



USING ALTERNATIVE LIGHT SOURCES (ALS) IN INFANT AND CHILD DEATH INVESTIGATIONS

TYLER COUNSIL, ED.D.
DIRECTOR, CENTER FOR EDUCATION & WORKFORCE
DEVELOPMENT (ZERO ABUSE PROJECT)
CORONER, DAVIESS CO.

<https://zeroabuseproject.org/>

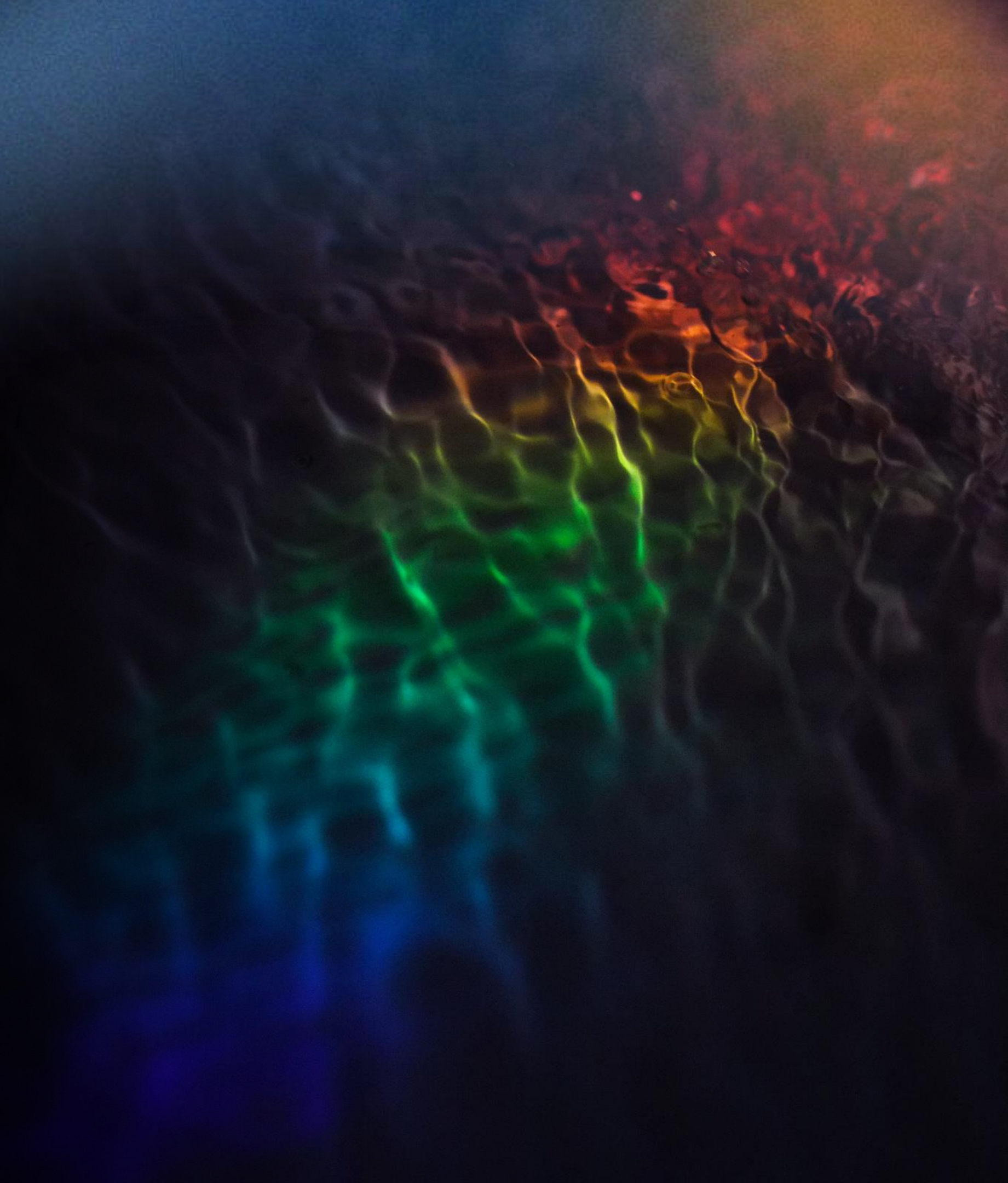
LEARNING OUTCOMES

- **Define** Alternative Light Sources (ALS) and the principles of fluorescence.
- **Identify** different wavelengths and corresponding barrier filters used in ALS.
- **Understand** the types of evidence that can be detected or enhanced with ALS.
- **Apply** ALS techniques to locate subtle bruising and trace evidence on skin or surfaces.
- **Demonstrate** proficiency in using ALS for detecting biological fluids.
- **Outline** best practices for proper documentation (photography, notes) of ALS findings.
- **Integrate** ALS into a comprehensive child death scene processing strategy, ensuring non-contamination.



WHAT IS AN ALTERNATIVE LIGHT SOURCE (ALS)?

- **Definition:** Light source that emits a specific wavelength (color) of light.
- **Purpose:** To excite latent (hidden) evidence, causing it to glow or fluoresce, or to enhance contrast.
- **Mechanism (Fluorescence):**
 - a. Evidence absorbs light at one wavelength (excitation).
 - b. Evidence re-emits light at a longer wavelength (emission), visible to the eye through a filter.
- **Comparison to White Light:**
 - White light illuminates all visible objects.
 - ALS selectively illuminates only fluorescent substances or enhances contrast.
- **Why "Alternative"?**
 - It's an alternative to standard white light for specialized viewing.



THE ELECTROMAGNETIC SPECTRUM & ALS WAVELENGTHS



- ALS operates across various parts of the electromagnetic spectrum.
- Key Wavelengths (and common uses):
 - Ultraviolet (UV) / 400nm & below
 - Violet (415nm)
 - Blue (450-490nm)
 - Green (505-530nm)
 - Red-Orange (570-700nm)

BARRIER FILTERS

NECESSARY FOR ALS SUCCESS

- **Purpose:** Block the excitation light, allowing the fluorescent emission from the evidence to be seen.
- **Color Matching:** The filter's color corresponds to the wavelength of the emitted fluorescence
- **Without a Filter:** The intense excitation light would overwhelm the faint fluorescence, making it invisible.
- **Types of Filters:**
 - Handheld goggles
 - Camera lens filters
 - Filter screens

Choosing the Right Filter is Essential!



TYPES OF ALS- ENHANCED EVIDENCE: AN OVERVIEW

- Biological Fluids
- Fibers & Hairs
- Bruising
- Latent Prints
- Treated Evidence
- Trace Evidence



ALS APPLICATION: DETECTING BIOLOGICAL FLUIDS

- **Common fluids:** Semen, saliva, urine, vaginal secretions, breast milk.
- **Importance:** Can indicate sexual abuse, neglect (urine saturation), or contact.
- **Typical Wavelength:** Blue light (450–490nm) with an orange barrier filter.
- Examination Areas:
 - Clothing
 - Skin
 - Surrounding environment
- **Appearance:** white, yellow, or blue-white against a dark background.
- **Confirmation:** ALS indicates possible presence (**presumptive**); laboratory testing is always required for definitive identification.

ALS APPLICATION: CONTUSIONS

- **Challenge:** Subtle bruising, pattern injuries, or older bruising can be difficult to see on infants/children.
- **Mechanism:** ALS enhances the visualization of hemoglobin breakdown products beneath the skin.
- **Typical Wavelengths:** Green light (505–530nm) or Blue-Green (490–505nm) with appropriate barrier filters (yellow, orange).
- **Examination Areas:**
 - All skin surfaces, focusing on areas consistent with abuse
 - Patterned injuries
- **Appearance:** Bruises may appear as darker areas that absorb the light or as areas of altered fluorescence.
- **Best Practices:**
 - Examine the entire body systematically.
 - Compare findings with white light and magnify.
 - Document meticulously.



CLARIFYING ALS USE FOR BRUISING:

Beyond the Naked Eye

Addressing a Common Misconception: Some resources suggest ALS **only** for enhancement of visible bruises, not for identification of unseen ones.

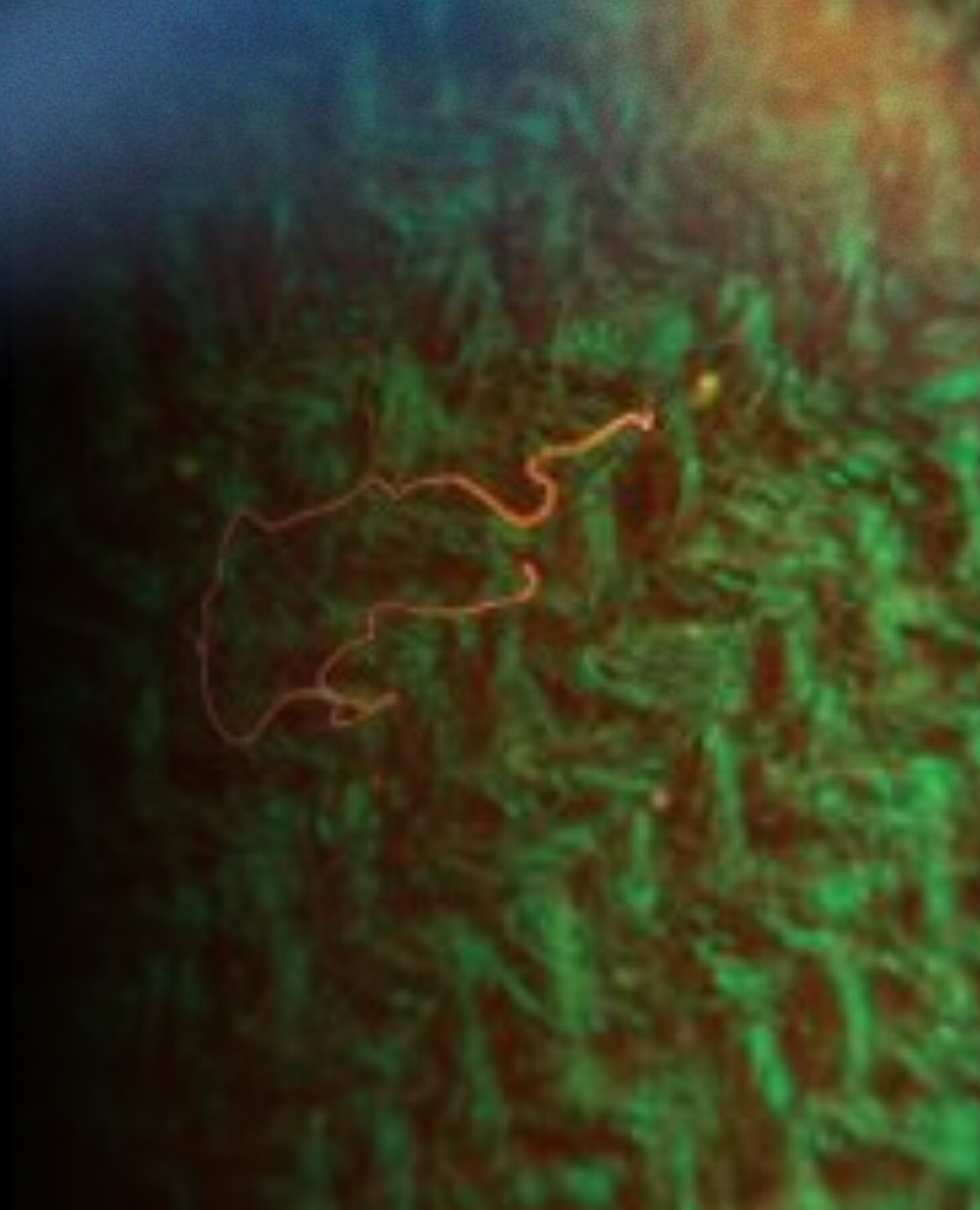
- *Why This is Problematic in Child Death/Abuse:*
 - Subtle Injuries
 - Skin Tone & Melanin
 - Anatomical Location
 - Protective Instinct
- *Current Best Practice & Rationale:*
 - Systematic ALS Screening for ALL Bruising
 - Mechanism Review
 - Minimizing Missed Injuries.

Dangerous Precedent: Relying solely on white light visibility sets a dangerous precedent, potentially leading to missed abuse and compromised investigations.

Conclusion: ALS is an essential screening tool for bruising on all children, irrespective of initial white light findings or skin tone.

ALS APPLICATION: FIBERS & TRACE

- **Transfer Evidence**
- **Fluorescence:** Many natural and synthetic fibers, hairs, and even lint can fluoresce under various ALS wavelengths (UV, blue, green).
- **Examination Areas:**
 - Child's clothing, bedding, and body.
 - Suspect's clothing, vehicle, or residence.
 - Surrounding scene surfaces.
- **Collection:** Once visualized, collect carefully using forceps, tape lifts, or vacuuming (trained experts only).
- **Trace Evidence:**
 - Small glass fragments, plastic shards, some paint chips may fluoresce.
 - Useful for reconstructing events



ALS APPLICATION: LATENT PRINTS & POST- LUMINOL BLOOD

- **Latent Prints:**
 - ALS enhances prints after chemical treatment
 - *Wavelengths:* UV (for powders), Blue (for DFO/ninhydrin-treated prints).
- **Blood (Post-Luminol/Bluestar):**
 - Luminol/Bluestar is a presumptive test that reacts with blood to produce chemiluminescence
 - *Wavelength:* Between 400 and 500 nm + yellow barrier filter.





EQUIPMENT CONSIDERATIONS

Beyond the Naked Eye

- Light Source Unit
- Fiber Optic Light Guide (optional)
- Barrier Filters:
- Power Source
- Safety Gear
- Cost
- Training & Proficiency

SAFETY CONSIDERATIONS

- Eye Protection
- Skin Protection
- Ventilation
- Electrical Safety
- Scene Security
- Warning Others





ALS SCENE PROCESSING

Non-Contaminating Integration

- ALS Early in Sequence
- Initial Walkthrough (White Light)
- ALS Systematic Sweep:
 - Darken the room.
 - Begin with UV light, then progress through visible wavelengths (violet, blue, green).
 - Use corresponding barrier filters.
 - Thoroughly sweep all relevant surfaces.
 - Examine the body before/during external exam.
- Documentation Immediately
- Collection After ALS

ALS PHOTOGRAPHY

Capturing the Glow

- Requires Specialized Techniques
- Camera Settings:
 - Longer Exposure Times
 - Higher ISO
 - Manual Focus
 - Tripod
 - Barrier Filter for Lens
 - Dark Environment
- "Before & After" Photos
- Scale & Orientation
- No Flash



DOCUMENTATION

- Detailed Notes:
 - Date, time, location
 - ALS wavelength used
 - Barrier filter color
 - Specific area examined
- Description of fluorescence
- Corresponding photo numbers
- Observations under white light vs. ALS
- Sketches & Diagrams:
 - Location & size
 - Symbols or color coding
 - Include measurements and reference points
- Video Documentation (Optional)
- Chain of Custody

LIMITATIONS & CHALLENGES

- Not All Evidence Fluoresces
- Background Fluorescence
- Faint Fluorescence
- Low Contrast vs Lasers
- Training & Experience
- Environmental Factors
- Eye Fatigue
- Non-Confirmatory





CASE STUDY

Case Summary: 4-month-old infant pronounced deceased. Parents claim infant rolled off couch. Initial external exam by responding officers and paramedics shows no obvious trauma.

- ALS Application
- Findings
- Impact on Investigation

Key Takeaway: ALS can reveal critical injuries not apparent to the naked eye.

HYPOTHETICAL

Scenario: You are the lead investigator at a suspicious infant death scene. The child's body is still present on a heavily soiled crib mattress. There is visible red fluid blood around the infant, but also other suspicious staining you can't identify.

Reflection:

- What is your immediate ALS strategy regarding the infant's body and the mattress?
- What other areas of the room would you prioritize for ALS examination?
- How would you ensure you don't contaminate potential evidence while using ALS?

INVESTIGATOR SELF-CARE: THE BURDEN OF DETECTING HIDDEN TRAUMA

- Unseen Trauma Revealed
- Psychological Impact (Intense)
- Cognitive Load
- Emotional Processing
- Mitigation Strategies:
 - Breaks
 - Debriefing
 - Peer Support
 - Clinical Supervision/Therapy
 - Focus on Impact/Prevention



KEY TAKEAWAYS

- ALS Enhances Invisible Evidence
- Wavelength & Filter Match
- Broad Range of Evidence
- Systematic Scene Strategy
- Meticulous Documentation
- Safety First
- Understand Limitations
- Self-Care



RESOURCES FOR FURTHER LEARNING

- **National Institute of Standards and Technology (NIST):**
<https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8515.pdf>
- **Crime Scene Investigator Network (CSIN):**
<https://www.crime-scene-investigator.net/PDF/nij-landscape-study-of-alternate-light-sources.pdf>
- **American Academy of Pediatrics (AAP):**
<https://publications.aap.org/pediatrics/article/128/2/233/30622/Collection-of-Forensic-Evidence-From-Pediatric>
- **Journal of Forensic Nursing (Scafide et. al.):**
<https://pmc.ncbi.nlm.nih.gov/articles/PMC9940828/>



CONTACT US

Phone

651.714.4673x708

Email

tyler@zeroabuseproject.org

Website

<https://zeroabuseproject.org/>