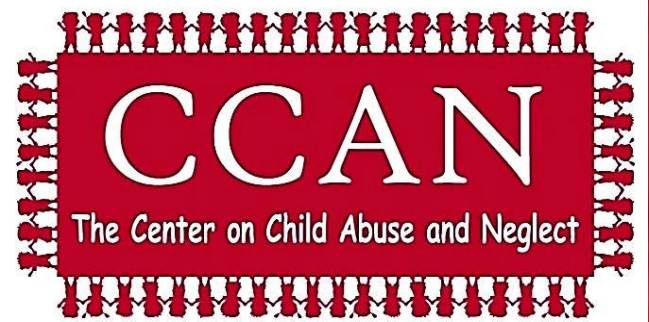




Physical Child Abuse

Mary Ellen Stockett, M.D.



David Ross Boyd
Paul Moore

Goals (Unattainable)

- Report child maltreatment every time it occurs
- Never report child maltreatment when it has not occurred



Attainable Goal

- Identify patterns of injury or neglect that should make you worried enough to report child maltreatment



Objectives

- Describe the association between child development and child maltreatment in regard to bruises, burns and fractures
- Identify patterns of bruises
- Identify types of burns
- Describe characteristics of abusive head trauma
 - Association with crying
 - Consequences
 - Incidence
 - Perpetrators





Bruises



Five Month Old Baby Girl





- Report

- Don't report

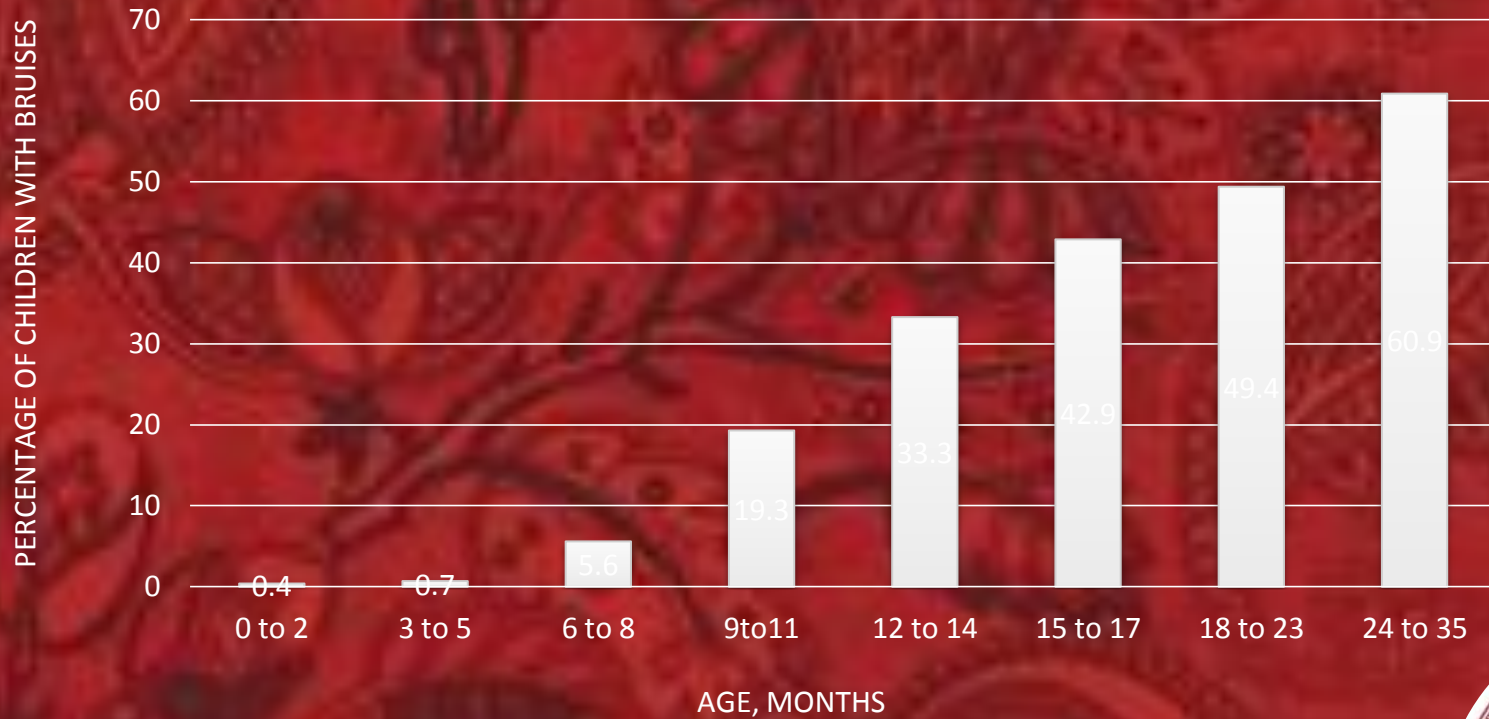


Those Who Don't Cruise Rarely Bruise

Archives of Pediatric and Adolescent
Medicine, 1999; 153: 399-403

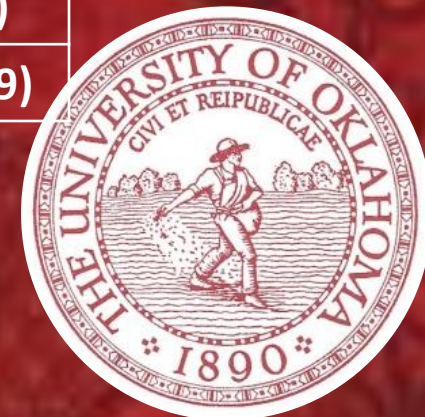


Percentage of Children with Bruises by Age



Bruises by Age and Developmental Stage of Child

Age, months	Precruiser	Cruiser	Walker
0-2	1/225 (0.4)		
3-5	1/141 (0.7)		
6-8	4/99 (4.0)	2/8 (25)	
9-11	4/38 (10.5)	12/63 (19)	7/18 (38.9)
12-14	1/8 (12.5)	3/24 (12.5)	23/49 (46.9)
15-17		1/6(16.7)	26/57 (45.9)
18-23			39/79 (49.4)
24-35			70/115 (60.9)
Total	11/511 (2.2)	18/101 (17.8)	165/318 (51.9)



One Month Old Baby Girl



Twenty Month Old Boy



Falls do
not cause
bruises
on
multiple
planes of
the body







25 Month Old Boy



Bruises can occur at the intersection of compressed and not compressed tissue causing an outline of the object.



Incidence and Prevalence

- Incidence of physical abuse
 - 2.1 per 1000 children in 2004
- Prevalence of physical abuse
 - 31.25% for males
 - 21.1% for females
- Prevalence of severe child abuse
 - 10.7% for males
 - 9.2% for females





What happened to you ?



“My mom hit me with a gray belt with hearts on it because I didn’t clean my room.”







85-0285
(2-03)
CENTIMETERS
1 2 3 4 5 6 7 8

Almost 4 Year Old Boy



Case Number Initials
85-0285 (2-03)
CENTIMETERS
1 2 3 4 5 6 7 8



History from the child is essential



8 year girl reported her mother hit her with a belt... the buckle part

Bruises can occur over compressed surface causing a bruise the shape of the object.





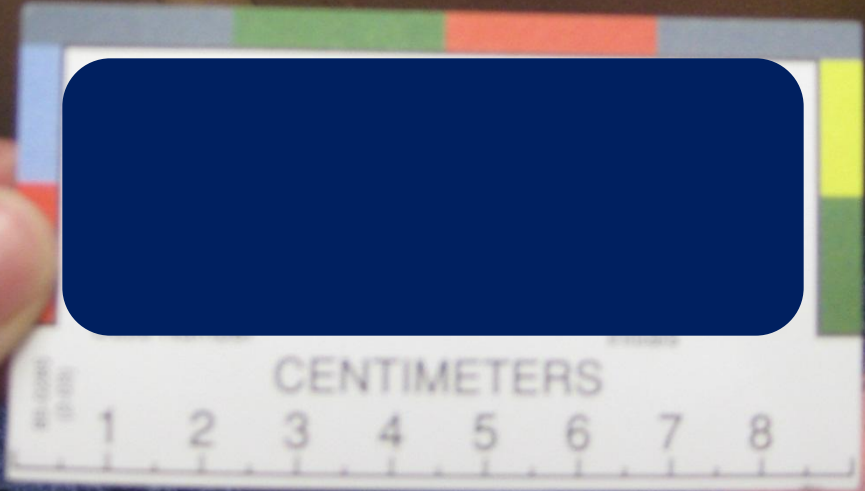






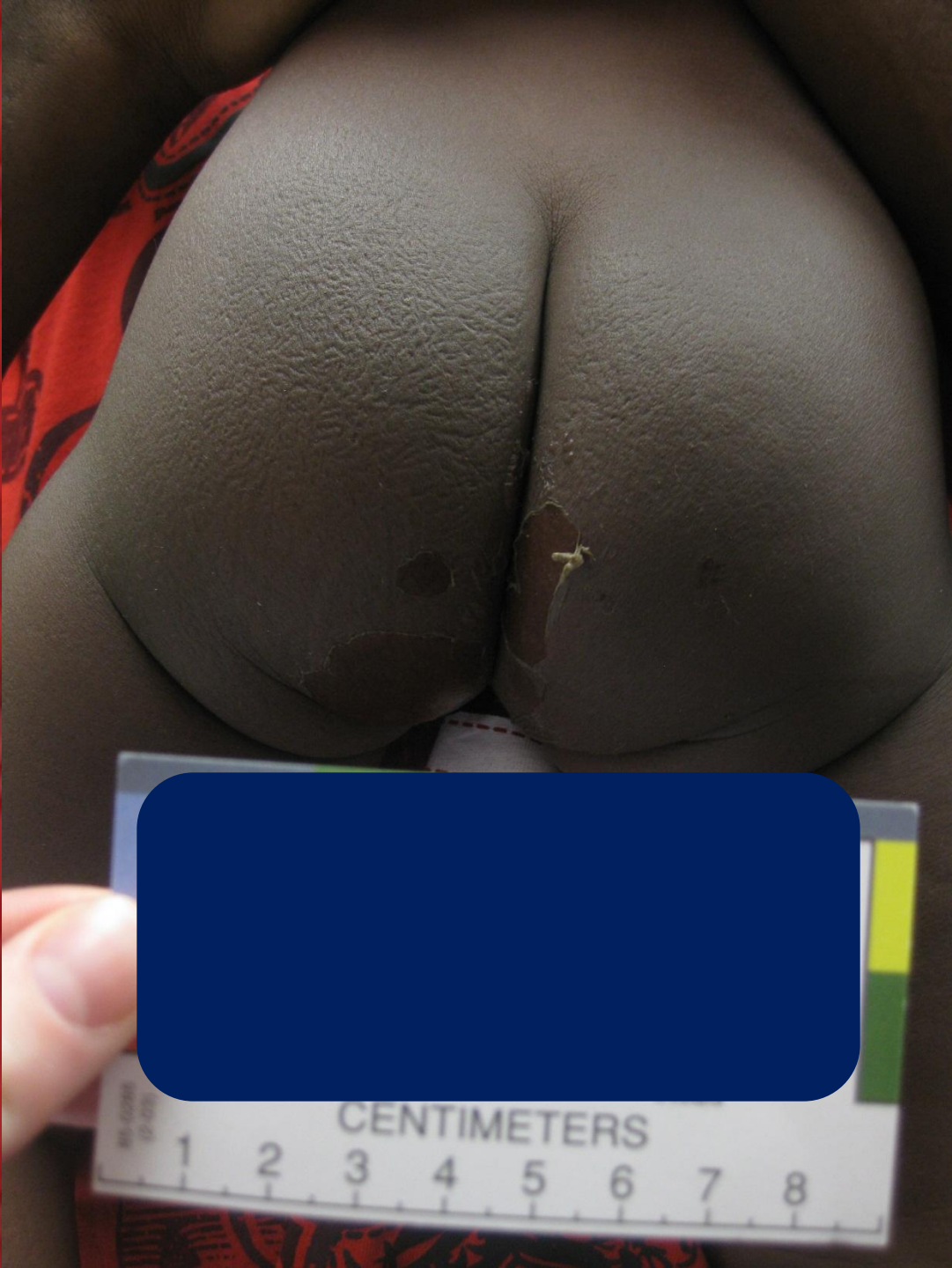
Burns





CENTIMETERS

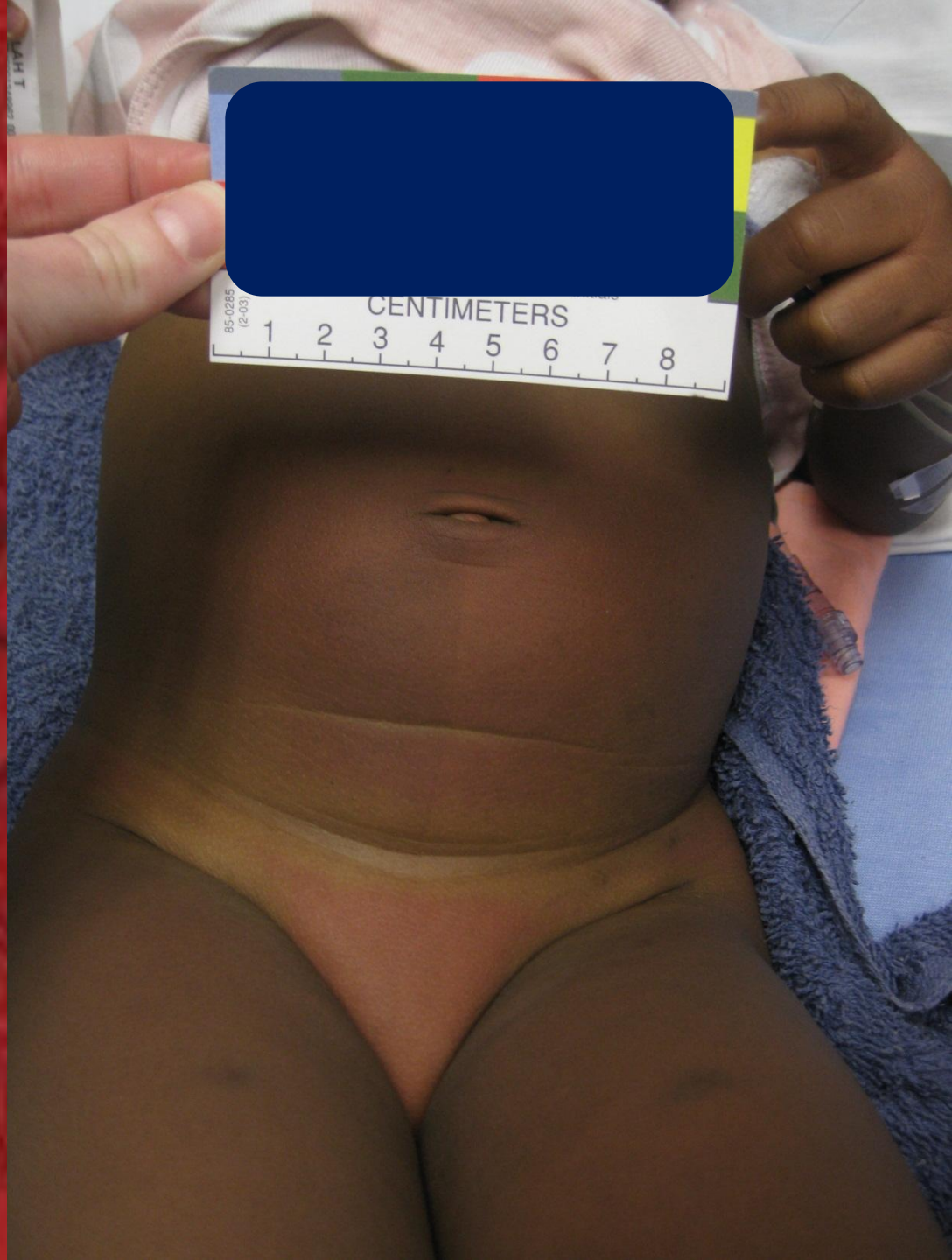
1 2 3 4 5 6 7 8



Worried ?



Immersion
burns cause a
stocking or
glove pattern
with sparing
of areas of
flexion





9820-98
(2-2)
Site

1	9	06	11	Time	6pm	Photographer	Sgt
2							
3							
4							
5							
6							
7							
8							

Case Number

CENTIMETERS

Initials

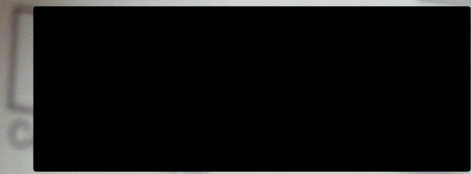
MES

06/11

LOPW

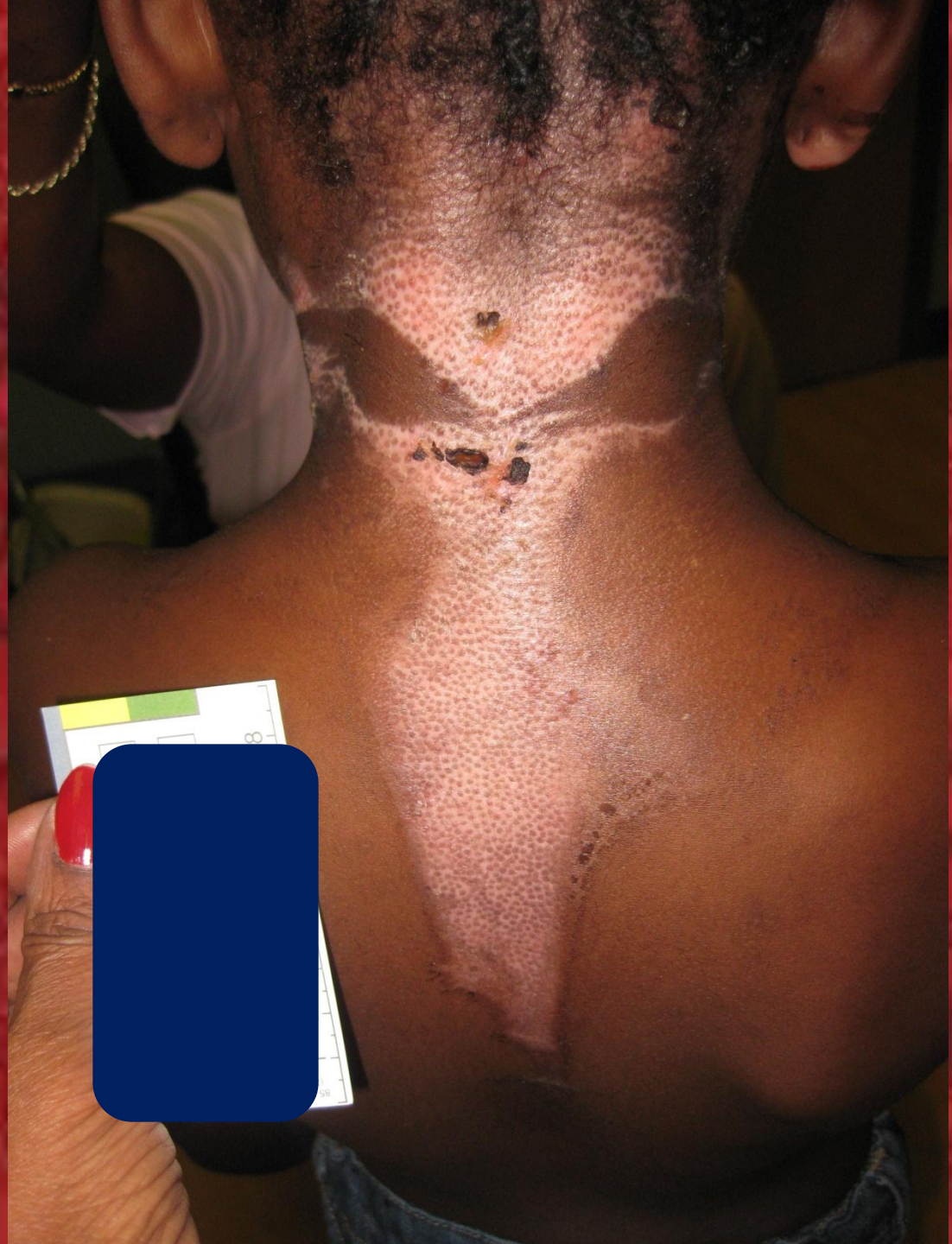
SJA
Photographer

WES
Initials





Splash or streaming burns cause triangular lesions wide at the top coming to a point at the bottom

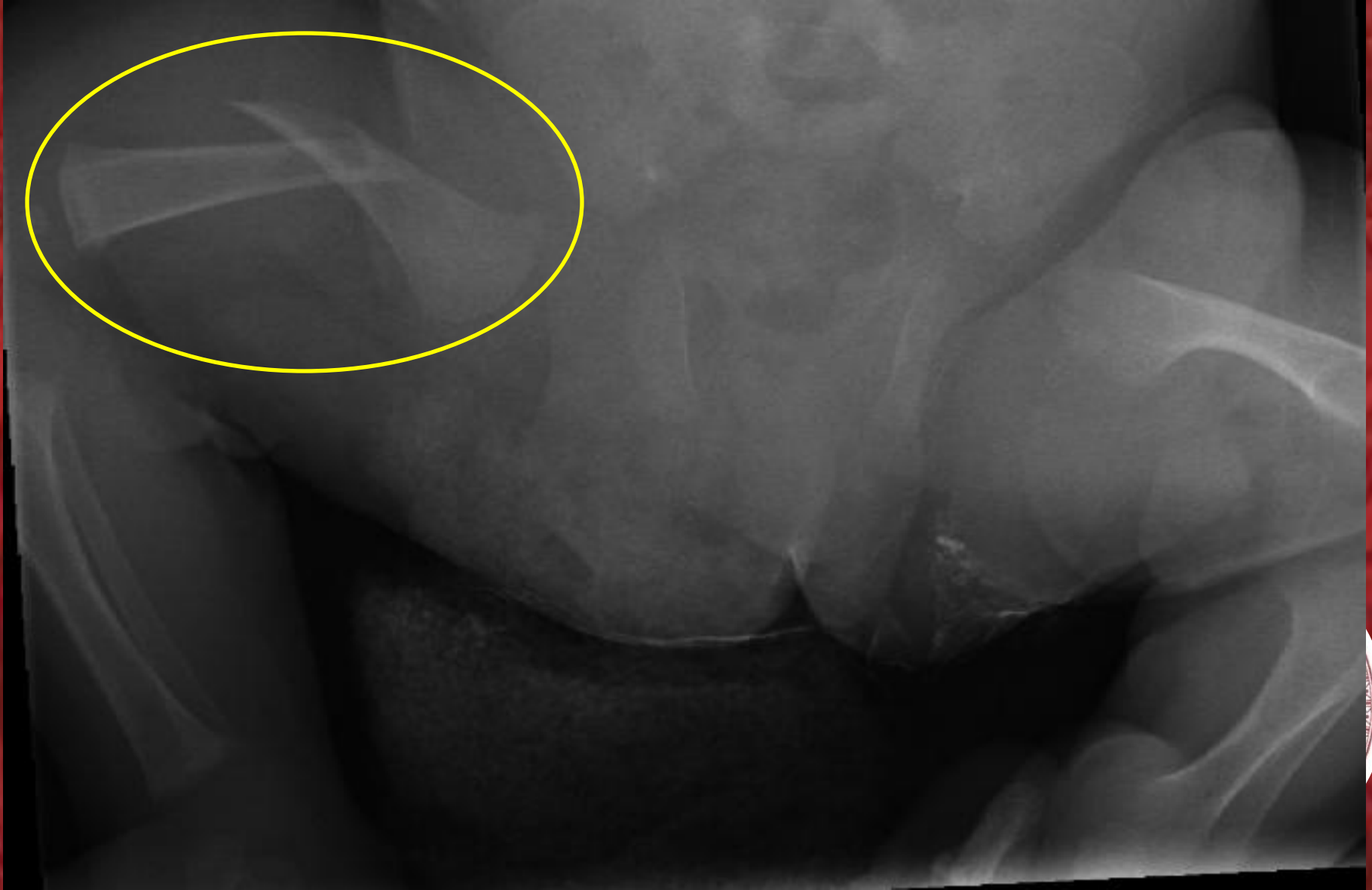




If injuries are not caused by abuse they may be caused by neglect.



Broken Bones



10 02:29PM CR
88



**Three Year Old Girl
Tibia and Fibula**



Does the history match
the injury?



Spiral fractures are not specific for physical child abuse.





Femur of 6 week old girl



Those Who Don't Walk
Rarely.... Break Bones



Femur Fractures Due to Abuse

Number, Age, Ability to Walk

	Abusive	Not due to abuse	Total
Number	13 (9%)	126 (91%)	139
Average age (years)	1.1	2.3	2.3
Number of children with fractures who could not walk	10 (77%)	3 (23%)	13



Femur Fractures Due to Abuse

Walking vs. Not walking

	Fractures due to abuse	Positive Skeletal Survey	Average Age
Unable to walk	10/24 (42%)	6/16 (38%)	0.5
Walking	3/115 (2.6%)	0	2.6



Femur Fractures in Children Less Than Three Years Old

	Abusive (n=14)	Accidental (n=113)
Total (n=127)	14 (11%)	113 (89%)
Age \leq 12 months	10 (17%)	50 (83%)
Age > 12 months	4 (6%)	63 (94%)
Mean Age, months	12	16



Children with Femur Fractures Due to Abuse or Accident

	Abusive	Accidental
Children \leq 12 months old	10/14 (71%)	(50/113) 44%
Nonambulators	14/14 (100%)	35/113 (31%)
Delayed presentation, >24 hrs	6/14 (43%)	9/113 (8%)
Mechanism of injury unknown, unwitnessed or historically inconsistent	10/14 (71%)	3/113 (3%)
Presence of other injuries	6/14 (43%)	13/113 (12%)



Classic metaphyseal lesions are the fractures most commonly associated with physical child abuse



Classic Metaphyseal Lesions

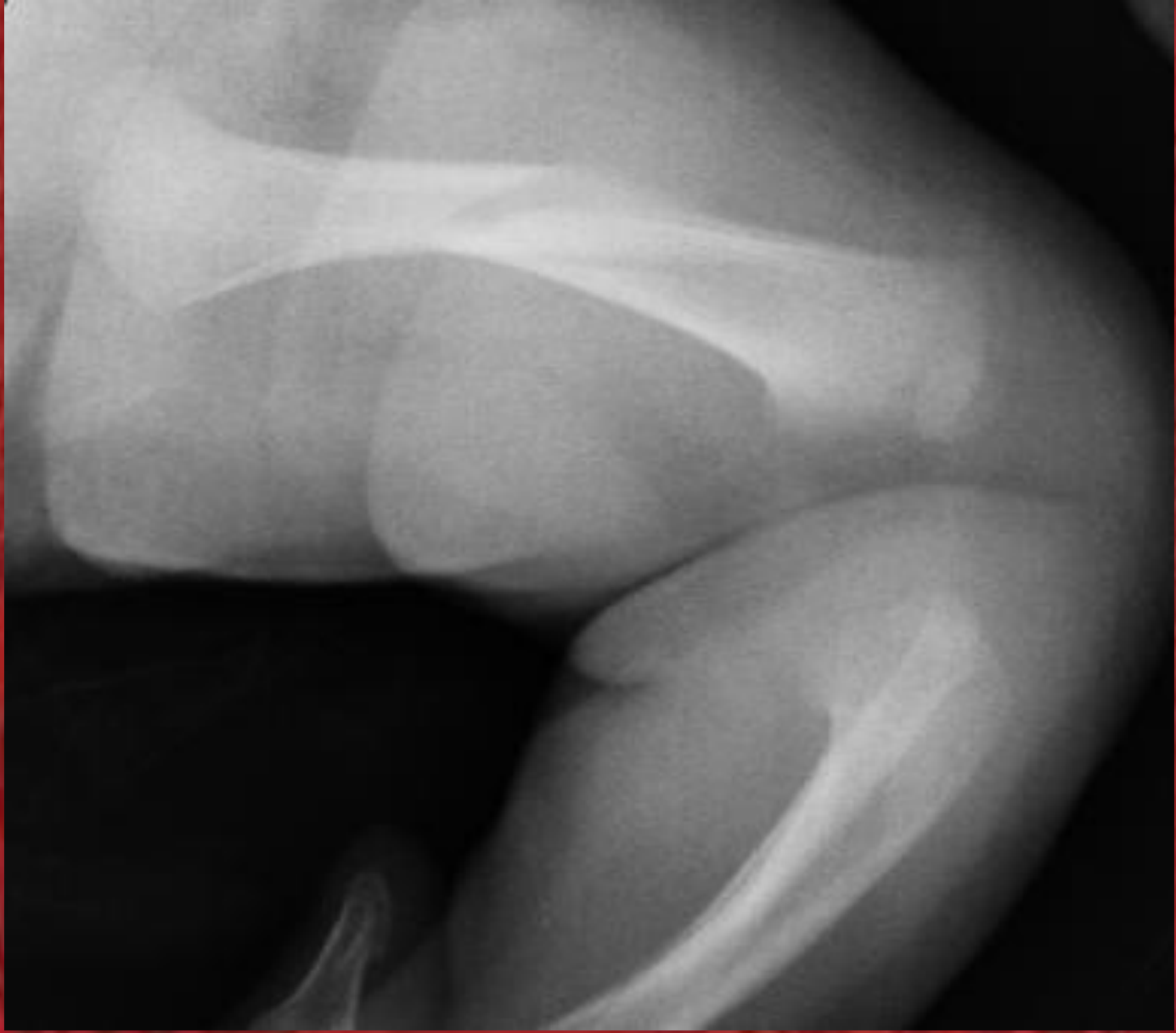
- Corner fractures
- Bucket handle fractures
- Fracture plane through the most immature metaphyseal bone including two adjacent mineralized regions: the distal zone of hypertrophic chondrocytes of the physis and a thin portion of metaphyseal primary spongiosa
- Thicker peripherally than centrally as fracture encompasses the subperiosteal bone collar





Femur of 6 week old girl





Metaphyseal fractures are caused by violent shaking of the baby or jerking of the limb.



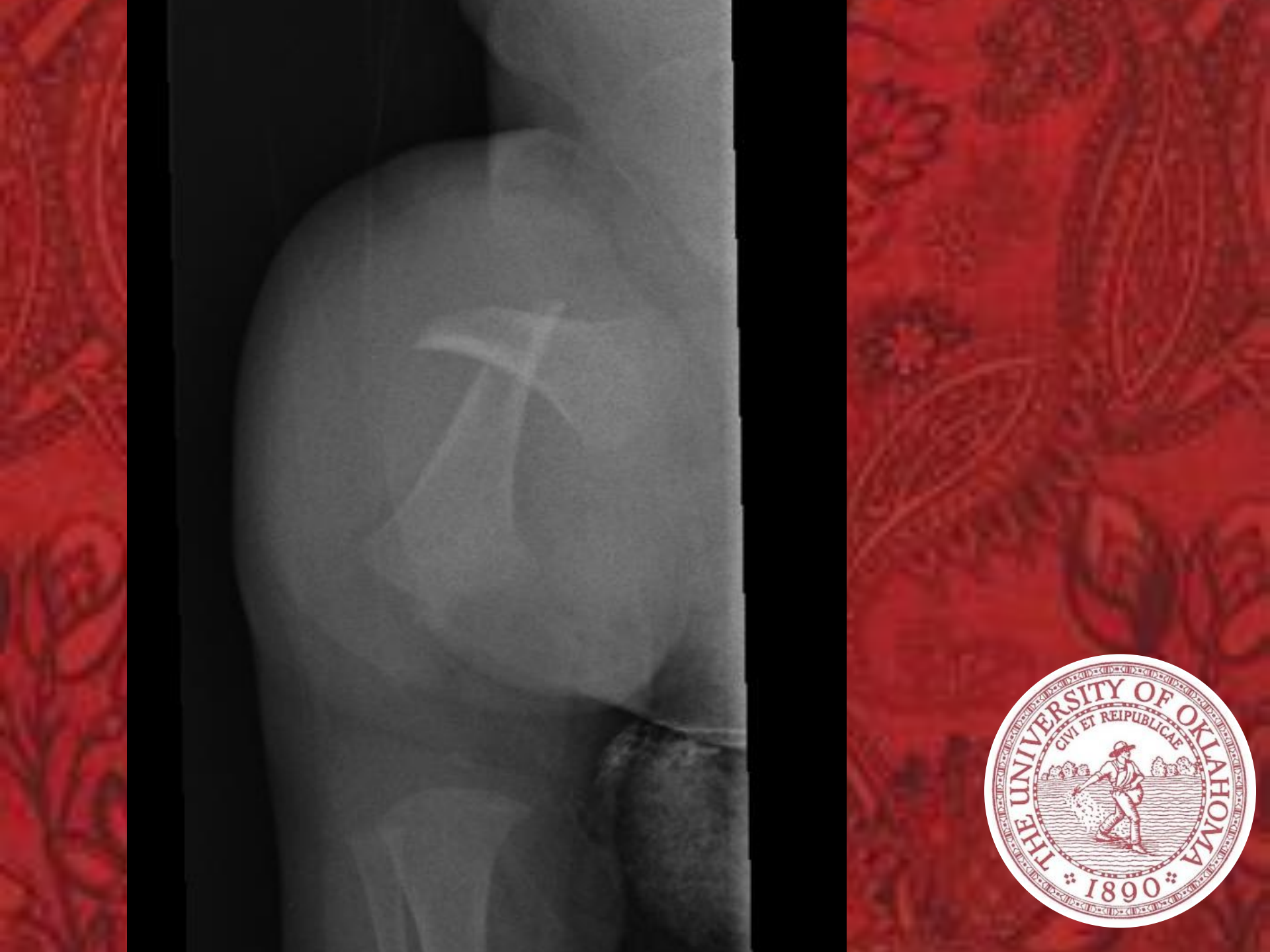


Subperiosteal new bone formation
(physiologic)



Two Month Old Boy





Same Boy when 28 Months Old

#1 07-FEB-2007 05:40FIM CR

Ac: 2942616

X Wrist PA Left

Series 1



#1 07-Feb-2007 05:44PM CR

Ac: 2942616

X Wrist Lat Left

Series 2

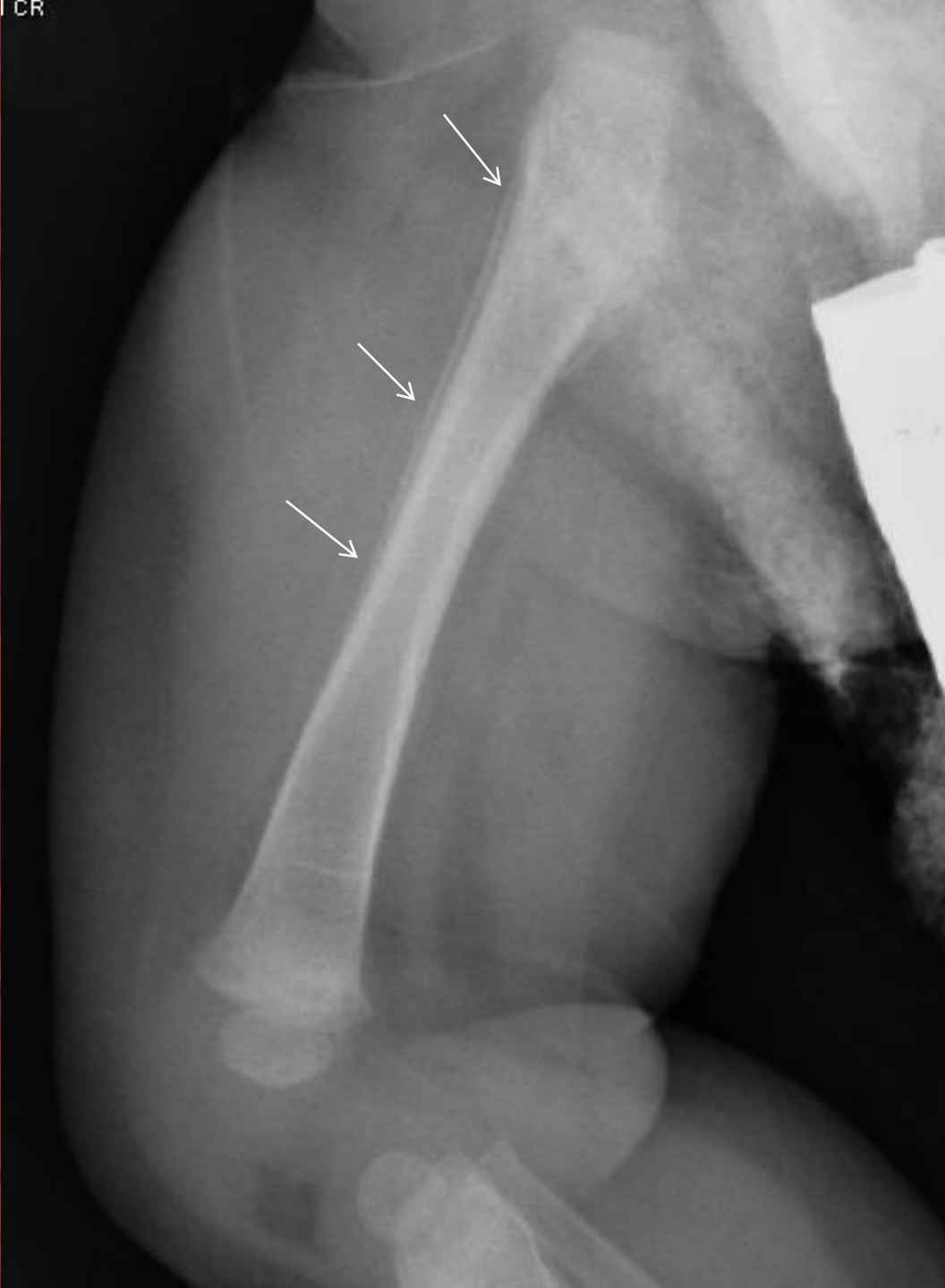


W:1852 L:



Five Month Old Baby Girl

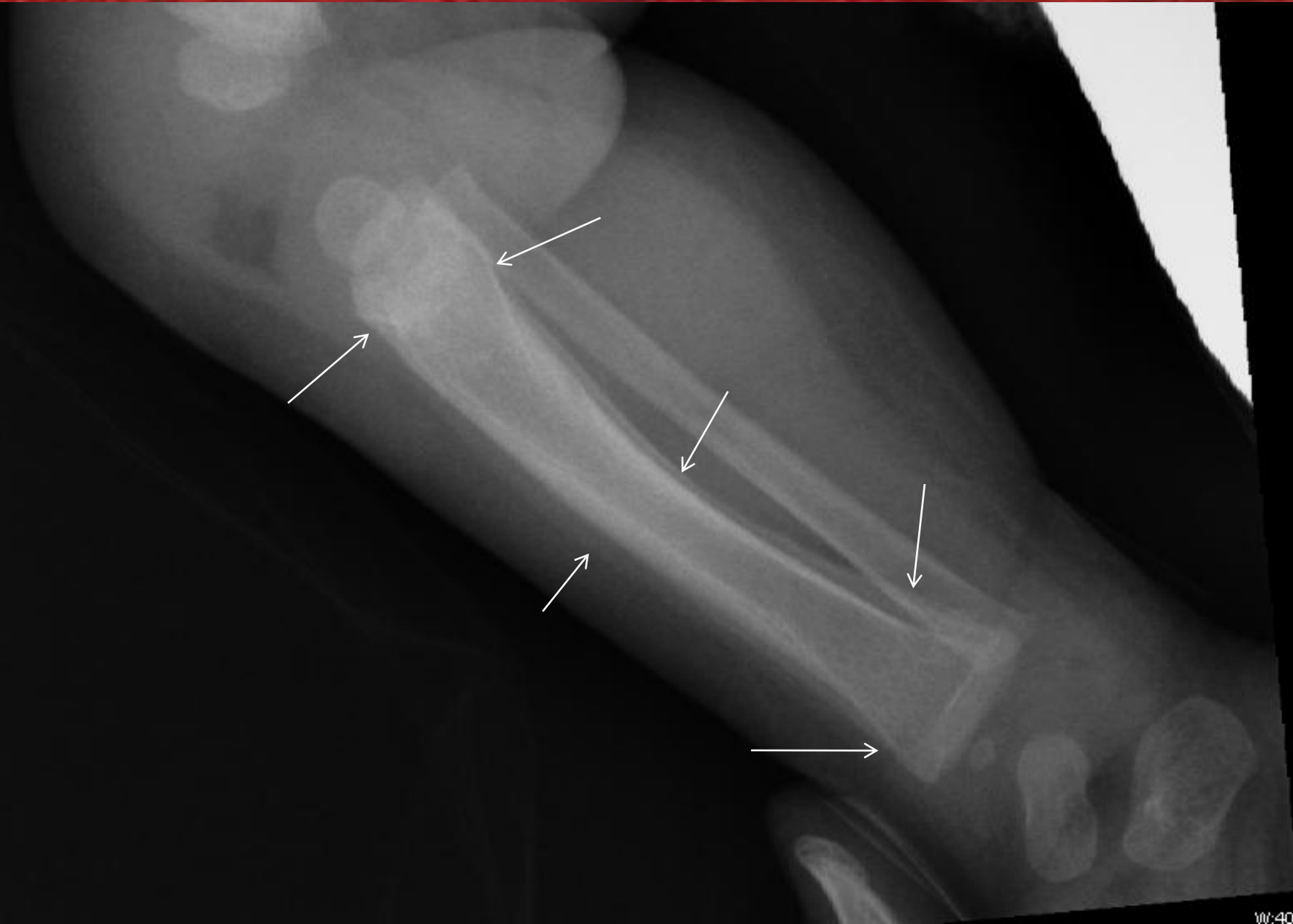




Five Month Old Baby Girl Right Femur



Right Tibia and Fibula



#4 01-Dec-2007 06:04PM CR

Ac: 3306166

AP

Series 1



Right Humerus

Left Humerus



Ac: 3306166
P
eries 1



Right Radius and Ulna



Left Radius and Ulna

W:4048 L:2061



Shaken Baby Syndrome

- 14-30 children less than 1 year old per 100,000
- 1 in 3000 to 4000 children less than 1 year old
- Lower risk between 1 and 2 years and continues to decrease in older children, though children up to 5 years old may be vulnerable



Consequences of Shaken Baby Syndrome

- Mortality rate of 13-30%
- Higher mortality for children with inflicted brain injury compared to accidental injury (16.8% vs 10.7%)
- Most common cause of fatal inflicted injury
- Leading cause of death from traumatic brain injury



Consequences of Shaken Baby Syndrome

- 45-91% of survivors had significant impairments in motor and cognitive abilities, language, vision and behavior
- Children who are quickly stabilized may still have considerable developmental problems
- 1/3 have evidence of previous brain injury



Shaken Baby Syndrome and Crying

Crying was the stimulus for
Shaken Baby Syndrome in 28%
of cases in one study



Brazelton's Graph of Hours of Crying by Age

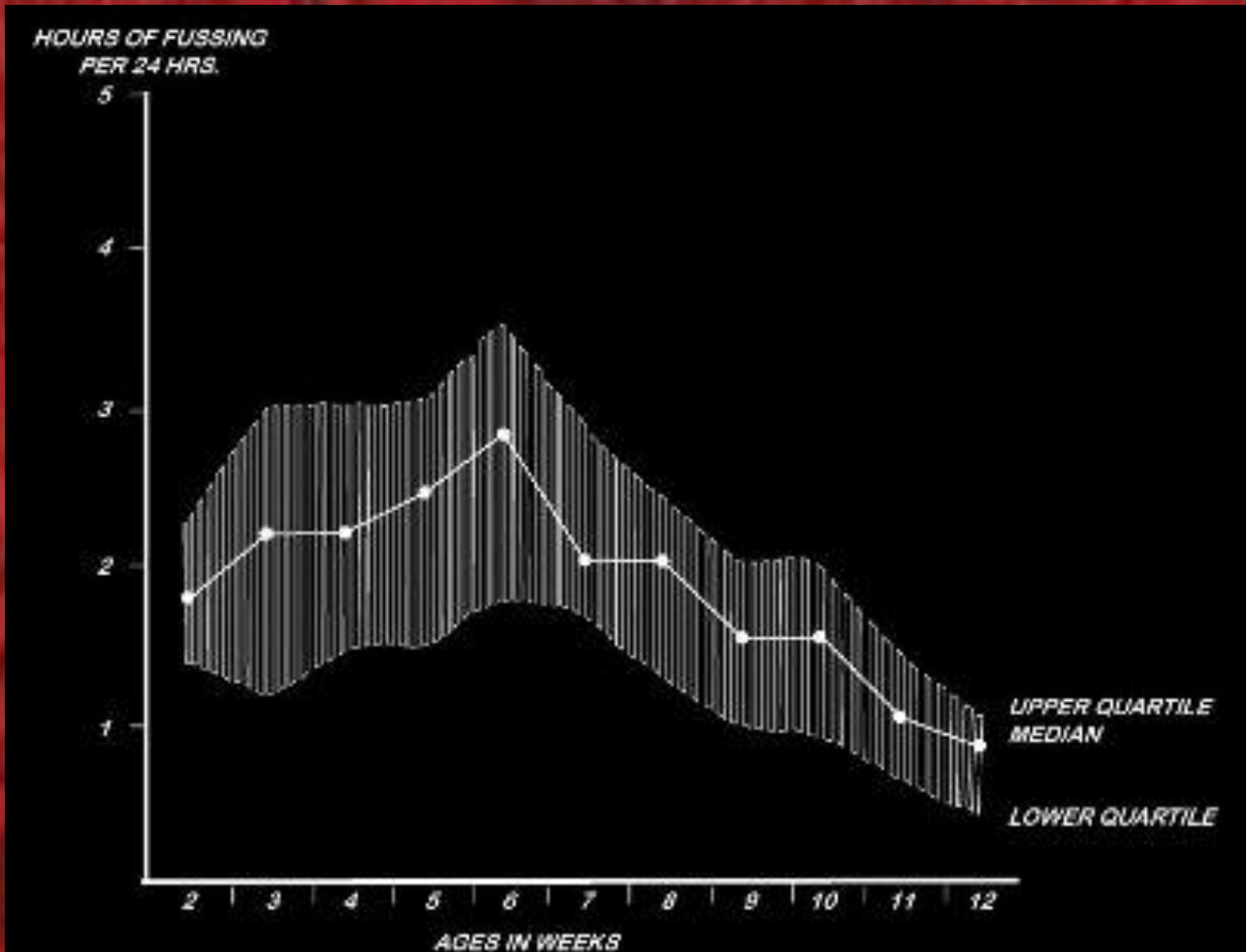
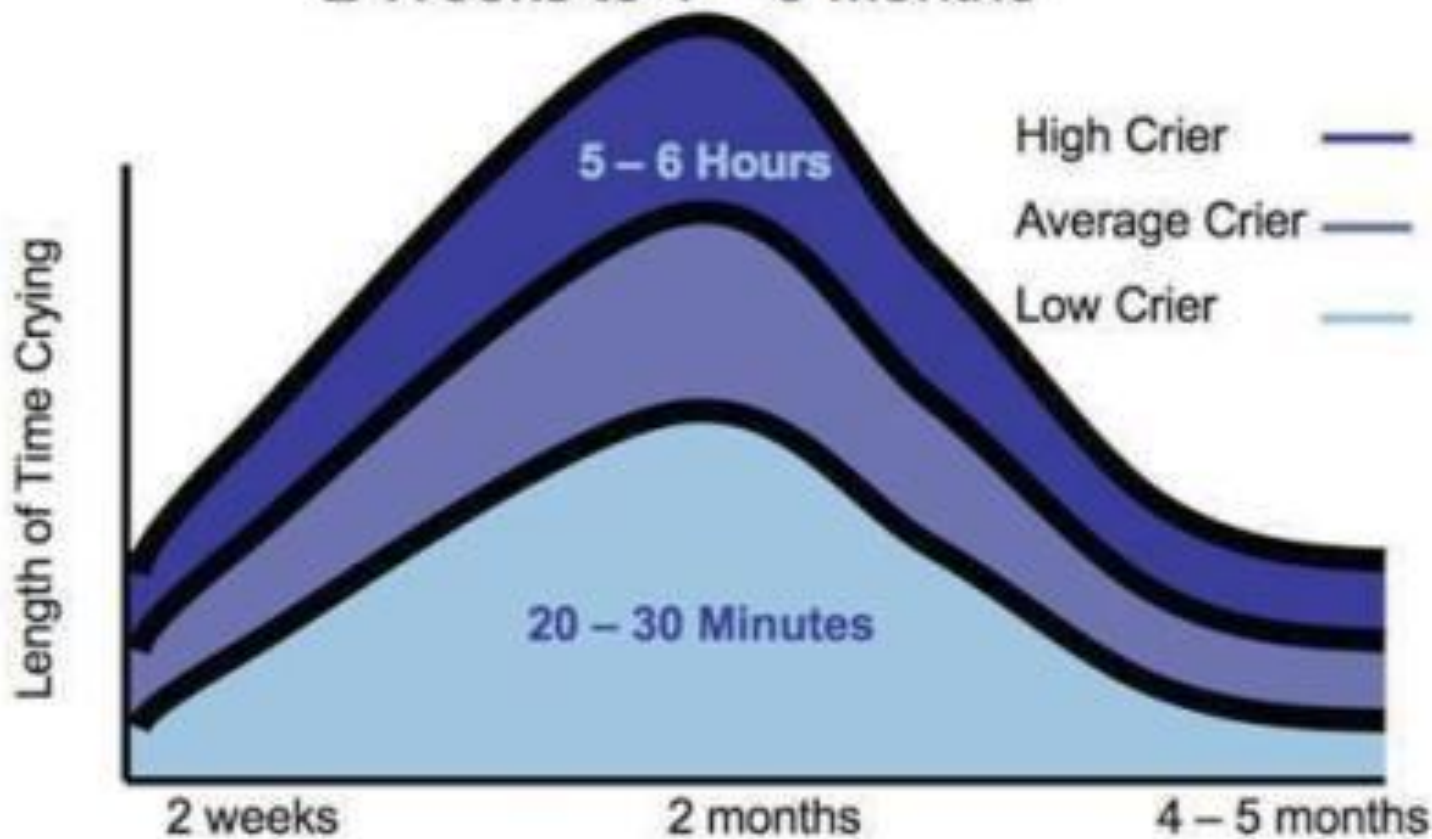


FIG. 2. Summary of the total crying time of the 80 infants studied.

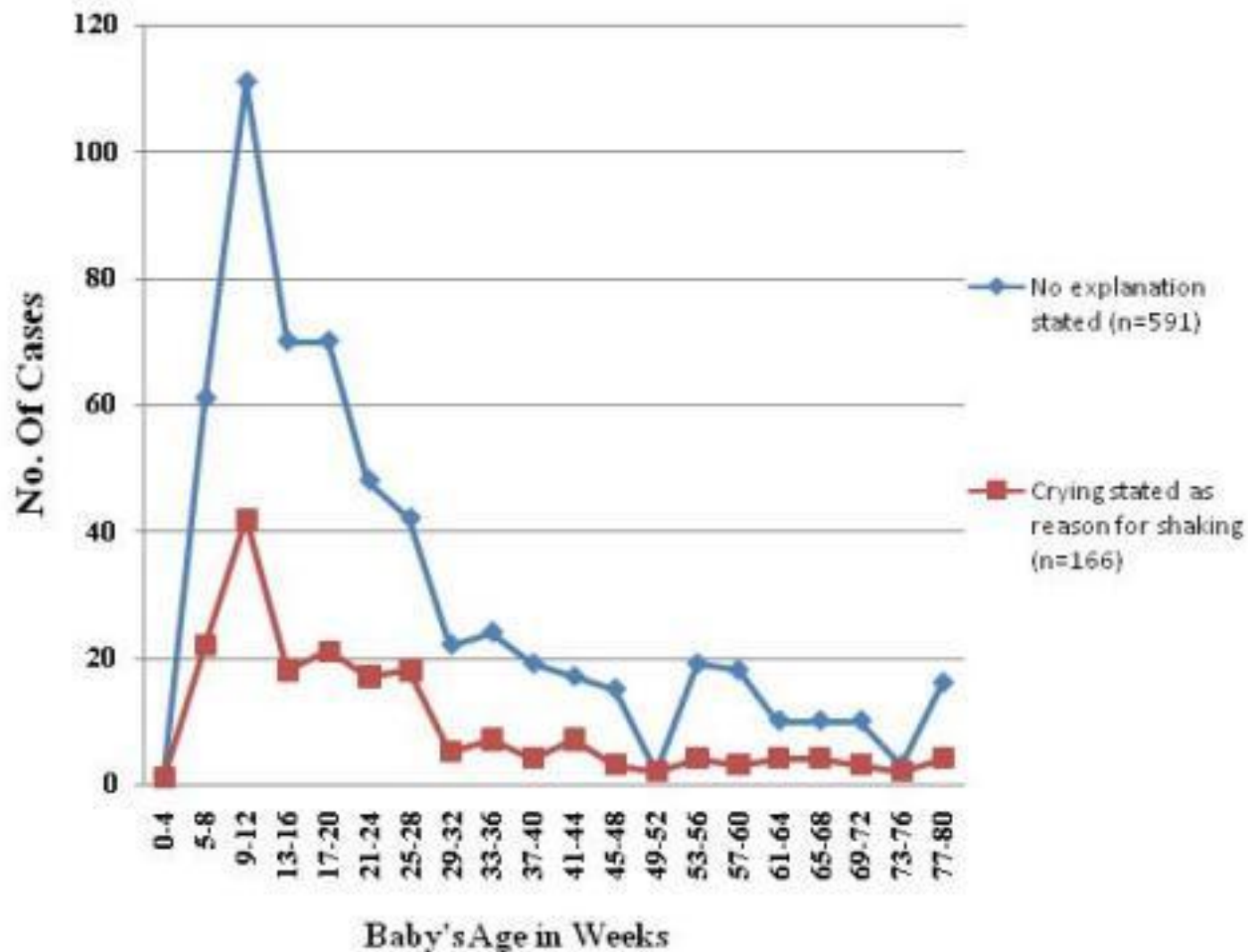


Barr's Crying Curve Replicates Brazelton's Finding

Curves of Early Infant Crying 2 Weeks to 4 – 5 Months



Barr's Graph of Crying and SBS



Timing of Crying and Shaken Baby Syndrome

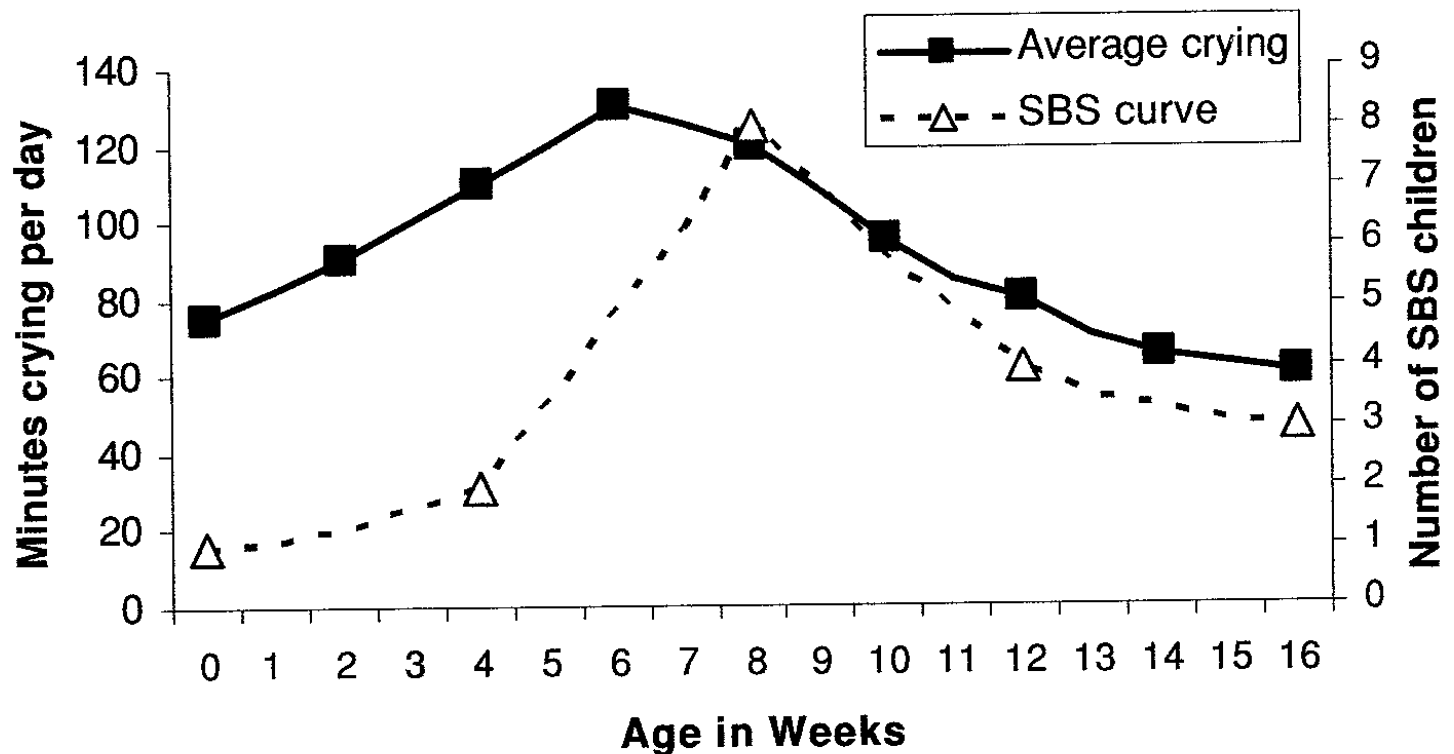
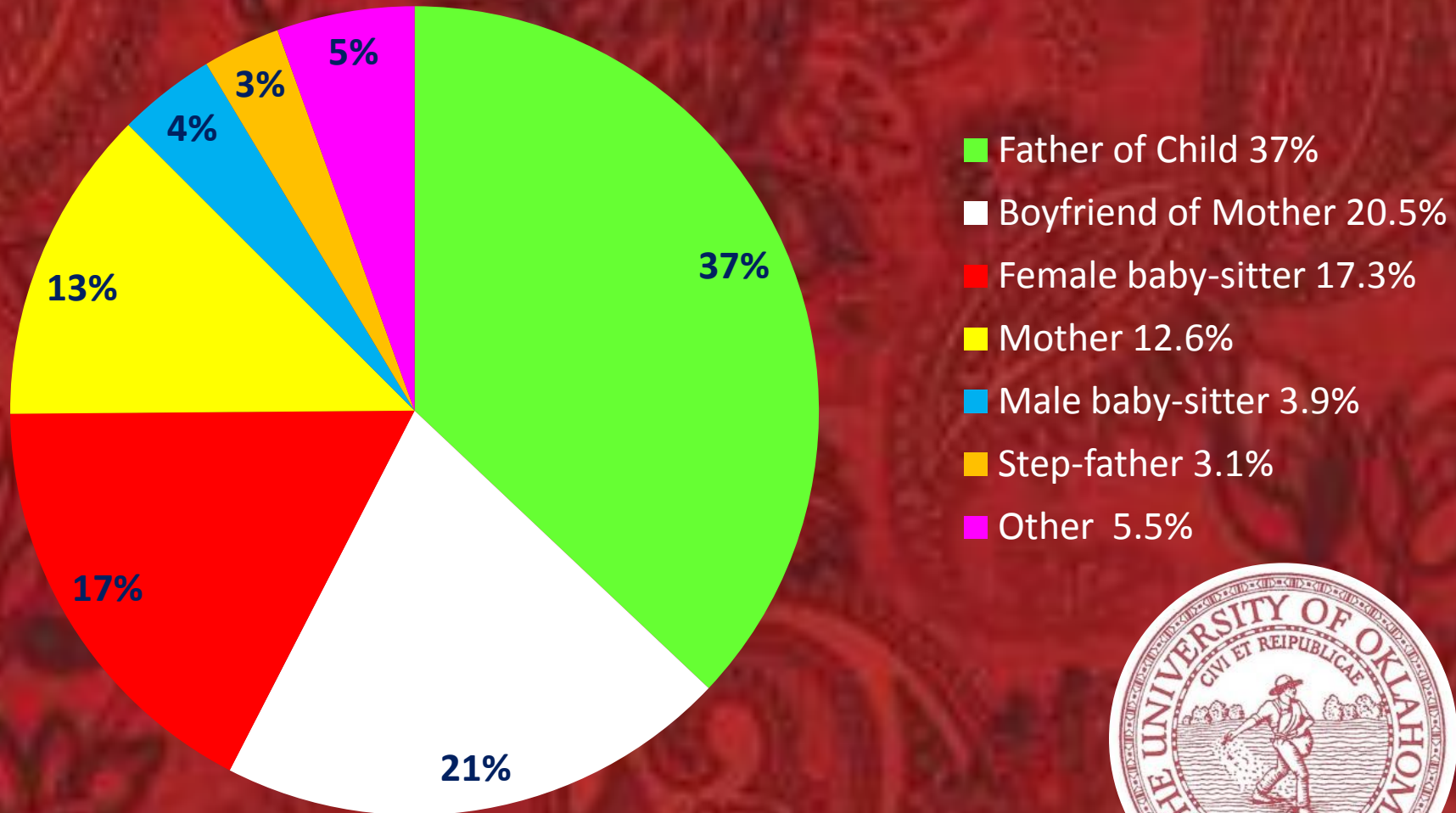
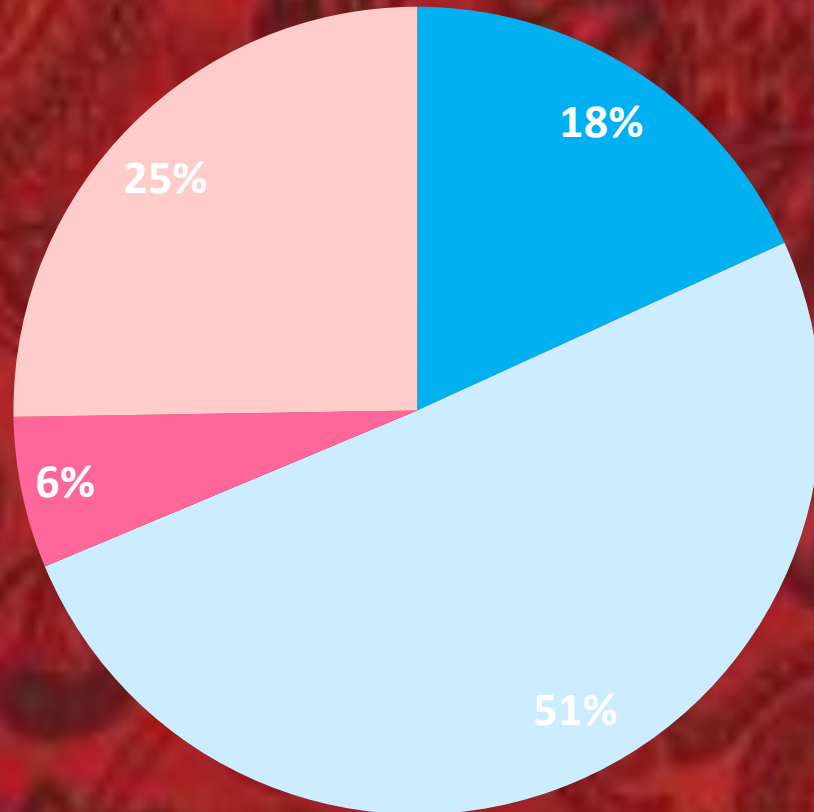


Figure 1 Infant crying curve (modified from http://en.citizendium.org/wiki/Infant_colic) and age of babies with SBS/ITBI in Estonia.

Relationship of Perpetrators to Their Victims



Gender of Perpetrator in Fatal and Nonfatal Abusive Head Trauma



- Fatal male perpetrator 18%
- Nonfatal male perpetrator 50%
- Fatal female perpetrator 6%
- Nonfatal female perpetrator 25%



Sentinel Injuries Study

- 401 children <12 months old evaluated for abuse
 - 200 definitely abused
 - 100 with intermediate concern for abuse
 - 101 nonabused
- Evaluated for sentinel injuries
 - Injuries in infants who could not cruise
 - Injuries in which the explanation was implausible

Pediatrics, 2013; 131: 701-707



Sentinel Injuries Rates

- 27.5% of abused infants
 - 30% of infants with abusive head trauma (AHT)
 - 25% of infants with non-AHT abuse
- 8% of infants with intermediate concern for abuse
- None of nonabused infants



Sentinel Injuries in Abused Infants

- 80% bruising
- 11% intraoral injury
- 7% other injury



Medical Provider Awareness

- In 41.9% of the abused infants a medical provider was aware of the sentinel injury
- In 43.5% of these cases a medical provider suspected abuse
- In 56.5% of these cases abuse was not suspected

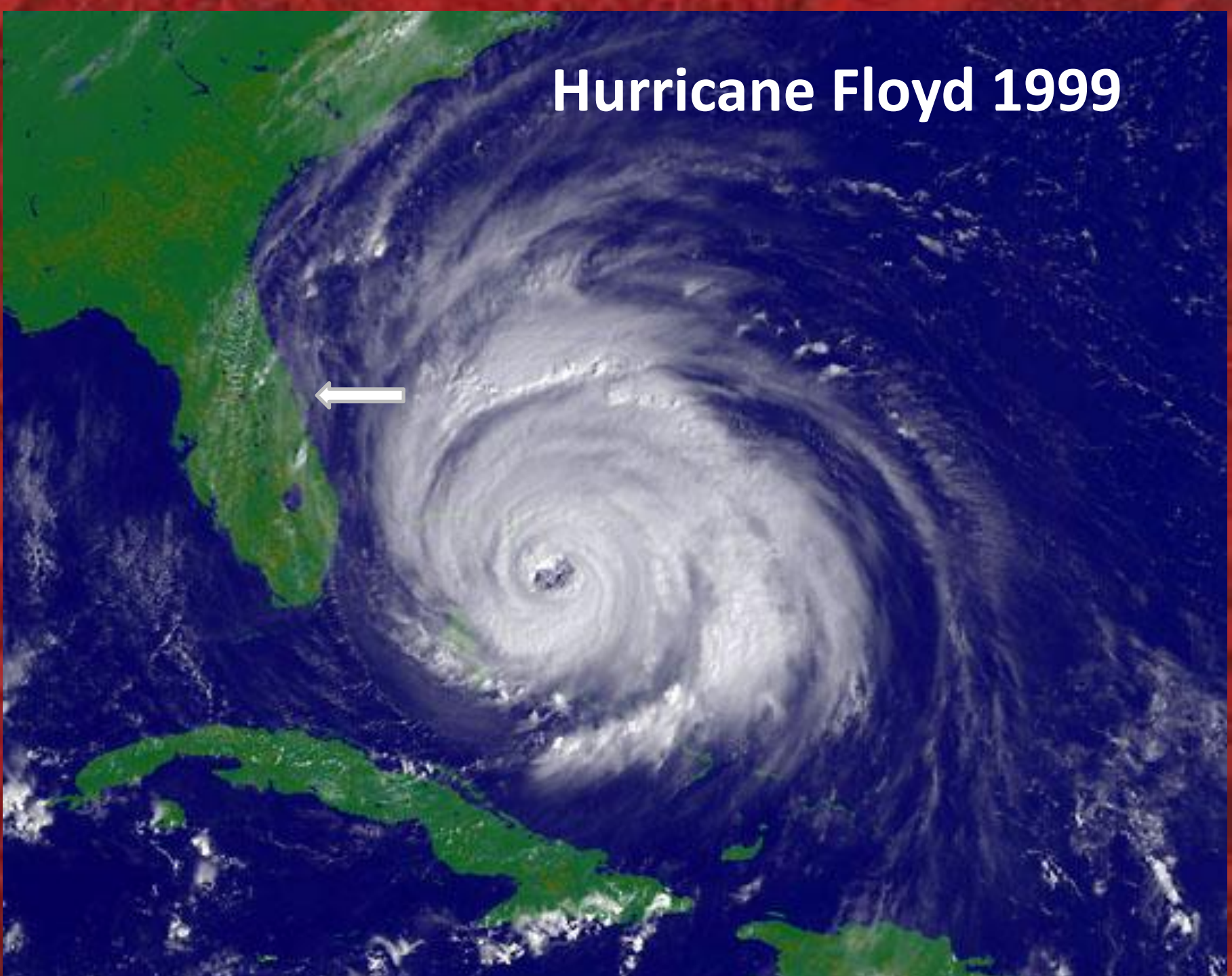


Age of Abused Infant when Sentinel Injuries Occurred

- 71% at or before 3 months of age
- 94% at or before 7 months of age
- Interval between sentinel injury and abuse ranged from 1 day to 7.3 months with a median of 1 month

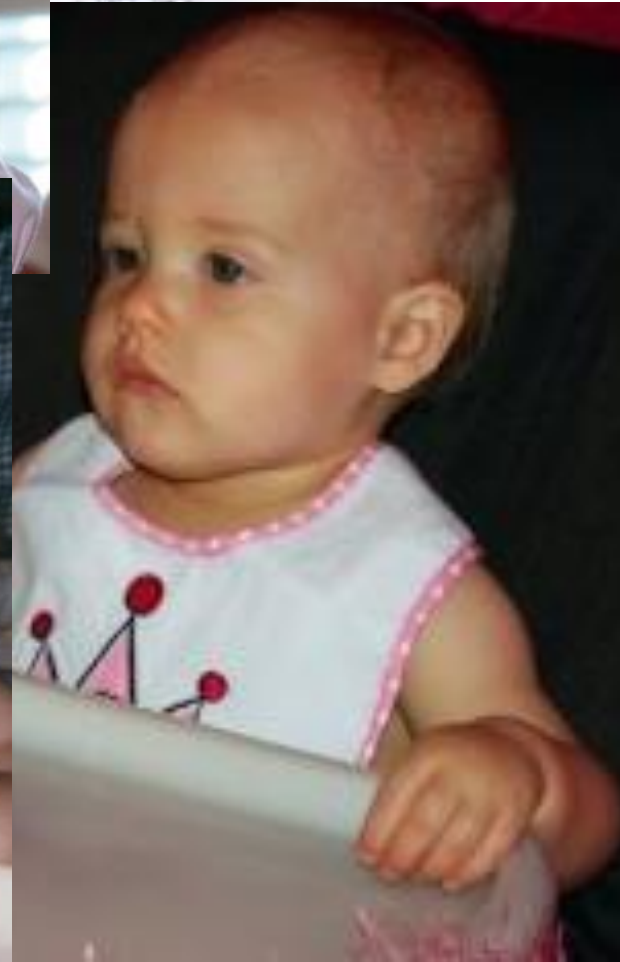


Hurricane Floyd 1999





Your ability to recognize injuries in young babies indicative of physical abuse can allow prevention of subsequent injuries and allow them to celebrate a **Happy 1st Birthday!**



Thank You

