Scientific Working Group on Digital Evidence

Best Practices for Photographic Documentation of Scars, Marks, and Tattoos

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1. Purpose

This document is intended to increase the quality and consistency of photographs captured of scars, marks, and tattoos in order to optimize all end-use cases, including manual comparisons and image database searches. It provides photography guidelines to better allow organizations to develop training programs and in-practice protocols. This document is not intended to address all potential conditions, nor does it supersede requirements of accrediting or certifying bodies.

2. Scope

This document outlines best practices for photographing scars, marks, and tattoos on living or deceased persons to achieve high-quality images and optimize image database searches and manual comparisons. This document cannot replace knowledge, skills, or abilities acquired through education, training, and experience, and is to be used in conjunction with professional judgment by individuals with such discipline-specific knowledge, skills, and abilities.

This document does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.

3. Universal Precautions for Health and Safety

Universal precautions is an approach to infection control in which all human blood and certain human body fluids are treated as if they are known to be infectious.

- Use appropriate personal protective equipment such as gloves, masks, and gowns to prevent coming into contact with blood and other bodily fluids.
- UV eye protection and protective clothing that covers skin should be worn when using UV light sources.

4. Suggested Equipment

- Digital Single Lens Reflex (DSLR) Camera or Mirrorless Interchangeable Lens Camera (MILC)
- Lenses
  - Wide Angle
  - Normal
  - Macro
  - Or a zoom lens capable of wide-angle to normal and macro
- Lens Filters
  - Circular Polarizer

  - Ultraviolet
  - Infrared
- Lens cloth
- Storage media cards
- Batteries
- Light Sources
  - External flash unit
  - Ring flash
  - Infrared (IR) emitting (~750nm)
  - Ultraviolet (UV) emitting (between 300nm and 365nm)
- Flash diffuser
- Off-camera flash sync cord, or wireless trigger
- Polarizing filters/gels for light sources
- Various Forensic scales that have been previously checked against a known standard for accuracy (e.g. L-shaped, and straight edged, ABFO no.2); a scale that utilizes millimeters is recommended.
- Tripod or stabilizing device
- Cloths / towels / drapes
- Step stool/ ladder
- Neutral background material
- Color reference target for setting white balance

5. Camera Settings

1. Select an image format that allows for the highest resolution and least compression available, (i.e. Uncompressed RAW, TIFF, or highest quality JPEG available).
2. Use Manual exposure mode.
3. Camera settings such as focal length, aperture, and subject-to-camera distance should be considered to minimize distortion and control depth of field.
4. Use of an external flash in through-the-lens (TTL) mode is recommended. Alternatively, a ring flash should also be considered for even lighting, especially when photographing with a macro lens.
   a. When using a flash, ensure the shutter speed is synced with the flash.
5. If not using a tripod or stabilizing device, use a shutter speed that minimizes image blur caused by camera movement (1/focal length or faster).
6. Set the White Balance to match the predominant light source or use custom White Balance.
7. Use an ISO setting that minimizes artifacts from noise.

6. Considerations

1. Follow agency guidelines on the inclusion of case identifying information and camera settings and equipment used in the photographs or bench notes.
2. The camera lens should be perpendicular to the area of interest being photographed.
3. The focus mode of the camera should be single point focusing, so that the focal point is a deliberate choice and placed on the area of interest. This is especially important in close-up photography, where the depth of field is limited.
4. If using an external flash, consider using it off-camera to direct the flash by hand at an angle to reduce glare or hotspots, control shadows, and accentuate texture as needed.
    a. Avoid lighting with harsh shadows. A diffuser in front of the light may aid in reducing shadows.
5. The subject's dignity should be a consideration. If the subject will be disrobed or photographs are to be captured of areas of interest that would require exposing sensitive areas, they should be draped professionally or the identity of the subject at this stage should be shrouded.
6. An orientation photograph should be captured of the area of interest in reference to a physical structure or "landmark" on the body to establish its location. It should be captured with as wide a view as practical without showing any distracting elements in the background. If distracting elements cannot be avoided, consider placing a white sheet or other neutral background behind the subject. An additional close-up photograph should be captured filling the frame with the area of interest.
7. If the area of interest is large in size and its location is apparent in a close-up photograph, an orientation photograph may be unnecessary.
8. If the size of an area of interest is relevant and a scale is to be used, capture an orientation photograph, a close-up photograph without the scale, and an additional close-up photograph with the scale.
    a. Place the scale on the same plane as the area of interest and photograph the scale and feature as perpendicularly as possible to obtain the most accurate image for any future measurements.
    b. If the area of interest is on a contoured surface, reposition the scale and re-photograph as necessary along the contour. Maximizing depth of field should be a primary consideration as well.
    c. For close-up photographs, the scale should be placed on the edge of the photograph and not fill any more of the frame than is necessary.
    d. The scale should be oriented along the long edge of the photograph whenever possible.

7. Scars

Scars refer to dysmorphic or discolored areas or both of skin where permanent damage has healed [1].

When capturing close-up photographs of scars and enhancing texture is beneficial, using an off-camera flash at an oblique angle to the scar is recommended.

The use of Reflective Ultraviolet imaging may enhance detail not apparent in the visible spectrum. (See section 10.2)

8. Marks

Marks are portions of the skin that contain a different level of pigment than the rest of the surrounding skin [1]. These could be birthmarks, moles, freckles, piercings, etc. Marks could also refer to external injuries of the body (e.g. bruises, lacerations, abrasions, etc.)

- Any suspected pattern injury or possible "tool mark" on the body should be photographed with an ABFO no.2, or other L-shaped scale.
- Due to the highly varied nature of marks, various photographic and lighting techniques should be considered.
    - The first approach should be to avoid lighting with harsh shadows, introducing a diffuser if necessary.
    - If the texture of the mark is an important component, consider using an off-camera flash at an oblique angle to accentuate it.
    - If the mark is hard to discern or somehow obscured, consider the use of any or all of the specialized techniques in section 10 to enhance detail not apparent in the visible spectrum.

9. Tattoos

Tattoos are a form of body modification made by ink, dyes, or pigments placed either temporarily onto the skin, or permanently into the dermis layer of the skin to form a design.

- When capturing photographs of tattoos, avoid lighting with harsh shadows. If necessary, consider the use of a diffuser.
- If the tattoo is faded or hard to discern, consider using polarization to increase the saturation and contrast of the image, as well as decrease light reflection off the skin. (See Section 10.3)
- If the tattoo is obscured by darker skin tones, mummification, decomposition, or other factors, consider using Near Infrared photography to enhance detail not apparent in the visible spectrum (See Section 10.1)

- The same tattoo photographed using different wavelengths of lights (i.e. visible, NIR, UV) can appear drastically different, which may affect the results of an image database search.

10. Special Techniques

10.1 Near Infrared (NIR)

This technique requires a camera that is sensitive to IR energy in conjunction with an IR-emitting light source to enhance detail in the area of interest not apparent in the visible spectrum. This technique works especially well to capture details below the skin such as bruises, bite marks, and scarring.

1. Capture an initial photograph of the area using normal lighting.
2. Mount the camera on a tripod or other sturdy device and compose the photograph of the area to be documented.
3. Use a light source with significant output in the IR spectrum; examples include external flash unit, tungsten or halogen bulbs
4. Check focus and adjust as needed. A camera with live view will aid in checking focus, as IR filters block visible light.
5. Use a filter designed to transmit IR radiation while blocking visible light.
6. Capture an initial test exposure.
7. Evaluate the results, adjust the settings, and rephotograph as necessary.
8. Cameras produce a false color image when taking IR photographs. Further processing or conversion to black and white often produces better results. Additionally, consider capturing the image using a RAW file format, which provides greater dynamic range.

10.2 Reflective Ultraviolet (UV)

This technique requires a camera that is sensitive to long-wave UV energy in conjunction with a long-wave UV light source. This technique works especially well to capture details on the surface of the skin such as scarring and bite marks.

1. Capture an initial photograph of the area using normal lighting.
2. Mount the camera on a tripod or other sturdy mount and compose the photograph of the area to be documented.
3. All non-UV light sources should be turned off or blocked out for best results.
4. Use a light source with significant output in the long-wave UV spectrum. Efforts should be made to minimize long-term exposure to skin and eyes as UV exposure can be detrimental.
5. Use a filter designed to transmit UV radiation while blocking visible light (~350nm).
6. Check focus and adjust as needed. A camera with live view will aid in checking focus because UV filters block visible light.

7. Capture an initial test exposure.
8. Evaluate the results, adjust the settings, and rephotograph as necessary.
9. Cameras produce a false color image when taking UV photographs. Further processing or conversion to black and white often produces better results. Additionally, consider capturing the image using a Camera RAW file format, which provides greater dynamic range.

10.3 Polarization

This technique may eliminate glare and increase the saturation and contrast in an image.

1. Polarizing the light will affect the amount of light reaching the sensor; therefore, mounting the camera on a tripod or other sturdy mount to compose the photograph of the area to be documented may be considered.
2. Use a circular polarizing filter on the camera lens.
3. While looking through the lens or using live view, rotate the filter on the lens to observe the change in polarization until the desired result is achieved.
4. Consider using polarizing filters or gels on the light source(s) in conjunction with the polarizing filter on the camera lens for cross-polarization.
5. Evaluate the results, adjust the settings, and rephotograph as necessary.

11. References

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13. History

Revision	Issue Date	History
1.0 DRAFT	1/8/2024	Initial draft created and moved forward for SWGDE vote to release it as a Draft for Public Comment.
1.0 DRAFT	3/11/2024	SWGDE voted to release as a Draft for Public Comment; formatted for release for public comment.
1.0 DRAFT	5/16/2024	No public comments received. Moved forward for SWGDE membership vote to release as a Final Approved Document.
1.0	7/31/2024	SWGDE voted to approve as Final Approved Document. Formatted for release as a Final Approved Document.