BACKGROUND
• In the absence of significant accidental trauma, multiple fractures in a young child raises concern for physical abuse
• It has been hypothesized that there is an unrecognized “epidemic” of 25-OH Vitamin D insufficiency that produces findings frequently mistaken for child abuse
• This has been widely cited in legal cases involving suspected child abuse
• We aim to test the theory that 25-OH Vitamin D deficiency increases the risk for fracture in children
• Important to note this is only a preliminary study and significantly underpowered
• Data would seem to refute the hypothesis that 25-OH Vitamin D deficiency predisposes children to multiple fractures in the absence of significant trauma
• 25-OH Vitamin D insufficiency should not be offered as a reason to doubt the presence of physical abuse in a child with multiple, unexplained fractures
• This study is continuing to enroll subjects until a predetermined power criteria is met

METHODS
• This study was approved by the IRB under a waiver of informed consent
• Participants were prospectively identified from a single level 1 pediatric trauma center who met CDPHE or NTDS trauma registry criteria
• Included criteria: < 5 years old and sufficient serum was obtained during the patient’s clinical care
• 25-OH Vitamin D levels were obtained and clinical data was reviewed to determine the total number of fractures
• Exclusion criteria: previously diagnosed bone fragility disorder or inadequate serum available for 25-OH Vitamin D analysis

CONCLUSIONS AND LIMITATIONS
• Important to note this is only a preliminary study and significantly underpowered
• Data would seem to refute the hypothesis that 25-OH Vitamin D deficiency predisposes children to multiple fractures in the absence of significant trauma
• 25-OH Vitamin D insufficiency should not be offered as a reason to doubt the presence of physical abuse in a child with multiple, unexplained fractures

Table 1: Outcomes Stratified by 25-OH Vitamin D Status

| Vitamin D Status | Number of Subjects | Median (IQR) | Range | p
|------------------|--------------------|-------------|-------|-----
| Sufficient (>20 ng/mL) | 70 | 27.4 (25.4-31.7) | 20.1-69.5 | <0.001
| Insufficient (<20 ng/mL) | 13 | 14.7 (11.5-16.7) | 4.0-18.5 |

Table 2: Logistic regression for odds of fracture from vitamin D levels (ng/mL) and adjusting for age, sex, ISS scores and injury mechanism

| Factor | Univariate OR (95% CI) | Multivariate aOR (95% CI)
|--------|------------------------|------------------------
| Vitamin D Insufficiency | 1.23 (0.37, 4.43) | 2.45 (0.46, 19.73)
| ISS (Moderate vs. Minor) | 2.36 (0.83, 7.04) | 1.99 (0.54, 7.50)
| ISS (Severe/Very Severe vs. Minor) | 2.36 (0.67, 9.29) | 1.85 (0.39, 9.23)
| Severe Injury Mechanism | 3.40 (1.18, 11.42) | 2.21 (0.46, 12.12)
| Age (Months) | 0.99 (0.97, 1.03) | 0.99 (0.96, 1.03)
| Male | 1.04 (0.43, 2.52) | 1.20 (0.39, 3.82)
| Trauma Mechanism: Fall | 1.96 (0.57, 5.77) | 2.58 (0.21, 37.78)
| Trauma Mechanism: Non-Accidental Trauma | 2.37 (0.72, 9.23) | 11.71 (1.60, 142.53)
| Trauma Mechanism: Motor-Vehicle | 1.62 (0.51, 5.68) | 3.74 (0.19, 82.21)
| Trauma Mechanism: Animal | 0.72 (0.15, 3.26) | 2.03 (0.23, 26.17)
| Trauma Mechanism: Burn/Unclear/Other | 0.41 (0.15, 1.04) | 0.79 (0.07, 9.26)