Fontana L¹](#), [Neel S](#), [Claise JM](#), [Ughetto S](#), [Catilina P](#).
 - Results:
 - Occupational risk factors
 - Occupations involving repetitive thumb motion
 - Jobs perceived by the subject having not enough rest breaks
 - Conclusion:
 - There is some evidence to support the role of certain occupational factors in the occurrence of CMC OA in women

Evidence in Literature

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- **Occupational use of precision grip and forceful gripping, and arthrosis of finger joints: A literature review**

V. Jensen, H. Bøggild, J. P. Johansen

- *Occupational Medicine*, Volume 49, Issue 6, August 1999, Pages 383–388
- A systematic review of arthrosis of finger joints in relation to occupational exposure
- Arthrosis of the proximal interphalangeal joints and first carpo-metacarpal joints was not related to any specific occupational task

Evidence in Literature

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- **Associations of work activities requiring pinch or hand grip or exposure to hand-arm vibration with finger and wrist osteoarthritis: a meta-analysis**
 - *by [Hammer PEC](#), [Shiri R](#), [Kryger AI](#), [Kirkeskov L](#), [Bonde JP](#)*
 - **Conclusion** Epidemiological studies provide limited evidence that pinch grip may increase the risk of wrist or finger OA, but causal relation cannot be resolved because of cross-sectional designs and inadequate characterization of biomechanical strain to the hand and wrist.

Clinical Perspective:

- Radiographs demonstrate evidence of small joint (CMC, IP) arthritis in patients routinely, symptomatic or not
- There appears to be no consistent correlation to work activities
- Injuries or overuse can make an otherwise asymptomatic, but with radiographically present changes, painful and symptomatic
- Causation is difficult to prove
- Aggravation of underlying condition is more appropriate
- Documentation and understanding of the legal process

Case Review: Thumb CMC

- 54-year-old rural carrier, filed an occupational disease claim alleging that the bone-to-bone condition of her left thumb was a result of her federal employment
- Very sharp, stinging pains, weakness, dropping mail at times
- Orthopaedic surgeon - diagnosed carpometacarpal arthritis, left thumb, chronic “and related to her work as a mail carrier”
- Attending physician’s form report - diagnosis was caused or aggravated by employment activity

Case Review: Thumb CMC

- Employer confirmed that worker did use her hands and thumbs as a letter carrier
- Employer provided a position description describing the duties and responsibilities of a rural carrier
- Worker was denied claim for compensation
- ***Discussion:***

Case Review: Legal Course

- Denial based on:
 - failure to establish the element of fact of injury
 - evidence did not support that the injury occurred as alleged
 - did not submit any medical evidence to establish that her diagnosed medical condition was causally related to the work injury or events the injury or events occurred as alleged

Case Review: Legal Course

- Appeal
 - attributes her left thumb condition to the duties she performed as a rural carrier, in particular, using her left hand to hold mail
 - no dispute that she performed such activities at work
 - employing establishment confirmed that she did use her hands and thumbs as a letter carrier
 - Board finds that appellant has met her burden to establish that she experienced a specific event, incident or exposure occurring at the time, place and in the manner alleged

Case Review: Legal Course

- Did the work activities cause or aggravate any diagnosed medical condition?
- Orthopedic surgeon found chronic left thumb carpometacarpal arthritis was “related to her work as a mail carrier”
- Attending physician form report indicated diagnosis was caused or aggravated by employment activity

Case Review: Legal Precedent Federal Claims

- Employee seeking benefits has the burden of proof to establish the essential elements of his or her claim
- Employee must submit sufficient evidence to establish that he or she experienced a specific event, incident or exposure occurring at the time, place and in the manner alleged
- He or she must also establish that such event, incident or exposure caused an injury

Case Review: Legal Precedent Federal Claims

- Medical evidence generally required to establish causal relationship is rationalized medical **opinion** evidence
- The opinion of the physician must be based on a complete factual and medical background of the claimant
- Must be one of reasonable medical certainty
- Must be supported by medical rationale explaining the nature of the relationship between the diagnosed condition and the established incident or factor of employment

Case Review: Federal Appeals Board Analysis

- Surgeon did not provide medical rationale to support opinion
- Any opinion on causal relationship must be supported by medical rationale explaining the nature of the relationship between the diagnosed condition and the established incident or factor of employment
- Surgeon did not discuss from an orthopedic perspective how holding mail in the left hand, or any other employment activity, caused or aggravated the diagnosed arthritis, or on what basis he could make such a determination

Case Review: Conclusion

- Board found that appellant has not met her burden to establish that she sustained an occupational disease in the performance of duty
- The medical opinion evidence, although supportive, is insufficiently rationalized to establish the element of causal relationship

Conclusions:

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- From clinical perspective – it is important to document the work activities and relate it to the injury being alleged
 - Limited scientific evidence to provide clear causality for OA and work activities
 - Lack of scientific consensus on causation makes the process inconsistent and results in other factors determining the course of the work claim
 - Understanding of the legal process in compensation claims

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