



# **GRIC Protecting Our Communities Addressing Domestic Violence, Child Violence, and Sexual Violence**



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## **ABUSIVE HEAD TRAUMA: THE SCIENCE & THE LAW**

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# Abusive Head Trauma: The Science and the Law

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MARICOPA COUNTY ATTORNEY'S OFFICE



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# AGENDA

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- **HANDLING DIFFICULT CASES, SELF-CARE**
- **CHILD ABUSE, GENERALLY**
- **ABUSIVE HEAD TRAUMA – THE MEDICAL**
- **BRIEF INTRO TO DISSECTING/ORGANIZING MEDICAL RECORDS**
- **PROSECUTING ABUSIVE HEAD TRAUMA: FROM CHARGING TO TRIAL**
- **QUESTIONS**

# INTRODUCTIONS

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- **Elizabeth Bingert** has been with the Maricopa County Attorney's Office since November of 2014 and before that, briefly worked as a Deputy Public Defender. She has been with the Family Violence Bureau since May of 2017 and prosecutes domestic violence cases, including adult and child homicides. She received her B.A. from Brigham Young University and her J.D. from Phoenix School of Law.

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- **Joshua Clark** has been with the Maricopa County Attorney's Office (Phoenix, AZ) since February of 2013. After a short stint in trial group, he was assigned to the Family Violence Bureau and has been there ever since. Joshua handles felony domestic violence cases ranging from child abuse to strangulation to homicide. Joshua began his prosecuting career with the Gila County Attorney's Office where he spent two and a half years handling a wide variety of cases with a focus on juvenile and felony criminal cases.

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# HANDLING TRAUMATIC CASES

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- These cases are difficult; emotionally, mentally, and sometimes physically (if you still use paper files).
- You may have to go to the hospital before the victim passes away.
- Please take time to check in with yourself and evaluate.
- Talk to your colleagues, your supervisor.
- Pursue counseling, if necessary; listen to your mind and body.
- What do you currently do when cases get overwhelming?



# THESE ARE HARD CASES

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- Victim is usually dead or too young to tell us what happened
- Oftentimes there are multiple caregivers in the timeline
- Family reluctant
  - Want to protect suspect
  - Fear of DCS involvement
  - Don't want to believe suspect could do this
- Medical evidence is complex
  - Cannot always provide timing or exact mechanism
- Defense Experts
- Short window to nail down suspect's story and collect evidence
  - Family/Suspects clean up scene
  - Witnesses get their stories straight

# MEETING WITH NEXT OF KIN

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- Meet in person if possible
- Be very sensitive – this is the worst time of their lives
- Get a sense of what side they're on
- Inform them that this is a marathon, not a sprint; it will be a long process
- Drive home the importance of taking our time, getting experts, getting reports
- Explain the process – charges, exposure after trial, explain difference between trial v. plea
- Tell them about resources – use your victim advocate
- Make yourself available
- Always come prepared to hearings

# CHILD ABUSE, GENERALLY

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- Circumstances likely to cause death or serious physical injury
- Circumstances other than those likely to cause death or serious physical injury
- From misdemeanors to murder
- From negligently to intentionally/knowingly
- Causing physical injury vs. endangering the health or failure to seek medical care

# ABUSIVE HEAD TRAUMA – THE MEDICAL

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- Old nomenclature is “Shaken Baby Syndrome” (SBS)
- Now “Abusive Head Trauma” (AHT)
- You may also see “Inflicted Traumatic Brain Injury” (ITBI)

# HOW DO YOU LEARN THIS?

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- Read the medical records
- Familiarize yourself with medical nomenclature
- Google
- Attend Child Protection Team (CPT) meetings
- Ask your nurses/doctors/medical examiners questions about anything you don't understand
- Keep going to trainings
- Contact resources (MCAO, USAO, other colleagues who do these cases)



# ABUSIVE HEAD TRAUMA (AHT)

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- **Definition**

- Inflicted injury to a child's brain as a result of child abuse
- Defense will try to use outdated language like "triad," but think of it as a *constellation* of injuries

- **Mechanisms of Injury**

- Blunt force trauma (BFT)
- Dropping or throwing
- Forceful, repetitive shaking
- Could include more than one of the above

- **What Happens?**

- Rotational and/or acceleration/de-acceleration forces act on the head
- Can damage skull, blood vessels, brain, eyes, and spine
- [Show movie]

# AHT - ANATOMY

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- Most affected areas in Abusive Head Trauma
  - The Head
    - Extra-cranial
    - Cranial
    - Intracranial
  - The Eyes
  - The Spine
  - Ribs/Long Bones

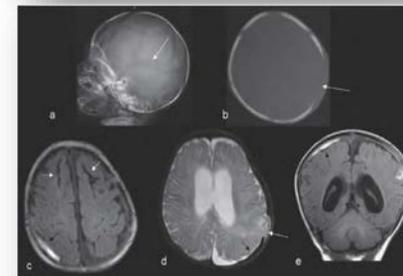
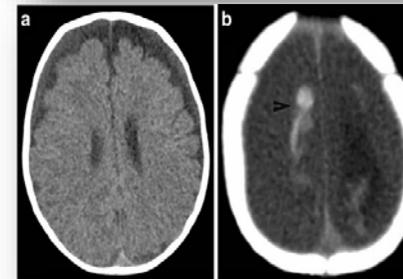
# AHT - ANATOMY

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- Questions to consider when speaking with doctors:
  - What are the areas of the head/injury called?
  - What do they consist of?
  - Differ with age of child?
  - How do injuries heal?
  - How does the doctor diagnose them?

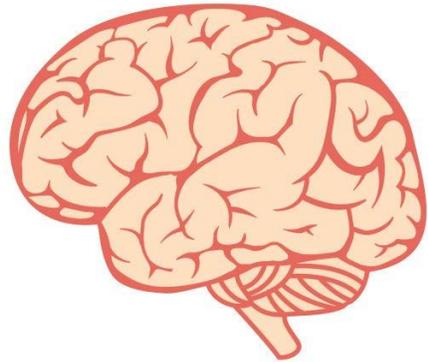
# AHT - ANATOMY

- How do doctors diagnose injuries?
  - **X-ray**
    - Good for fractures and some disease, good “first look”; can’t assess bleeding; remember to follow up on fractures – either forensic anthropologist or follow-up skeletal survey
  - **CT/CAT Scan**
    - Shows soft tissue, blood vessels, detailed bony structures, lung/chest disease; less clear image of bleeds than on MRI
  - **MRI**
    - Very detailed images; can discern normal v. abnormal tissue; better identify bleeds; no radiation



# AHT – THE HEAD

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- **Primary Brain Injury**

- Brain is injured by the force and/or moving within the skull
- Brain and skull move at different speeds, causing bridging veins to stretch and break
- These breaks result in hemorrhages (subdural, subarachnoid, subpial)
- Mid-line shift
- Brain matter moves at different speeds causing the matter to tear and/or shearing axons (DAI)

# AHT – THE HEAD

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- **Secondary Brain Injury**

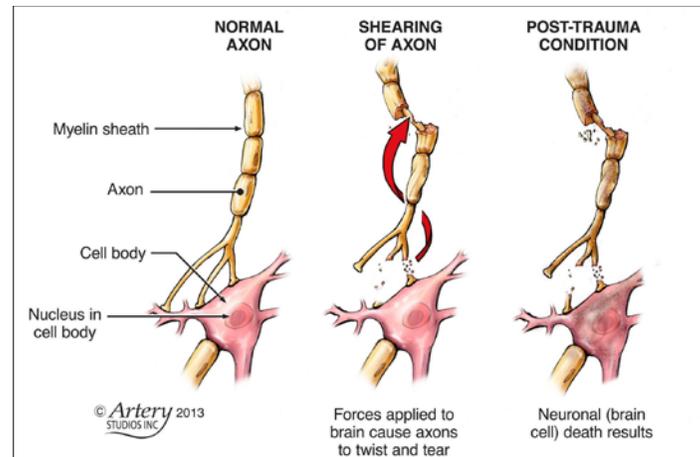
- Brain swelling (edema) as a result of injury leads to increased intracranial pressure (ICP), or brain herniation
- Seizures occur – brain is irritated from subdural blood, can occur from direct or secondary injuries
- Blood vessels tearing causes hemorrhages and lack of blood flow to portions of the brain (ischemia) – brain can't breathe – brain tissue dies



# AHT – THE HEAD

- **Diffuse Axonal Injury (DAI):**

- Shearing of axons prevents communication with the brain stem, which regulates all major bodily functions – brain can no longer send messages to the body
- Body can no longer regulate respiration and blood pressure
  - Brain loses oxygen (hypoxia)
  - Inability to control blood pressure means oxygenated blood can't reach the brain, also results in swelling (edema)
  - These result in death of brain tissue



# AHT – THE HEAD

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- **DAI CONTINUED**

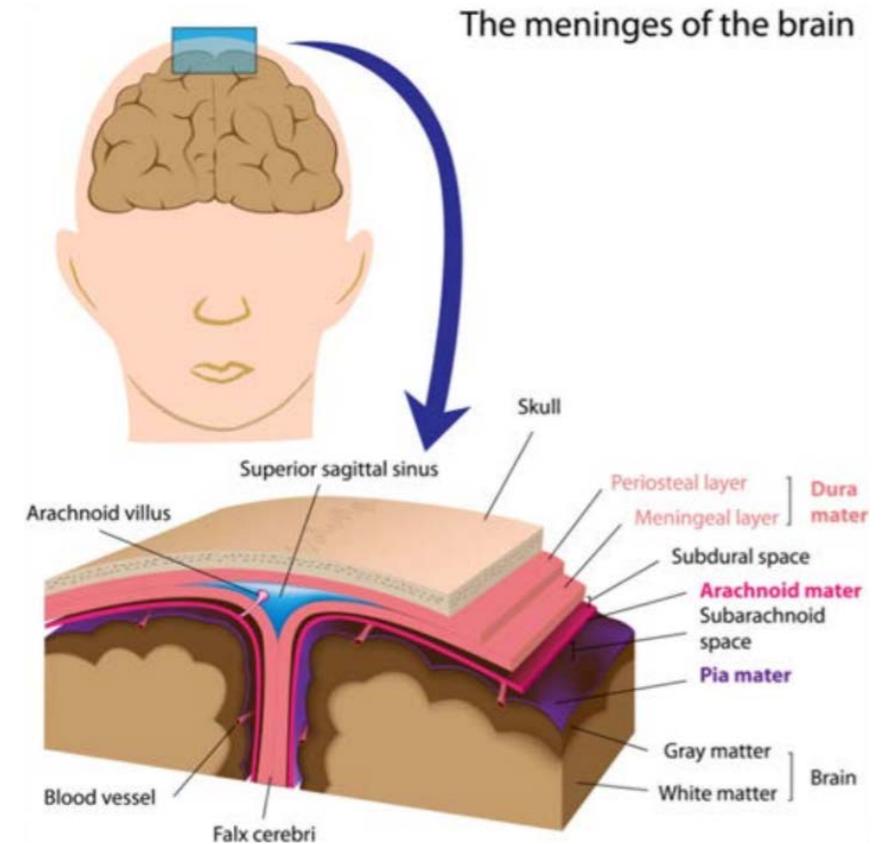
- Child will be immediately symptomatic
- “Lights out” injuries
- Infants will not feed or respond, no tracking with eyes, no coo-ing, etc.
- *Can use these injuries to determine timing based on onset of symptoms*

# AHT - THE HEAD

- Extra-Cranial
  - Hair
  - Scalp
  - Galea (a type of bandage for covering the head)
- Cranial
  - Skull
- Intracranial
  - Meninges/Membranes
    - Dura mater
    - Arachnoid Mater
    - Pia Mater
  - Brain Parenchyma
    - Grey/White Matter
    - Vasculature

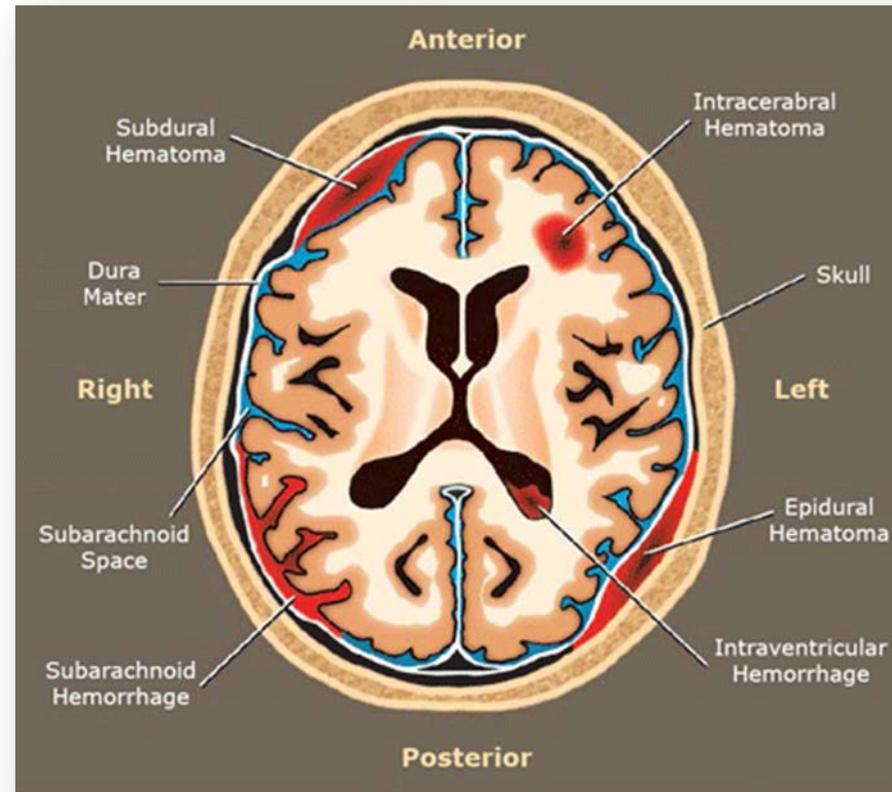
Keep in mind that each tissue has its own unique properties.

Each tissue reacts to trauma (and lack of blood and oxygen) differently.



# AHT – THE HEAD

- INTRACRANIAL INJURIES



# AHT – THE HEAD

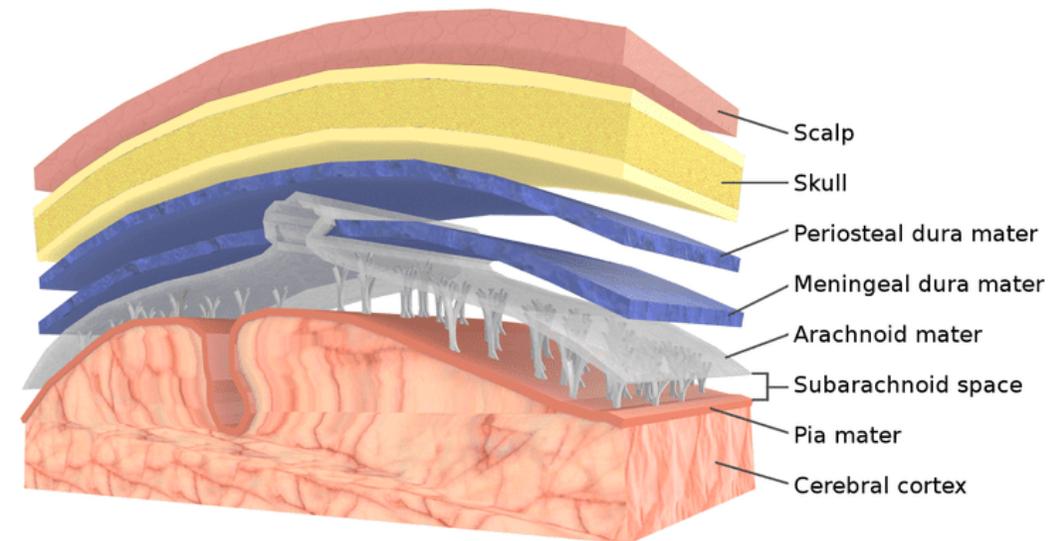
- **Membranes/Meninges**

- Dura Mater
  - Tough, fibrous membrane forming the outermost covering of the brain and spinal cord
- Arachnoid Mater
  - Spiderweb-like membrane forming middle covering of brain and spinal cord
- Pia Mater
  - Delicate and highly vascular innermost membrane covering brain and spinal cord

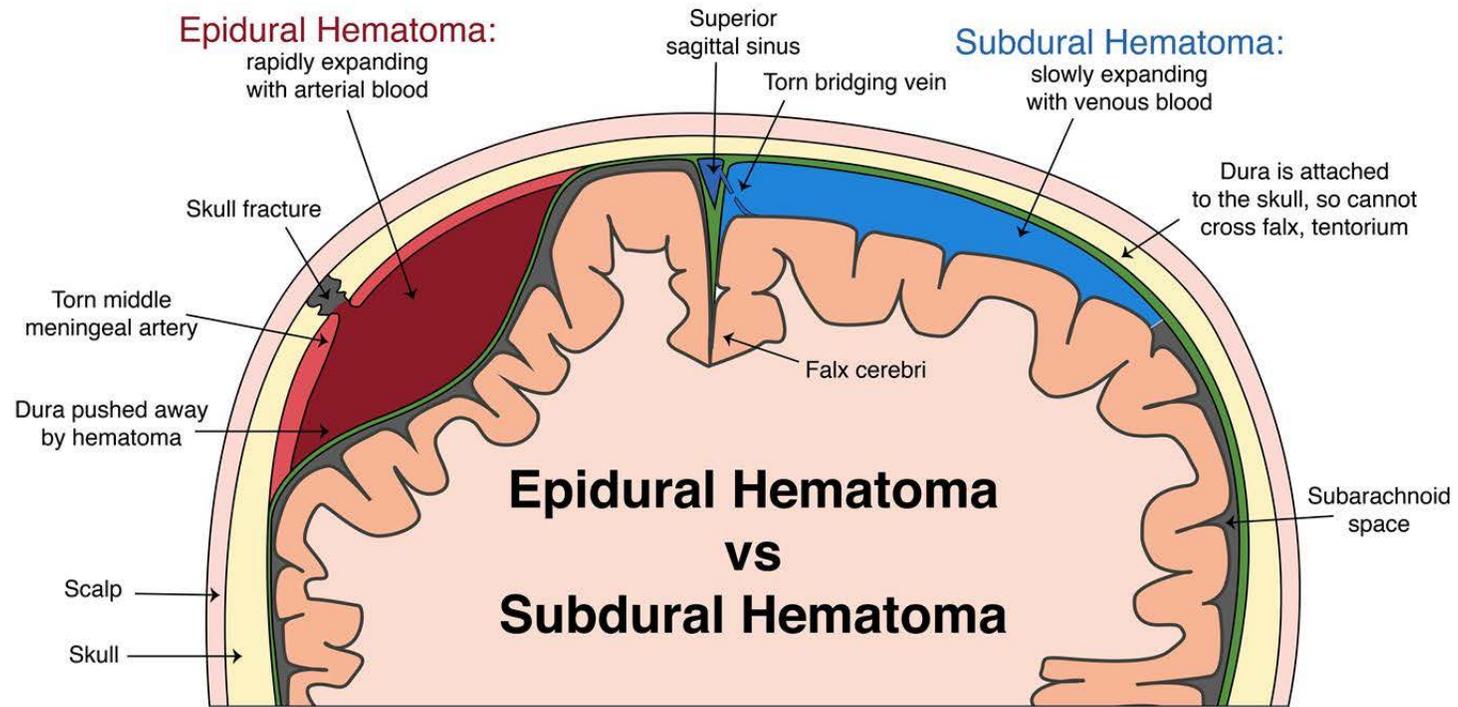
- Injuries: bleeding, swelling, seizures

- Diagnosis: CT, MRI, Surgery, Autopsy

- Issues: Dating the blood – what color is it on scans? Acute vs. chronic



# AHT – THE HEAD



# AHT – THE HEAD

EPIDURAL HEMORRHAGE	SUBDURAL HEMORRHAGE
Traumatic Impact Injury	Traumatic injury from rotational forces/impact/both
Often accompanied by a skull fracture	<i>Can</i> be accompanied by a skull fracture
Consists of quickly-expanding arterial or venous blood	Consists of slowly-expanding venous blood
<i>Can</i> result in a “lucid interval”	Possible “lucid interval” – no interval with DAI
If left untreated, can result in death from brain herniation (shifting of brain tissue from one space in the brain to another – brain finds a space to go when something is pushing on it)	Typically asymptomatic – “marker” of an injury, not cause of injury

# AHT – THE HEAD

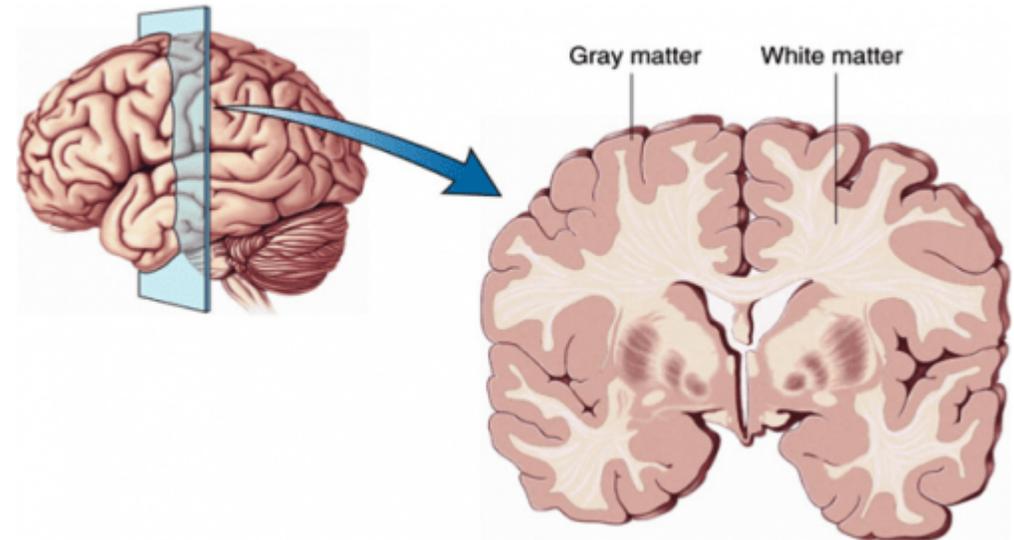
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- **Gray Matter**

- **Cell Bodies**
- The grey matter includes regions of the brain involved in muscle control, and sensory perception such as seeing and hearing, memory, emotions, speech, decision making, and self-control.

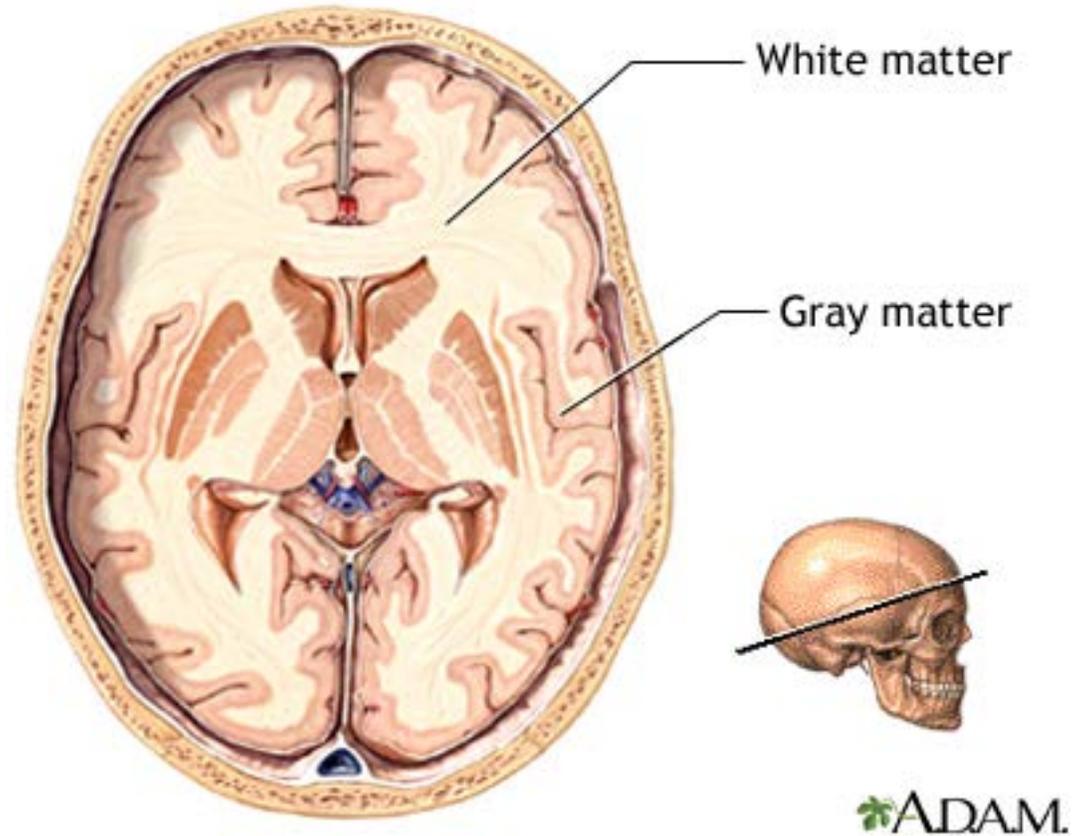
- **White Matter**

- **Axons**
- **Myelin:** insulating layer, or sheath that forms around nerves, including those in the brain and spinal cord. It is made up of protein and fatty substances. This myelin sheath allows electrical impulses to transmit quickly and efficiently along the nerve cells.



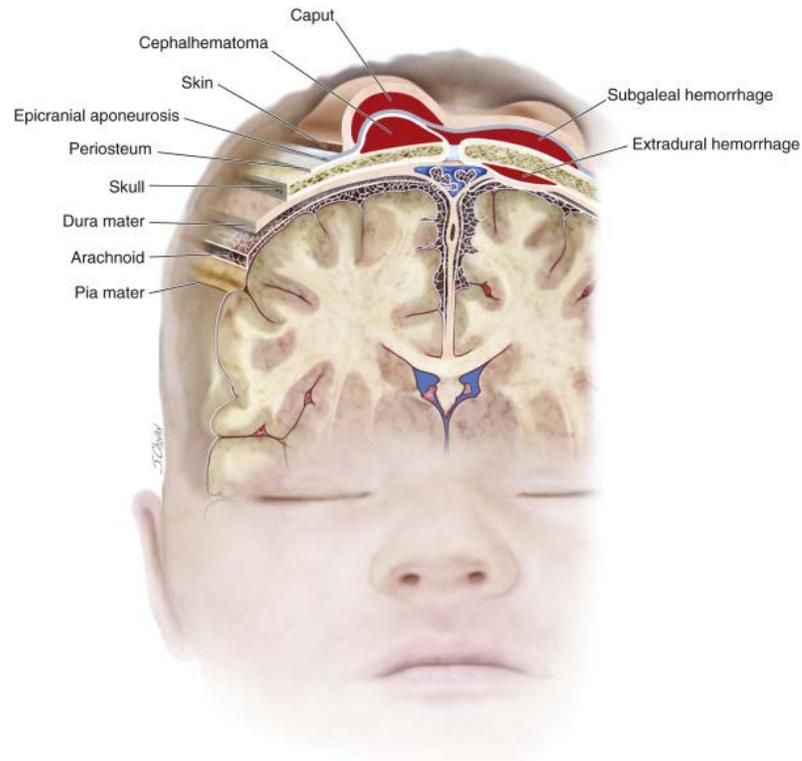
# AHT – THE HEAD

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# AHT - THE HEAD

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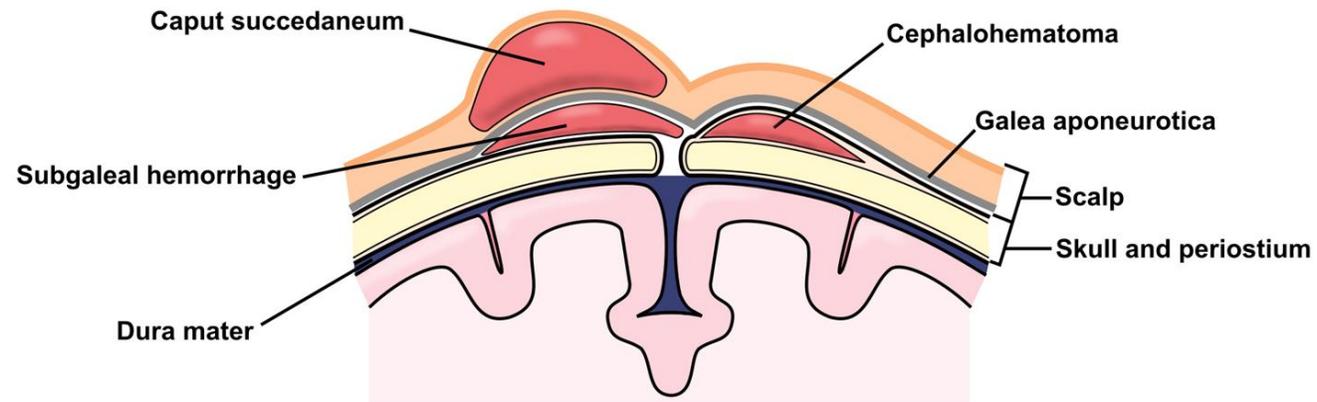


- Extra-Cranial (hair, scalp, galea)
- Types of injuries
  - Bruising
  - Abrasions
  - Lacerations
  - Hemorrhage
  - Cephalohematoma
    - Collection of blood under the scalp
    - Can also happen from birth injury

# AHT – THE HEAD

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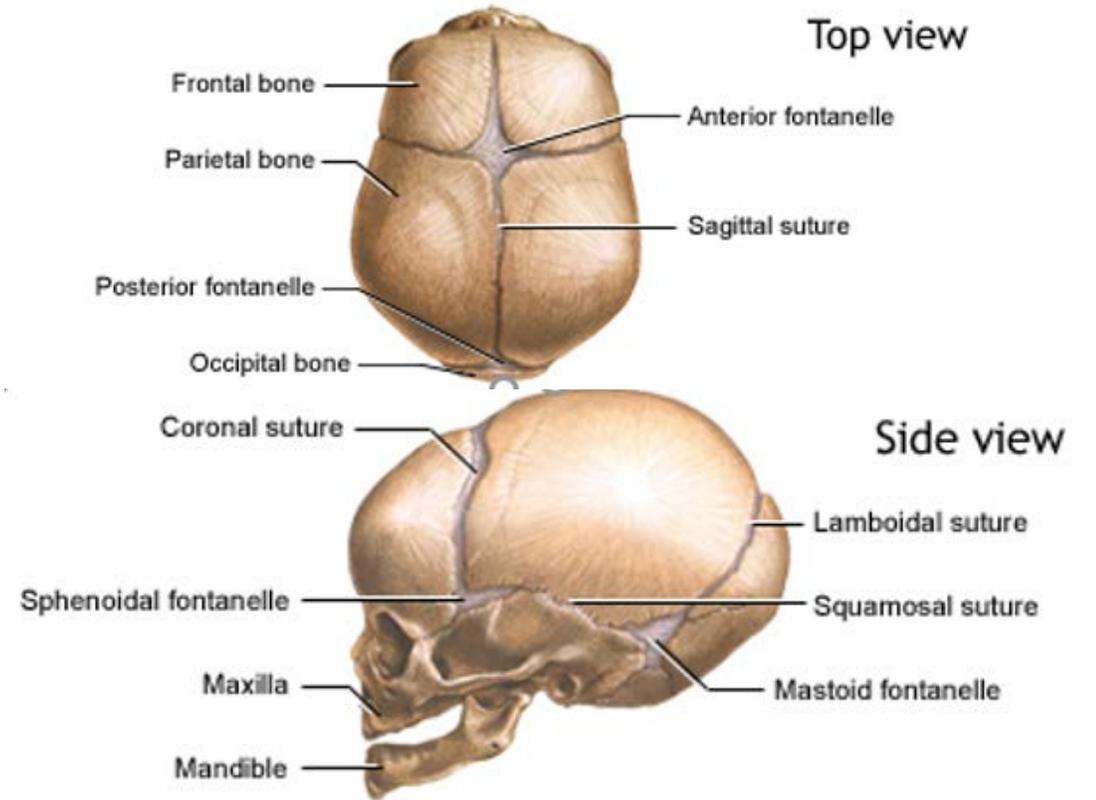
## Neonatal Extracranial Injuries



# AHT - THE HEAD

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- Cranial
  - Skull
  - Don't mistake sutures for fractures
- Types of Injuries
  - Fractures
    - Simple
    - Complex

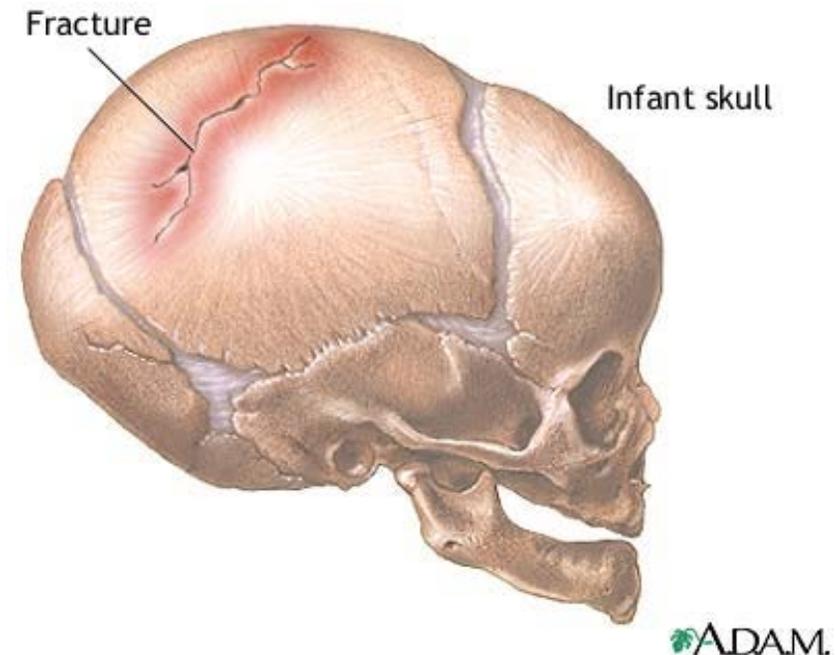


# AHT – THE HEAD

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- Simple Fracture

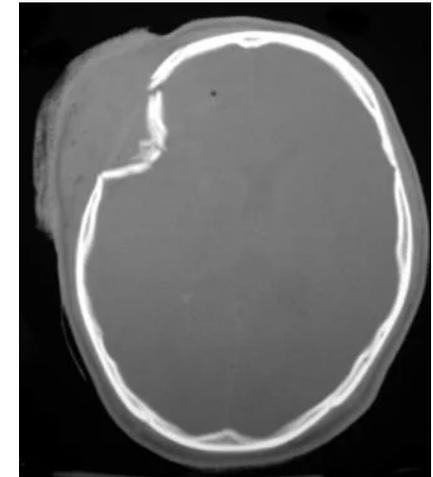
- Also called: Linear, non-displaced
- Diagnosed by: X-ray, CT, 3D reconstruction, autopsy
- Causes: BFT over large area (floor or wall)
- Issues: Hard to date (no callus), may be confused with suture lines



# AHT – THE HEAD

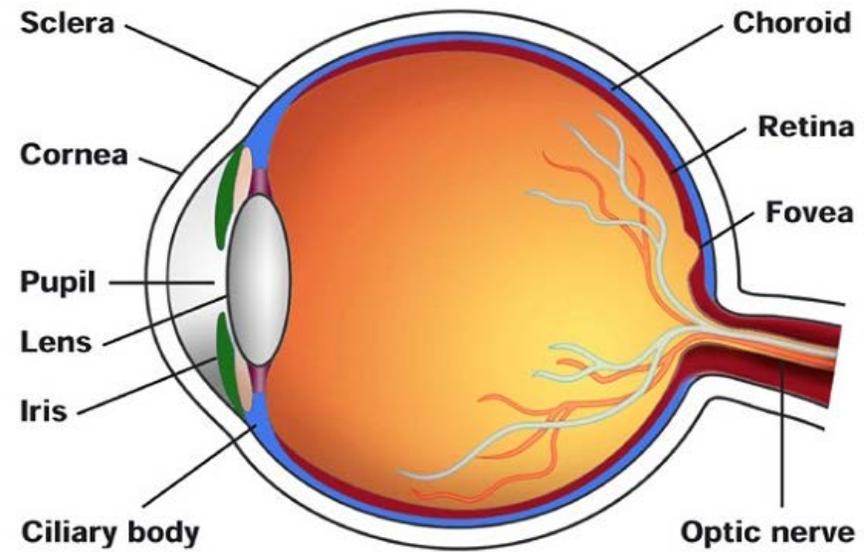
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- Complex Fracture
  - Also called: Comminuted, depressed
  - Diagnosed by: X-ray, CT, 3D reconstruction, autopsy, surgery
  - Causes: BFT over small area (instrument)
  - Issues: Hard to date



# AHT – THE EYES

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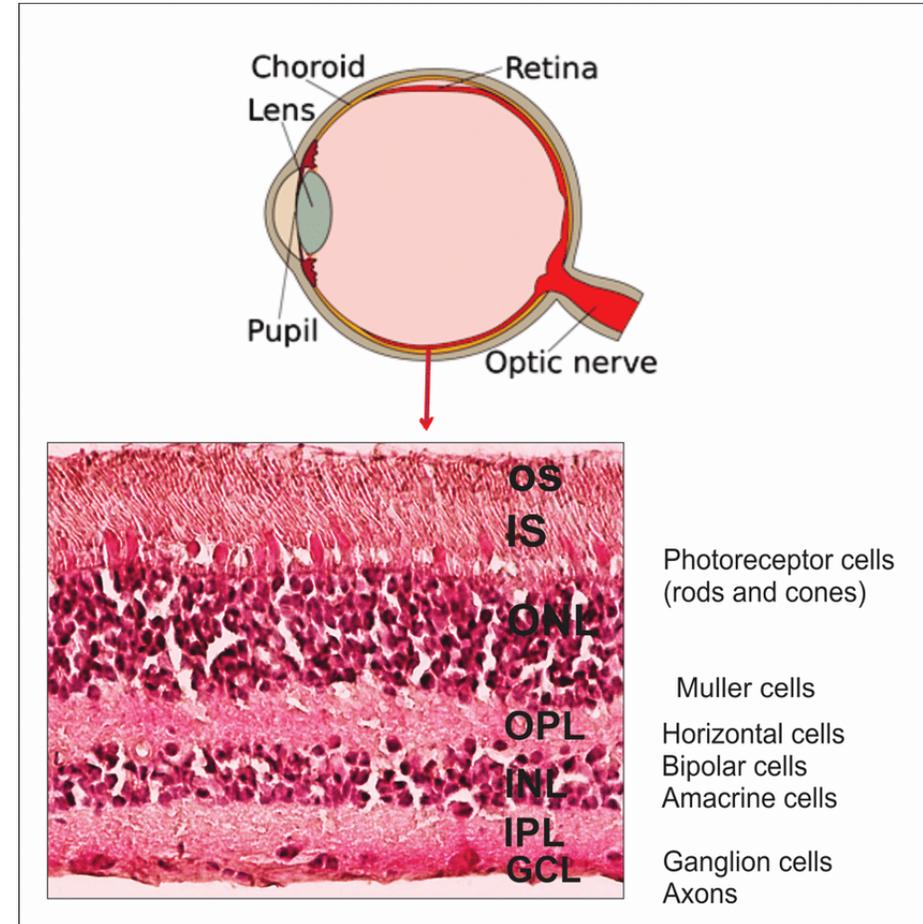
# AHT – THE EYES

- Commonly Affected Areas

- Retina
  - Retinal Hemorrhages
    - Diffuse, multi-focal RH have high specificity for AHT
- Optic Nerve
- Vitreous (less common)

- Diagnosis

- Ophthalmologist
- Imaging
  - CT/X-ray/MRI
- Autopsy



# AHT – THE EYES

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- Issues
  - Can resolve quickly
- Important to Note:
  - Sometimes neurologist will delay dilating eyes to make sure the child is still responsive

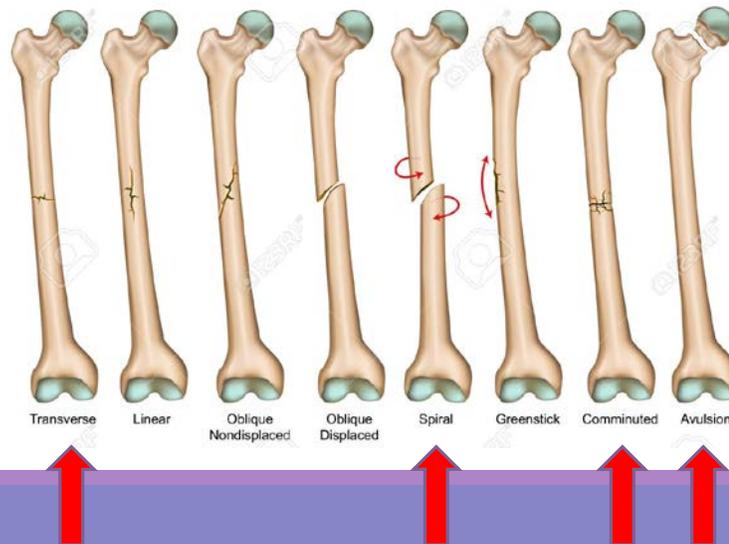


# AHT – THE SPINE

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- Cervical Spine Increasingly Being Tested
  - Technological advances in imaging show injuries we didn't see before
- Remember: Babies are not “little adults”
  - Larger head-to-body proportion
  - Weaker cervicular musculature
  - Immature joints
  - Spinal column more elastic so will tolerate more irritation before rupture
- Have ME/doctor examine lumbar and thoracic spine, too
  - May be visible if imaging is done while child is alive or proper analysis done by ME at autopsy

# AHT - FRACTURES



- **Common Areas Associated with Abuse:**

- Ribs
- Collarbone
- Skull
- Long Bones (arms/legs)
- Fingers

- **Easier to date because of identifiable healing changes**

- **Other Causes (watch out):**

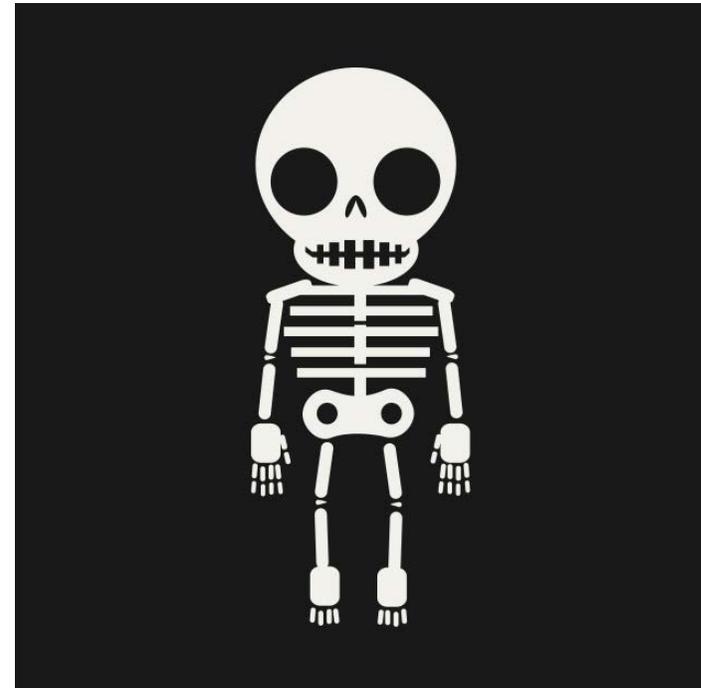
- Vitamin D/Rickets
- Brittle Bone Disease
- Metabolic Disease
- Genetic Disorder
- Birth Trauma (rare)
- Accidents

# AHT - Fractures

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- **Things to Remember**

- Babies and toddlers have pliable bones
  - much more so than adults
- It takes *significant* force to break younger bones
- Ask family and doctor about possibility of genetic disorders, disease, etc.
- Many hospitals will run genetic testing to rule out the common defenses



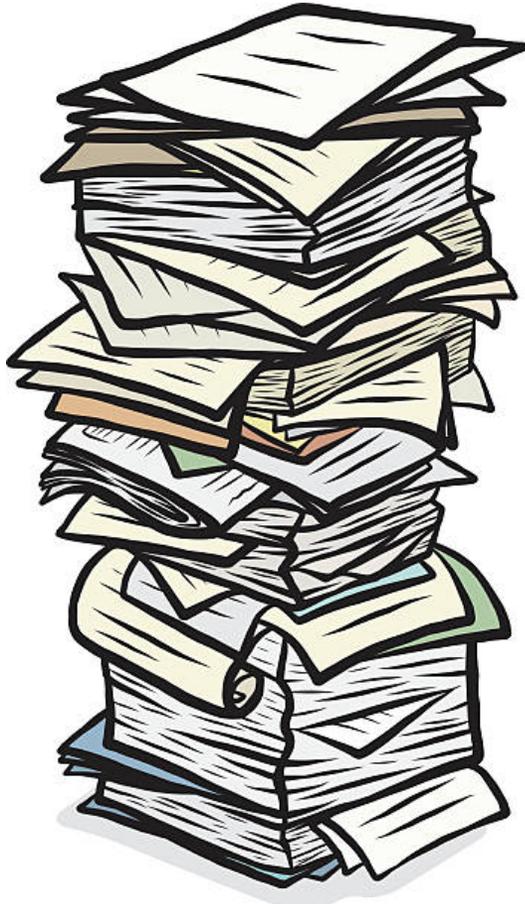
# BRIEF INTRO TO READING/ORGANIZING MEDICAL RECORDS

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- You will receive *hundreds* if not *thousands* of pages of medical records in AHT cases. It will feel overwhelming.
- 1. Identify types of doctors – residents, attendings, nurses, specialties
- 2. Make sure you have ALL of the records
- 3. Start with the discharge/death summary
- 4. Look at diagnostic radiology
- 5. Look for key words like “impression” “diagnosis” “differential diagnosis”

# MEDICAL RECORDS

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- **-ER Records**
  - -Admission History and Physical
  - -Consultation Notes
  - -Social work notes
  - -Discharge summary
- **Secondary Review**
  - -nurses notes
  - -progress notes
  - -diagnostic imaging
  - -operative reports
- **Not so important to review (put aside)**
  - -flow charts
  - -medications
  - -lab reports
  - -nutrition
  - -orders

# PROSECUTING ABUSIVE HEAD TRAUMA: FROM CHARGING TO TRIAL

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- Pre-Charging
  - Make sure law enforcement appreciates the uniqueness of these investigations (pamphlet)
  - Ideally, you will be called out as soon as possible, but oftentimes we're never called
  - Don't charge these cases on your own, consult your supervisor and colleagues
  - Don't rush to arrest – get information from suspect and family while they're cooperative
- Pretrial Prep
  - Organize your case from the very beginning – this will save you headaches later on!
  - Identify weaknesses in your case – timeline issues? Caregiver issues? Defenses noticed – how will you overcome them?
  - Who are critical witnesses to your case?
  - Can you proceed without certain witnesses? Examine confrontation clause issues, hearsay, etc.

# PROSECUTING AHT – PRETRIAL LITIGATION

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- Motions

- Motions in Limine
  - Consider them well before trial and keep adding to your list as new issues arise
  - Anticipate defense MILs and be ready to fight them, research early
- 404 Motions
  - Try to stay in intrinsic land – did suspect admit to previous uncharged abuse that is close-in-time?
  - Older, uncharged injuries
  - Injuries to other children
- Daubert Motions/Hearings
  - Try to get defense expert precluded
- Motions to Compel
  - Birth records
  - DCS records
  - Defense experts



# PROSECUTING AHT – PRETRIAL LITIGATION

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- **Evaluating the Defense**

- You need defense's disclosure to determine whether you need a rebuttal expert
- Go back through your evidence to see if you already have something to refute their defense
- Research their experts (NYPTI) – get previous trial testimony – prosecutors are happy to share
- You may need to have further testing done on the evidence (tissues, carpeting, subfloor)

- **Photos**

- Are they “gruesome”?
- Be selective with your photos beforehand
- Gruesomeness evaluation changes in these cases – locations of bleeds are all important
- Stress to the court that it's not cumulative

# PROSECUTING AHT – TRIAL

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- **Jury Selection**

- Try to get the court to allow a jury questionnaire
- Relationship that involved child abuse?
- Victim of child abuse?
- DV questions may or may not apply
- “CSI” questions – “House”
- You want “big picture” people – defense argues nuances, you need people who will look at and accept the concept of constellation
- Avoid people who are similar to your defendant
- Parents who are beyond “terrible twos”
- Use your jury selection skills to get jurors talking

# PROSECUTING AHT - TRIAL

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- **Order of Witnesses**

- Think about your theme and theory of the case
- Civilians first
- Chronological usually makes the most sense
- End with the OME helps reinforce the science and mechanism of injury/cause of death

- **Stick to YOUR Theory**

- Confusion breeds acquittals

- **Prep Your Witnesses (and Defense's)**

- Meet with all your witnesses beforehand, *everyone*
- You don't completely know your case until you know theirs
- **Prepare your cross of the Defendant well in advance - goes back to knowing your case inside and out**

# PROSECUTING AHT – HANDLING A LOSS

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# QUESTIONS?

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