



# Extent of Injury Workshop



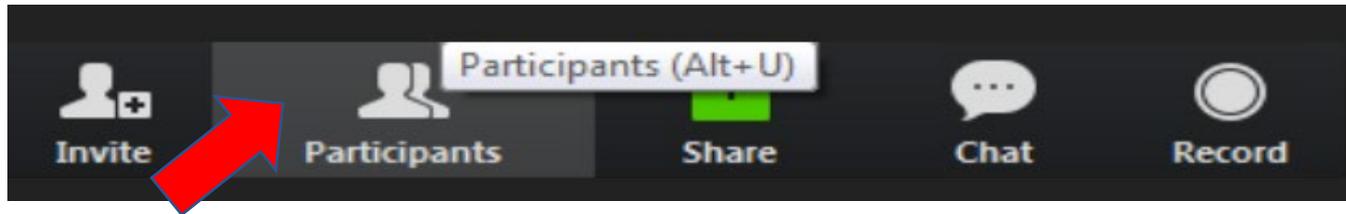
# Disclaimer

The material presented in this presentation is made available by the TDI-DWC for educational purposes only. The material is not intended to represent the only method or procedure appropriate for the medical situations discussed. Rather, it is intended to present an approach, view, statement, or opinion of the faculty, which may be helpful to others who face similar situations.



# Housekeeping

At the bottom of your screen, click to turn on the participant list:



Ensure your name (not phone # or initials) is shown on the Participant List for CME and attendance purposes. If not, do the following to rename:

Hover over your current sign in and two boxes appear

Click on the Rename box

Type in your first and last name



# Asking questions

Please mute your phone/VOIP audio connection



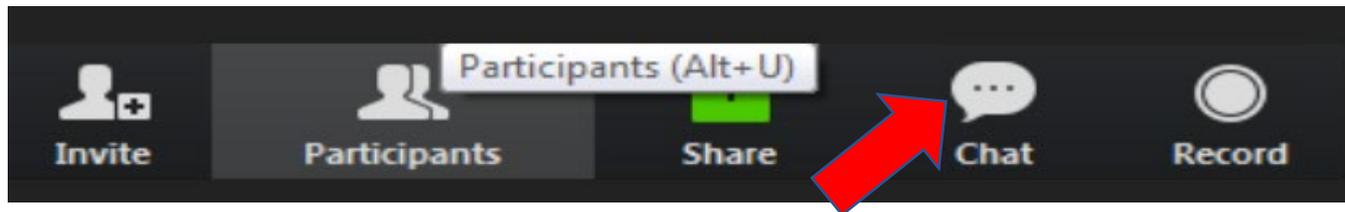
All attendees will be muted during the presentation and submit questions via Chat



Attendees may be unmuted at the request of the monitor or instructor for clarification or further discussion

# Asking questions

You will find the Chat feature to the right of the participants list.



As the instructor goes through the course they will ask for questions via chat at the end of a case, or after a concept has been explained.

You may type your questions into Chat. The Chat monitor may answer your question in Chat, or have the instructor answer the question verbally.



# Dispute Resolution – Designated Doctors (DD) System

- **Designated Doctor's role is to assist in Dispute Resolution**
  - Impartial, objective medical expert selected and ordered by DWC
  - Answer specific questions
  - Does not recommend or provide treatment
  - One of the dispute questions for the DD is Extent of Injury

# Importance of DD Opinion



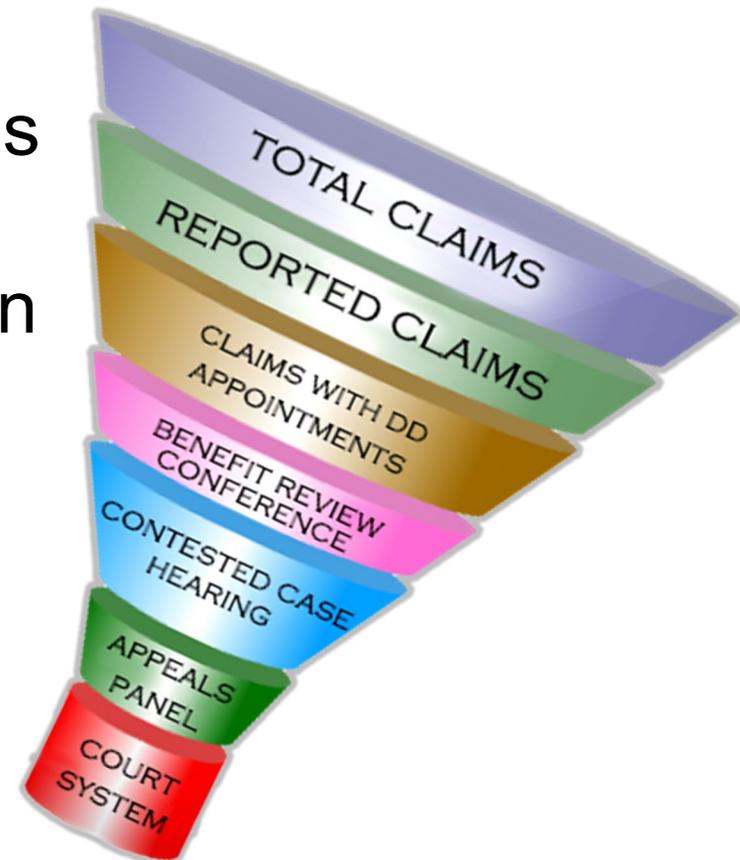
The report of DD is given **presumptive weight** in dispute resolution unless the preponderance of evidence is to the contrary



Insurance Carrier (*IC*) is required to pay income and medical benefits based on opinion of DD during pending dispute

# DD Reports in Dispute Resolution

- **The DD report may facilitate informal resolution of many issues**
- In event parties cannot resolve issues in dispute based on DD's report, they may pursue issues through DWC dispute resolution process
  - Benefit Review Conference
  - Contested Case Hearing
  - Appeals Panel
  - Courts



# Dispute Resolution – Designated Doctors (DD) System

- Most disputes arise after the first several months from the DOI.
- To have a Designated Doctor be appointed to resolve a dispute, a *Request for Designated Doctor Examination* (DWC Form-32) must be completed.



# Dispute Resolution – Designated Doctors (DD)

**Texas Labor Code §408.0041** states questions to be addressed by DD:

- Attainment of Maximum Medical Improvement (*MMI*);
- Impairment as a result of the compensable injury (*IR*);
- **Extent of employee's compensable injury (*EOI*)**;
- Whether disability is a direct result of the compensable injury (*DDR*);
- Ability to return to work (*RTW*); and
- Issues similar to those described above.



# Dispute Resolution Designated Doctors (DD)

- **Some reasons an insurance carrier (IC) may initiate dispute resolution:**
  - When there appears to be delayed recovery
  - There is concern as to what diagnoses are caused by the events on the date of injury
  - There are multiple ICD-10 diagnoses used on the claim
- Dispute may occur after the insurance carrier has requested a peer review to review the records to assist in defining the compensable diagnosis.

# Dispute Resolution Designated Doctors (DD)

**Some reasons an injured employee may initiate dispute resolution:**

- there is a notice (PLN-11) disputing a diagnosis, condition or symptom; or
- treatment ordered by the treating or consulting doctor is denied.

# Dispute Resolution

## **Designated Doctors (DD)**

**Who can complete a *Request for Designated Doctor Examination* (DWC Form-32) to request resolution of Extent of Injury?**

- Insurance carrier
  - \* Adjuster
  - \* Carrier attorney representative
- Injured employee
- Injured employee's representative
  - \* Ombudsman
  - \* Attorney
- Benefit Review Officer (BRO) / Administrative Law Judge (ALJ)



# Dispute Resolution

## Designated Doctors (DD)

- Who can complete a **Presiding Officer's Directive** (POD) to Order a Designated Doctor Exam?
  - DWC Benefit Review Officer (BRO)
  - DWC Administrative Law Judge (ALJ)



# Dispute Resolution

## Designated Doctors (DD)

### Presiding Officer's Directive (POD)

- This may be generated after a hearing at some level (BRO or ALJ). Specific diagnoses / conditions may have been stipulated by the parties or adjudicated by ALJ
- The DD **MUST** consider **ONLY** the questions posed in the POD
- Do not add other diagnoses / opinions unless specifically asked to.



# Changes

## Designated Doctor and MMI and IR Doctor Rules

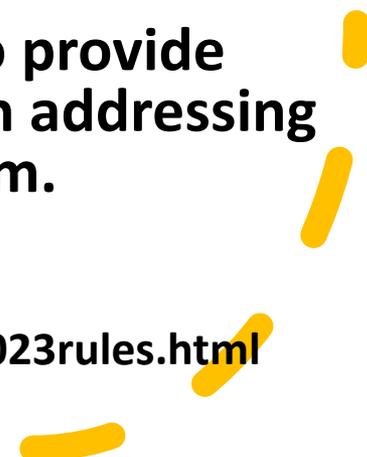
**Amendments to the §127.1-127.25 and §180.23 have been adopted and are effective 6/05/2023.**

**Amendments include changes that :**

- **Qualify chiropractors to examine some additional fractures and some multiple fractures.**
- **Add additional MD and DO board certifications as qualified for TBI exams**
- **Remove the requirement to provide multiple certifications when addressing EOI, MMI and IR in one exam.**

**For more information see:**

**<https://www.tdi.texas.gov//wc/rules/2023rules.html>**



# DISPUTE RESOLUTION - EOI

We will start with the DWC-32.

There are changes effective 6/5/2023 to the DWC-32 that will be important for you to be aware of.

# Dispute Resolution - EOI

## DWC Form-032

# REQUEST For DESIGNATED DOCTOR EXAMINATION

DWC032



**Division of Workers' Compensation**  
PO Box 12050 | Austin, TX 78711 | 800-252-7031 | tdi.texas.gov/wc

Complete, if known:  
DWC claim #  
Insurance carrier claim #

**Request for designated doctor examination**  
Este formulario está disponible en español en el sitio web de la División en [www.tdi.texas.gov/forms/dwc/dwc045brcs.pdf](http://www.tdi.texas.gov/forms/dwc/dwc045brcs.pdf)  
Para obtener asistencia en español, llame a la División al 800-252-7031.

**Part 1. Injured employee information**

1. Employee's name (first, middle, last)	2. Social Security number
3. Employee's address (street or PO box, city, state, ZIP code)	4. Employee's county
5. Employee's primary phone number	6. Employee's alternate phone number
7. Employee's date of birth (mm/dd/yyyy)	8. Date of injury (mm/dd/yyyy)
9. Representative's name (first, middle, last)	10. Representative's phone number
11. Representative's email address	12. Representative's fax number
13. Employer's name	14. Employer's phone number
15. Employer's address (street or PO box, city, state, ZIP code)	

**Part 2. Insurance carrier information**

16. Insurance carrier's name	
17. Insurance carrier's address (street or PO box, city, state, ZIP code)	
18. Adjuster's name (first, middle, last)	19. Adjuster's email
20. Adjuster's phone number	21. Adjuster's fax number
22. Does the claim have medical benefits provided through a certified workers' compensation health care network? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, provide the name of the network.	
23. Does the claim have medical benefits provided through a political subdivision according to Labor Code Section 504.053(b)(2), directly contracting with health care providers or contracting through a health benefits pool? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, provide the name of the health care plan.	
Employee's name:	[bar code]
DWC claim number:	For DWC use only

DWC032 Rev. XX/23
Page 1 of 8



# Dispute Resolution Designated Doctors (DD)

## ***Box 37 has been removed from DWC-32***

- ***Previously*** this box was provided for the requester to enter all injuries “*accepted as compensable*” by the insurance carrier. This information on the Form-32 was not a final legal determination of the *compensable* injuries
- The Designated Doctor determines the compensable injuries and conditions after a thorough review of records, certifying examination and evidence-based research.

### [TAC §130.1 \(c\)\(3\)](#)

***Assignment of impairment rating for the current compensable injury shall be based on the injured employee’s condition on the MMI date considering the medical record and the certifying examination.”***



# Dispute Resolution

## Designated Doctors (DD)

### **Box 38 has been removed from the DWC-32**

- ***Previously*** this box was provided for the requester to list all injuries legally determined to be compensable by:
  - Approved DWC Form-024,
  - DWC decision & order,
  - DWC Appeals Panel decision, or
  - Final court order

The DWC-32 Form will now provide a box for the requester to check, to indicate if the compensable injury has been legally determined by one of these means.

If so, information on the determined compensable injury will be provided to the DD with the Commissioner's Order for the examination.



# DWC 32, Box 31C

## C. Extent of Injury

List all injuries (diagnoses/body parts/conditions) in question, claimed to be caused by, or naturally resulting from the accident or incident **and** describe the accident or incident that caused the claimed injury.



# Extent of Injury (EOI): DWC Form-032, Box 31C

- Lists all injuries I/ conditions in dispute, as per either the carrier or IE / IE Representative.
- Gives a description of the accident/incident that caused the claimed injury in question/in dispute.
- DD must address EACH injury (diagnosis/body part/condition) listed in Box 31C.
- Failure to do so may result in your opinion not being adopted.

**28 TAC §127.1(b)(11)(C) Revised 12/06/18**

# Extent of Injury (EOI): DWC Form-032, Box 31C

- Continue to refer to the injury or condition using the **same terms** as listed in Box 31C
- If referring to injury or condition by different medical term or grade of condition than listed in Box 31C, this must be explained
  - Do you view these terms as synonymous? If so, state that these are same and provide evidence
- If there are injuries that can be **grouped together** as the same, or part of the same medical process, explain diagnoses / conditions in a grouping



**Extent of  
Injury  
Question  
for the  
Designated  
Doctor**

**Discussion of the  
definition of  
Extent of Injury**

**And how this impacts  
your analysis**



# Extent of Injury Question for the Designated Doctor

Was the accident or incident giving rise to the compensable injury a **substantial factor** in bringing about the additional claimed injuries or conditions, and **without it, the additional injuries or conditions would not have occurred?**

**Include an explanation of the basis for your opinion, NOT just your opinion.**

# Extent of Injury Question for the Designated Doctor

## What IS Substantial Factor?

- No legal definition in DWC system
- **Substantial factor is relative**
- Consider the mechanism of injury
- Co-morbidities

**Substantial factor is not the same as sole cause.**

**May be more than one substantial factor**



# Extent of Injury Question for the Designated Doctor

## “Injury”

- Damage or harm to the physical structure of the body
- Disease or infection naturally resulting from the damage or harm
- Includes occupational disease

[Texas Labor Code](#)  
[§401.011\(26\)](#)



# Extent of Injury Question for the Designated Doctor

## Appeals Panel Interpretation of AGGRAVATION

- Claimed injury that causes additional damage or harm to the physical structure of the body
- May include any naturally resulting disease or infection
- Can include an enhancement, acceleration or worsening of an underlying condition\*

\* Not just increase in subjective symptoms.

[Appeals Panel Decision 002967](#)



# EOI Analysis: Understanding the Question of EOI

- Important medical/legal question in workers' compensation
- **You** give your opinion and rationale as to which conditions are caused by events of the DOI and which are not
- Support your opinion, from a medical perspective, within the legal framework
- You provide medical expertise to inform those reading your report, including an Administrative Law Judge

**Do not assume the reader of your report has any medical knowledge**

# EOI Analysis: Understanding the Question of EOI



**KEEP IN MIND THE LEGAL  
CONCEPTS OF INJURY AND  
AGGRAVATION**



**EXPLAIN THE INJURY USING  
MEDICAL TERMINOLOGY**



**GIVE THOROUGH  
EXPLANATION.**

# EOI Analysis: Understanding the Question of EOI

## Give thorough explanation. Describe:

- Terms of the additional claimed diagnoses / conditions
- How the injury in question typically occurs
- The pertinent positives and negatives in the records that support your opinion
- The consistencies or any inconsistencies of the MOI, subjective complaints (SC), objective findings (OF) in the medical records.
- IF the MOI, SC, OF consistent with the injury model



# EOI Evaluation Steps for Success

**The revised DWC-32 as of June 2023 WILL NOT have a "Carrier Compensable" list of injuries, but will have the Additional Claimed Conditions.**

**You Provide:**

- **A Forensic Exam** that captures all the necessary information
  - **Research and Literature Review**
  - **Causation Analysis**
  - **Producing a Narrative Report** that is legally sufficient
- 



# EOI Evaluation

## Insufficient Causation Analysis

- Provide an **EXPLANATION**
- **DO NOT** provide **CONCLUSIONS**, rather than **explanation**
  - Only listing diagnoses or ICD-10 codes
  - General statements that the condition was not present until after accident – the Ergo Proptor Hoc fallacy

All parties, including Administrative Law Judge, need explanation as to ***why*** you reached your ***conclusion***, ***not just a conclusion***



# EOI Evaluation - LEGALLY SUFFICIENT DESIGNATED DOCTOR REPORT

DESCRIBE EACH INJURY FROM BOX 36C

+ MECHANISM OF INJURY

+ CLINICAL FINDINGS AND TIMELINE

+ EVIDENCE BASED MEDICINE

+ ANSWER QUESTIONS WITH APPROPRIATE LEGAL TERMS

---

SUFFICIENT CAUSAL ANALYSIS

# Extent of Injury Template

[www.tdi.texas.gov//wc/dd/documents/ddcauseanalysis.pdf](http://www.tdi.texas.gov//wc/dd/documents/ddcauseanalysis.pdf)

## Extent of Injury Analysis Section of a Designated Doctor Report

In addition to the basic requirements of a designated doctor narrative report in 28 TAC Rule 127.220, a narrative on extent of injury may include the following information:

### I. Injury in Question (Box 31C of the DWC Form-032)

*State injuries in question as listed in Box 31C, and define and describe each injury in medical terms.*

Note: Extent of Injury is a specific question as to a specific injury as listed in Box 31C. Failure to use the exact terms as listed in Box 31C to refer to the injury may result in a letter of clarification, or a report not being adopted. If there are other medical terms used in the report to refer to the injury in question as listed in Box 31C, explain or clarify that to the reader by stating these terms are synonyms, one is inclusive of the other, etc. If there are injuries that can be grouped together as the same, or part of the same medical process, explain such grouping.



# Extent of Injury Template

## II. Accident/Incident (Mechanism of Injury)

Describe the accident/incident (mechanism of injury). Include any account described and who gave it. (i.e. Claimant told me during the exam, or treating doctor describes in the notes on 1/1/2023.)



# Extent of Injury Template

## III. Clinical Findings and Timeline in Support of Causation Analysis

*Provide the relevant findings contained in the medical records, history and physical exam. Where applicable, detail symptom onset relative to the timeline of the medical history.*

In your review and detail of the above, pay particular attention to the following in relation to the injury in question (Box 31C):

- a. Did the injury in question exist prior to the work-related accident or incident (mechanism of injury)?
- b. Was the injury in question present during the physical examination?

# Extent of Injury Template

## IV. Analysis of Clinical Findings and Timeline

*Provide an analysis based on the findings from Sections II and III above, and any other relevant supporting factors to explain the basis for the opinion regarding the injury in question (Box 31C).*

Pay particular attention to the following in relation to the causation analysis for the injury in question (Box 31C), and explain all that are applicable:

- a. Consider whether the timeline of symptom onset was consistent with the work-related injury, including relevant medical records prior to the injury, proximate to the time of injury, as well as post-injury treatment and testing.
- b. Is this type of work-related accident/incident (mechanism of injury) consistent or inconsistent with the injury in question?

If evidence-based medicine is available, then explain how it supports that the work-related accident/ incident (mechanism of injury) caused or did not cause the injury in question (Box 31C).



# Extent of Injury Template

## v. Medical/Legal Causation Opinion Statement

### ***SAMPLE CONCLUSION TEXT***

"Based on the above referenced reasons, it is my medical opinion, based upon my education, training, and experience, and within reasonable medical probability that (the work-related accident/incident/ mechanism of injury) caused or did not cause the injury in question (Box 31C). I find that the compensable injury of (mm/dd/yyyy) was/ was not a substantial factor in bringing about the additional claimed injury or condition (Box 31C), and without it, the additional injury or condition (Box 31C) would not have occurred. Specifically, it does or does not extend to include (Box 31C)."



# Extent of Injury Template

\*\*DWC does not require use of this form, and additionally, this form is not applicable in all cases. DDs must adhere to all applicable rules regarding reporting requirements and this form is neither a substitute nor an addendum to those requirements. This form is an example of expert causation analysis where extent of injury is an issue and is not a comment on whether expert testimony is required to establish causation as to this, or any other specific injury. Whether expert testimony is required to establish causation for an injury is a determination that is made at the hearings level on a case-by-case basis.



# QUESTIONS about Extent of Injury Template?





Extent of  
Injury  
Evaluation  
HOW DO  
WE START  
OUR  
ANALYSIS?

## **This next section covers:**

- **Basic science of injury patterns / types**
  - **Mechanism of injury**
  - **You should be very familiar with these concepts. If time allows, this will be covered.**
  - **It is otherwise available in PDF format in the DD training portion of the DWC website.**
  - **DD Training page:**  
**<https://www.tdi.texas.gov//wc/dd/training.html>**
- 

# Extent of Injury Evaluation

## HOW DO WE START OUR ANALYSIS?

Understand each of these areas of

### **BASIC SCIENCE:**

1. **Basic ANATOMY (including neuroanatomy) and PHYSIOLOGY of the diagnoses / conditions you will be analyzing,**
2. **What is the Natural History of Biologic Tissue with time / age,**
3. **Tissue Injury Model,**
4. **Tissue Healing Model**



# Extent of Injury Evaluation

## Understand Tissue Injury Model

What is the Natural History of Biologic Tissue?

### **ALL TISSUES AGE**

- Tendons and muscles
- Ligaments
- Chondral / hyaline cartilage
- Fibrocartilage of the joints
- Nerves and Blood vessels (arteries and veins)
- Skin
- Bone



# Extent of Injury Evaluation

## Understand Tissue Injury Model

### What is the Natural History of Biologic Tissue?

- Biochemical changes occur with the aging process, no matter how healthy the individual.
- Connective tissues lose:
  - elasticity;
  - water content;
  - volume;
  - Other degenerative changes
- **THIS IS WHY WE SEE A GREAT DEGREE OF TISSUE CHANGES ON MRIs in ASYMPTOMATIC INDIVIDUALS**

# Extent of Injury Evaluation

## Tissue Injury

### Evidence-based medicine demonstrates:

- There is a natural timeline for the appearance of objective CLINICAL or IMAGING correlates of tissue injury.
- MOST soft tissue injuries are lower grade and will resolve spontaneously with limited intervention.



# Extent of Injury Evaluation Tissue Injury

- **Connective tissue responds to injury with:**

Edema

Inflammation,

Hemorrhage,

- **These processes are also the body's mechanism to initiate repair of the structure**

# Extent of Injury Evaluation

## Tissue Injury

- The greater the trauma, the more objective evidence of acute tissue changes should be present on the clinical exam or imaging.
- The corollary is the lesser the trauma, less edema / inflammation / hemorrhage expected.
- **USE LOGIC!** Does the MOI described make sense with the objective clinical findings in the initial hours to days after the injury event?



# Extent of Injury Evaluation Tissue Injury

## Why is this important?

Type and degree of injury will determine

- Recovery time
- Prognosis
- Recommended treatment



# Extent of Injury Evaluation Tissue Injury

## Why is this important?

Type and degree of injury will determine:

### **COMPENSABLE DIAGNOSES**

These can the be applied to:

ODG for MMI

MDG for RTW

EBM for EOI



# Extent of Injury Evaluation

## Tissue Injuries and Changes

- Not ALL structural changes in connective tissues are synonymous with an injury.
- While structural changes can occur as a result of trauma but are most often degenerative.
- Since several of the "tissue injury" terms can be degenerative, there should be some acute, objective findings or structural change in a tissue if it is proposed to be due to an injury
- The term TEAR has a connotation of trauma, but most of these changes are degenerative, resulting from the slow, insidious breakdown of tissue over time.



# Extent of Injury Evaluation

## **CLASSIFICATION OF TISSUE INJURY:**

**While the following may seem elementary,**

Lack of basic understanding  
of tissue injury model

will limit success of providing a

**LEGALLY SUFFICIENT**

**EXTENT OF INJURY ANALYSIS**



# **Extent of Injury Evaluation Tissue Injury Model**

## **TISSUE CHANGES / POTENTIAL INJURY**

**Strain**

**Sprain**

**Tendinopathy / Tendinitis**

**Abrasion**

**Contusion**

**Bruise**

**Neuropathy**

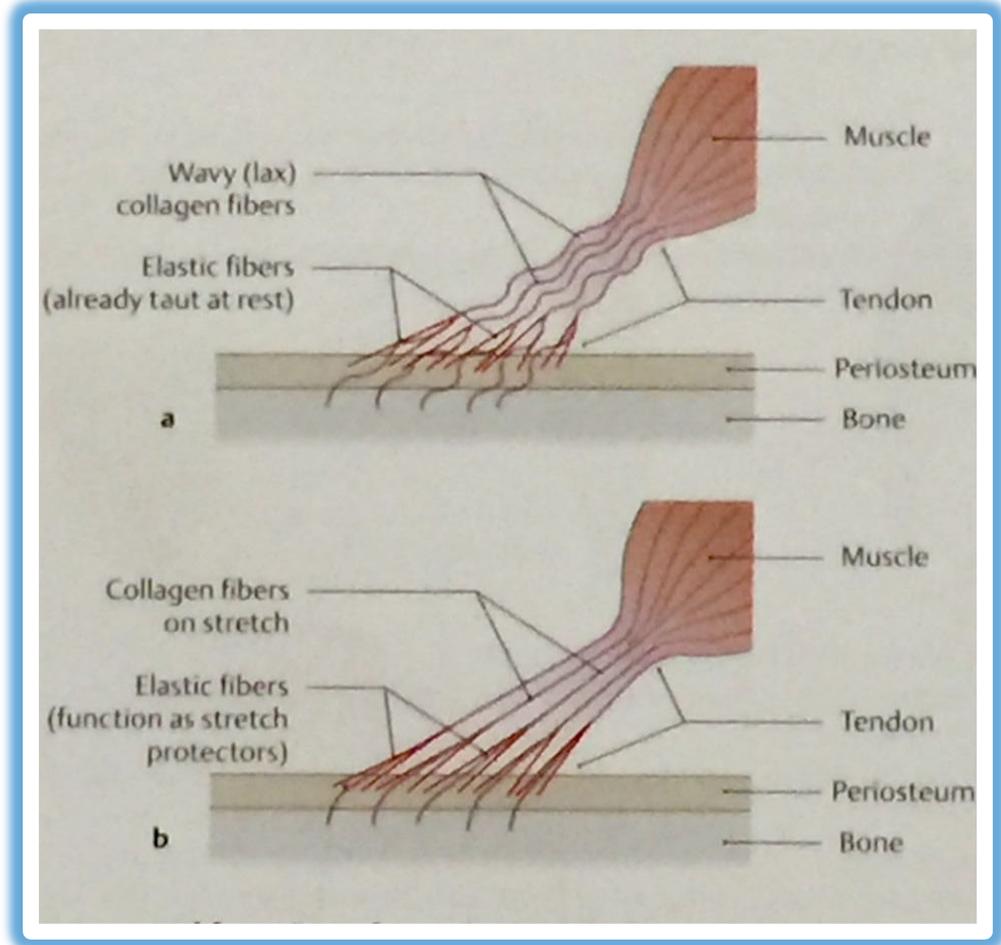
# Extent of Injury Evaluation

## Tissue Changes and Injury

- These terms are often used interchangeably
- While some may co-exist, they are generally not synonymous.
- ALL these terms demonstrate a continuum of tissue changes or disruption.

# Extent of Injury Evaluation Strains

- A **strain** occurs when the fibers of a muscle or tendon overextend / stretch / *tear* due to mechanical stress.
- Can occur as a result of:
  - repetitive contraction
  - excessive eccentric load
  - age and time





# Extent of Injury Evaluation Sprains

A **sprain** is a stretching of the ligaments of a joint.

- Ligaments are tough, semi-elastic bands of fibrous tissue that connect one bone to another in a joint.
- Sprains occur after mechanical stress to a joint, disrupting some or **all** the fibers of the ligament.
- Sprains are usually traumatic but **may** be due to chronic attrition (i.e. ACL of knee in the face of OA).
- Sprains of ligaments can heal uneventfully, **BUT** when more significant, due to residual lengthening or disruption of the ligament fibers, it can result in instability of the joint.



# Extent of Injury Evaluation

## Sprains and Strains

Sprains are graded by the degree of fiber disruption.

Grade I = Mild (stretching)

Grade II = Moderate

Grade III = Severe

(Grade II and III usually with some macroscopic changes)

*Further information is available in the Official Disability Guidelines (ODG) and the Medical Disability Guidelines (MDG).*

# Extent of Injury Evaluation

## Sprains and Strains

### Grade I = Mild

- Stretching of the muscle tendon unit
- Typically, microscopic or minimal disruption of the muscle, tendon or ligaments

# Extent of Injury Evaluation

## Sprains and Strains

### Grade I = Mild

#### Clinical Findings:

- Some localized swelling
- Stretching of the ligament or contraction of the muscle may be painful
- No instability
- Resolve uneventfully within weeks

# Extent of Injury Evaluation

## Sprains and Strains

### Grade II = Moderate

- Some macroscopic disruption or tearing of the fibers
- Tendons and ligaments have a height, width and length, so PARTIAL tears can have a variable degree of involvement of those dimensions
- The muscle or tendon has not been completely disrupted

# Extent of Injury Evaluation

## Sprains and Strains

### Grade II = Moderate

#### Clinical Findings:

- Loss of strength (often due to pain inhibition)
- Local swelling or joint effusion
- Limitation in active motion
- Some degree of joint instability on clinical exam (especially if a SPRAIN)

# Extent of Injury Evaluation

## Sprains and Strains

### Grade III = Severe

- Complete rupture in the muscle tendon unit or ligament at mid-point or avulsion
- Mechanism is usually much more substantial IF the grade III disruption is traumatic.
- Often other associated tissue injuries
- Individual will often report hearing a loud pop or snap when the injury occurred (although “pops and snaps” may occur without tissue disruption)

# Extent of Injury Evaluation

## Sprains and Strains

### Grade III = Severe

#### Clinical findings:

- Very painful at the location of injury.
- May be a palpable defect in the muscle or tendon.
- Grade III muscle strain / ligament sprain will often have very serious bruising and swelling and pain with movement of the tissue.
- Grade III ligament injury results in significant joint effusion and substantial joint instability with or without bone contusions that are evident on MRI.
- Once a large effusion established, clinical instability may be masked

# Extent of Injury Evaluation

## Sprains and Strains

### Tendinopathy:

Any dysfunction of a tendon, manifest as tendon damage involving overuse, microtears and collagen degeneration.

- Broad terms encompassing conditions occurring in and around tendons usually in response to overuse or age.
- Typically, chronic conditions of a tendon.

# Extent of Injury Evaluation Tendonitis vs. Tendinopathy

## Tendinopathy:

- Recent basic science research suggests little or no inflammation is present in tendons exposed to overuse.
- Many of the biochemical changes in tendinopathy are pathologic and result in tendon degeneration, whereas others appear to be beneficial or protective.
- Many of the initial anatomic changes to a tendon are sub-clinical (no symptoms) or produce only intermittent brief periods of “soreness.”



# Extent of Injury Evaluation

## Sprains and Strains

**Tendonitis:** An "inflammatory" process within a tendon. Not always due to an acute event.

**Tendinosis:** Appearance of a tendon on imaging after the fibers of the tendon start breaking down and there are breakdown products / mucinous replacement. The tendon often actually appears "thicker" for a period before more macroscopic tears appear.

**"Tear":** An area of tendon where there are visible defects in the width, length or depth of a tendon.

# Extent of Injury Evaluation

## Contusions & Bruises & Abrasions

**Bruises & Contusions are somewhat interchangeable but are due to blunt trauma.**

- A **bruise** requires injury to tissues, resulting in extravasation of blood out of broken blood vessels in a diffuse pattern.
- As the blood accumulates under the skin or the heme in the blood breaks down, the colors change.
- When there is breakage of the skin, this is called an **abrasion**, which can have surrounding bruising.

# Extent of Injury Evaluation

## Contusions & Bruises & Abrasions

(continued)

- The depth of a bruise / contusion can vary; what is below the surface can be greater than what is visible at the surface.
- Contusions can also occur at the level of the bone
- These usually require greater force or degree of injury (i.e. “kissing lesions” of the femur and tibia after a grade III sprain of the ACL)

# Extent of Injury Evaluation

## Hematoma & Seroma

### Other terms related to blunt trauma.

A **HEMATOMA** is a pocket or localized area of collected blood.

- Often due to a larger blood vessel with injury.
- These can present with more swelling from the underlying collection of blood.

A **SEROMA** is a mass caused by the accumulation of serum within a tissue or an organ.

- Seromas may accumulate as a complication of surgery or after other traumatic injuries to soft tissues.

These may require more specific treatment to remove the collection.

# Extent of Injury Evaluation Neuropathy

## Other terms related to trauma.

**NEUROPATHY:** These are more often related to diseases.

- When due to trauma, severity progresses from blunt trauma, stretch or laceration.
- **NEUROPRAXIA:** Swelling within a nerve
- **AXONOTMESIS:** When there is disruption of some or all the axons within a nerve, but preservation of the external connective tissue support
- **NEUROTOMESIS:** Transection of the axons and the connective tissue support.

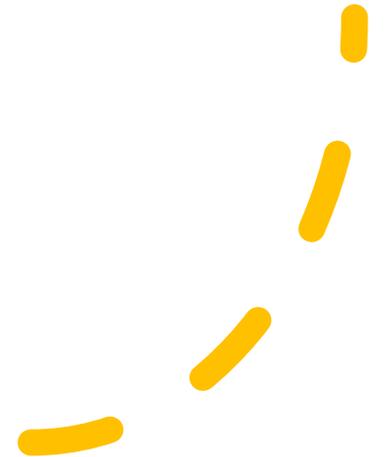
# Extent of Injury Evaluation Neuropathy

## **NEUROPATHY:** due to trauma

- **NEUROPRAXIA:** Usually 100 % reversible over time as swelling dissipates. Most common form of trauma
- **AXONOTMESIS:** The external connective tissue support is intact, so after the initial 1 – 2 weeks, recovery is ~ 1 – 5 mm / day. Prognosis variable.
- **NEUROTOMESIS:** The connective tissue support is damaged, so the nerve **WILL NOT** regenerate unless the connective tissue tube is reapproximated. Prognosis guarded

Extent  
of  
Injury  
Evaluation

# Analysis of Injury





# Extent of Injury Evaluation Analysis of Injury

The starting point and one of the most important points for an EOI analysis is the MECHANISM OF INJURY (MOI).

- Give the MOI the weight it deserves
- Some MOIs are no more significant than
  - ✓ Activities of daily living an individual has done many times in their lifetime
  - ✓ Minor “traumas” that have occurred in the persons past (fender-benders, falls, athletic activities, roller coaster riding, etc.)

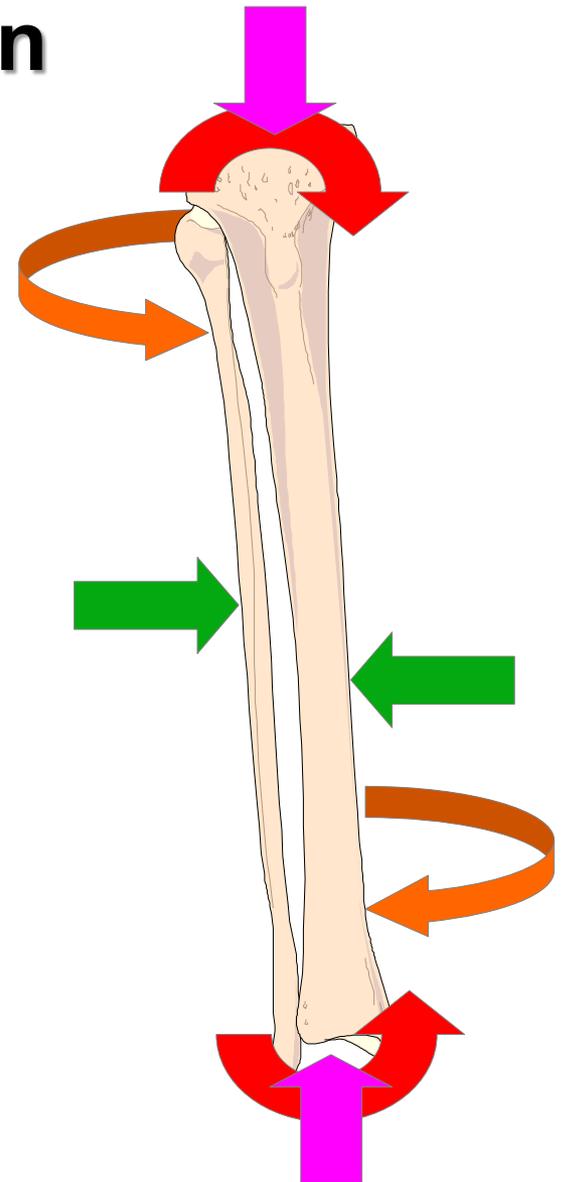
# Extent of Injury Evaluation: Analysis of Injury

- **Mechanism of injury (MOI) is an important concept in the analysis of an injury.**
- **The MOI is defined by the principal direction of force in relation to the injured segment.**
- Tissues fail due to local stress *and* can be affected by:
  - ✓ Factors that alter stress distribution; joint position or muscle tension
  - ✓ Systemic factors that affect the health of the tissue.

# Extent of Injury Evaluation Mechanism

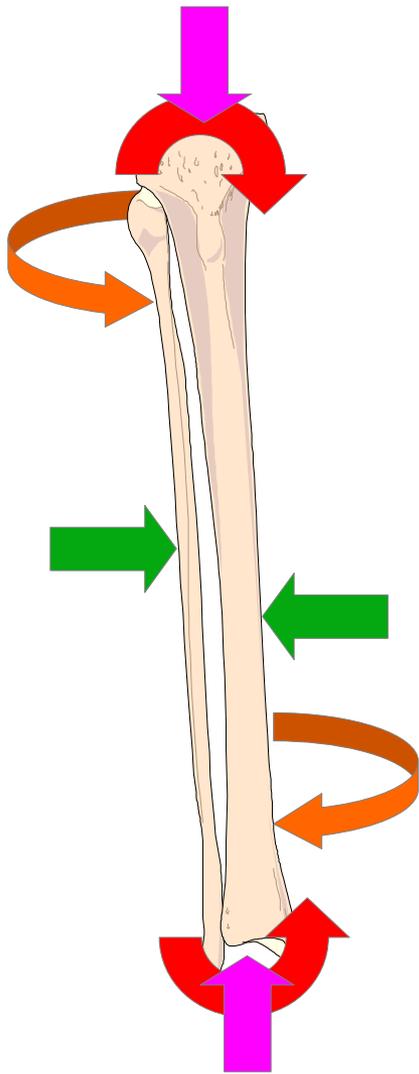
## Forces that cause tissue injury

- Axial Load = Compression (Pink)
  - Bending (Red)
  - Shear (Green)
  - Torsion (Orange)
    - Distraction



# Extent of Injury Evaluation

## Tissue Injury



- **Effects of the applied force are dependent upon:**
  - age
  - gender
  - body mass
  - bone density
  - individual variations in tissue health
- **Factors affecting local stress at force application:**
  - joint position
  - muscle tension



# Extent of Injury Evaluation

## Analysis of Injury

- Tissue injury occurs when a force exceeds the tissue's ability to tolerate that force and is disrupted.
  - ***Make your MOI statement more detailed than the preceding statement***
- The degree of injury will be determined by clinical and radiologic findings.

Grades I, II, III

(and higher for some joints or fractures)



# Extent of Injury Evaluation

## Tissue Injury

### Evidence-based medicine demonstrates:

- More significant injuries should demonstrate relatively immediate (hours to no more than 72 hours) OBJECTIVE signs of tissue injury
- More significant injuries require more intervention and minor injuries *should* require less.
- With appropriate treatment, the injury should result in limited residual effect.
- On-the-job injuries can result in greater cost and length of treatment and greater “*Disability*” than non-work injuries. **Refer to the ODG and other EBM.**

# Extent of Injury Evaluation

## Alternate Explanations

Doctors must be cognizant of alternate explanations for the continued perceived or claimed symptoms and disability:

- Different musculoskeletal, neurologic or “*usual disease of life*” mimicking the proposed work-related injury.
  - ✓ Pre-existing cervical myelopathy causing myelopathic gait, mistaken for a hip injury
  - ✓ Symptoms of peripheral vascular DZ mistaken for lumbar “radiculopathy”
  - ✓ Uncontrolled hypertension and DM causing neuromuscular mimics



# Extent of Injury Evaluation Alternate Explanations

## Alternate explanations...(continued)

- Pre-existing Psychological disorders that color the IE's perception of the injury and it's effect on their life
- **Non-Injury related factors:**
  - Misattribution of symptoms to an injury event
  - “*Good Old Days*” bias
  - Subconscious secondary gain & Conscious manipulation

# QUESTIONS about the Basic Science Section?

