

CLEAR VISION FORENSIC NECRO-RADIOLOGY

Victoria leads the world in the use of forensic scanning technology to determine cause of death, but the legal profession is yet to fully embrace its benefits.

KARIN DERKLEY

Dr Chris O'Donnell describes the Victorian Institute of Forensic Medicine (VIFM) as a "jewel" in the forensic investigation crown. "We are just so far ahead of the rest of the world when it comes to medico-legal death investigation," he says.

In 2005, VIFM was one of the first in the world to set up a facility to use computer tomography (CT) to scan all bodies that come through the Coroner's Court of Victoria. More than 108,000 bodies have been scanned since then, O'Donnell says, while the use of autopsies has plummeted to fewer than 50 per cent.

"There are very few places in the world that are doing this, and certainly not to the extent that we are doing it," O'Donnell says.

In July 2025, VIFM installed a magnetic resonance imaging (MRI) machine that offers a more sophisticated way of examining soft tissues, detecting subtle changes to organs and demonstrating injuries.

"That will further add to our ability to detect injury and contribute to understanding the cause and manner of death," O'Donnell says.

CT images are less confronting to view than autopsy photographs, can be understood more easily and help determine how injuries may have occurred "often to a better extent than an autopsy", he says. For example, the extent of a fracture can be difficult for a pathologist to dissect out, while "a CT scan can produce evocative images to portray those injuries".

Despite its advantages, however, the use of forensic imaging in homicide or assault trials is still low. As one of few forensic radiologists qualified to give expert testimony on post-mortem scans, O'Donnell says he has been called to give evidence no more than a dozen times.

More objective and accurate investigations

Medico-legal researcher Dr Marc Trabsky says forensic scanning has "changed everything - from post-mortem examinations to coronial investigations, to the presentation of traumatic image-based evidence in court".

Trabsky is an Associate Professor and Deputy Director with the Australian Centre for Justice Innovation in the Faculty of Law at Monash University.

He recently completed a research project, funded by an Australian Research Council's Discovery Early Career Researcher Award (DECRA) fellowship, on the socio-legal implications of forensic imaging technology in coronial investigations.

Trabsky says forensic scanning creates a more objective and accurate investigation of the medical cause of death. "It also creates a more permanent record and a way of discovering the cause of death without doing damage to the body."

Traditional post-mortem dissections are irreversible, Trabsky points out. "When you open up a person, you can cause significant damage that can disrupt the chain of evidence."

It is a bit like Schrödinger's cat, O'Donnell adds, referring to the famous paradox where it is impossible to know whether a cat sealed in a box is alive or dead until the box is opened.

"By cutting the body, you are actually changing the body," he says. "And, like with Schrödinger's cat, as soon as you open the box, you alter the conditions of



what is in the box. With MRI and CT, on the other hand, the box remains closed.”

From traumatic to probative

Forensic scanning has also revolutionised the way evidence is presented in court, says David Ranson, Clinical Professor in the Department of Forensic Medicine at Monash University and former VIFM Deputy Director.

The VIFM used CT scanning to help identify victims of the 2009 Black Saturday fires, and the methods and technologies they developed in the process are now used across the world.

“CT scans are a very powerful learning and communication tool if you want to adduce evidence,” Ranson says. “They often show things better than a photograph or an X-ray can.”

For judges and jurors who need to examine images closely, CT scans are much more palatable, Ranson says. “You can have a person with multiple stab wounds, and you might not want to show photos of that to the jury. But you can show the CT scan, which just gives you a surface map of the body without any blood.”

CT scans can also be used to create 3D models of an injured body part. “This means you can move away from an emotional image to a much more probative image,” Ranson says.

Trabsky agrees. “Before all this technology, you would come into the court with really grisly photographs of the injuries,” he says, which can be traumatic and emotive, and get in the way of an understanding of what has happened.

Evolution in death investigation

Increased adoption of digital technology in the courts offers the capability to use forensic imagery during trials.

According to the Office of Public Prosecutions, scans may be provided to jurors to help them understand pathology evidence “instead of or in addition to post-mortem photographs, depending on the facts in issue and what the best evidence is”.

The use of electronic jury books and electronic trials means that pathologists can mark an image on a screen electronically while giving their evidence, and that marked image can be uploaded to jury books.

Barrister Dr Ian Freckelton KC – who co-authored *Death Investigation and The Coroner’s Inquest: Law, medicine and practice* with Ranson, and is an Honorary Professor of Forensic Medicine at Monash University – says forensic post-mortem scans have been an important evolution in how death is investigated and determined.

Freckelton believes forensic scans are likely to play an increasingly significant role as evidence in the courts, including in homicide trials. “Judges are taking steps to avoid distressing or overly graphic pictures of deceased bodies. The use of scans and radiographic images is less confronting and just as effective in showing what needs to be provided to jurors.”

Forensic scans are “simply another form of obtaining information about what brought about the death of a person,” he says. “That kind of evidence is adduced regularly in the coroners’ courts.”

Reasonable doubt

Not everyone agrees, however.

Criminal lawyers like Holly Boylan, Partner at Doogue + George, are sceptical about whether medical imaging alone can



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Forensic Radiologist,
Victorian Institute of Forensic Medicine

provide enough information to determine cause of death. “While there is no doubt that forensic imaging is less confronting than autopsy photographs,” she says, “it cannot provide the same level of detail and insight that a full autopsy offers.”

While medical images presented in criminal proceedings can provide information about the presence, nature and extent of injuries, “they rarely speak directly to the mechanism or cause of death or injury”.

“In serious matters such as homicide, it is crucial that juries are presented with the most comprehensive and reliable evidence available to support their deliberations. In my view, juries in a criminal trial are best served by having access to all available evidence – no matter how distressing,” Boylan explains.

An added challenge is that CT and MRI scans only truly exist in 3D form. The technology to display them in 3D is expensive, so in many cases they are distributed to the court as a series of 2D images that are a simulacrum of the 3D scan.

Challenges with interpretation

There are also concerns about CT and MRI images being manipulated or interpreted in a way that favours the prosecution’s case.

Boylan says she recently acted on behalf of a father charged with intentionally causing serious injury to his infant daughter. “The prosecution alleged that he had shaken her, resulting in a serious brain injury.”

The prosecution’s expert interpreted the hospital’s CT and MRI images of the child

as showing a subdural haemorrhage. The defence engaged its own expert, who offered a different interpretation.

“The central issue became whether the imaging showed a true haemorrhage – in other words, an accumulation of blood, or a fluid collection that also contained blood,” Boylan says. “These differing interpretations led to conflicting opinions regarding the cause of the brain injury.”

Freckelton argues, however, that this simply highlights the need for informed and focused cross-examination to ensure that limitations and ambiguities in forensic radiography are identified and explored.

O’Donnell acknowledges that presenting forensic scans in court, by definition, involves manipulating and interpreting images. “By taking those slices and then putting them into a computer, I am producing images that show the findings I want to portray.”

“But this is something that is done every single day by clinical radiologists,” he points out. “I’m using the same techniques that would be used in clinical practice, but just in a post-mortem practice. That’s my role as an expert.”

Defence lawyers who are concerned that forensic images might be manipulated are able to examine the data used to produce them as a base set, O’Donnell says. “At any time, if a defence attorney or anyone wanted to have the information that I’ve used to produce the images, it is available. They have access to other radiologists that can do similar things that I do on a workstation.”

Battle for the experts

Interpreting CT and MRI scans requires an expert in criminal proceedings, Boylan says. “Lawyers and fact finders, including jurors, are not trained to interpret these images independently.”

“Instead, qualified specialists – such as radiologists – must provide expert reports that can be scrutinised and analysed within the legal process. It is also important to note that interpretations of such images can be contested and may vary between experts.”

As Trabsky puts it, “What we are going to see is the battle of two experts in court interpreting the image differently.” This is similar to what happens in medical practice, with different doctors delivering different diagnoses.

A major challenge, however, is a shortage of radiologists qualified to interpret forensic imagery. When O’Donnell first started at VIFM years ago, he was the only one, “and there are still not many other forensic radiologists”, he says.

This is an issue the VIFM is trying to address, he adds, including through education and training courses.

Clinical radiologists can contribute, but scanning and interpreting scans of a dead body is quite a different skill to imaging of a live person, O’Donnell points out. “When someone dies, the body changes, and you have to understand those changes. Clinical radiologists cannot look at a post-mortem CT scan and assume they are an expert. They do need additional training to make sure they don’t make mistakes.”

Forensic pathologists, who conduct traditional autopsies, can also play a role, while the creation of a Faculty of Forensic Medical Imaging could help to train radiologists and pathologists in forensic post-mortem imaging to enhance their skills.

Still a place for autopsies

O'Donnell hopes the use of imaging in court trials will increase in the future as the courts and defence lawyers come to recognise their value. "At the moment, it is really being driven by the prosecution. But there is great potential and, as it percolates through the legal system, we'll probably be asked to do more and more."

However, there is no suggestion that autopsy dissections will be eliminated altogether in homicide trials.

To Freckelton, a forensic scan "provides a significant part of the overall picture, and then it's up to the jury to decide on the basis of other evidence, often circumstantial evidence, or maybe eyewitness evidence, about what took place during the relevant incident".

"The next step, if it is necessary, is a full or partial autopsy."

There will always be a place for post-mortem dissections, Trabsky agrees, "particularly when it comes to the threat of someone being deprived of their liberty through a prison sentence". But conducting a forensic scan ahead of an autopsy can make it more precisely targeted.

"If you do a scan, you can pinpoint a certain part of the body that needs

to be dissected, which will give you clues about the medical cause of death," he says.

"You can find out where the bullet is and then plan how to retrieve it in a way that doesn't disrupt that chain of evidence and cause more damage."

Forensic scans represent just one more tool in the toolbox for finding the medical cause of the death, Trabsky adds. "While they are accurate, they can't solve everything."

"When there is an interested party who could face a prison sentence, we need to ensure we are doing the post-mortem dissection. It is about the highest standards of proof and the gravity of what is occurring." ♦

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