April 12, 2021

Ms. Elizabeth Sawyer and Ms. Sagi

Coconino County Public Defender's Office

Preliminary Report – Forensic Medical Pathology and Forensic Biomechanics

State of Arizona vs. Collin Tarr

i. Introduction

We have been asked to review the evidence by Ms. Elizabeth Sawyer and Ms. Kara Sagi as it relates to the death of Mr. Timothy Larson, and to provide opinions regarding the cause and nature of the trauma which resulted in the fatality of Mr. Timothy Larson on the afternoon of February 9th, 2018. We reserve the right to consider any information that may become available at a later date and if necessary, author an additional supplemental report.

ii. Summary Backgrounds of Drs. Hannon and Iliescu

Dr. Michael Iliescu

My professional background is in forensic pathology and pathology of trauma. My academic experience includes eight years of teaching in the areas of forensic pathology and the pathology of trauma. I have performed more than 2,000 forensic autopsies throughout my eleven-year career in forensic pathology and have testified in criminal cases in County, State and Federal courts in Arizona and Florida. Furthermore, I functioned as a full-time medical examiner in Arizona for approximately 4 years and in Washington State for one year.

Dr. Patrick Hannon

My professional background is in biomechanics, functional anatomy, and the neurosciences. I have been funded by the National Science Foundation as a Project Director as well as a contributing scientist. Additionally, I have been funded by the Air Force Office of Scientific Research and the US Department of Defense. I am a retired professor and Faculty Emeritus at Northern Arizona University, College of Engineering and Natural Sciences, Dept. of Biological Sciences. I held a tenured full time faculty position for twenty-eight years at Northern Arizona

University and I have addressed over 2475 cases involving injury biomechanics, neurosciences and functional anatomy injury issues and have testified nationwide in over 475 civil and criminal cases in county, state, and federal courts over the past thirty-three years. I have completed eight-week faculty fellowships at Wright-Patterson Air Force Base (Ohio) in Biodynamics; Brooks Air Force Base (Texas) in the Neurosciences, and I have accomplished a six-month sabbatical at Thomas Jefferson Medical College (Dept. of Neurology) (Philadelphia) in 1991. I have co-authored the first textbook published in the United States in forensic biomechanics, entitled Forensic Biomechanics, (2006; 2008) with a new edition presently available as of Jan. 2020. Additionally, I serve on the Editorial Board for the Journal of Forensic Biomechanics (sixteen associate editors worldwide) and on the Editorial Board of "Biology, Engineering and Medicine". I am an active reviewer and contributor to both international journals. My CV is provided.

Patrick Hannon: Biomechanics/Functional Anatomy and Neurosciences Analyses

It must be appreciated that the Newtonian physics used in biomechanics is one basis for my opinions which follow. These basic physics principles are the same principles used by the mechanical, materials or structural engineer or the physicist without a biomechanics education. Medical opinion (diagnosis and treatment of specific medical pathology) is not provided by me and is beyond my scope of expertise. However, physical trauma diagnoses (provided by the physicians) are fully understood and enter into my analysis. It is the biomechanist (requiring at a minimum a Master of Science or Master of Arts degree in biomechanics) who is most qualified on the basis of education, training, and experience to render an opinion regarding biomechanics and functional human anatomy. Such an analysis by the biomechanics/functional anatomy expert demands a complete understanding of structural/functional anatomy, injury biomechanics and mechanical properties of biological tissues, (bone, muscle, cartilage, brain, peripheral nerve, etc). Furthermore, the biomechanist is qualified when he or she has applied for and received membership in the American Society of Biomechanics (ASB) which requires submission of authored research papers in the area of biomechanics as well as recommendations from two current ASB members. Neurophysiology is also one of my areas of expertise (non-medical) based upon my education, research publications, and teaching experience.

1.0 List of materials Reviewed.

1. Autopsy report, including toxicology and autopsy photographs
2. Scene photographs
3. Photographs of Collin Tarr taken after the incident
4. Evidence photographs
5. Pitts, initial investigation reports
6. Officer McNerney initial investigation report

7. Medical examiner defense interview
8. Interviews of Mr. Collin Tarr and Mr. Nathan Golden.

2.0 The facts of the case:

Witness Natalie Fredrickson called 911 on 02/09/2018 because she heard screaming coming from a house near her, which was not uncommon in the area. Ms. Fredrickson lived a block away from where the incident was occurring and could view the incident from her porch. Ms. Fredrickson stated she saw a male standing over another male. Ms. Fredrickson also stated that she heard one person banging someone's head on the road, noticing the victim was bleeding from the face. The witness stated she saw a gray truck down the road but was not aware if this truck was part of the altercation or not. When the officers arrived on scene, they saw Timothy Scott Larson, on the ground and Collin Joseph Tarr was in a house nearby. There was a pit bull dog licking blood from Mr. Larson's wounds. After the Victoria Tarr removed the animal from the scene, emergency aid was administered to Mr. Larson. Officer Pitts began performing CPR maneuvers on Mr. Larson and noticed a cracking noise of chest which felt unstable when examining the body. This indicated rib fractures occurring prior to his CPR attempt, possibly from a prior CPR attempt. EMS took over resuscitation efforts which were unsuccessful, and Mr. Larson was pronounced dead at 1728 hrs. When Mr. Tarr came out of the home nearby, the officer stated he was covered in a great amount of what appeared to be blood. The officer could strongly smell alcohol coming from Mr. Tarr. Mr. Larson's brother later reported that he believed Mr. Larson to be intoxicated as well and was up the street near Mr. Tarr's residence. Mr. Larson's brother further reports that Timothy Larson and Collin Tarr were friendly and Mr. Larson commonly spent time in this area.

3.0 Trauma Injuries leading to a Fatality

3.1 Head and Neck Blunt Force Trauma- Based upon the Autopsy Report (4/30/2018)

- Scalp Contusions
    - Left occipital scalp region - ¾ inches with various abrasions as labeled by medical examiner.
    - Central occipital scalp region - 1 ¼ x ¼ with various scattered red abrasions as labeled by medical examiner; separate impact could be result of fall backward (terminal fall).
    - Central to right occipital scalp region - 3 x 2 ¾ inch area of red contusion with overlying red abrasions as labeled by medical examiner.
    - Parietal occipital scalp region - 2 ½ x 1 ½ inch area of scattered punctate red abrasions as labeled by medical examiner.

- Galeal (subscalpular) hemorrhages:
  - Right forehead extending into right temporal region– 4x2 inches
  - Left frontotemporal parietal region, diffuse
  - Right occipital region, 3 inches
- Left parietal/temporal scalp contusion– 1 x 1 1/8-inch contusion.
- Many scalp shaving/abrasions artifacts.
- Very faint contusion close to vertex of the head.
  - 2 ½ x 1 ½ inch

- Large complex, 3-inch laceration of the right supraorbital margin (eyebrow). This injury, in association with the mid-upper facial trauma represents the major blunt force trauma causing the death of Mr. Larson. The right supraorbital laceration shows scant abraded area at the lateral corner of the right orbital skin. There are no other abrasions around this injury, which is consistent with a single, high energy impact with a blunt object causing the laceration. The following injuries are associated with this mid-upper facial trauma.
  - Periorbital hematoma bilaterally (faint skin tears, left inferior eyelid), as a result of bilateral fractures of the orbit mentioned below.
  - Comminuted fractures of the right supraorbital ridge, including right supraorbital process of the frontal bone, superior and medial aspect of both orbital bones, lateral aspect of the right orbital bone, ethmoid bone, both sphenoid bones, and petrous bone portion of right temporal bone. This is consistent with a (right) unilateral Le Fort IV fracture pattern. This resulted in the collapse of the bones of both orbits and the base of the skull. The fracture lines extend into anterior fossa bilaterally, and crosses into both mid-fossae at the base of the skull. The right petrous bone (portion of right temporal bone) is also fractured. The brain contusions associated with this injury are listed below.
  - From the lips to the top of the forehead and from the left to right side of the face, there is a large 12x9 inch confluent contusion, as labeled by the medical examiner.
  - Palpable comminuted fractures of the facial bones which include: the maxillary bones (consistent with Le Fort I fracture pattern); the nasal bones, the right zygomatic bone, (consistent with Le Fort II and III fracture pattern).
    - Collapsed right hemi-face.
    - Caved in mid-upper facial bone structures, with misshapen face appearance.
  - Subarachnoid and subdural hematoma (predominantly over the right hemisphere).
  - Brain contusions and small lacerations of the inferior portion of both frontal lobes, in the mid-line.
  - Fragments of brain extruding from the right supraorbital laceration are retrieved from within the hair follicles.

- 2 scattered abrasions of the forehead in the midline measuring up to 1/8 inch each (mid-line to left. I cannot exclude shaving artifacts due to the fact that they show no hemorrhage).
    - Left lateral forehead abrasion by the hairline insertion, measuring 1 x $^{5}/_{16}$ inches.
    - Grazing type of abrasion of the tip of the nose, measuring 2 ¼ x ¾ inch
- Laceration of buccal mucosa (upper and lower) almost in the same sagittal plane as forehead laceration.
- Tongue contusion. Biting of tongue can be result of the direct impact to the midfacial structures or could be caused by seizures.
    - 1 inch surface contusion with underlying intramuscular contusion measuring up to 2.5 inches.
- Right side of the face contusion (jaw).
    - 3 ¼ x 1 inch area of purple contusion with an overlying ¼ inch area of punctate red abrasions.
- Iliescu Comment: [There is hyoid bone fracture. I cannot rule out iatrogenic injury from tracheostomy procedure as a cause to this injury (Gregersen and Vesterby, 1981)]
    - [Note: There is a 1-inch tracheotomy incision.]

3.2 Blunt Force Trauma of the Torso

- Anterior fractures of left ribs 2-10, anterior axillary line fractures of left ribs 4-7 at the sternal junction and anterior axillary line fractures of right ribs 2-7. There is a fracture of the sternum at intercostal space 3.
    - Iliescu Comment: During his attempted CPR, Officer Pitts noticed a cracking noise of chest which felt unstable.
- 2 abrasions to the upper left aspect of the back (1/6 inch and 1/8 inch).

3.3 Blunt Force Trauma of Extremities

- Lateral aspect the upper right arm is a $1/16$ inch red abrasion and a $1/32$ inch red abrasion.
- Front of the right forearm is a $1/16$ inch healing red abrasion.
- Palm of the right hand is a $1/16$ inch linear healing brown abrasion.
- Semi-lunar abrasion below right knee – 1.5 x 3/8 inches.
- Left knee scattered linear healing, yellow brown abrasions ranging in length from 1 /16 to 3/4 inches.
- Right shin - ¼ inch healing brown abrasion.
- Left shin shows scattered healed brown abrasions measuring up to ¼ inch.

3.4 Review of injuries sustained by Collin Tarr

- We have reviewed Mr. Tarr's photographs taken by law enforcement at the Flagstaff Medical Center Hospital later the night of February 9, 2018. See Appendix II. On the hands and elbows, there are small scrapes, dry knuckle bleeds and some small abrasions that are not full thickness skin abrasions (i.e., not completely through the two layers of the dermis skin under the epidermis tissue layers); although blood is present. The photographs of Mr. Tarr's hands, elbows and knees do not show evidence of recent injuries that should be attributed to a significant physical assault and the skin abrasions that are present are certainly not consistent with the force required to fracture the adult maxilla or to produce the depressed fracture of the supraorbital portion of the right side frontal bone of an adult male. Photos taken of Mr. Collin Tarr on February 12th provide strong evidence of only minimal abrasions and little if any bruising of elbow regions (See Appendix III.
- We have not reviewed any post arrest medical records of Mr. Collin Tarr at present.

3.5 Figure 1 through Figure 3 below depicts the head-face injuries of Mr. Timothy Larson.

The dotted line in figure 3 depicts the approximate area of impact to Mr. Larson's face. Again, standard radiographs taken before the autopsy examination would improve this evaluation but are not available.

Figure 1. Mid-upper face trauma sustained by Mr. Larson.

Figure 2. Severe comminuted fractures of Mr. Larson's base of the skull (anterior extending into the middle fossa) as a result of high energy, high momentum impact to his mid-upper face.

Figure 3. The dotted line white rectangle depicts the approximate broad area of impact of the mid-upper face.

4.0 Biomechanics:

4.1 Cranium bones have relatively thick layers of compact bone on the inside and outside surfaces (i.e., tables). Impact(s) to the face or skull may result in a single linear crack, a stellar pattern fracture, or depressed skull-face fractures that result in variable inward displacement. One key variable is the area of impact. Experimental procedures have manipulated the impact cross section area upon cadaver skulls with a striking implement impact in order to examine the differences between focal point and broad-based loading in terms of depressed skull fractures. One should note that simple linear fractures of skull bones occur at much lower force and compressive stress levels. However, Mr. Larson's skull fracture was a significant large, depressed skull fracture at the right side supraorbital frontal bone site with implosive bone fragments projected into the frontal lobe cerebral cortex and extrusion of brain matter.

4.2 Allsop, Perl and Warner (1991) applied one of two impactors to skulls of cadaver specimens. In this research effort, intact cranium parietal bones of cadaver specimens were impacted with a small flat circular disk (1.0-inch diameter) or a flat rectangular 5 cm by 10 metal plate. The greater the compressive stress (compressive stress = compressive force ÷ area), the greater the compressive strain (deeper depression fracture into the skull). Allsop et al. (1991) found that the parietal skull bone exhibited a depressed skull fracture depth of 0.6 cm with the small circular impactor at an average of 10,000 Newtons (2,248 lbs.). The rectangular plate impactor only resulted in an approximate 0.45 cm depressed parietal skull fracture at 16,000 Newtons (3,597 lbs.). The square centimeter area of Mr. Larson's face was impacted by an impactor closer on the continuum to the 50 cm^2 rectangular metal impactor based upon the autopsy findings. Certainly, because of the orientation of Mr. Larson's face at impact, the compressive stress level was higher at the right supraorbital portion of the frontal bone as compared to lower face or left side face structures. It should be noted that the human skull frontal bone has a significantly higher tolerance limit to fracture compared to the parietal bone of the skull although not quantified for human depressed skull fractures in the present scientific literature.

4.3 Forces applied to facial bones may transmit force inward to the brain. Such transmission requires a good bone conduit for energy wave propagation. An example of this mechanism is when a basal skull fracture (e.g., sphenoid bone) is fractured due to facial impacts and may result in brain damage due to significant bone fracture displacement (Hannon, 2020). "Because the skull [calvarium] fails in tension before compression, fracturing the inner table [i.e., the inner layer of the calvarium compact bone] is always more serious than that of the outer table. In-driven bone fragments can then perforate or lacerate the dura mater or brain and cause local brain damage. This cortical injury is associated with a serious risk of infection and seizure" (Torg, 1991, p.235). Therefore, it should also be appreciated that any time there is a direct displacement of skull bone fragments as in a skull penetration impact, bone fragments are retroposed into the brain and significant brain damage occurs. In a sense, these fragments enter like shrapnel into the cranium, destroying brain tissue and brain vasculature with additional complications such as bleeds and brain tissue edema following (Hannon, 2020). This describes Mr. Larson's trauma to the right side supraorbital frontal bone and the highly comminuted fracture of the anterior and middle fossae

4.4 Facial fractures do occur in boxing and mixed martial arts, usually limited to the bifurcated nasal bone (about a 200 lbs. tolerance limit). Such matches have resulted in fractures of the zygoma and also the mandible. However, the frontal bone of the upper face is much stronger and more resistant to even simple linear fracture failures. Furthermore, the perpetrator's metacarpals, proximal phalanges, and metacarpophalangeal joints of the hand during bare fist strikes would fail long before a depressed or even a linear fracture occurs to the human frontal bone of someone receiving the blow. Such hand fractures in bare knuckle fist fights are not

uncommon and attest to the biomechanical strength and stiffness of the human head (fist to the frontal or parietal bones of the skull). Boxers who tape their hands before fights and wear padded boxing gloves will also suffer broken metacarpal bones and fractured metacarpophalangeal (MCP) joints; albeit much less commonly compared to bare knuckle fights.

4.5 Penzkofer et al. (2014) investigated kicks to the head delivered by young and older members of the German police tactical units or the regular German police. Shoe wear was also an independent variable with test subjects wearing: 1) light weight sneakers or 2) hard combat boots (repeated measures cross over research design). Even the younger group of police (mean age 28.2 years old) were not able to deliver horizontal kicks or vertical kicks [stomps] wearing hard combat boots to a full body-head WorldSID triaxial accelerometer instrumented human crash dummy head that approached the level of force and/or compressive stress required to result in a significant depressed skull fracture of the frontal bone. The force of kicks and vertical stomps recorded by Penzkofer et al. (2014) certainly could produce a serious brain injury but much below that required for a depressed skull fracture of the human parietal and certainly the frontal bone of an adult human. Additional details of head impact trauma may be found in Torg, (1991) and Hannon, chapter 9, (2020).

5.0 Interpretation of the Injury Trauma Injuries

5.1 Two scenarios are addressed in this present report. The first is an assault with and without an impact weapon. The second scenario is a motor vehicle strike to Mr. Timothy Larson while he was sitting on the packed cinder road or he was lying in the road in a somewhat dorsal recumbent body position with his head somewhat higher than his chest. The motor vehicle scenario involves an acceleration of a vehicle over approximately 43 feet. At a forward vehicle acceleration level of 0.2 gs, a velocity of 16 mph is achievable. This would be a normal vehicle acceleration. At the high end for a vehicle including recent model full size pickup trucks, an acceleration could be achieved of 0.35 gs (consultation with Mr. Timothy Pebler of HBA) on a packed cinder road (pavement accelerations would be higher) and would have resulted in a vehicle speed of 21.2 mph at impact.

5.2 The leading cause of death was the injury to the right forehead which resulted in a frontal bone depressed fracture, a subdural and subarachnoid hemorrhage and brain contusions. The area of impact involves the right supraorbital region of the frontal bone where a large complex, 3-inch laceration and depressed skull fracture exposing the brain was present. The extensive skull fracture line originating from this impact point at the right supraorbital portion of the frontal bone into the anterior and middle fossae of the skull indicates that this trauma was the result a high energy stiff object impact principally applied to the right-side frontal bone but also significantly involving the mid- face and the left side face and to a lesser extent, the lower face.

This is described by Dr. Czarnecki as a Le Fort I facial fracture. Le Fort fractures are among the most severe facial fractures. Progressively severe categories of Le Fort fractures from I to IV, with III and IV being the most severe due to significant brain injury or death. Even under the former standard classification of Le Fort fractures I through III, one can see that respectfully, the Le Fort I description does not appropriately describe the facial fracture pattern of deceased Timothy Larson. See Figure 4. The best description is actually a right side unilateral Le Fort IV which involves the right side supraorbital frontal bone. The Le Fort IV fracture pattern is described in detail by Manson et al., (1987). Additionally, some authors will term a Le Fort III facial fracture a type IV Le Fort if the base of the skull is also fractured with or without frontal bone involvement.

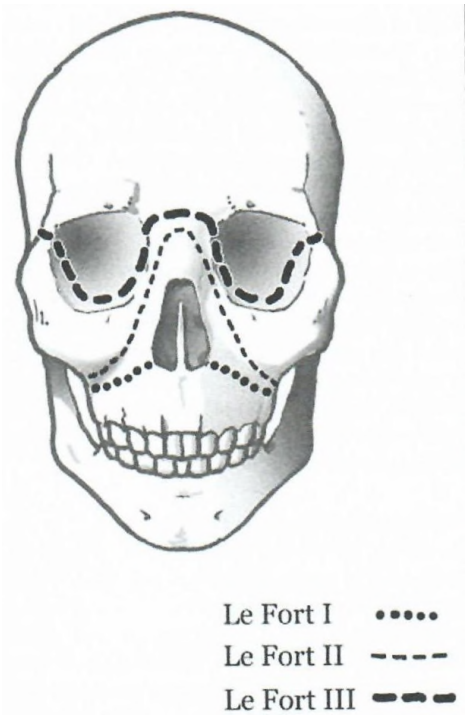


Figure 4. Depicting Le Fort Fractures I through III. From Hannon, Ch. 9, 2020, p.138.

5.3 The area of impact is quite broad as described by Dr. Czarnecki and as indicated in Figures 1-3. In addition to the large bony defect of the right frontal bone, the mid-face has a caved in appearance involving the nasal bones and the anterior and middle cranial fossae of the base of the skull. The maxilla (bilateral sides are reported as fractured and the right side zygoma has fracture failed. These figures indicate the approximate broad-based nature of the blunt force blow to Mr. Larson's face. Clearly, the greatest force was applied to the supraorbital portion of the right-side frontal bone with decreased force levels applied at lower portions of Mr. Larson's

face. However, the comminuted fracture of the base of the brain as indicated in the previous figure photograph in this report is also an indication of a high energy, high momentum force applied to the skull.

5.4 Multiple impacts to the face and head might be considered to fit best with a physical fight. Dr. Czarnecki in his interview indicates a sum total of five blows to the head. However, our opinion is that there is only one principal impact responsible for the following: the right-side frontal bone, right side zygoma bone, the nasal bone (and underlying bone structures), both right and left sides of the maxilla and both right and left sides of the internal anterior and middle fossae (i.e., basal skull fractures). This is consistent with a motor vehicle strike at a speed exceeding 15 mph. These bony regions all line up with one single impact as indicated in our figure photo; albeit with variable force levels applied to each region due to orientation of the head and face during this motor vehicle strike.

5.5 Furthermore, in a motor vehicle strike, the principal impact to the face of someone sitting in the road for example would slam the head backwards to the ground accounting for occipital and/or parietal scalp contusions. Other impacts could be the result of vehicle undercarriage contacts to the head/face and/or due to the body and head rolling over on the road during an accident event. Some bruises on the face (e.g., over the right-side mandible could be old bruises). Aging of a contusion can only be determined by microscopy which was not performed by the medical examiner in this case. Finally, medical procedures during attempted resuscitation applied to Mr. Larson's head-face may account for some facial bruising. We do not have enough information at present to assess these probabilities.

Moreover, banging someone's head on the cinder road several times during a fight would produce a much more variable impact pattern on the face. Each repetition push or slam of the head-face against the road would be somewhat different and therefore create its own pattern and constellation of injuries upon the soft tissues of the face. See Appendix I of a gravel road pattern applied to the face of the deceased (figure B) most probably the result of a single ground impact.

5.6 Bilateral costae (ribs) are fractured in Mr. Larson's thorax and exhibit an extensive widespread fracture pattern with the left side indicating anterior axillary line fractures in ribs 2-10. Additionally, on the left side chest, two separate fractures are described in each of the ribs 4-7 with one fracture site being described as an anterior axillary line fracture and the second fracture-failure point described as being at the sternal junction. These are major crush injuries and indicate significant loading possibly in concert with being against the ground during the force (load) application. This is termed a lateral clamp mechanism whereby the thorax is clamped between the load application and a stiff surface. Right side anterior axillary line rib fractures are also indicated in ribs 2-7 and there was a fracture of the sternum at the third intercostal space as indicated by Dr. Czarnecki. The extent of these fractures (displaced vs. non-displaced) is unknown at present. However, at the incident scene, Officer Pitts noticed cracking

noise of chest which felt unstable when examining the body which would indicate displaced rib fractures. Standard radiographs would have clarified this issue.

5.7 These fractures of the ribs could have been produced by a vehicle direct strike, a wheel-tire rollover or undercarriage impacts. Many times, with clothing on the torso, a rollover will not leave tire witness marks on the skin but will produce significant compression loading.

5.8 Alternatively, it may be possible, although not probable in my view (Patrick Hannon) to produce widespread fractures during CPR attempts when someone is untrained and most probably alcohol intoxicated. Professional EMTs and paramedics do break ribs of patients but not with the widespread pattern in Mr. Larson as described by Dr. Czarnecki.

5.9 The pattern and extent of the rib fractures are not consistent with a physical altercation. Kicks or stomps to the thorax of Mr. Larson would most probably leave witness marks and still fall short of the force levels required to produce multiple bilateral rib fractures, especially the left sided thorax rib fracture pattern. Additionally, one might have expected a ruptured spleen with horizontal kicks. The spleen was unremarkable at autopsy.

Furthermore, it is our understanding at present that there is no substantive evidence which supports the use of a weapon such as a baseball bat, tire buddy or crow bar being used by anyone. Such a weapon would leave witness marks under light clothing and heavy clothing would decrease the force application. Finally, rib fractures do occur in mixed martial arts and in boxing competition. However, even in these high-level athletes who punch and/or kick very hard, we do not see the widespread pattern of bilateral rib fractures that we see in Mr. Larson's thorax.

5.10 Regarding rib fractures and thoracic trauma, no explanation is perfect in this matter. There is simply not enough information. However, given the information that we do have, the fit is much better for a motor vehicle accident. It should be noted that such a collision would be heard and felt by the driver occupant of the striking vehicle and therefore this accident should be regarded as a "hit and run" event.

5.11 Regarding the hyoid bone fracture, this may be the result of iatrogenic injury resulting from the endotracheal intubation which has been documented to cause laryngeal and/or hyoid bone injuries (Ong et al., 2015). There are no reported abrasions or contusion marks on Mr. Larson's neck**.** As reported in the medical literature, hyoid bone fractures may be associated with head and neck trauma during road traffic accidents which is more likely the case in the event of February 9, 2018.

6.0 Conclusions:

6.1 There are numerous problems with a physical fight or assault scenario in regard to the injury pattern and in regard to the severity of injury/death of Mr. Larson on February 9, 2018. This analysis includes a fight with or without a hand-held implement weapon as described in the narrative of this present report.

6.2 Collin Tarr's body does not indicate recent injury (most importantly to his hands, elbows or knees) consistent with a fight or assault based upon the photographs on February 9, 2018 and again the photographs of February 12, 2018. DOI Medical Reports of Mr. Collin Tarr have not been reviewed at present. Photographs of Collin Tarr are included in this present report with comments in Appendices II and III.

6.3 It is our understanding that DNA analysis of some of the blood on Mr. Tarr's clothing and his body was that of Mr. Timothy Larson. This opens the possibility that Mr. Tarr who was most probably alcohol intoxicated at the time was attempting to help Timothy Larson after the motor vehicle accident the afternoon of February 9. Such interaction with Mr. Larson would have resulted in Collin Tarr being covered with Mr. Larson's blood.

6.4 Many times we will see defensive wounds on the upper and lower extremities of an assault victim regardless of their position (standing or lying on the ground/pavement). Defensive wounds are not visible in the autopsy photographs or reported by Dr. Czarnecki and this is inconsistent with a fight/assault regardless of Mr. Larson's level of alcohol intoxication (BAC ranging from 0.176 to 0.187 at autopsy).

6.5 The most probable scenario in regard to Mr. Larson's death is that this was a hit and run motor vehicle accident which occurred at the approximate location of where Mr. Larson was found. Mr. Larson was most probably sitting in the road or in a dorsal recumbent position when he was struck by a vehicle. The perpetrator left the scene.

The opinions in this case are held to a reasonable degree of scientific, biomechanical/functional anatomy certainty and are based upon my education, training, and experience in forensic medicine, forensic biomechanics, functional anatomy and the neurosciences including my university teaching and research experience over 35 years. I confirm that I am not aware of any adverse finding, or any pending investigation, by a court of law or professional or regulating body regarding my professional competence or credibility as a witness.

Dr. Patrick Hannon PC M.A., Ed. D.

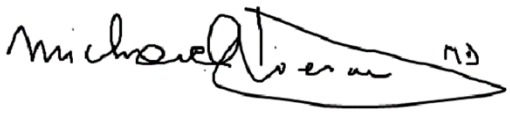
Principal, Hannon Biomechanics Analysis

Emeritus Faculty-Northern Arizona University-Dept. of Biological Sciences

The opinions in this case are held to a reasonable degree of scientific and medical certainty and are based upon my education, training, and experience in forensic medicine. I confirm that I am not aware of any adverse finding, or any pending investigation, by a court of law or professional or regulating body regarding my professional competence or credibility as a witness.

Dr. Michael Iliescu, MD

Principal, Autopsy and Forensic Services, Inc.



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Appendix I Examples of Assault Trauma to the Head/Face

Blunt Force Trauma

FIGURE X-67. Injuries sustained in a fist fight, recessed as well as protuberant areas are injured. The clusters of abrasions above the medial left eyebrow, the tip of the nose and the lower lip resulted from a fall onto a gravelly road.

Figure A. From a fist fight and a later fall to a gravel road. Spitz and Fisher's Medicolegal Investigation of Death-4th ed.2006. A fist fight followed by a same level fall to a stiff surface may result in death. However, look closely at the trauma pattern of the face which does not approximate the facial trauma of Timothy Larson.

FIGURE X-40a. Patterned abrasions from impact on gravel. Note the irregular outline of each of the injuries and their superficiality. Protuberance of the lower jaw protects the neck.

Figure B. Impacted left side face against gravel or cinders. Repeated slamming the front of the face as in a physical assault could result in a fractured nasal bone but would likely result in a similar pattern upon large portions of the front of the face. Spitz and Fisher's Medicolegal Investigation of Death-4th ed.2006.

Figure C. - Hammer impacts/laceration to the face. Spitz and Fisher's Medicolegal Investigation of Death-4th ed.2006.

FIGURE X-44. Crescent-shaped lacerations from impacts with the round end of a hammer. Note that injuries of the eye, nose and chin are also hammer blows but appear different. In identifying the weapon, it is necessary to recognize patterns and realize that different areas of the body react differently to trauma. Areas with underlying bone, folds and recessed areas will distort the pattern.

FIGURE X-45a–b. (a) Semicircular tears of the scalp due to blows with the round end of a claw hammer. (b) The victim's hair is on the hammer. Completion of the circle of the scalp wounds indicates the diameter of the round end of the hammer, thus its weight.

Figure D. Hammer lacerations, tears to the skull calvarium. Spitz and Fisher's Medicolegal Investigation of Death-4th ed.2006.

FIGURE X-46. Numerous lacerations on the back of the head, when considered in conjunction with the elongated bruises on the back, suggest that a pipe was used. The diameter may be represented in the bruise at the bottom of the picture which shows the imprint of the end of the pipe.

FIGURE X-47. Multiple injuries caused by a hexagonal side of a hammer. The hexagonal shape is shown in abrasion indicated with the *arrow*. The central lacerations of the two adjacent wounds are splits. The large curvy linear split in the center back shows the abraded rectangular impact at its lower end. Many of the remaining injuries, although complex, do show the typical abrasions of the weapon contact.

FIGURE X-48. Injuries caused by both sides of a claw hammer. Note the overlapping of the injuries produced with the claw end. The use of a magnifying glass when viewing the original pictures showed the weave pattern of the clothes the victim was wearing when he was struck in all of the injuries.

Figure E. - Additional Hammer impacts to the Head and a Pipe Impact. Spitz and Fisher's Medicolegal Investigation of Death-4th ed.2006.

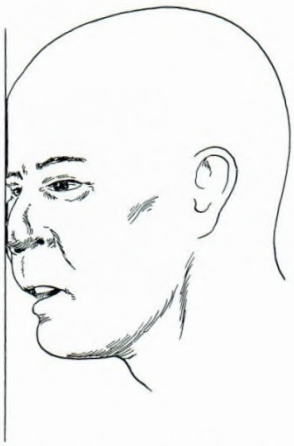

FIGURE X-53. Diagram showing protuberant parts of the face in contact with a flat surface. These are the areas often injured in a fall. Note, the nose is pushed to the left.

FIGURE X-54. Shot in the back of the head, protuberant parts of the central portion of the face making contact with the flat surface of the pavement. These areas are often injured in an unmitigated fall.

FIGURE X-55. A full face forward fall, striking the forehead, the bridge and the tip of the nose. The forehead is lacerated at the midline, which is the most protuberant part in that position. The skin is scraped in the middle of the forehead and the injury extends above the right eyebrow. The tip of the nose gave way on impact, permitting the bridge of the nose to make contact.

Fig. F. Same level (approximate) face falls to pavement. Spitz and Fisher's Medicolegal Investigation of Death-4th ed.2006.

FIGURE X-62. Irregular and ragged lacerations of the scalp caused by pistol-whipping. The triangular-shaped wound (arrow) was caused by a pointed corner of the weapon, which produced the center of the wound; the three radiating tears were caused by splitting of the skin. The four parallel horizontal injuries were likely produced by the blunt edge of the pistol handle. The underlying skull was fractured.

Fig. G. Pistol whipping is a general term referring to any weapon held in the hand when delivering impacts. Spitz and Fisher's Medicolegal Investigation of Death-4th ed.2006.

FIGURE X-65. Pistol whipping. Different areas of the weapon cause injuries of different shapes.

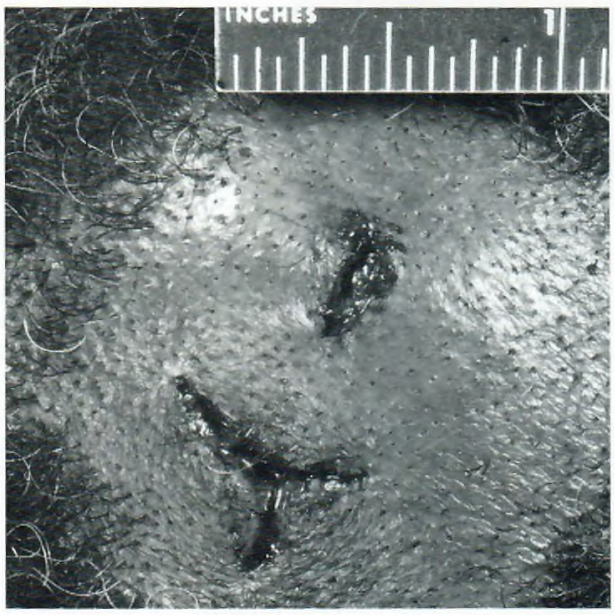

FIGURE X-66. Pistol whipping. The lower triangular laceration shows no abrasion suggesting that a corner impacted. The upper injury shows a semicircular abrasion on the right edge.

Fig. H. - Again, Pistol whipping witness marks in both photos. Spitz and Fisher's Medicolegal Investigation of Death-4th ed.2006.

FIGURE X-72. Night watchman stuck with a crowbar during a robbery. Note the linear shape of the injuries and the V-shaped extensions from each end. These extension tears result from bursting or splitting of the skin due to crushing between the weapon and the bone in the central segment of the wound.

FIGURE X-73. Struck by unidentified weapon. Several of the lacerations have straight abraded edges. The width of the abraded skin, after the wound edges are approximated, represents the approximate dimension of the weapon in the area of contact. The well demarcated bruise in the nape of the neck also shows the width of the weapon.

FIGURE X-74. The abraded margins of two parallel scalp wounds are easily visible. Re-approximation of the wound edges indicates the area of contact with the weapon.

Figure I. The top photo involved impacts to the skull calvarium with a crowbar. The weapons used in the bottom photos are unknown. Spitz and Fisher's Medicolegal Investigation of Death- 4th ed.2006.

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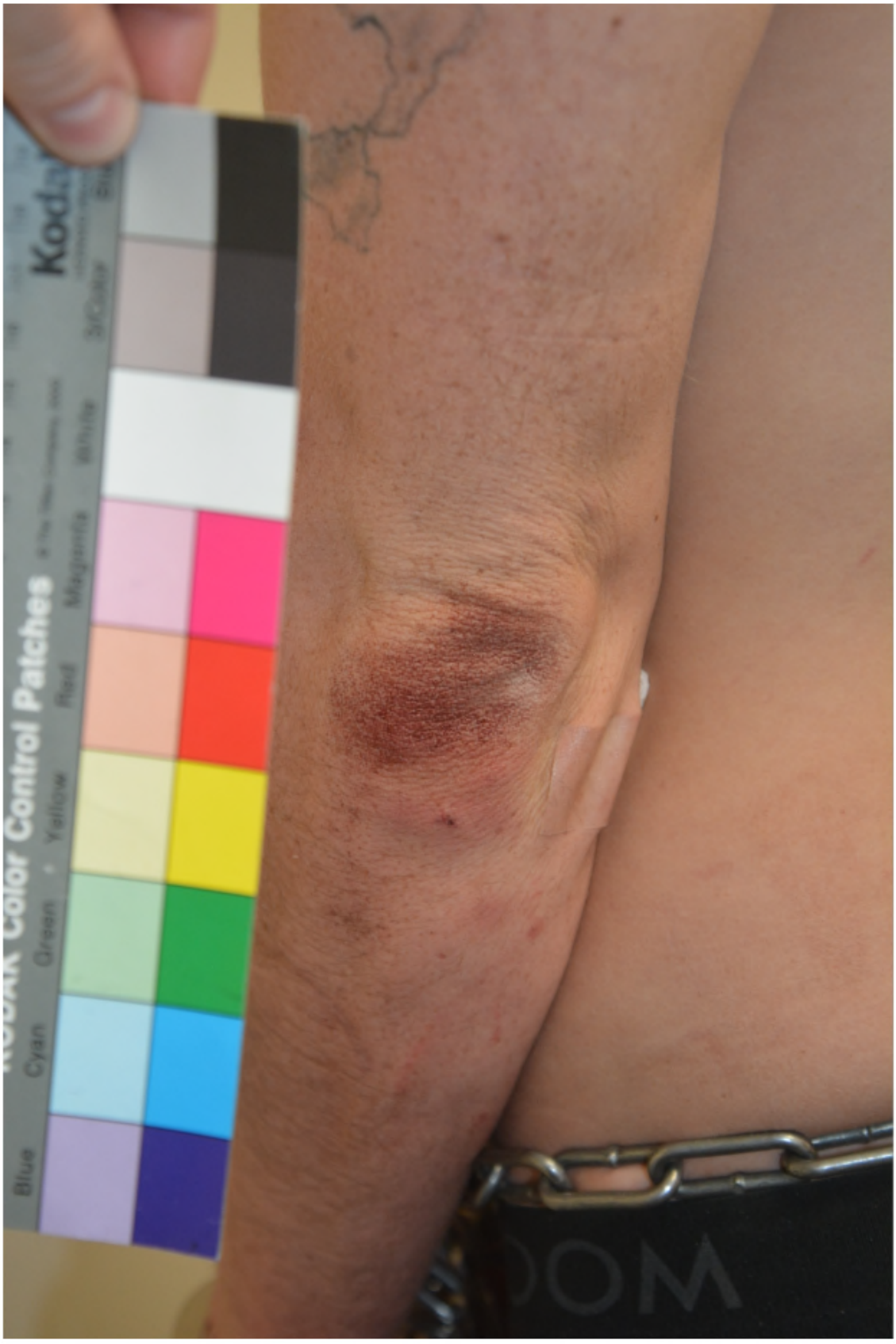
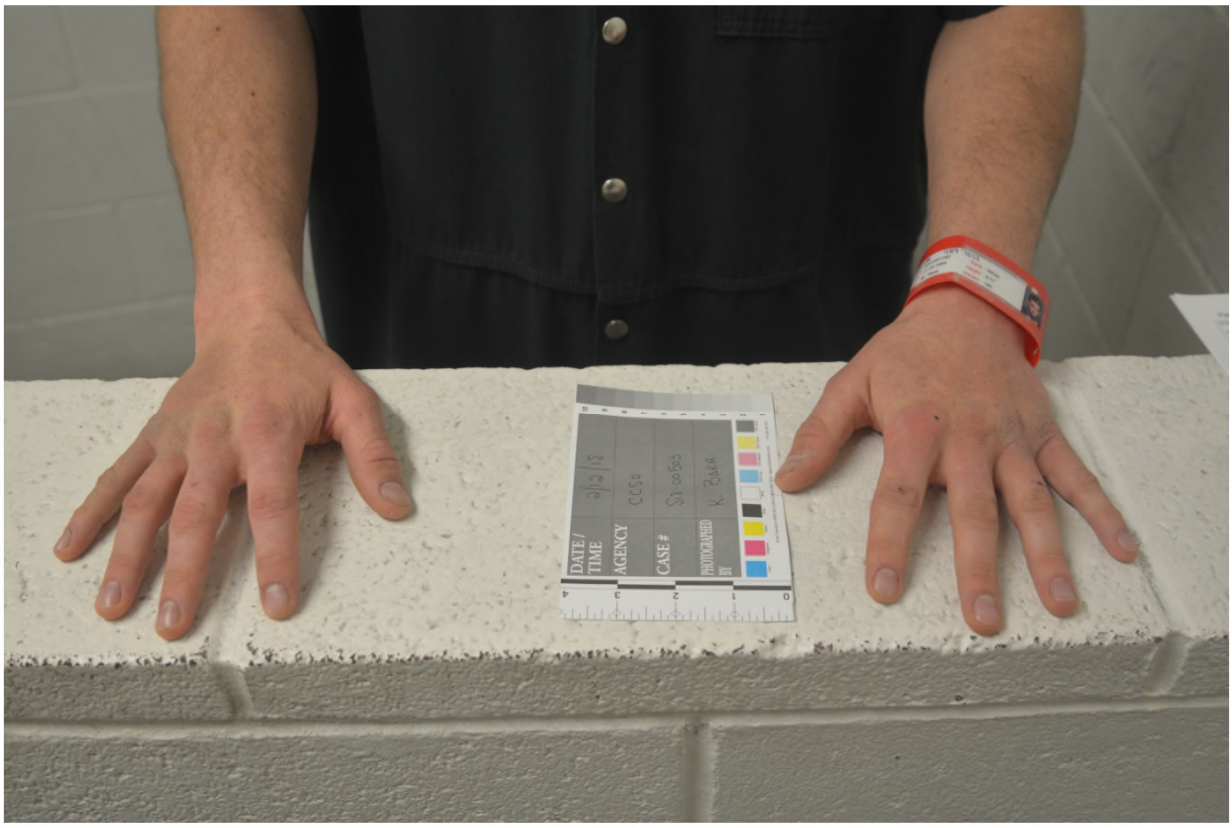
Figure 6.2 Circular fracture of cranial vault from fall onto top of head.

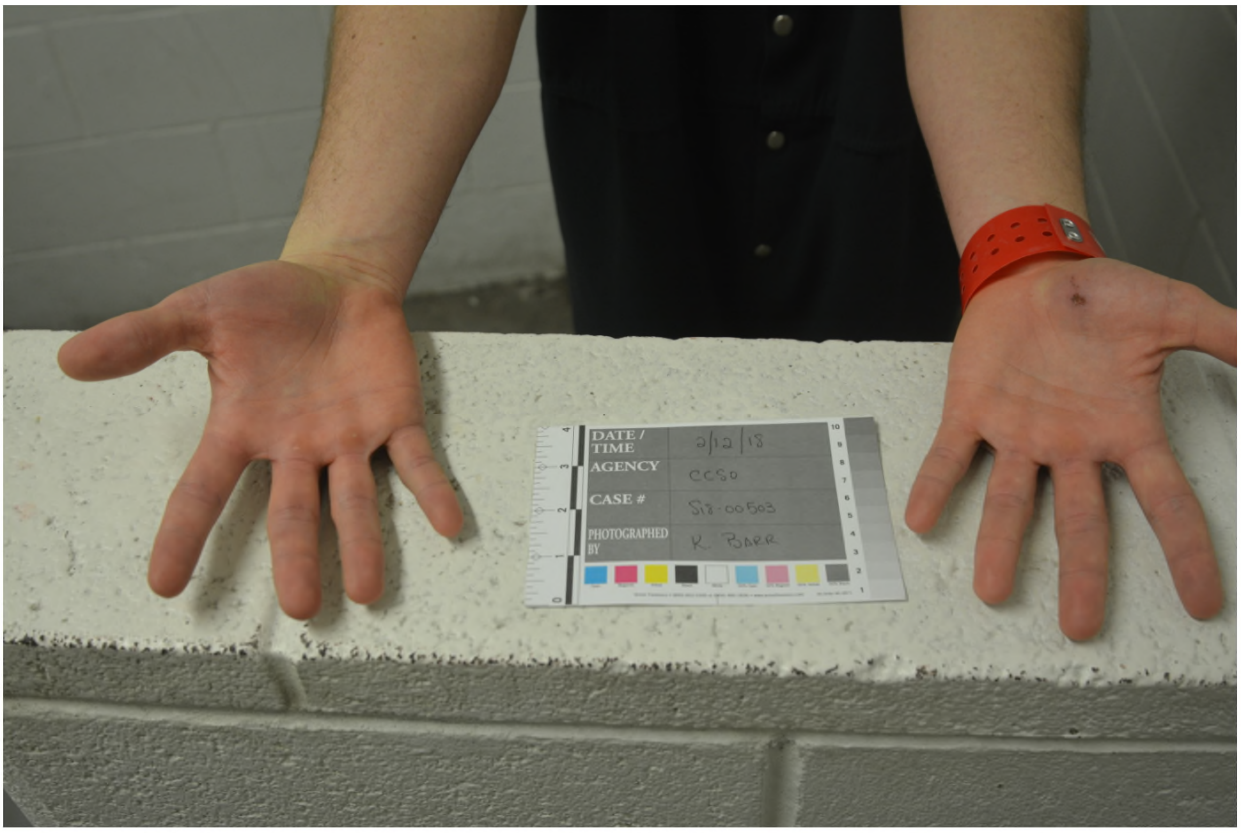
Fig. J. A fall from considerable height to the top of the head. This clearly is a high energy, high momentum impact which has resulted in a stellate and depressed skull fracture with exudation of brain and blood vessel tissue. (DiMaio, V and DiMaio, D. (2001) Forensic Pathology, 2nd ed. CRC Press. Boca Raton Fl.

Appendix II- Photos of Collin Tarr at DOI on February 9th, 2018.


Color Control Patches
Blue
Cyan
Green
Yellow
Red
Magenta
White

Appendix III- Photos of Collin Tarr on February 12th , 2018. Hands and elbows are now clean. Note that skin bruising resulting from contusions should be more evident on this date some three days after the Collin Tarr's arrest. These are not the hands of someone involved in a bare knuckle fight some three days previous to these photographs.




DATE / TIME
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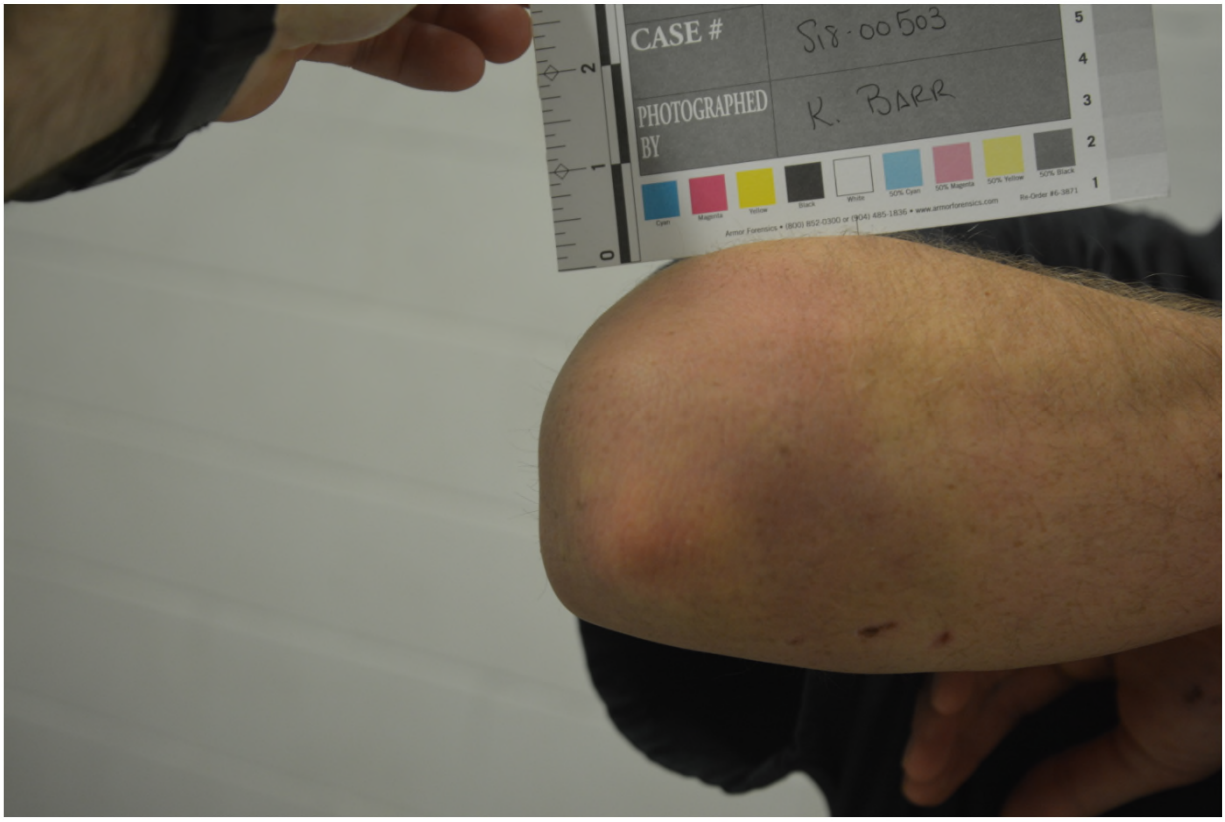
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