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## The Uses of Light in Criminal Investigation

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استخدامات الضوء في التحقيقات الجنائية

Rapid and perfect finding of trace evidences at the crime scene is of utmost importance in criminal investigation. Many body fluids are fluorescent in their nature and can be discovered using light with different wave lengths suitable for each type of fluid which will reflect light to disclose its location. The intensity of light and degree of visibility of the fluid stain depend on different factors such as the type of the fluid and the nature of the surface on which it has been deposited.

There are different types of light source that are used in crime scene investigation and the selection depends on the nature and state of the crime scene, the circumstances and the environmental condition at the time of evidence collection.

According to their wave lengths, these lights are classified into the following categories: Green, Blue, UV and White light.

They are used under the following circumstances:

- 1- Discovering and visualizing blood stains using UV light: The advantages of using light include the following:
  - Minimizing the risk of collecting other stains or un-

wanted stains by mistake.

- Discovering blood stains on dark, red or violet color surfaces.
  - Discover blood stains that are covered with paints.
- 2- Discovering and visualizing other body fluid stains (such as semen, saliva, urine, vaginal fluid and sweat): These stains can be discovered using a UV Lamp which locates the site and place of the stain but without discrimination between different types of fluid which ultimately lead to the examiner or the forensic chemist to do further investigation to discover the type of fluid to which the stain belongs. This can be accomplished by using Alternative Light Source Kit (ALS Kit).
  - 3- Visualizing latent fingerprints: Using fluorescent powder and spraying it on suspected locations, latent fingerprints will be seen after using UV light on smooth or rough surfaces. But they will be difficult to visualize when the surface is dark in color.
  - 4- Detecting fire: Fire investigations are conducted to disclose the criminal setting of the fire or deliberate burning and in Arson investigation. This is a simple



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and economical method for the detection of different ignitable liquids or fire accelerants. Using ALS may also lead to the location where the fire was started first. It will also reveal the pour pattern of the accelerant not only at the crime scene but also on the skin and clothes which will give fluorescence under UV light.

- 5- Discovering illegal dumping of hydrocarbon materials in soil or water using UV as a light source and different stains or radiofluorescent materials.
- 6- Revealing invisible ink by using UV which will disclose various information such as names, phone numbers, location of stolen items, regardless of the nature of the surfaces they were written upon, e.g. glass, plastic, wood or paper surfaces or on clothes.
- 7- Detecting narcotics: This can be done using UV to detect different narcotics and ecstasy drugs such as amphetamines and cocaine. All these drugs will fluoresce after application of UV light even if they were in small quantities.
- 8- Detecting hair and fibers: This can be accomplished by two different methods:
  - Application of white or usual light to the surface in parallel or tilted direction.
  - Application of UV or blue light.Hair and fibers will fluoresce which will make them easy to locate and collect.
- 9- Visualizing bite marks, bruises, pattern wounds and shoe prints which all might not be seen in ordinary light. Alternative light sources help to visualize injuries and bruises which are not visible on the skin under the ordinary light sources.
- 10- Detecting gunshot residue (GSR) or explosive resi-

due through detection of fire residue like tattoo, carbon or soot blackening on the victim's clothes. Consequently, the direction of the shot and the entrance wound will be known and discriminated from the exit wound. It will also help to identify the perpetrator through the detection of the same fire residue on his hand and clothings.

- 11- Detecting skeletal remains and the age of old bones by examining the cross section of one of the long bones and observing the fluorescence which will start to decrease gradually in a circular manner starting from the outer circumference to disappear completely after about 100 to 150 years.

In short, ALS provides an efficient means of locating various types of physical evidence items and body fluid stains at the crime scene or in the forensic laboratory.

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