

# *Understanding Death and the Death Investigation System*

Death is referred to as “the permanent cessation of all vital functions; the end of life”<sup>1</sup> and while most of us probably know that we felt it necessary to start off with a simple definition. Most of the time the end of life comes after many years of living when someone dies of natural causes. Well over 90% of all deaths are what we call a “natural” death. Sometimes it is just old age but many others succumb to things like cancer, brain hemorrhages, or some other physiological or disease process. It is interesting to note that only about 1% of all deaths are homicides, 2–3% are suicides, and the rest are either accidental or equivocal where we do not know what happened. Therefore, the object of this chapter will be to build the foundation or knowledge base which the death investigator will utilize in analyzing and interpreting facts and circumstances to determine what we call the manner of death (homicide, suicide, accident, natural or undetermined), who did it, when, how, and why.

## ► Cause and Manner of Death

It is important to understand the difference between cause of death and manner of death. Cause of death is the medical reason for the death; e.g. gunshot wound to the chest, stab wound to the abdomen, blunt force trauma to the head, etc. This is determined by the coroner and/or medical examiner (ME) serving in specific jurisdictions. This person is also legally responsible for making the final manner of death determination of either homicide, suicide, accident, natural or undetermined. It was mentioned previously that the death investigator is charged with “analyzing and interpreting facts and circumstances to determine what we call the manner of death.” However, the actual label placed on the death certificate is the responsibility of the coroner or medical examiner. The death investigator provides the critical information necessary for an accurate determination in conjunction with either a medical evaluation and/or autopsy of the

deceased. It is extremely important that the police and the coroner/ME work together as a team.

While the cause of death can be almost anything, the manner of death focuses on the five possibilities mentioned previously. The manner of death determination should be based on the totality of the circumstances and not a guess based on limited information. Homicide is basically defined as one taking the life of another without any consideration for which statute may have been violated (i.e. first degree murder versus manslaughter or negligent homicide). Suicide is one taking the life of oneself or as Freud would call it, “selbstmord” or self-murder. Accidental deaths are exactly that—an accident in which a set of circumstances occurred that lead to a death. In some jurisdictions charges may still be filed as in motor vehicle accidents (MVA) but the death certificate will still read accident MVA. The degree of fault or negligence is not something the coroner/ME are concerned with. Natural deaths have already been explained and absent any evidence to the contrary these types of deaths will be labeled natural. The last category is “undetermined” and these can be undetermined cause and/or undetermined manner of death. In these cases, the coroner/ME does not have sufficient information to accurately label the death.

## Legal Definitions

As previously stated, if the manner of death is determined to be homicide, then that is the label placed on the death certificate and basically means one taking the life of another. But when one is arrested by law enforcement and subsequently charged for a statute violation the label is different and more comprehensive in considering the circumstances involved. These labels can vary from jurisdiction to jurisdiction but the elements of proof are all very similar. They may include labels such as, homicide, criminal homicide, negligent homicide, reckless homicide, vehicular homicide, felony DUI, murder, felony murder, first degree murder, second degree murder, voluntary or involuntary manslaughter, and justifiable homicide.

For the purposes of this text we will describe the most common according to Black’s Law Dictionary<sup>2</sup>. Murder is defined as “the killing of a human being with malice aforethought.” A person is guilty of murder if he or she: (1) caused the victim’s death or serious bodily injury that then resulted in the victim’s death, and (2) did so purposely or knowingly. In order for a defendant to be found guilty of murder, the State is required to prove these elements beyond a reasonable doubt: (1) that the defendant caused the victims death or serious bodily injury that then resulted in the death, and (2) that the defendant did so purposely or knowingly. A person acts purposely when it is that person’s conscious objective to cause death or the serious bodily injury that results in death. A person acts knowingly when that person is aware of the likelihood that his conduct will cause death or serious bodily injury resulting in death.<sup>3</sup>

- First-degree murder—murder that is willful, deliberate, or premeditated; or that is committed during the course of another dangerous felony.
- Second-degree murder—murder that is not aggravated by any of the circumstances of first-degree murder.
- Felony murder—murder that occurs during the commission of a dangerous felony (often limited to rape, kidnapping, robbery, burglary and arson).
- Voluntary manslaughter—an act of murder may be reduced to manslaughter because of extenuating circumstances such as adequate provocation (arousing the heat of passion) or diminished capacity.
- Involuntary manslaughter—homicide in which there is no intention to kill or do grievous bodily harm, but that is committed with criminal negligence or during the commission of a crime not included within the felony murder rule.
- Negligent homicide—homicide resulting from the careless performance of a legal or illegal act in which the danger of death is apparent.
- Justifiable homicide—the killing of another in self-defense when faced with the danger of death or serious bodily injury.

### ► Coroner and Medical Examiner

While these terms may be familiar to some, there are those who may not fully comprehend the differences. The medico-legal death investigation system in the United States legally defines death investigation and death certification responsibility as being within the jurisdiction of a coroner, medical examiner or combination of the two. The statutes usually state that the coroner or medical examiner has investigative responsibility over all violent, unattended, unexpected or questionable deaths that occur within their jurisdiction.

The coroner is usually elected, is a political entity and may or may not be a medical doctor. The medical examiner, or ME, on the other hand, is normally appointed and is a medical doctor. The ME is usually a pathologist, specially trained and board certified in forensic pathology. In many jurisdictions the coroner utilizes the expertise of a pathologist or forensic pathologist to medically evaluate the body of the deceased and for the purpose of conducting an autopsy. In some jurisdictions these pathologists are not board certified in forensic pathology but may have some forensic experience. Both systems have their own unique problems, and issues may arise in either one that could adversely affect the outcome of a death investigation. Remember, the coroner and medical examiner have complete authority and jurisdiction over the body—it is *their* crime scene. Therefore, complete cooperation and collaboration

between them and the law enforcement death investigator is paramount for a successful investigation.

## ► Forensic Autopsy

An autopsy is defined as “an examination of a body after death to determine the cause of death or the character and extent of changes produced by disease”.<sup>4</sup> The practice of forensic pathology as applied in the forensic autopsy is defined as “a branch of medicine that applies the principles and knowledge of the medical sciences to problems in the field of law”.<sup>5</sup> It is a sub-specialty of pathology that goes beyond the basic education and training of the average pathologist, who is primarily clinical. To be more specific, the forensic autopsy usually includes the following determinations<sup>6</sup>:

1. Identity of the deceased
2. Time of injury or time of onset of illness
3. The causative agent or object
4. The dynamics of the injury-direction, position, magnitude
5. Other contributing causes
6. Duration and quality of survival after injury or illness
7. Time of death
8. Cause of death
9. Manner of death

In order to accomplish this task, the forensic pathologist needs to be able to evaluate the entire situation including observations at the scene, statements from witnesses, historical information about all participants, and the evidence collected. In order to ensure a successful outcome, all agencies involved must work together cooperatively.

## ► Identification of the Deceased

Accurate identification of the deceased is imperative. Knowing the identity of the victim is critical in determining what happened to him, why, and who did it. There are five basic ways to identify the victim at autopsy. These are: (1) latent fingerprints, (2) dental records, (3) DNA, (4) surgical procedures, such as implants, scars, marks, tattoos, and (5) personal documents or personal recognition.

Fingerprints are the best method we have to identify a person, because there are no two fingerprints alike in the world. However, in order to make identification through latent prints, the victim's prints must have been ob-

tained while the victim was still alive and a record of them must exist. Then post mortem prints (those taken during autopsy) may be compared to those earlier prints. Automated systems like AFIS are extremely helpful but the person must already be in the system while living for this to be effective. Another method utilizing prints can be found in **Case Study 1-1**.

Dental records are the second best method. Although humans tend to have the same number and type of teeth, through use they tend to become very individualized. Such individual markers may include overbite, crooked or chipped teeth, periodontal disease, cavities and fillings, other specialized reconstructive work such as bridges, or even false teeth. However, the difficulty remains that we must have previous records to use in comparison to the victim at autopsy.

Although DNA is one of the newest forensic developments especially in identifying suspects from crime scenes, it can be problematic because one cannot be identified to the exclusion of all others, but can be very significant statistically. This is particularly true with identical twins. They both have the same exact DNA because they were formed initially by the same egg and sperm cell and therefore have the same genetic markers. However, in the absence of fingerprints and dental identification, DNA is still a good choice.

Scars, particularly surgical scars, may also be used but it is the unusual scars or a series of surgical scars that should be used to identify a victim. The same can be said with dentures, false limbs, and pacemakers. Previously healed broken bones, or other medical procedures should be used in conjunction with medical records as a further means to identify the victim. Radiographic films taken during life may also be helpful when compared to those taken after death. An example of the utilization of x-rays coupled with a previously healed broken bone, is described and illustrated in **Case Study 1-2**.

## Case Study 1-1

During the Oklahoma City bombing investigation, it was very difficult to accurately identify some of the deceased children because there were no recorded prints available for comparison. Therefore, several different methods were used. Some were able to be identified through their birth certificates that had an imprint of their foot. For some of the others, police actually obtained latent prints on personal possessions obtained from their homes. In one case, toys inside a damaged vehicle across the street from the destroyed building were obtained and latent prints recovered from them were used to identify one victim from post mortem prints.

## Case Study 1-2

A farmer notified the coroner's office that along the side of a creek on his property he found what he believed to be a human leg bone. A forensic anthropologist confirmed that the initial bone was in fact human and as a result, a systematic search of the area was conducted over the next three days. Participants in the search were members of the sheriff's office crime scene unit, the coroner's office and two graduate students studying forensic anthropology under the supervision of the anthropologist. The initial observations by the anthropologist of the skeletal material indicated to him that the deceased person was most likely 40–50 years old and male. Armed with this information, as the search continued and more material was collected (see **Figure 1-1**). Detectives from the sheriff's office began canvassing the area and gathered reports of missing persons that coincided with the description.



**FIGURE 1-1.** Case Study 1-2, identification made from limited skeletal material. See Color Plate 1.

The search ended with only those bones reflected in Figure 1-1. During a subsequent examination of these it was determined that the decedent had a plate surgically placed on his leg to possibly repair a broken ankle (see **Figure 1-2**). In the meantime the detectives located a missing persons report



**FIGURE 1-2.** Case Study 1-2, metal brace surgically placed on victim's broken ankle. See Color Plate 2.

from 3 months prior of a black male, 40–50 years old, last seen alive walking away from the home he was living in not far from the location of the skeletal material. Interviews of the occupants of the home confirmed this and that the deceased had in fact had an operation for a broken ankle sometime in the past.

The medical records of the deceased were located at a local hospital and a review of those records reflected he had in fact undergone surgery for a broken ankle and a plate had been placed on his leg to stabilize the leg and ankle. Radiographs taken at the time of the surgery were obtained and compared to those taken after death. There was no question that the two were identical and that the recovered remains were this person (see **Figure 1-3**). No other skeletal material was found and it could only be assumed that animals took them. Based on what was collected the person was positively identified; the cause and manner of death were undetermined, and the belief that it was most likely a natural death. That was all based on information gathered by the sheriff's department and the coroner in which there were no indications of foul play. The deceased was known to have heart problems; was known to take long walks in the rural area where he lived, and there were no indications that he had any enemies.



**FIGURE 1-3.** Case Study 1-2, ante mortem and post mortem x-rays compared. See Color Plate 3.

At one time tattoos were a good source for identification but in recent years with the number of persons engaging in tattooing they're becoming more and more common. The more unusual or unique the tattoo, the more likely it can be used to identify the victim, particularly if the tattoo contained specific information such as children's names, or specific dates that can be compared with other information as a means to identify the owner. Certain birth marks may also be used.

Body piercings are another means of identification. These include those clearly visible such as tongue, ears, navel, nose, eyebrows, but might also include the penis or the nipples. One problem with the piercings of private areas is that the family may not be aware of them and therefore might not be able to confirm their location.

The least reliable of all methods of identification is the utilization of personal effects or documents found on or near the deceased. Clothing can be changed, wallets or personal effects can be stolen or planted on the body. If a tentative identification is made based on scars, marks, tattoos or personal identification/documents, be sure to confirm it through latent prints, dental, or DNA. This might avoid problems such as those described in **Case Study 1-3**.

Regardless of the method utilized, the investigator, in conjunction with the pathologist, should always seek to identify the decedent through one of the more reliable methods. Failing that, as many of the other methods as possible should be used to have a collective confirmation of identity.

If the identity cannot be established at the autopsy through one of the previously mentioned methods, steps may need to be taken to preserve the body for an extended period of time until it has been positively identified. This could range from a refrigerated morgue to a freezer specifically designed to maintain unidentified bodies and/or body parts. Once the body has been buried or the decaying process has begun, the identification becomes more difficult. The old adage "do it right the first time" is paramount because you may not ever get a second chance. With unidentified remains, an investigator will have to expand the search to other areas that might include records and information contained in the NCIC, VICAP, and missing person's reports; or use the media to broadcast a photograph or sketch of the unidentified person. It is important to remember that in over half of all murders committed the victim knew the assailant. Identification is critical in order for the investigation to proceed in the right direction. It is from this point that the operational plan is designed.

### Case Study 1-3

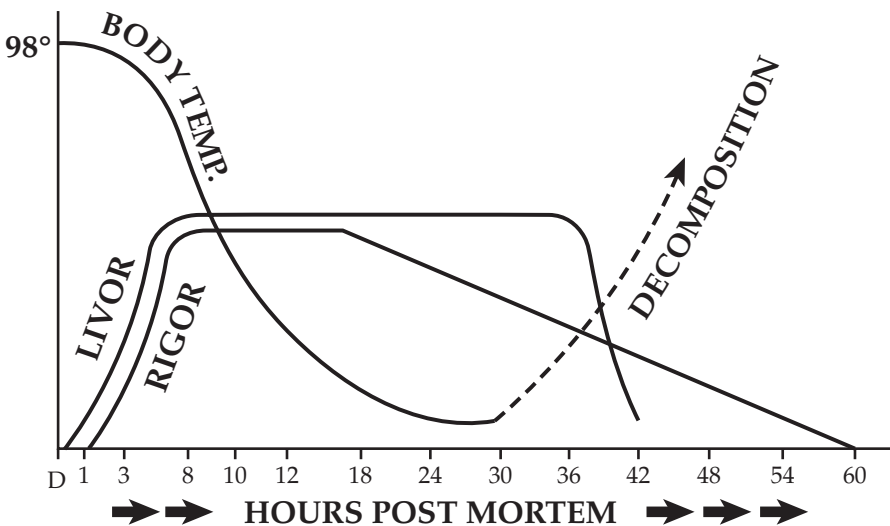
Two teenage females were involved in a motor vehicle accident where one was seriously injured and the other was pronounced dead. Both were disfigured to the extent that identification was based on general appearance and clothing they were wearing at the time of the accident. Sadly, the deceased's parents took the girl identified as their daughter and buried her. Once the girl in the hospital woke up it was discovered that they had buried the wrong girl, and that their daughter was the one who had survived. As tragic as this scenario is, imagine the difficulties that may take place when the victim of a homicide cannot be properly identified or is incorrectly identified.

## ► Time of Death

The next major area of concern for the investigator and the forensic pathologist is the time of death. This is absolutely critical to the investigation especially when attempting to evaluate alibis of persons of interest. Having not only the means and the motive to kill someone but also the opportunity are all a part of what the investigation needs to determine. However, time of death determination, without an eyewitness to the incident, is fraught with complications and is an educated guess based on the physiological changes the body goes through at the onset of death. Furthermore, information gathered from witnesses as to the last time the victim was seen alive must also be considered. Collectively, this information and the physiological changes in the body can provide a reasonably accurate time of death. The remaining investigative process will focus on and revolve around this determination.

These physiological changes incorporate a series of actions that take place at the onset of death. The primary three are algor mortis, livor mortis, and rigor mortis. An overall view of these can be found in **Figure 1-4**.

Keep in mind that none of these changes, in and of themselves, is that accurate but collectively they can be of great help. Algor mortis is the cooling of the body after death (Figure 1-4, Body Temp.). The body will cool, but no cooler than the ambient temperature and is affected in numerous ways by activity of the person just prior to the death, illness, infection, changes in the temperature surrounding the body, clothing, etc. A classic example of this can be found in **Figure 1-5**.<sup>7</sup> Therefore, careful consideration of these factors and



**FIGURE 1-4.** Physiological changes.



**FIGURE 1-5.** This couple was killed at the same time by a mentally deranged son. The body of the mother was found in the cool basement, while the body of the father was discovered in a warm upstairs room. Outside temperature was 90°, post mortem interval was forty-eight hours. (Reprinted with permission from Dr. Werner U. Spitz and Charles C. Thomas, Publisher.)

of the scene is important in determining the post mortem interval or time since death. The rule of thumb, under normal conditions, is that the body should be about 98.6°F and that once death occurs the temperature drops about 1.5°F each hour up to four hours; then drops about 1°F per hour. Body temperature however will never drop below the ambient temperature of the environment.

Livor mortis is the settling of the blood to the lower extremities of the body in accordance with gravity. The onset begins immediately and is advanced in 2–4 hours to a point of “fixation” between 8 and 12 hours. If the body is moved prior to fixation an incomplete development or positioning of the livor pattern may be seen. If this does occur it may also be helpful in narrowing the time of death; therefore full and complete documentation, including colored photographs of the body at the scene prior to removal are imperative.

Rigor mortis is the gradual onset of rigidity of the muscles after death. Also referred to as the stiffening of the body and while it begins in all muscles simultaneously, it is quickly evident and sometimes more prominent in the smaller muscles earlier than in the larger muscles.<sup>8</sup> Although this process starts almost immediately it may take up to 6 hours to become readily identifiable and up to 24 hours to complete rigor, or the entire body rigidity. It then will begin to dissipate after an additional 12–36 hours, dependent on the environment, temperature, etc., as stated earlier. Again, neither rigor mortis, nor livor mortis, nor algor mortis should be relied upon separately as sole determinant but collectively can be a strong indicator of the time of death.

Other determinants that the forensic pathologist may choose to evaluate in conjunction with the physiological changes are scene investigation information, ocular changes, vitreous potassium levels, the autopsy findings, and food in the stomach. However, when the discovery of the body is days to weeks after death the determination becomes more difficult. Rigor mortis may have come and gone, body temperature will have lost its value and decomposition may become evident internally as well as externally. The first stage of decomposition is usually the blue to green discoloration of the skin and abdomen and can be seen 24–36 hours after death. Other characteristics are marbling, bloating of the body, and skin slippage. Also noted may be insect activity on or in any injured areas of the body first where entrance to the body is facilitated. Any manifestation of maggots would be a clue to possible injury especially if not at a location of a normal body orifice or opening (mouth, eyes, etc.). At this point consultation with a forensic entomologist is highly suggested.

### ► Skeletal Remains

Bodies that are extremely decayed or reduced to skeletal material present a challenge to the investigator. Care must be taken with the scene of the remains and the manner in which the material is collected. It is suggested that the investigator solicit assistance from either a forensic anthropologist or a forensic archeologist to ensure all human specimens are collected and that nothing with evidentiary value is left behind. Once collection is completed, the forensic anthropologist is asked to examine and evaluate the skeletal material looking for means of identification, signs of injury, or other information that may lead to the identity of the deceased.

In situations where skeletal material is found expect to spend hours to days processing the scene correctly. As stated above experts, are very helpful in these cases as the scene needs to be methodically processed to ensure the collection of all available pieces of bone, clothing, jewelry, projectiles, etc. It is suggested that the investigators secure and margin off the area into three separate levels of security (scene, search area, and control area). This will be discussed in later sections of this text that pertain to crime scenes and physical evidence.

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## References

1. Merriam-Webster (2010). Retrieved from <http://www.merriam-webster.com>.
2. Garner, B. A. (Ed.). (2004). *Black's law dictionary*. (8th ed.). St. Paul, MN: West Publishing.
3. New Jersey Statutes Annotated (2004). Retrieved from <http://www.judiciary.state.nj.us/criminal/charges/homicide2.doc>.
4. Merriam Webster (2010). Retrieved from <http://www.merriam-webster.com>.
5. Di Maio, D. J., & Di Maio, V. J. M. (1989). *Forensic pathology*. New York, NY: Elsevier Publishing. p. 1.
6. Froede, R. C., (Ed.). (2003). (2nd ed.). *Handbook of forensic pathology*. Northfield, IL: College of American Pathologists. p. 140.
7. Spitz, W. U., & Fisher, R. S. (2006). (4th ed.). *Medicolegal Investigation of Death*. Springfield, IL: Charles C. Thomas Pub. Ltd. p. 108. Reprinted with permission.
8. Spitz, W. U., & Fisher, R. S. p. 72.