

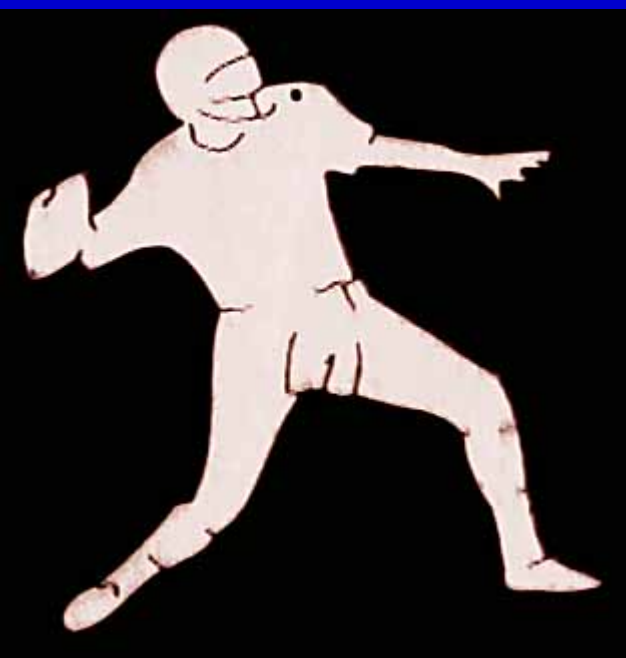


# Injury Prevention in Throwing Athletes

Tod Sweeney, M.D.

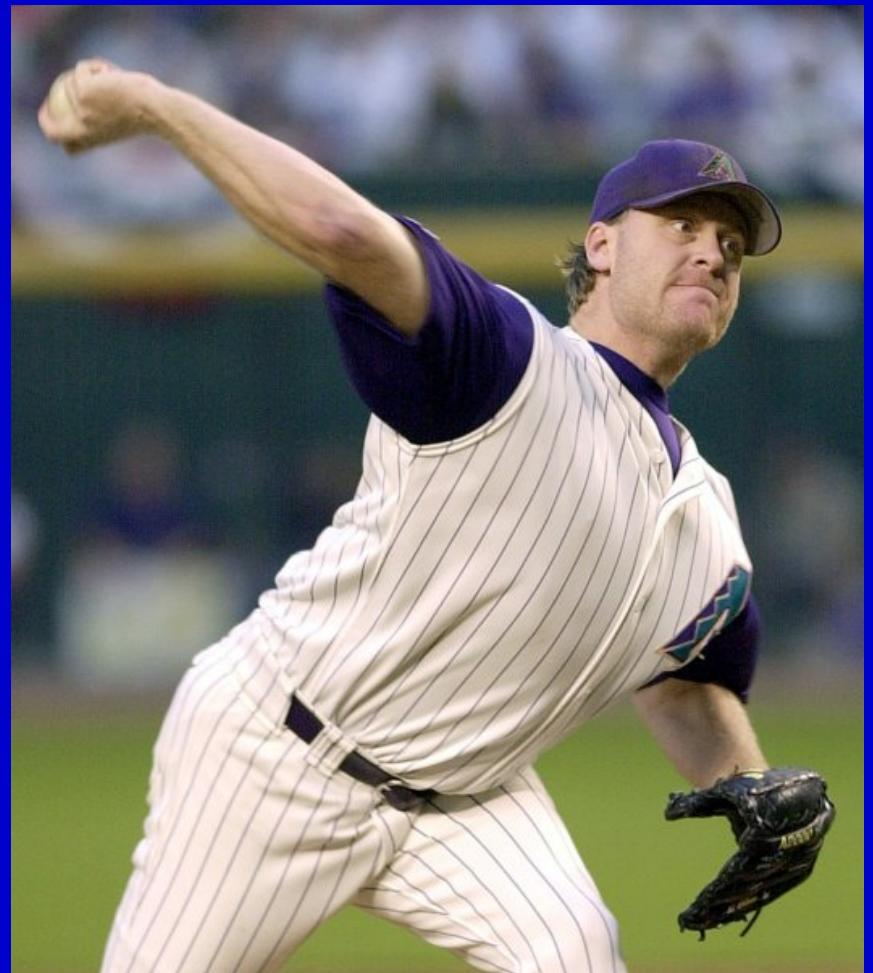
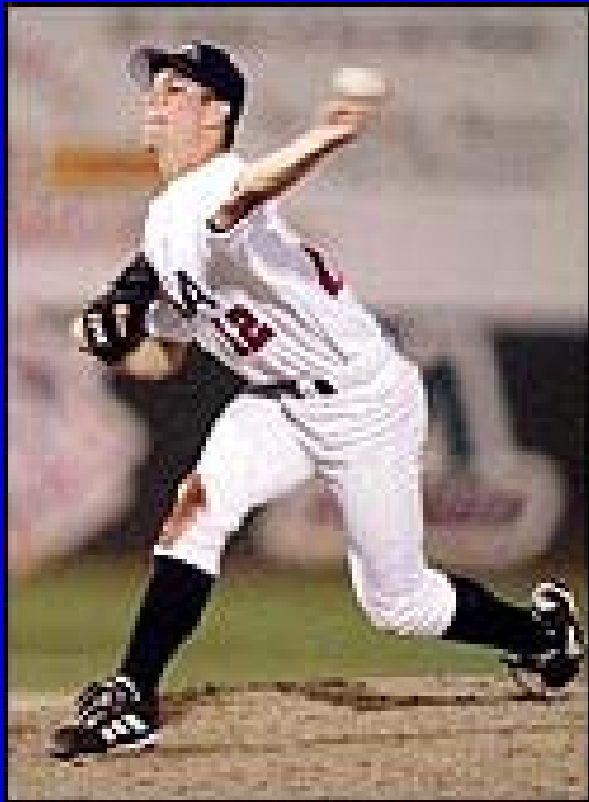
Sports & Family Medicine of Colorado

Arvada, CO



# Baseball





“I love this game”



# Baseball

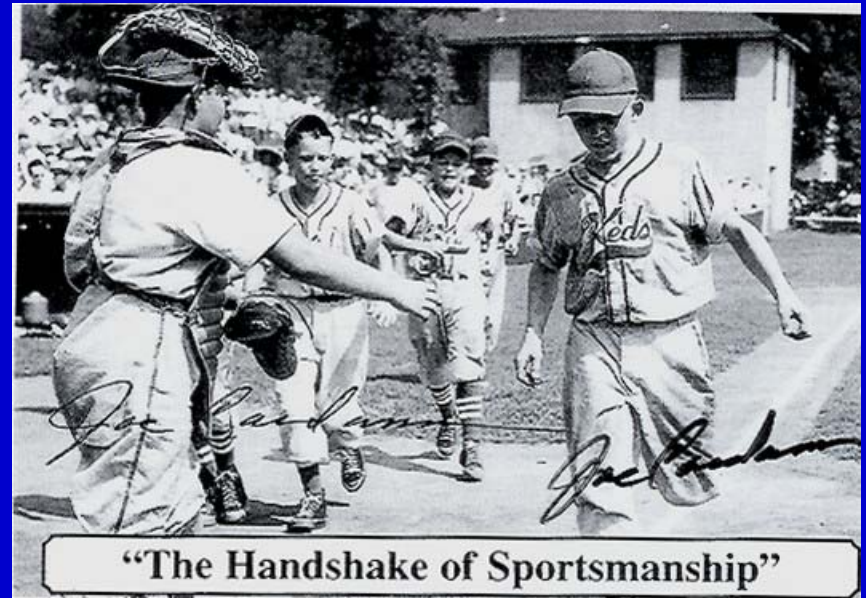
- One of the safest sports available for today's youth
- Many serious injuries suffered by adult baseball pitchers may have begun to develop at the youth level
- **Goal** is to reduce the risk of injury and maximize the younger player's ability to perform and advance to higher levels



Carl E. Stotz "Tuck" 1910-1992. The Founder and organizer of Little League Baseball

# Pitch counts

- Why? *Reduce the risk of injury*
- 1996 USA Baseball Medical & Safety Advisory Committee
  - Expert survey
- 2002 *American Journal of Sports Medicine* study
  - Epidemiological study



# Pitch counts

- 2002 study - *American Journal of Sports Medicine*
  - 476 baseball pitchers ages 9-14 followed x 1 season
    - Pre-season and post-season questionnaires
      - Types of pitches
      - Stiffness and pain in elbow and shoulder
    - Injury and performance interviews following each game
    - Pitch count logs
    - Video analysis of pitching mechanics

## 2002 study - *American Journal of Sports Medicine*

- 50% reported either elbow or shoulder pain at least once during season
- Pitchers who threw sliders were 86% more likely to experience elbow pain during season
- Pitchers who threw curve balls were 56% more likely to experience shoulder pain during season
- Pitchers who threw change ups were 12% less likely to experience elbow pain and 29% less likely to experience shoulder pain during season (*#'s not statistically significant – nevertheless, important*)

## 2002 study - *American Journal of Sports Medicine*

- As pitch counts increased, the number of cases of shoulder and elbow pain increased
- The incidence of elbow and shoulder pain increased with the # of pitches thrown in a season
- *This study presents valuable data and represents a foundation for future research*
- *Prospective, longitudinal studies are needed*

# Recommendations – USA Baseball Medical & Safety Advisory Committee

- Coaches and parents should listen and react to pitchers/players who complain about arm pain
- A pitcher who complains or shows signs of arm pain during a game should be removed immediately from pitching
- Parents should seek medical attention if pain is not relieved within four days or if the pain recurs immediately the next time the player pitches
- *League officials should inform parents re: the above*

## Pitch counts

- Recommended limits for 9-10 year old pitchers:
  - 50 pitches per game
  - 75 pitches per week
  - 1000 pitches per season
  - 2000 pitches per year



## Pitch counts

- Recommended limits for 11-12 year old pitchers:
  - 75 pitches per game
  - 100 pitches per week
  - 1000 pitches per season
  - 3000 pitches per year



## Pitch counts

- Recommended limits for 13-14 year old pitchers:
  - 75 pitches per game
  - 125 pitches per week
  - 1000 pitches per season
  - 3000 pitches per year



# Recommendations – USA Baseball Medical & Safety Advisory Committee

- Pitch count limits pertain to pitches thrown in games only
- Pitchers should not throw breaking pitches (curveballs, sliders, etc) in competition until their bones have matured (indicated by puberty) – typically about 13 yrs of age
- Attention should focus on good mechanics, a fast fastball, a good change-up, and good control

## Recommendations – USA Baseball Medical & Safety Advisory Committee

- Pitchers should develop proper mechanics as early as possible and include more year-round physical conditioning as their body develops
- A pitcher should be prohibited from returning to the mound in a game once he/she has been removed as the pitcher

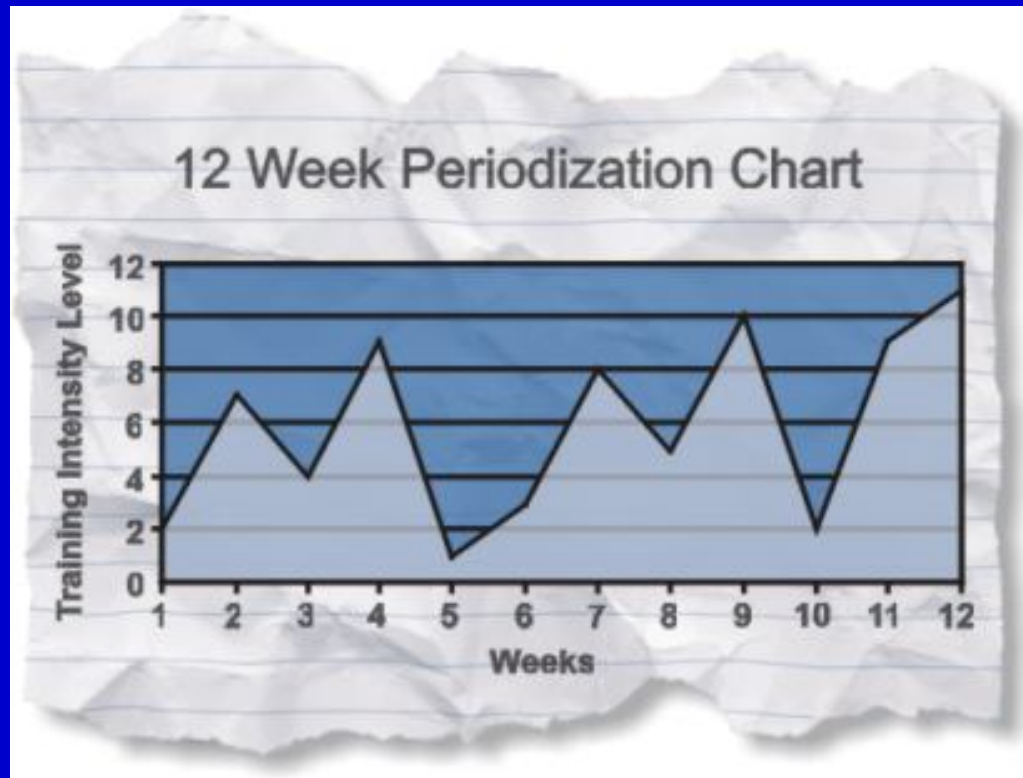
# Recommendations – USA Baseball Medical & Safety Advisory Committee

- Baseball players – especially pitchers – are discouraged from participating in showcases due to the risk of injury (*inappropriate preparation, over-throwing*)
- Baseball pitchers are discouraged from pitching for more than one team in a given season
- Baseball pitchers should compete in baseball no more than 9 months in any given year, as *periodization* is needed to give the pitcher's body time to rest and recover

# Periodization

- An organized approach to training that involves progressive cycling of various aspects of a training program during a specific period of time
- Varying a training program at regular time intervals to bring about optimal gains in physical performance

# Periodization



# Principles of conditioning

- Includes strength training, flexibility, speed, power, muscle endurance, aerobic/anaerobic capacity, agility, coordination, nutrition and mental preparation



# Principles of conditioning

- Condition the entire body
- Train the muscles with the movement they perform during throwing
- Train for muscular balance
- Train strength before power or endurance i.e. a base level of strength is necessary
- Emphasize quality of exercise, not quantity
- Train for muscle endurance

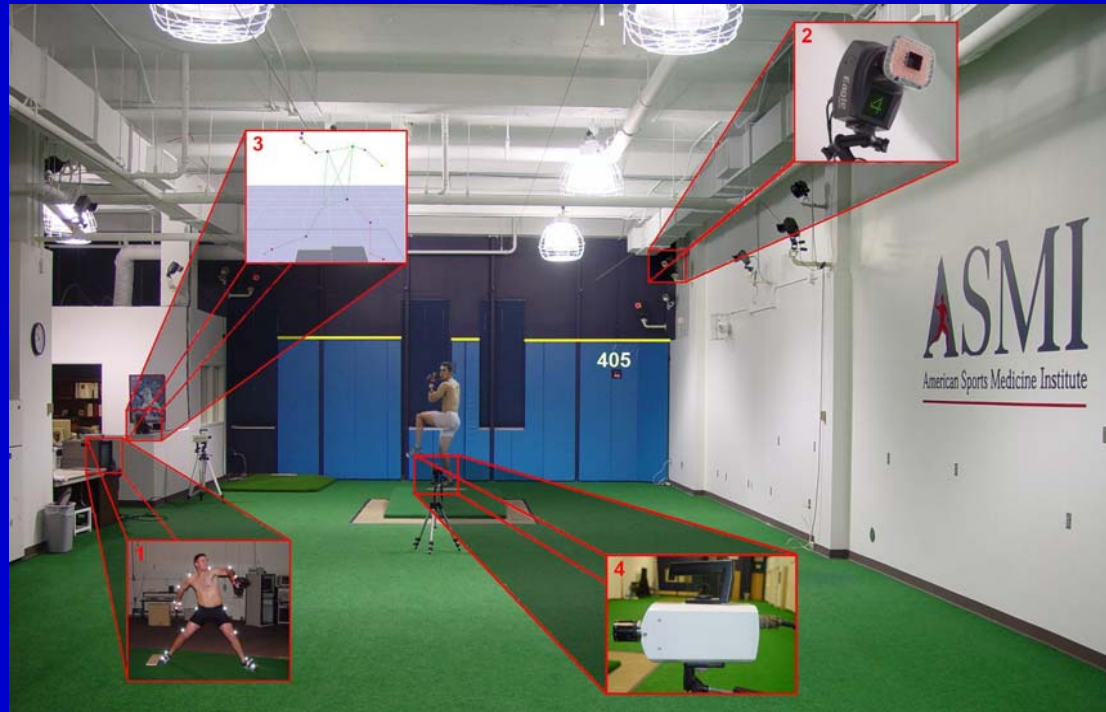
# Interval throwing programs

- Used to help train, condition, and rehabilitate the throwing arm
- Consist of both short and long toss
- Short toss stimulates the physical demands that occur in game situations
- Long toss provides low-intensity, long duration stimulation to the thrower and to increase arm strength

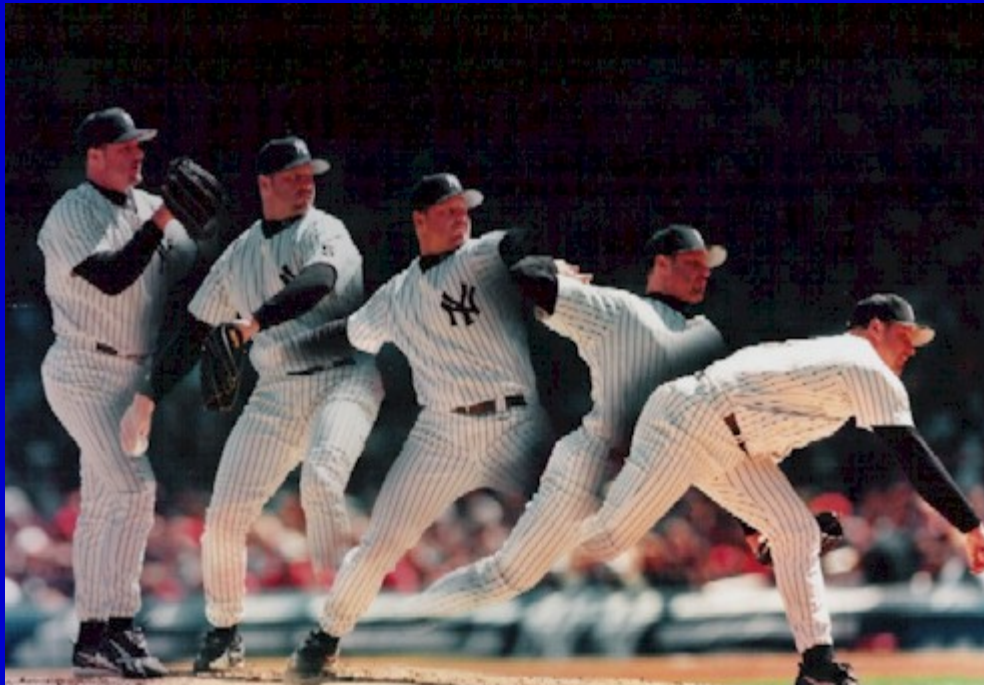
# Interval throwing programs

- Can be tailored for both pitchers and position players
- More beneficial to follow the # of throws than limit throws by suggested times
- Reinforces proper mechanics while systematically increasing joint loads

# Biomechanics



# Biomechanics



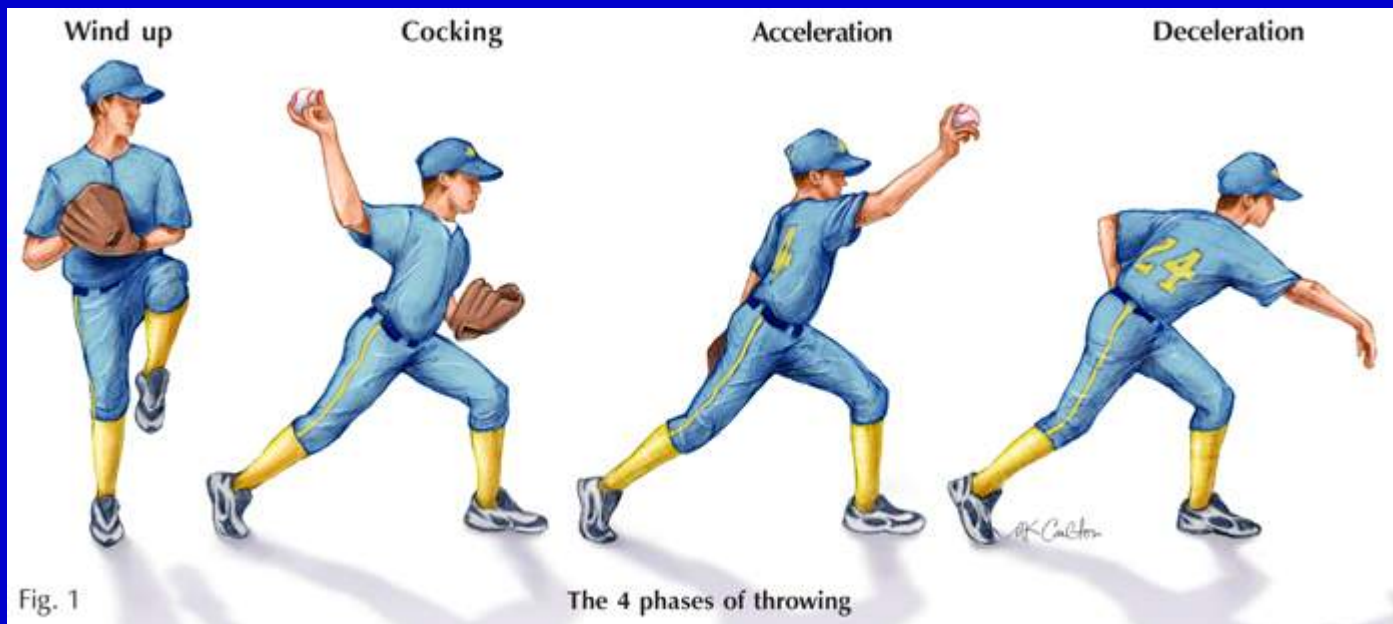
# Biomechanics

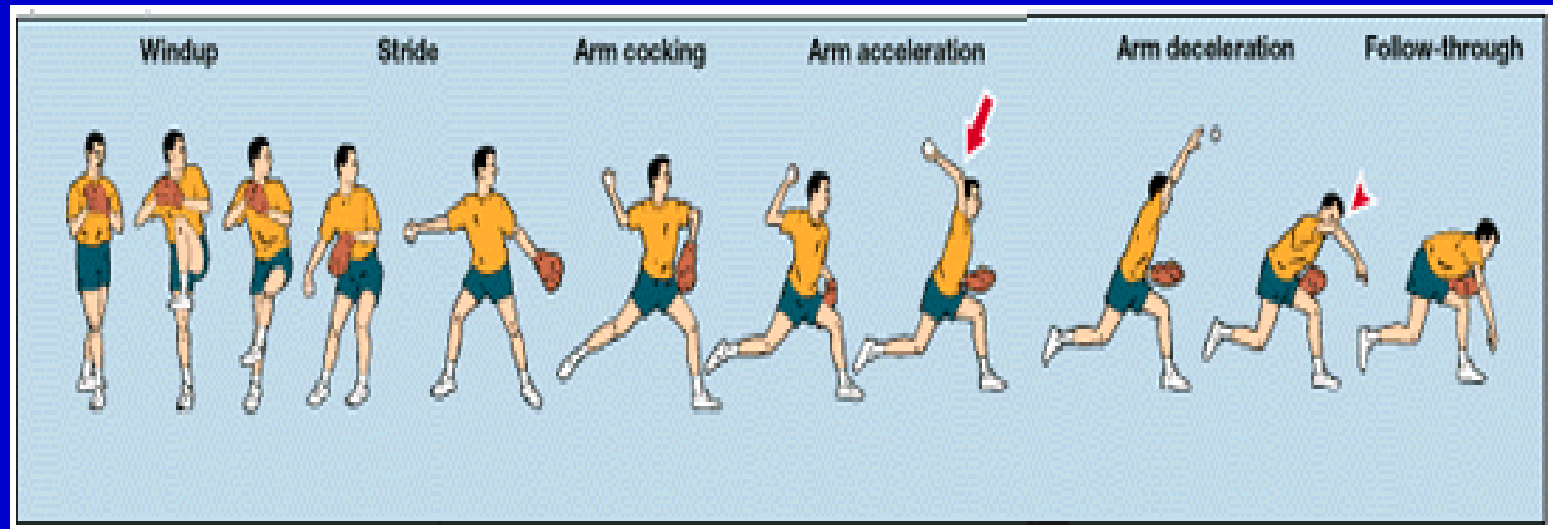
- Purpose of the biomechanical pitching evaluation is to reduce the risk of injury or re-injury by addressing the efficiency of a pitcher's mechanics
- If a pitcher is able to generate arm speed using his *entire body*, then less force and torque will be placed on his throwing arm

# Biomechanical Analysis



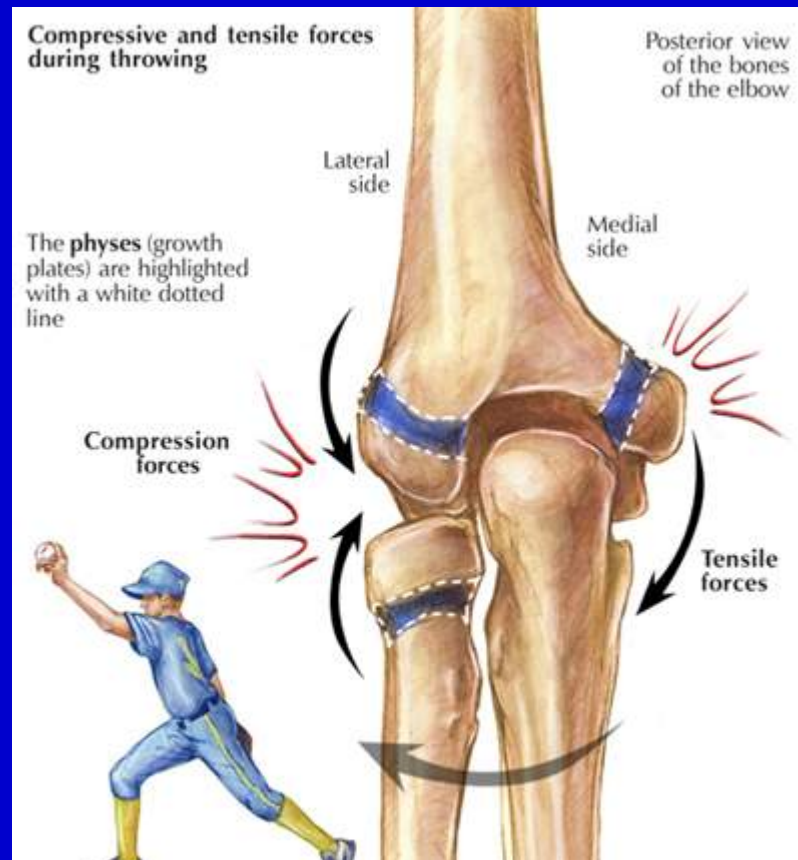
# Phases of throwing





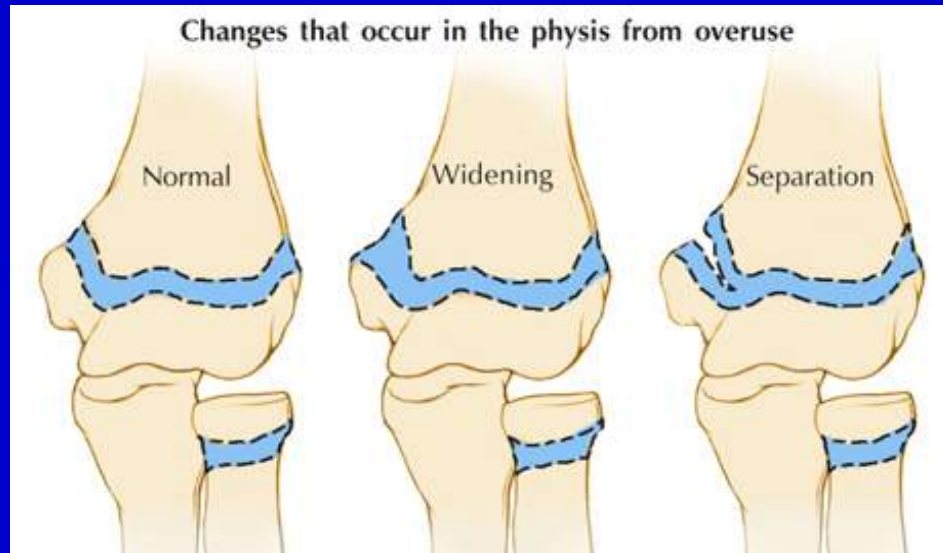
- The acceleration phase (arrow) with a flexed elbow places a valgus stress on the medial ligamentous support structures and the ulnar nerve, compressing the lateral bony structures
- Posteriorly, valgus torque causes the medial olecranon to impinge against the medial olecranon fossa
- Forearm extension after ball release (arrowhead) eccentrically stretches the distal bicipital tendon

# Compressive and tensile forces during throwing



Posterior View

# Physeal changes from overuse



Anterior View

# Common elbow disorders of the throwing athlete

- Soft tissue injuries
  - Flexor-pronator strain/rupture
  - Ulnar Neuritis
  - Ulnar collateral ligament sprain/rupture
- Bony injuries
  - Loose bodies (posterior, lateral)
  - Olecranon osteophytes
  - Medial epicondyle avulsion
  - Osteochondritis dissecans of the capitellum

Skeletally immature



## Rehabilitation – *after injury*

- Throwing activities are usually limited for ~ 6-8 wks
- Light stretching after 7-10 days
- Light strengthening after 7-10 days (isometrics)
  - <http://www.asmi.org/sportsmed/exercise/exercise.html>
- Thrower's 10 program @ 3 wks

# Rehabilitation – *after injury*

- Interval throwing program when...
  - Full non-painful range of motion
  - Normal strength
  - No tenderness over the injured area

# Summary

- **Goal** is to reduce the risk of injury and maximize the younger player's ability to perform and advance to higher levels
- Understanding injury mechanisms, risk factors and the basis for pitch count recommendations will help achieve the above goal
- Knowing when and who to refer injured athletes to is critical to a speedy recovery



# Addendum

Pitch grips

# Four Seam Fastball



# Two Seam Fastball



# Changeup



# Curveball





# Thanks!



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