## F36 Lens Correction, White Balance, and Other Photographic Prerequisites to Bitemark Interpretation

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After attending this presentation, attendees will be briefed on new scientific evidence regarding the requirement for lens correction caused by optical aberrations of a particular lens and the necessity for "white balance" and methods used to accomplish the tasks as well issues surrounding different file formats.

The theme of this year's Annual Meeting is *Global Research: The Forensic Science Edge*. This presentation will impact the forensic science community by providing forensic odontologists with the leading edge of knowledge on the subject of bitemark evidence.

Bitemark analysis is by far the most complex and difficult subject matter in forensic dentistry.[1] Following bitemark recognition, the analysis involves a series of noninvasive procedures that includes photography regardless of whether the bitemark recipient is alive or deceased. The conclusions are, at times, solely based on this analysis. It is therefore paramount to understand the factors that influence photographic evidence and which may ultimately contribute to erroneous conclusions.

A search of the Journal of Forensic Sciences between 1972-2010 reveals not a single article dealing with the issue of lens correction or "white balance" in forensic photography.

Lens aberrations are deviations from a norm of an optical system that leads to image blurring. Even if the image is sharp, it may be distorted. Ideally, the magnification of an object is inversely proportional to its distance to the camera. Distortion can result from non-uniform stretching of an image. The most prominent form of distortion is referred to as "barrel distortion" where the center of the image is magnified more than the perimeter.

"White balance" in a photo reflects the lighting condition under which it was taken. It is influenced by daylight, cloudiness, shading, tungsten, fluorescent and flash conditions, and so on.

This presentation will focus, in part, on methods of correcting lens distortion and "white balance" using Adobe® Photoshop® CS5 Extended.

RAW file format is a class of formats and each manufacturer creates its own version of a RAW file format for each camera model. This data block contains unprocessed pixel readings from the camera metadata and sensor chip. The standard for RAW image format is ISO 12234-2, TIFF/EP. Adobe's Digital Negative (DNG) specification is an attempt to standardize a RAW image format for cameras.

File compression is the process of reducing the size of a file to facilitate storage and transfer. The resulting file may retain all of the data or there may be data loss. Compression algorithms that retain all of the original data are referred to as "lossless" compression, and those with a loss of data as "lossy." When using the former, the compressed file uses fewer bits to represent the information. The original data when re-opened is reconstructed despite a compression ratio of approximately 2:1. Digital files such as ZIP and LZW (Lempel-Ziv-Welch) are examples of lossless compression files. There are various types of compression encoding including Quantization, Run-length and Lexicographic.

This presentation will concentrate, in part, in comparing various file formats and its influence on photographic quality and ultimately on bitemark interpretation.

**Reference:**

[1.] Dorion RBJ, editor. Bitemark Evidence. 2nd edition, Boca Raton, FL., CRC Press, 2011.

**Bitemark, Lens Correction, White Balance**

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