# Forensics in dermatology: Part II

Kalpana Reddy, MD,[a] and Eve J. Lowenstein, MD, PhD[a,b,c]
*Brooklyn, Oceanside, and Long Beach, New York*

## CME INSTRUCTIONS

The following is a journal-based CME activity presented by the American Academy of Dermatology and is made up of four phases:
1. Reading of the CME Information (delineated below)
2. Reading of the Source Article
3. Achievement of a 70% or higher on the online Case-based Post Test
4. Completion of the Journal CME Evaluation

**CME INFORMATION AND DISCLOSURES**

**Statement of Need:**
The American Academy of Dermatology bases its CME activities on the Academy's core curriculum, identified professional practice gaps, the educational needs which underlie these gaps, and emerging clinical research findings. Learners should reflect upon clinical and scientific information presented in the article and determine the need for further study.

**Target Audience:**
Dermatologists and others involved in the delivery of dermatologic care.

**Accreditation**
The American Academy of Dermatology is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

**AMA PRA Credit Designation**
The American Academy of Dermatology designates this journal-based CME activity for a maximum of 1 *AMA PRA Category 1 Credits*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

**AAD Recognized Credit**
This journal-based CME activity is recognized by the American Academy of Dermatology for 1 AAD Recognized Category 1 CME Credits and may be used toward the American Academy of Dermatology's Continuing Medical Education Award.

**Disclaimer:**
The American Academy of Dermatology is not responsible for statements made by the author(s). Statements or opinions expressed in this activity reflect the views of the author(s) and do not reflect the official policy of the American Academy of Dermatology. The information provided in this CME activity is for continuing education purposes only and is not meant to substitute for the independent medical judgment of a healthcare provider relative to the diagnostic, management and treatment options of a specific patient's medical condition.

**Disclosures**

**Editors**
The editors involved with this CME activity and all content validation/peer reviewers of this journal-based CME activity have reported no relevant financial relationships with commercial interest(s).

**Authors**
The authors of this journal-based CME activity have reported no relevant financial relationships with commercial interest(s).

**Planners**
The planners involved with this journal-based CME activity have reported no relevant financial relationships with commercial interest(s). The editorial and education staff involved with this journal-based CME activity have reported no relevant financial relationships with commercial interest(s).

**Resolution of Conflicts of Interest**
In accordance with the ACCME Standards for Commercial Support of CME, the American Academy of Dermatology has implemented mechanisms, prior to the planning and implementation of this Journal-based CME activity, to identify and mitigate conflicts of interest for all individuals in a position to control the content of this Journal-based CME activity.

**Learning Objectives**
After completing this learning activity, participants should be able to offer an understanding of the scope of the dermatologic aspects of forensic science, describe the dermatologic signs suggestive of assault, murder, torture, abuse, neglect, poisoning, self-inflicted injury, and bioterrorism, and describe findings in hair and nails of value in a forensic investigation.

**Date of release:** May 2011
**Expiration date:** May 2012


doi:10.1016/j.jaad.2010.06.066

The evaluation of skin findings is critical in identifying many types of injury, whether self- inflicted or accidentally or intentionally inflicted. Specific causes of injury include homicide, abuse, neglect, assault, self-inflicted injury, suicide, torture, poisoning, and bioterrorism. Forensic findings in hair and nails are also discussed. This overview of dermatologic findings in forensic pathology highlights the significance of the cutaneous manifestations of injury. (J Am Acad Dermatol 2011;64:811-24.)

***Key words:*** abuse; assault; bioterrorism; forensic medicine; homicide; injury; neglect; poisoning; suicide; torture.

## PATTERNS OF INJURY

### Key points

- **Gunshot wounds may be classified as contact wounds of close, medium, indeterminate, or distant ranges or as graze wounds**
- **Bite marks, which frequently occur during sexual attacks, are typically circular with central bruising within each tooth mark**
- **The pattern of injury of burns can aid in differentiating abuse from an accidental burn**
- **Populations at increased risk for abuse include children, the mentally impaired, women, and the elderly**
- **Reporting of the suspicion of abuse is mandated in all 50 states**
- **Because perpetrators of torture often use methods with minimal or no scarring, victims of torture may lack physical evidence**
- **Physicians should consider mimickers of abuse and self-injury in the differential diagnosis of suspicious wounds**
- **The classic features of asphyxia are facial congestion, edema, cyanosis, and periorbital or conjunctival petechiae**

### CAPSULE SUMMARY

- The evaluation of skin findings is critical in identifying many types of injury, whether self- inflicted or accidentally or intentionally inflicted.
- Specific causes of injury can be deduced from skin findings, including homicide, abuse, neglect, assault, self-inflicted injury, suicide, torture, poisoning, and bioterrorism.
- Forensic findings in hair and nails can often be detected.
- Cutaneous manifestations of injury can be significant.
- Injury patterns differ based upon different sources of trauma, including extrinsic kinetic (gunshot, burns, and electrocution), environmental (hypothermia, hyperthermia, drowning, and lightning), or vehicular injury.
- Patterns of injury can be telling with regard to the cause and circumstances of injury.

Injuries may be classified by the different patterns of skin findings they produce. Bullets cause damage by the transfer of their kinetic energy into crush injury of impacted tissue. When a gun is fired, a unique pattern of marks is imprinted on the bullet, analogous to a fingerprint. To prevent the loss of evidence, precautions should be taken when recovering bullets, such as the use of gloves and covering surgical instruments with gauze before manipulating the bullet. A gunshot residue test detects invisible residues that may be present on a victim or perpetrator who has fired a weapon. Washing the skin with alcohol or povidone-iodine (betadine), applying tape on the skin, rubbing the hands on clothing, or putting plastic bags over the hands and creating a moist environment can all decrease the sensitivity of this time sensitive test. A bullet wound is affected by the bullet size, shape, configuration, and velocity, and by the intrinsic properties of the affected tissue.[1] Entrance wounds are classically round with a margin of abrasion, or abrasion collar, caused by friction as the bullet penetrates the skin[2] (Fig 1). Entrance wounds are classified according to the range at which the gun was fired: as contact wounds, near-contact or close range, intermediate or medium range, indeterminate or distant range, and graze wounds.[1] Contact and close range wounds can be subclassified as either tight or loose contact wounds, depending on whether the barrel of the gun was applied to skin with pressure.[1] A tight contact wound may appear as a small hole surrounded by seared black edges. Alternatively, if gases expand beneath the skin, a large stellate defect results. The skin around the defect may be erythematous because of the presence of carbon monoxide gas discharged from the gun.[2] Upon expansion, the skin may press against the muzzle, resulting in a muzzle contusion, which can aid in determination of the type of weapon (Fig 2). The presence of soot and powder at the wound site helps differentiate close-range and contact wounds from exit wounds.[1] An elongated pattern of soot can be seen in cases of tangential, loose, or near contact wounds. Soot may be occasionally seen on exit wounds if they are close enough to the entrance site to have allowed for passage of soot through the wound itself.[1]

A medium or intermediate-range gunshot wound presents with stippling, or punctate abrasions, as a consequence of contact with gunpowder that has been partly burned or remains unburned (Fig 3). The

From The State University of New York Health Science Center at Brooklyn,[a] Brookdale University Hospital Medical Center,[b] Brooklyn, and South Nassau Dermatology PC,[c] Oceanside and Long Beach, New York.

Funding sources: None.

Reprint requests: Eve J. Lowenstein, MD, PhD, Chief of Dermatology, Brookdale University Hospital Medical Center, 1 Brookdale Plaza, Room 222A, Brooklyn, NY 11212. E-mail: evlow13@yahoo.com.

0190-9622/$36.00