Review Article

Volume-II, Issue- III, 2025
Journal Home Page: https://farpublisher.com/farjms/
Page: 33-39
DOI: 10.5281/zenodo.17528132

Article Accept: 10/10/2025 Article Received 18/10/2025 Publication Date: 05/11/2025

SEEKING THE TRUTH IN FORENSIC MEDICINE

BY

***Murat Senavci, **Ozlem Erel**

Murat Senavci, Adnan Menderes University, School of Medicine, Depart. of Forensic Medicine

Abstract

Forensic medicine is a branch of medicine dedicated to investigate injuries and deaths to determine how they occurred. It is practiced by specialized physicians known as forensic pathologists. Forensic pathologists are the only medical specialists trained to characterize injury patterns in both living and deceased individuals. Careful recognition and interpretation of injury patterns are the central skill of this field. It is what distinguishes forensic medicine from all other medical disciplines. This advanced focus on injury analysis is coupled with broad medical and scientific knowledge. Together, these qualities clearly separate forensic pathologists from other physicians [1-2].

Keywords: Forensic medicine, Injuries and deaths, Advanced focus, Specialized physicians

SCOPE

The scope of forensic pathology is broad. It encompasses investigations of violent or suspicious deaths, as well as deaths involving chemical agents such as drugs, poisons, or alcohol. It even covers certain sudden natural deaths that require further scrutiny. These diverse cases are united by the forensic pathologist's focus on injuries and other findings. The key is what those findings reveal about the cause of death [3].

Forensic autopsies differ fundamentally from hospital (clinical) autopsies in both procedure and purpose. In a forensic autopsy, the external examination of the body is just as critical as the internal dissection. External findings provide context about how the death occurred. These include injuries (new or healed), the condition of clothing, signs of medical intervention, nutritional status, and personal hygiene. These details are documented with exceptional rigor in forensic practice. They are often overlooked in routine hospital pathology. For example, a hospital pathologist seldom has access to the decedent's clothing. In contrast, a forensic pathologist will photograph and describe every garment. They note clues such as soot on clothing or the layering of attire, which can help estimate the time of death. Forensic pathologists routinely document advanced postmortem changes such as decomposition or animal scavenging. They also collect evidence during the autopsy. This includes both macroscopic evidence such as bullets or weapon fragments and trace evidence like hairs, fibers, or residues. Such procedures have almost no place in a typical hospital autopsy. This shows that forensic examinations are far more comprehensive [4].

The duties of forensic pathologists extend beyond determining the medical cause of death. A core task within their scope is establishing the identity of the decedent, especially when the person's identity is unknown or in doubt. This task lies outside the usual remit of hospital pathologists. In addition, forensic experts often tackle cases of sudden, unexpected death where no obvious cause is immediately apparent. Training and experience show that very few natural diseases cause truly instantaneous death. The main exceptions are catastrophic heart arrhythmias, massive pulmonary emboli, ruptured aneurysms, or certain types of strokes in the brainstem. If a complete autopsy rules out those rare events, the forensic pathologist must rely on the totality of the evidence to reach a reasonable conclusion about why the person died. This may involve integrating subtle autopsy findings with investigative information to formulate an "operationally useful" cause of death. An

"operationally useful" cause of death is one that best fits the evidence, even when the mechanism of death is not immediately obvious [5].

Forensic pathology's broad scope is matched by deep expertise in interpreting findings. Consider the challenge of sudden cardiac deaths. Such deaths often result from coronary artery disease, yet an autopsy will not always show a clear-cut acute "heart attack" (myocardial infarction). Studies have shown that roughly half of sudden cardiac deaths due to coronary atherosclerosis involve an acute issue, such as coronary thrombosis (a blood clot in a heart artery) or recent infarction. The other half shows only long-standing changes, such as stable plaques and old scar tissue in the heart. In other words, a person with severe coronary artery disease can die suddenly from a fatal heart rhythm disturbance (arrhythmia) even if no new damage is visible in the heart muscle. The death occurs so quickly that no microscopic changes are visible yet. Under a microscope, definitive signs of an infarction only appear about 4–12 hours after the blood supply is cut off. Forensic pathologists recognize this reality. They will attribute a sudden death to coronary artery disease based on the context and chronic findings (extensive atherosclerosis and its effects), even if an acute clot isn't found at autopsy [6].

Likewise, a forensic pathologist will diagnose hypertensive heart disease at autopsy even if the decedent's medical records never noted high blood pressure. If the autopsy reveals an enlarged, thickened heart and finely granular (scarred) kidneys–classic signs of long-standing hypertension then hypertension is assumed to have been present and to have contributed to death. Even if other factors (like chronic drug use) might also be in play, those autopsy findings should be weighed strongly in favor of hypertensive cardiovascular disease as the cause. Ignoring such evidence simply because it wasn't documented in life would mean missing the true cause of death. These examples illustrate how forensic specialists use their broad knowledge of pathology and disease mechanisms to interpret autopsy findings in context, ensuring that the cause of death is identified correctly [7].

Seeking the Truth: Concept of the Death

Seeking the truth in forensic medicine means following the evidence wherever it leads, without jumping to convenient conclusions. A forensic pathologist approaches each case with a disciplined mindset. To "think forensically" is to plan, anticipate, observe, document, and question. It also involves synthesizing information, forming an expert opinion, and communicating findings effectively. The ultimate goal is to determine the most accurate cause and manner of death. Achieving this goal requires meticulous documentation of physical and laboratory findings. It also demands a careful appraisal of the circumstances in which those findings occur. In other words, context is everything in a forensic investigation [8].

Forensic pathologists must interpret medical findings within the story of each case. Sometimes that story needs correcting. For example, a toxicology report might show a high concentration of cocaine in a person's blood. A layperson might immediately assume that the person died of a cocaine overdose. However, context can completely change the interpretation.

Considering Two Scenarios

In one, the decedent has a high cocaine level in their system. In the other, the decedent has the same level plus a telltale injection mark on the arm. If the second person died from a fatal gunshot wound, then the cocaine in their system is not the cause of death at all. It is merely an incidental finding. In fact, many deaths associated with illicit drug use are not true "overdoses." The misconception arises from treating toxicology numbers as if they speak for themselves, like a cholesterol or blood sugar value might. Although toxicology results provide data not conclusions, the forensic pathologist must investigate the scene and exclude other plausible causes to determine whether a drug caused a death. Only by grounding conclusions in scientific evidence and context can one say that a death was due to drug toxicity rather than some other factor [3].

Objectivity is paramount in the search for truth. The forensic pathologist must be autoptic. This means they believe what the body tells them, not what anyone might wish or expect to see. This stance

minimizes cognitive bias. Cognitive bias is the natural human tendency to force observations to fit a preconceived theory. In practice, keeping one's assumptions flexible is essential. If the autopsy findings do not align with the initial story or hypothesis about the death, the problem lies not in the corpse but in the account of events. Such a discrepancy is a signal to dig deeper. Often, when the physical evidence and the narrative clash, there are unanswered questions, overlooked scene details, unknown circumstances, or "half-truths" that require further investigation [3].

Striving for truth in forensics is a balancing act between considering context and remaining scientifically objective. On one hand, the pathologist integrates all available information to inform their understanding of the case. This includes scene evidence, witness statements, and medical records. On the other hand, they must not let an expected narrative distort what they observe. Performing an autopsy "blind" (with no context at all) is just as problematic as being biased by a narrative. Without context, one might miss critical interpretations. Without objectivity, one might see only what they expect to see. Operating at extreme leads to both the less accurate and the less evidence - based conclusions. As Dr. Charles Hirsch famously observed, "To refuse to consider context may, in the name of objectivity, amount to a denial of the truth." In essence, seeking the truth means evaluating every case on its actual merits. It means noticing when findings conflict with assumptions and following the physical evidence wherever it leads [3].

When an investigation's scientific findings contradict the initial account of events, the forensic pathologist must make those conflicts known to all relevant parties. All relevant parties must be alerted when the autopsy reveals something that changes the narrative. This includes clinicians, law enforcement officers, prosecutors, family members, child-protection agencies, and others involved in the case. Stakeholders can make progress only by comparing the most accurate information, obtained through meticulous scientific inquiry, with the story that was previously believed [9].

The guiding principle at the heart of the profession is the principle of impartiality. Forensic pathologists are independent finders of fact. Their conclusions might not always align with any particular party's wishes, and their opinions are not necessarily the final legal word – but their duty is to report exactly what the evidence shows, no matter who it helps or hurts. They remain sensitive and respectful toward the families of the deceased. However, this is never at the expense of their professional standards. In the pursuit of truth, impartiality and integrity must override all other pressures [10].

WHAT FORENSIC MEDICINE CONTRIBUTES TO THIS

Forensic medicine brings a rigorous scientific framework to the pursuit of truth. Through their specialized training, forensic pathologists provide objective, evidence-based determinations of how and why someone died. These answers would often be unattainable without their expertise. They serve as a vital bridge between medicine and the justice system. They translate medical findings into factual conclusions that investigators, courts, and families can rely on [11].

One of the key contributions of forensic pathology is establishing a solid evidentiary foundation for each death investigation. Every autopsy finding is documented in detail. The pathologist's thought process is made explicit in the report. A well-prepared forensic case file remains open to objective scrutiny even years later. In practice, the forensic pathologist clearly states what was found at autopsy. They also explain which potential causes were considered and ruled out. They document which alternatives were eliminated and the reasons why. This makes their reasoning transparent. This thoroughness ensures that the final determination of cause and manner of death is grounded in facts. It also means that the conclusion can withstand challenges or re-examination [12].

Forensic pathologists have a deep understanding of disease and injury mechanisms, which is crucial for unraveling complex deaths. In cases with multiple possible causes or an unclear chain of events, they use their expertise to pinpoint the actual sequence of physiological events that led to the death. This sequence is known as the mechanism of death. Identifying the mechanism is not an academic exercise. It directly guides decisions on the primary

cause of death and the manner of death. By clarifying how the death unfolded, they prevent misattributing the cause. This scientific rigor involves insisting on evidence for every link in the causal chain. It distinguishes forensic conclusions from speculation. The essence of forensic practice is to produce conclusions that are scientifically defensible. A forensic pathologist will not invoke a cause of death that cannot be supported by the autopsy findings and investigative evidence. In this way, they avoid conjecture and stick to what can be proven. Years of training and case experience reinforce this discipline. Even in perplexing situations with many variables, their opinions must stem from solid, supportable facts [13-14].

Another important contribution of forensic medicine is its absolute impartiality. Forensic pathologists do not take sides. Their only allegiance is to the truth. What matters is that it is reported accurately. By acting as impartial referees of the evidence, they bring credibility and trust to investigations. Those investigations might otherwise become clouded by bias or adversarial interests. Their involvement helps ensure that determinations of cause and manner of death are based on medical facts rather than assumptions or agendas [15].

HOW FORENSIC MEDICINE ACHIEVES IT

The process of forensic investigation ensures that no potential clue is overlooked. Pre-autopsy planning is the first step. Before a single incision is made, the forensic pathologist reviews all available case information. This includes scene findings, witness statements, and medical history. Every autopsy benefits from brief but focused assessments before, during, and after the procedure. These assessments help guide the examination toward finding the truth [16].

During the autopsy, the forensic pathologist remains flexible and attentive to emerging findings. They adjust dissection techniques and order ancillary tests as needed to pursue possible theories of how the person died. For example, preliminary information might suggest the person died of shock. If shock is suspected, the pathologist will deliberately look for telltale signs. They examine the body for clues such as very pale internal organs or muscles, which could indicate extreme blood loss or poor circulation. They also look for a “bloodless” appearance of tissues or an empty heart and blood vessels. Documentation often includes photographs as well as written notes. This targeted examination ensures that the autopsy directly addresses the suspected mechanism of death. This approach can either confirm the suspected mechanism or rule it out with evidence [17].

A bit of forethought can also improve the effectiveness of the autopsy. In some cases, the pathologist may need to take specific actions before the routine autopsy steps begin. For instance, if a sexual assault is suspected, they will collect swabs and other evidence for DNA analysis. They do this before washing the body or making any incisions. If infection is a possibility, they might draw a blood culture from a vein (such as the inferior vena cava) before removing the heart. This is done to check for bacteria in the bloodstream. These special steps at the outset can be crucial for capturing evidence that might otherwise be lost or compromised during the autopsy [3].

Throughout the examination, thoroughness is paramount. Every autopsy, no matter how routine or high-profile, must be conducted comprehensively. In high-profile or legally sensitive cases, however, the forensic pathologist takes special care to anticipate questions that others might later ask. If a death is likely to be scrutinized by multiple parties (law enforcement, lawyers, the media, etc.), the pathologist operates as an impartial referee of events. They gather all possible facts without bias. They will document not just the obvious injuries but also any detail that might become relevant under debate. Meticulous photography is used to capture every significant finding. This includes documenting both what is present and what is not. The standing rule is that if the pathologist even wonders about a particular test, procedure, or observation, they will go ahead and pursue it. By following this philosophy, the forensic pathologist maximizes the chances that no important question will remain unanswered when the autopsy is complete[18].

After the hands-on examination is done, the work is far from over. Post-autopsy analysis is just as important as the planning stage. The pathologist must interpret the findings in light of the initial questions. They also consider any new investigative information that emerged during the autopsy. At this stage, some

early theories about the death may be confirmed, while others are disproven. By the time the autopsy ends, the pathologist has typically eliminated certain possibilities and identified others as more likely [19].

If the cause of death is still not obvious after the autopsy, the investigation doesn't stop there. The forensic pathologist will then turn to additional steps to get answers. This may include [19]:

- Ancillary laboratory tests: for example, more in-depth toxicology screens microscopic tissue examinations, genetic testing, or other specialized analyses.
- Further investigative inquiries: for instance, requesting more information from police (witness statements, scene reconstructions), reviewing medical records or previous incidents involving the decedent, and asking new questions that arose from the autopsy findings.
- Follow-up consultations or visits: this could involve calling clinicians or family members for clarification, consulting with other specialists (such as neuropathologists for brain examination), or even revisiting the death scene with investigators if something in the autopsy points back to an issue at the scene.

By pursuing these avenues, the forensic pathologist ensures that no stone is left unturned. Their duty is to contribute every possible piece of information to the foundation of the death inquiry. All findings are recorded, including negative findings (things the pathologist looked for but did not find). This ensures that the conclusions drawn are transparent and can be reviewed independently if necessary. When a case is concluded, a good forensic report will state the final determination. It will also note the other possibilities that were considered and ruled out. This level of documentation means the investigation's integrity can hold up under scrutiny even many years later [12].

As part of the interpretive process, the forensic pathologist always considers the mechanism of death before finalizing the cause. Identifying the mechanism (the specific physiological chain of events that leads to death) is crucial for understanding the sequence of what happened. No autopsy is considered complete until the pathologist can explain how the death occurred, not just what the immediate cause was. For example, suppose a deceased person is found to have both a severe heart condition and a significant head injury. The pathologist must determine which reason was the actual cause of death.Identifying which mechanism was at work steers the examiner toward the true primary cause of death. Clarifying the mechanism also informs the manner of death (natural, accident, homicide, etc.). Thus, careful consideration of mechanism is an essential checkpoint that guides the pathologist to the correct conclusion [20].

Forensic pathologists are careful to avoid speculation and over-interpretation. They stick to what the evidence supports. For instance, if a blood culture taken at autopsy grows bacteria, they will report that finding as an indication that bacteria were present in the bloodstream at the time of death. However, they would not label the death as septicemia (a body-wide infection) unless other evidence strongly supported that conclusion. If such mechanisms are identified, the pathologist will still seek the underlying trigger (21).

If a person is found in a position or situation that could be lethal (like face-down in water or wedged in a restrictive position), the pathologist must establish why that person could not escape the situation. That explanation–say, intoxication, injury, or illness rendering them unable to move–then becomes a crucial part of the cause of death. If no satisfactory explanation can be found (for example, if a person should have been able to get out of a dangerous position but didn't), then the pathologist is likely to conclude that the position or scenario itself was not the true cause of death. The ability to distinguish a true cause of death from a mere byproduct or coincidence of death is critical to avoiding misdiagnosis [19].

Forensic pathologists also use microscopic analysis to detect vital reactions. These are changes in body tissues that indicate an injury or insult occurred while the person was still alive (even if only moments before death). These vital reactions can sometimes connect disparate pieces of evidence and help build a unified theory of how multiple injuries or factors played a role in the death. However, every finding showing a vital reaction must still be evaluated in context to determine the actual causeof death. By checking for these microscopic clues, the pathologist can better sort out the timeline and relevance of

injuries. This practice strengthens the accuracy of the final conclusions [3].

Families, investigators, and courts often ask about the time of death or the interval between an injury and death. Unless there was a witness or a recording of the death, pinpointing the exact time is usually impossible. Forensic pathologists emphasize the limitations of such estimates. The longer the interval between death and the discovery of the body, the less precise any time of death estimate can be. They rely on various postmortem changes (body temperature, rigor mortis, insect activity, etc.) to offer a rough window of time[22].

Finally, after synthesizing the information, the forensic pathologist reaches a conclusion and communicates it through official documents. The death certificate is such document that distills the outcome of the investigation in a formal way. A death certificate can never capture all the nuances of a case and is no substitute for the full case file. However, it is used to officially record the cause and manner of death. Ideally, the cause-of-death statement on the certificate is phrased in clear, well-supported terms. If needed, brief explanatory notes are added to clarify any unusual circumstances. The wording is kept factual and neutral to avoid implications beyond what the evidence shows [23].

In complex cases, forensic pathologists may use descriptive cause-of-death statements to ensure completeness and clarity. These are expanded formulations that include a brief description of the circumstances when a simple one-liner would be inadequate or potentially misleading.

CONCLUSION

Forensic medicine is a truth-seeking scientific discipline defined by unwavering objectivity and impartiality; forensic pathologists serve as independent fact-finders devoted to the truth. They approach each case without bias, guided solely by empirical evidence interpreted in context, and maintain a disciplined, neutral mindset that lets the evidence speak for itself.

Forensic experts uphold the highest standards of scientific integrity. Conclusions are based only on verifiable data, separating fact from speculation and avoiding bias. Every observation is documented and each plausible explanation tested to ensure the cause and manner of death are scientifically defensible and that no clue is overlooked.

Impartiality is more than an ideal. It is an ethical necessity: forensic pathologists never take sides, and their sole allegiance is to the facts. Even under pressure, they remain neutral, guided only by scientific evidence. This independence instills credibility in investigations otherwise clouded by prejudice. Such neutrality strengthens the integrity of the legal process, ensuring justice relies on objective facts rather than conjecture.

Ultimately, forensic medicine is more than a diagnostic field. It is a cornerstone of justice that safeguards society by resolving cases of sudden, unexplained, or contested deaths. It offers bereaved families scientific explanations and closure rooted in truth, while giving courts an objective foundation for fair decisions. Forensic pathologists speak for the dead to ensure silent evidence is heard and truth prevails over pressure, cementing a legacy of impartial truth-seeking, scientific rigor, and ethical responsibility, affirming that only objective truth suffices in the pursuit of justice.

References

1-Smith S. The history and development of forensic medicine. Br Med J. 1951;1(4707):599e607.

2- Collins KA, Lantz PE. Interpretation of fatal, multiple, and exiting gunshot wounds by trauma specialists. J Forensic Sci. 1994;39(1):94e99.

3-Ely SF, Gill JR, editors. Principles of forensic pathology: from investigation to certification. London: Academic Press; 2023. P.1-50.

4-Hirsch CS. Lester Adelson, M.D. Am J Forensic Med Pathol. 1989;10(3):261-263.

5-Gill JR, Ely SF, Hua Z. Natural disease causing sudden death: A comprehensive review. Acad Forensic Pathol. 2014;4(2):194-210. doi:10.23907/2014.024.

6-Davis JH, Wright RK. The very sudden cardiac death syndrome – a conceptual model for pathologists. Hum Pathol. 1980;11(2):117e121.

7-Schoen FJ, Mitchell RN. The heart. In: Kumar V, Abbas AK, Aster JC, editors. Robbins and

Cotran Pathologic Basis of Disease. 10th ed. Philadelphia: Elsevier; 2020. p.523-580.

8-Cooper GS, Dirks KY, Buckleton J. Cognitive bias research in forensic science: A systematic review. Forensic Sci Int Synergy. 2019;1:96-109. doi:10.1016/j.fsisyn.2019.07.005.

9-Martire KA, Thompson WG, Keller TF, et al. Transparent reporting in forensic science: Exploring its foundations and implications. Forensic Sci Int Synergy. 2025;1:100123.

10-Passalacqua NV, Pilloud MA, Belcher WR. Scientific integrity in the forensic sciences: Consumerism, conflicts of interest, and transparency. Sci Justice. 2019 Sep;59(5):573-579. doi: 10.1016/j.scijus.2019.06.010.

11-Hanzlick R, Combs D. Medical examiner and coroner systems: history and trends. JAMA. 1998;279(11):870-874. doi:10.1001/jama.279.11.870.

12-Ballantyne KN, Marchant C, Kayser M, et al. A transparent approach: Openness in forensic science reporting. Forensic Sci Int Synergy. 2024;8:100474. doi:10.1016/j.fsisyn.2024.100474. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11087997/.

13-Oliver WR, Fang X. Forensic pathologist consensus in the interpretation of photographs of patterned injuries of the skin. J Forensic Sci. 2016;61(4):972e978.

14-Oliver WR. Effect of history and context on forensic pathologist interpretation of photographs of patterned injury of the skin. J Forensic Sci. 2017;62(6):1500e1505.

15-Gill JR. Forensic Pathologist Testimony, Part 1: Common Concepts. J Forensic Sci. 2024;69(1):e1 e11. doi:10.1111/1556-4029.14691. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11558648/.

16-Spitz WU, Fisher RS, editors. Spitz and Fisher's Medicolegal Investigation of Death: Guidelines for the Application of Pathology to Crime Investigation. 4th ed. Springfield (IL): Charles C Thomas; 2006. p.26-71.

17-Rutty GN. The pathology of shock versus post-mortem change. In: Essentials of Autopsy Practice. Springer; 2012. p.93-127.

18-Adelson L. Pathology of Homicide. 1st ed. Springfield: Charles C Thomas; 1974.

19-Menezes RG, Monteiro FN. Forensic Autopsy. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023. Available from: https://www.ncbi.nlm.nih.gov/books/NBK539901/.

20-Tatsumi K, et al. Death Investigation in the United States: Forensic Pathology. Front Med (Lausanne). 2022;9:882585. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9616451/.

21-Lucas S, et al. The autopsy pathology of sepsis-related death. Pathol Res Pract. 2007;203(5): 327-335.

22-Shrestha R, Kanchan T, Krishan K. Methods of Estimation of Time Since Death. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 May 30 [Updated 2023 May 30]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK549867/.

23-Adeyinka A, Bailey K. Death Certification. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 [Updated 2023 Apr 17]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK526015/.