



Pathology Biology Section – 2010

G111 Digital UV/IR Photography for Tattoo Evaluation in Mummified Remains

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After attending this presentation, attendees will recognize an additional value of UV/IR imaging in the evaluation of mummified remains.

This presentation will impact the forensic community by providing an additional tool for postmortem identification.

The presence and location of tattoos can be an important component in the identification of remains in the extended postmortem period when remnants of skin persist. However, when there is significant mummification, elucidation of tattoos can be technically difficult due to skin discoloration and dehydration. Many methods have been proposed to increase the visibility of tattoos in the extended postmortem interval, including rehydration, hydrogen peroxide, and exposing subdural tissue. All have some, but limited applicability.

The use of ultraviolet and infrared photography has been of significant interest in forensic science in general and of cyclical published interest in forensic pathology and odontology. A large number of articles were published in the 1990s investigating the use of so-called "alternate light" methods, including narrow band illumination, fluorescence, and UV/IR photography for the evaluation of bite marks and trauma. There has been limited publication in the use of such methods for tattoo evaluation in the extended postmortem interval. One study found utility in evaluating fluorescence of ink using narrow band illumination. This study noted that infrared photographic evaluation, while slightly more useful than hydrogen peroxide, has traditionally been of limited utility because it "required photographic skills and was difficult and time consuming." Others have noted that the use of ultraviolet photography was difficult because it is impossible to see what is being photographed. With the use of film photography, the opportunity for quick feedback and fine-tuning of photographic parameters was not available. The photographs were, literally, taken blind.

In recent years, relatively inexpensive cameras sensitive to infrared and ultraviolet light have been marketed for forensic use. Many low-cost consumer digital cameras are sensitive to the infrared or ultraviolet spectrum, and incorporate blocking filters for standard use. An aftermarket has developed to market these cameras with the filters removed. The availability of these relatively inexpensive cameras has spawned an active hobby market in artistic infrared and ultraviolet photography.

In this report, a commercial forensic camera sensitive in the UV/IR range was used to visualize a tattoo that was not perceptible in the visible spectrum.

The nude body of an adult female was found prone unburied in the woods. A missing person's report had been filed in a nearby city approximately two months earlier and police investigators suspected these were the missing person's remains. At autopsy, the body was largely skeletonized, with mummification of the skin of the back and upper extremities. Anthropological evaluation was consistent with the age, sex, and race of the missing person. Dental evaluation was consistent with the missing person, but was limited to do postmortem loss of teeth, which defied efforts at recovery. By history, the decedent was known to have a small tattoo of a heart on the back of her left hand, though the exact location was uncertain.

Examination of the left hand revealed marked mummification, but the skin of the dorsal surface of the hand was intact. Visual examination of the hand did not reveal any evidence of a tattoo. Attempts to increase visualization by rehydration and washing were unsuccessful. Hydrogen peroxide was not applied.

Under both UV and IR photography, a small heart-shaped tattoo was noted between the metacarpals of the thumb and index finger. The detail of the tattoo was visually similar in both spectra, though the UV provided a more subjectively "realistic" appearance of the texture of the skin.

This case demonstrates that at least with some inks, tattoos are clearly discernible using UV and IR photography. The almost immediate feedback provided by digital photography allowed evaluation of each image as taken to provide the optimum exposure.

The development of relatively inexpensive commercial digital UV/IR cameras allows the immediate evaluation and optimization of UV/IR photographs of postmortem tattoos. This, in turn, may make a previously rather esoteric method practical.

Ultraviolet, Infrared, Tattoo