

# VIRTUAL AUTOPSY AS AN ALTERNATIVE TO A TRADITIONAL POST-MORTEM EXAMINATION



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*All deaths of unnatural . . . manner, suspicious deaths, and unexpected deaths necessitate a legal investigation, which includes an autopsy as a portion of the evidence-gathering process.*

—Ritesh Menezes and Francis Monteiro

Autopsies have been an accepted procedure since the nineteenth century.<sup>1</sup> However, some religions and cultures have an aversion to the desecration of a body after death.<sup>2</sup> This reluctance is traced back to the ancient Greeks, Romans, Egyptians, and Hebrews, who emphasized the undisturbed rest of a corpse.<sup>3</sup> Today, certain religions and cultures, including Orthodox Judaism, Islam, Hinduism, and some Native American communities, oppose autopsies for various reasons.<sup>4</sup>

Despite the melting pot of religious and cultural beliefs surrounding autopsies in the United States, most states offer little to no legal remedies to prevent forensic autopsies.<sup>5</sup> A new non-invasive procedure, the virtual autopsy, might offer a solution to those who object to a traditional post-mortem examination.<sup>6</sup> This article will explore the potential for virtual autopsies to become a non-invasive

alternative to traditional autopsies for those who object to the procedure on religious or other personal grounds.

## TRADITIONAL AUTOPSIES

An autopsy refers to the dissection of a body that is conducted to assist in ascertaining the cause of death or in examining the ravages of diseases.<sup>7</sup> The word is derived from the Greek *autopsia*, which means “to see with one’s own eyes.”<sup>8</sup> Although some historians trace the first recorded post-mortem to Julius Caesar’s murder in 44 BC,<sup>9</sup> autopsies were not considered an accepted practice until the nineteenth century, when Karl Rokitansky and Rudolph Ludwig Karl Virchow pioneered the foundation of the modern procedure.<sup>10</sup> The use of autopsies significantly expanded in the mid-twentieth century, when pathologists used the technique to study and document human diseases.<sup>11</sup> In modern times, autopsies are typically used to determine a person’s cause of death or examine the effects of disease.<sup>12</sup>

The benefits of an autopsy are unquestioned. Autopsies allow the evaluation of new diagnostic tools, surgical procedures, devices, and drugs.<sup>13</sup> They also make it possible to discover contagious

viruses, inherited diseases, and environmental contaminants, and to further the interests of society by advancing the areas of public health and epidemiology.<sup>14</sup> These examinations expand the understanding of medicine and document the health of society. Forensically, they can ascertain the cause, means, and time of death.<sup>15</sup> These death determinations should be objective and should not be founded upon helping the prosecution, circumventing publicity, advancing a political agenda, or supporting a particular goal.<sup>16</sup> Nevertheless, post-mortems are subjective, and medical examiners can interpret comparable evidence differently.<sup>17</sup> Therefore, it is little wonder that “[n]o medical procedure is more frequently involved in litigation than the autopsy.”<sup>18</sup>

There are five official causes of death: (i) natural; (ii) accidental; (iii) suicide; (iv) homicide; and (v) unknown.<sup>19</sup> Classifying a death is generally self-evident, but there are times where the reason a person died is problematic, such as when an individual is stabbed but dies months later from an infection at the wound location.<sup>20</sup> The cause of death denotes the medical reason the individual’s heart stopped beating. Usually, this term indicates both a scientific explanation of death—the terminal “physiologic, metabolic, or anatomic alteration”—as well as the latent disease or injury, known as the proximate cause.<sup>21</sup> For instance, if cardiac ischemia continues unabated, the heart muscle dies from a lack of blood supply, and coronary artery disease is usually listed as the cause of death.<sup>22</sup> These conclusions, however, can be challenged because of their subjectivity and the links in the chain of causation must be identified.<sup>23</sup>

There are two primary forms of autopsy: clinical autopsy and forensic autopsy.<sup>24</sup> A clinical autopsy determines the fatal illness or disease, even if the cause of death is established, to better understand a person’s demise.<sup>25</sup> This procedure requires approval of next of kin and is used in situations where illness was not discovered before death, or surviving family members want information on potential genetic diseases.<sup>26</sup> A forensic autopsy, sometimes referred to as a medico-legal autopsy, is performed when a death is suspicious or foul play is involved.<sup>27</sup> This

post-mortem examination may uncover the decedent’s identity, time and manner of death, as well as produce evidence to aid law enforcement investigations.<sup>28</sup> In addition to assisting criminal investigations, autopsies are useful in civil matters and benefit society when used to provide answers to families and the public or uncover environmental or occupational diseases.<sup>29</sup>

The forensic autopsy typically involves inspecting and dissecting a body and its organs<sup>30</sup> and is authorized by a coroner or medical examiner.<sup>31</sup> Increased accuracy of clinical diagnosis led to a decrease in clinical autopsies in recent years because physicians can often detect health issues before death.<sup>32</sup> This decrease in procedures is accentuated by the decedents’ next of kin refusing to consent to an autopsy.<sup>33</sup> Today, the procedure is performed in only seven to nine percent of deaths, a 50 percent decrease from rates in the 1940s and 1950s.<sup>34</sup>

It is understandable that those with knowledge of how an autopsy is performed are hesitant to permit this unpleasant procedure. The techniques of the post-mortem examination may also differ based upon the detail and focus of the examination.<sup>35</sup> While an autopsy may only look at a single organ or body part, the procedure typically inspects the brain, chest, and abdomen.<sup>36</sup> The post-mortem begins with an external examination, where the body’s height, weight, and any identifying marks are recorded.<sup>37</sup> Next, the examiner typically makes a Y- or U-shaped incision from the shoulders, joining at the sternum and ending at the pubic bone.<sup>38</sup> If the brain requires examination, an incision is made in the back of the skull from ear to ear.<sup>39</sup> Organs are first examined in the body, then removed and further dissected to reveal abnormalities and take samples.<sup>40</sup>

Once the autopsy is complete, the organs are returned, and incisions are sewn shut.<sup>41</sup> After the procedure, the pathologist generates a report containing visual descriptions, gross and microscopic organ assessment, any irregularities found, toxicology results, and an opinion on the cause of death.<sup>42</sup> As for the formality and content of the report,

several associations—such as the National Association of Medical Examiners and the College of American Pathologists—as well as post-mortem texts have issued guidelines setting forth a standardized form for the autopsy report.<sup>43</sup>

## STATE LAW ON AUTOPSIES

Both common law<sup>44</sup> and state statutes regulate the performance of autopsies.<sup>45</sup> State statutes determine when an autopsy is required or consent from next of kin is needed.<sup>46</sup> Once a person dies, a doctor must complete a death certificate before the body is sent to a funeral home.<sup>47</sup> If the individual dies from natural causes while in the doctor's care, the doctor may fill out the death certificate.<sup>48</sup> If the person dies from apparent unnatural causes, was not under the care of a medical professional, was under medical supervision for less than 24 hours, or the death presents a public health concern, then an investigation is conducted by a medical examiner in most jurisdictions.<sup>49</sup> In these instances, medical examiners have broad discretion to perform an autopsy.<sup>50</sup>

Typically, medical examiners can overrule a decedent's kin who refuses to consent to a forensic autopsy, especially when the cause of death is undetermined.<sup>51</sup> Absent a suspicious death requiring a forensic autopsy, consent for a clinical autopsy is generally required from the next of kin.<sup>52</sup> Certain state laws impose an affirmative duty on physicians to seek permission before performing an autopsy.<sup>53</sup> Some state laws go as far as to make performing an unconsented autopsy a crime.<sup>54</sup> A few states—California, Maryland, Minnesota, New Jersey, New York, Ohio, and Rhode Island—limit a medical examiner's ability to perform an autopsy when the decedent's kin have a religious objection.<sup>55</sup> In these states, religious objection laws give families the right to object to an autopsy in most circumstances by asserting that the procedure is contrary to their religious beliefs.<sup>56</sup>

In states without religious objection laws, medical examiners have full authority to perform forensic autopsies to determine the cause of death.<sup>57</sup> A medical examiner may consider religious objections

to an autopsy in these states, but such objections do not prevent the procedure.<sup>58</sup> Nevertheless, every state requires medical examiners to perform autopsies in certain circumstances.<sup>59</sup> For example, Pennsylvania requires investigation into particular types of deaths, including sudden death and passings involving trauma.<sup>60</sup> If the cause of death is still uncertain after an investigation, an autopsy is required.<sup>61</sup>

## RELIGIOUS OBJECTION TO AUTOPSY

Those asserting a religious objection to an autopsy must seek a court order to prevent the procedure through injunctive relief.<sup>62</sup> In *Wisconsin v. Yoder*, the United States Supreme Court determined that a jurisdiction could impinge upon a person's religious belief concerning an autopsy if the state's interest is of "sufficient magnitude" to override religious freedom.<sup>63</sup> Therefore, courts must balance a religious interest in objecting to an autopsy with a state's interest in determining the cause of death.<sup>64</sup>

Religious objections to autopsies are rarely successful because courts generally interpret a state's "compelling public necessity" to perform autopsies as providing medical examiners with extensive authority.<sup>65</sup> Additionally, some state statutes require medical examiners to perform autopsies in certain situations.<sup>66</sup> Particularly with unnatural deaths, jurisdictions have a compelling interest to determine the cause of death.<sup>67</sup> Therefore, permission from the decedent's kin is not required.<sup>68</sup> Post-autopsy redress for a decedent's kin is limited because medical examiners are considered public officers who enjoy governmental immunity if sued for performing an autopsy without consent.<sup>69</sup> Therefore, as long as an unconsented autopsy is deemed to be discretionary, within the ambit of legal authority, and conducted in good faith, the medical examiner is protected from a civil suit.<sup>70</sup>

Courts typically find autopsy statutes facially neutral and not an infringement on the First Amendment right to free exercise of religion.<sup>71</sup> For example, in *Snyder v. Holy Cross Hospital*, a young boy died suddenly, and his father objected to an autopsy on religious grounds.<sup>72</sup> The court allowed the medical

examiner to perform the procedure because the state's interest in determining the cause of death<sup>73</sup> outweighed the family's freedom of religion.<sup>74</sup> In *Montgomery v. County of Clifton*, a woman's family objected to an autopsy on religious grounds after she died in a car crash, but the court permitted the medical examiner to conduct an autopsy due to a state statute requiring an autopsy in all cases of violent death.<sup>75</sup> These cases exemplify a typical court's attitude favoring the state's interest in autopsies over a person's religious objection.

## VIRTUAL AUTOPSY

Forensic science has made great advancements in many areas, including DNA identification and crime scene investigative techniques.<sup>76</sup> However, forensic pathology has not kept pace and still uses a dissection to obtain forensic clues as to the time and manner of death which is then recapped in a report.<sup>77</sup> This process of inspection, dissection, and analysis of the major organs and injuries has not changed over the past 100 years.<sup>78</sup> Recently, a new method has been advanced known as a virtual autopsy.

This technique is a non-invasive way to perform an autopsy and determine the cause of death using imaging technology.<sup>79</sup> This process was created in the mid-1990s by scientists who combined computed tomography (CT) and magnetic resonance imaging (MRI) scanning with three-dimensional (3D) computer reconstruction to create post-mortem imaging of traumatic injury without dissection.<sup>80</sup> Virtual autopsies have the potential to become a scalpel-free alternative for families with religious objections to traditional autopsies because the body is not dissected.<sup>81</sup>

During a virtual autopsy, digital photographs taken from various angles are converted into a 3D model of the body.<sup>82</sup> The process begins by scanning the entire corpse with 3D photogrammetry and a projector, which outlines the exterior and provides a fringe pattern over the body's surface.<sup>83</sup> Next, the corpse undergoes a CT scan, made up of 3,500 x-ray slices, providing 3D pictures with cross-sectional views for analysis with reference markers.<sup>84</sup> The

images produced by the CT scan reveal bones and internal organs.<sup>85</sup> The CT scan also allows examiners to find foreign objects, fractures, and gas or fluid buildup, which uncovers injuries—including bullet paths—within the body.<sup>86</sup>

The corpse also undergoes an MRI scan, where images detail bones, organs, and soft tissues.<sup>87</sup> This modality allows examiners to determine if there are injuries in the brain, heart, or abdominal organs.<sup>88</sup> The MRI proves to be a helpful supplement to the CT scan because it produces a clear view of soft tissues and organs and may visualize different pathologies and trauma that the CT scan cannot uncover.<sup>89</sup> If necessary, a robotic arm can extract tissue samples with a biopsy needle in precise locations within the body via a remote computer.<sup>90</sup>

Certain factors make the virtual autopsy a promising alternative to traditional autopsies. A study on the accuracy of virtual autopsies determined that they corroborate diagnoses 88 percent of the time, which is slightly less reliable than traditional autopsies' rate of 93 percent.<sup>91</sup> Virtual autopsies can be performed on a body as many times as needed, whereas traditional autopsies prevent pathologists from performing multiple distinct analyses once the initial dissection occurs.<sup>92</sup>

Because the procedure allows examiners to see the precise location of foreign material, objects like bullet fragments or shrapnel can be removed more precisely.<sup>93</sup> The virtual autopsy may also reveal lesions and leaks that a traditional autopsy cannot uncover through CT angiography, which allows pathologists to inject a contrast agent into blood vessels to reveal such abnormalities.<sup>94</sup> For trauma-based injuries, the 3D surface scanning of a virtual autopsy can compare injuries on the corpse to potential injury-causing instruments.<sup>95</sup>

## LIMITATIONS OF THE VIRTUAL AUTOPSY

Those with religious objections to traditional autopsies may prefer virtual autopsies because no desecration of the body occurs during this non-invasive examination.<sup>96</sup> While a decedent's kin may request specific examinations by a medical examiner in

some states, they cannot require a medical examiner to perform an alternative procedure.<sup>97</sup> Currently, there is no legal precedent indicating that a decedent's kin can require a medical examiner to perform a virtual autopsy. Also, state laws offer a medical examiner's broad discretion that typically overrides the wishes of a decedent's family.<sup>98</sup>

Virtual autopsies continue to gain traction but are not yet generally accepted practice in the United States.<sup>99</sup> This procedure is relatively new and has not yet been scientifically tested to the same degree as a traditional autopsy.<sup>100</sup> Further, the process limits an examiner's senses of smell, touch, and sight, which are available with traditional autopsies.<sup>101</sup> Scientific findings on virtual autopsies are also mixed, with researchers noting the process is accurate for examining trauma-related deaths but not disease-related deaths.<sup>102</sup> Despite limited US mainstream acceptance, this country's military, New Mexico, and Maryland are current US-based entities routinely utilizing the virtual autopsy.<sup>103</sup> In other parts of the world—including Australia, Italy, Japan, and the United Kingdom—virtual autopsies are routinely used to supplement forensic autopsies.<sup>104</sup>

Administrative factors preventing virtual autopsies from replacing traditional autopsies include the high cost of equipment and personnel, competition for image machine access, and the technology's inherent limitations.<sup>105</sup> Investment in equipment, required training, and maintenance for virtual autopsies costs hundreds of thousands of dollars.<sup>106</sup> This might explain why virtual autopsies are not commonly performed throughout the United States.<sup>107</sup>

Currently, forensic science limits virtual autopsies to use as a supplement to traditional autopsies rather than as an alternative on their own.<sup>108</sup> This limitation may change in the future as the technique becomes more well-known and appropriate funding is provided to purchase the necessary equipment.

## CONCLUSION

When a person dies mysteriously or unexpectedly, the state maintains an interest in determining the cause of death. However, a decedent's next of kin may oppose an autopsy. Therefore, a delicate balance between state and family interests exists when a decedent's next of kin has an objection to a forensic autopsy. Because courts typically uphold the state's interest in determining the cause of death over a family's religious objections, those opposing a post-mortem examination are unlikely to prevent this invasive procedure through a court order.<sup>109</sup>

Virtual autopsies offer an alternative to the traditional post-mortem examination. They are a non-invasive image-based form of autopsy that does not desecrate the body, which may provide a solution for those with religious objections to traditional autopsies.<sup>110</sup> However, this practice has not yet been fully integrated into mainstream forensics in this country,<sup>111</sup> and no legal precedent indicates that next of kin may require a medical examiner to perform a virtual autopsy. Nevertheless, more and more facilities are starting to explore or use this technique, so counsel should gain a familiarity with the procedure. 📌

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### Notes

- 1 See Louis Dehner, *The Medical Autopsy: Past, Present, and Dubious Future*, 107 *Mo. Med.* 94, 95–96 (2010).
- 2 See Janet Portman, *Autopsies: When Are They Done, Can You Object?*, *Lawyers.com* (Jan. 13, 2021), <https://www.lawyers.com/legal-info/criminal/criminal-law-basics/autopsies-finding-out-why-may-be-required.html>.
- 3 *Id.*
- 4 Kaitlin Weaver & Kim Collins, *Religions and The Autopsy*, *Medscape* (May 17, 2020), <https://emedicine.medscape.com/article/1705993-overview?reg=1#a1>.
- 5 Samuel Hodge & Lauren Williams, *Virtual Autopsies—The New Kid on the Block in Death Investigations*, 46 *Dayton L. Rev.* 265, 280 (2021).
- 6 *Id.* at 266.
- 7 *Autopsy, Vocabulary*, <https://www.vocabulary.com/dictionary/autopsy>.
- 8 *Autopsy*, *Legal Information Institute, Cornell L. Sch.* (Nov. 2021), available at <https://www.law.cornell.edu/wex/autopsy>.

- 9 See, e.g., Natasha Sheldon, *The Earliest Recorded Autopsy in History Was Performed on This Roman Emperor*, History Collection (June 6, 2017), <https://historycollection.com/julius-caesar-complicit-death-re-examining-earliest-autopsy-history/>.
- 10 See Hodge & Williams, *supra* note 5, at 267–68.
- 11 See Dehner, *supra* note 1, at 96.
- 12 See Hodge & Williams, *supra* note 5, at 267.
- 13 *Id.* at 268.
- 14 *Id.*
- 15 *Id.*
- 16 *Id.*
- 17 Randy Hanzlick et al., *A Guide for Manner of Death Classifications* 6 (2002).
- 18 Cyril H. Wecht, *Utilizing the Pathologist to Prove Injury*, 2 Ann. 2000 ATLA CLE 2915, 2918 (2000).
- 19 Todd T. Smith, *Forensic Autopsies in Missouri: Navigating the Road from the Morgue to the Courtroom*, 76 J. Mo. B. 16, 17 (2020).
- 20 Samuel D. Hodge, Jr., *an Attorney’s Guide to an Autopsy: A Medical-Legal Overview*, 59 U. Louisville L. Rev. 23, 30 (2020).
- 21 *Id.* at 31.
- 22 *Id.*; *Silent Ischemia*, Texas Heart Institute, available at <https://www.texasheart.org/heart-health/heart-information-center/topics/silent-ischemia/>.
- 23 *Id.* at 31.
- 24 See *Coroner’s Statutes: § 1202-B*, Pa. State Coroner’s Ass’n (2018), <http://www.pacoroners.org/cms/about-the-psca/coroners-statutes/#1201-B>.
- 25 See *id.*
- 26 *History of the Autopsy*, Mopec, <https://www.mopec.com/history-of-the-autopsy/>.
- 27 See Hodge & Williams, *supra* note 5, at 270.
- 28 See Dehner, *supra* note 1, at 95–97.
- 29 Samuel D. Hodge, Jr. & Nicole M. Saitta, *Behind the Closed Doors of the Coroner’s Office—The Medical/Legal Secrets Involving an Autopsy*, 32 Temp. J. Sci. Tech. & Env’tl. L. 1, 39 (2013).
- 30 See *Coroner’s Statutes: § 1202-B*, Pa. State Coroner’s Ass’n (2018), <http://www.pacoroners.org/cms/about-the-psca/coroners-statutes/#1201-B>.
- 31 See *id.*
- 32 *History of the Autopsy*, *supra* note 26.
- 33 Hodge & Williams, *supra* note 5, at 270.
- 34 See Dehner, *supra* note 1, at 95–97.
- 35 Samuel D. Hodge, Jr. & Nicole M. Saitta, *Behind the Closed Doors of the Coroner’s Office—The Medical/Legal Secrets Involving an Autopsy*, 32 Temp. J. Sci. Tech. & Env’tl. L. 1, 39 (2013).
- 36 Melissa Conrad Stöppler, *When Is an Autopsy Mandatory?*, MedicineNet (Aug. 10, 2017), [https://www.medicinenet.com/when\\_is\\_an\\_autopsy\\_mandatory/ask.htm](https://www.medicinenet.com/when_is_an_autopsy_mandatory/ask.htm).
- 37 *Id.*
- 38 *Id.*
- 39 *Id.*
- 40 *Id.*
- 41 See Stöppler, *supra* note 36.
- 42 See 98 Am. Jur. Proof of Facts 3d, *Autopsies* § 2 (2020).
- 43 See, e.g., Mark Koponen, *The Autopsy Report*, Medscape, <https://emedicine.medscape.com/article/1718019-overview> (Mar. 14, 2019).
- 44 Common law initially regarded the corpse as having no value. See Richard Conran, *Microlegal Issues and the Autopsy*, MedScape (Aug. 5, 2019), <https://emedicine.medscape.com/article/1975045-overview#a3>. However, over time case law established the right for next of kin to protect a decedent’s body from unauthorized autopsy. Today, state statutes largely replace common law principles concerning consent for autopsies. See *id.*
- 45 See Hodge & Williams, *supra* note 5, at 277.
- 46 *Id.* at 277–78.
- 47 See *Forensic Autopsy*, Md. Dep’t Health, <https://health.maryland.gov/ocme/Pages/Forensic-Autopsy.aspx#>.
- 48 *Id.*
- 49 See Stöppler, *supra* note 36.
- 50 See, e.g., 16 Pa. Stat. Ann. § 1239.
- 51 Hodge & Williams, *supra* note 5.
- 52 Hodge & Saitta, *supra* note 35, at 10.
- 53 *Id.* at 10-11.
- 54 *Id.* at 11.
- 55 Jake Grovum, *Religious Freedom, States’ Interests Clash Over Autopsies*, Stateline, Pew Charitable Trusts (June 29, 2015), available at <https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2015/6/29/religious-freedom-states-interests-clash-over-autopsies>.
- 56 *Certificate of Religious Belief Objecting to Autopsy*, ALCOR, <https://www.alcor.org/library/certificate-of-religious-belief-objecting-to-autopsy/>.
- 57 See *id.*; *FAQ*, Westmoreland County, Pa., <https://www.co.westmoreland.pa.us/Faq.aspx?QID=273>.
- 58 *Id.* (“Certain religious objections to an autopsy may be considered but will not necessarily prevent it from occurring.”).
- 59 Stöppler, *supra* note 36.
- 60 See, e.g., 16 Pa. Stat. Ann. §§ 1238, 1239, 9521(a).
- 61 See *id.*
- 62 See *Notes from a Plaintiff’s Attorney: Avoiding Liability Involving Autopsies*, Med. Justice (Jan. 23, 2015), <https://medicaljustice.com/notes-plaintiffs-attorney-avoiding-liability-involving-autopsies/>.
- 63 *Wis. v. Yoder*, 406 U.S. 205, 214 (1972).
- 64 See *id.*
- 65 See generally, *Snyder v. Holy Cross Hospital*, 352 A.2d 334 (Md. Ct. Sp. App. 1976); *Kickapoo Traditional Tribe v. Chacon*, 46 F.Supp.2d 644 (W.D. Tex. 1999); *Yang v. Sturner*, 750 F. Supp. 558 (D.R.I. 1990); *Montgomery v. County of Clinton*, 743 F. Supp. 1253 (W.D. Mich. 1990).

- 66 See, e.g., 16 Pa. Stat. Ann. § 1238.
- 67 *People v. Dungo*, 286 P.3d 442, 450 (Cal. 2012) (noting an autopsy can be beneficial to satisfy the public's interest in knowing the cause of death).
- 68 See Notes from a Plaintiff's Attorney, *supra* note 62.
- 69 *Green v. Kearney*, 690 S.E.2d 755, 761 (N.C. App. 2010).
- 70 Hodge & Williams, *supra* note 5, at 278.
- 71 See, e.g., Yang, 750 F. Supp. at 560; Kickapoo Traditional Tribe, 46 F.Supp.2d at 654.
- 72 Snyder, 352 A.2d at 334–35.
- 73 The court stated that the state's interest includes "safeguard[ing] the peace, health, and good order of the community." *Id.* at 340.
- 74 See *id.*
- 75 Montgomery, 743 F. Supp. at 1259–60.
- 76 See Hodge & Williams, *supra* note 5, at 284.
- 77 See Stephan A. Bolliger et al., Virtual Autopsy Using Imaging: Bridging Radiologic and Forensic Sciences. A Review of the Virtopsy and Similar Projects, 18 *Eur. Radiol.* 273, 273 (2008).
- 78 See Vito Cirielli et al., Virtual Autopsy as a Screening Test Before Traditional Autopsy: The Verona Experience on 25 Cases, 9 *J. Pathol. Inform.* 28, 28 (2018), available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6106125/>.
- 79 See Hodge & Williams, *supra* note 5, at 266.
- 80 See Maryn McKenna, Virtues of the Virtual Autopsy, *Sci. Am.* (Nov. 1, 2021), available at <https://www.scientificamerican.com/article/virtues-of-the-virtual-autopsy/>.
- 81 See Hodge & Williams, *supra* note 5, at 288.
- 82 See Catherine Guthrie & Brittan Mitchell, The Swinton Six: The Impact of State v. Swinton on the Authentication of Digital Images, 36 *Stetson L. Rev.* 661, 713 (2007).
- 83 See *id.*; Mark Honigsbaum, Virtual Autopsy: Does it Spell the End of the Scalpel?, *Guardian* (Feb. 13, 2013), <https://www.theguardian.com/science/2013/feb/23/virtual-autopsy-virtopsy-forensic-science>.
- 84 Guthrie & Mitchell, *supra* note 82, at 713–14 (2007).
- 85 Honigsbaum, *supra* note 83.
- 86 Hodge & Williams, *supra* note 5, at 286.
- 87 Guthrie & Mitchell, *supra* note 82, at 713–14.
- 88 Honigsbaum, *supra* note 83.
- 89 Hodge & Williams, *supra* note 5, at 286.
- 90 Honigsbaum, *supra* note 83.
- 91 McKenna, *supra* note 80.
- 92 See Hodge & Williams, *supra* note 5, at 288.
- 93 See Honigsbaum, *supra* note 83.
- 94 *Id.*
- 95 *Id.*
- 96 Hodge & Williams, *supra* note 5, at 288.
- 97 Coroner's Statutes, *supra* note 24, § 1217-B, <http://www.pacoroners.org/cms/about-the-psca/coroners-statutes/#1217-B>.
- 98 Hodge & Williams, *supra* note 5.
- 99 Guthrie & Mitchell, *supra* note 82, at 713 ("Despite developments this technique has not yet been adopted by the mainstream forensic community in the United States.").
- 100 Hodge & Williams, *supra* note 5, at 289.
- 101 Isaac Joseph et al., Virtopsy: An Integration of Forensic Science and Imageology, 9 *J. Forensic Dent. Sci.* 111, 112 (2017).
- 102 McKenna, *supra* note 80.
- 103 See *id.*
- 104 Hodge & Williams, *supra* note 5, at 287.
- 105 McKenna, *supra* note 80.
- 106 See Guthrie & Mitchell, *supra* note 82, at 717. A CT scanner initially costs \$560,000 and costs \$200,000 to maintain, and an MRI machine costs \$200,000 to maintain. See Tanya Mendis, Medical Investigators Conducting Virtual Autopsies, *KOAT 7 Action News*, Nov. 1, 2013, available at <https://www.koat.com/article/medical-investigators-conducting-virtual-autopsies/5051762>.
- 107 See Cirielli et al., *supra* note 78.
- 108 Guthrie & Mitchell, *supra* note 82, at 718. Japan, Australia, the United Kingdom, and Italy are examples of jurisdictions using virtual autopsies to supplement traditional autopsies. See Hodge & Williams, *supra* note 5, at 287.
- 109 See, e.g., Snyder, 352 A.2d at 334–35; Montgomery, 743 F. Supp. at 1259–60.
- 110 See Joseph et al., *supra* note 101, at 111–12; Hodge & Williams, *supra* note 5, at 266.
- 111 See Guthrie & Mitchell, *supra* note 82, at 713.