

# Medico-legal perspectives on the use of alternative light sources in blunt-force trauma: a systematic review

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The ability to detect and enhance markers of blunt-force trauma may yield valuable clues into the mechanisms of injury and provide novel evidence in medico-legal investigations. The use of alternative light sources (ALS) for bruise analysis has been studied for over a decade, yet results are conflicting and as of current, inconclusive. A systematic review of the literature was conducted according to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) and studies were evaluated using a novel framework referred to as SPICOT, developed by the Swedish National Board of Forensic Medicine to systematically assess both scientific evidence and risk of bias in forensic literature. From an initial 164 records, 15 studies met the eligibility criteria and were selected for this review. Evidence suggests that the use of ALS to detect non-visible bruising in trauma victims is mixed, and caution is therefore advised due to the significant risk of generating false-positive results that cannot be confirmed. The use of topical cosmetic products, previous wounds/scar-tissue as well as tattoos, moles and freckles may result in false-positive detection. Nevertheless, the application of ALS with specific wavelengths between 415 nm and 450 nm in conjunction with yellow detection filters holds promise for enhancing the visibility of identified bruises, potentially improving the quality of evidence in criminal investigations.