ePathWay
THE ROYAL COLLEGE OF PATHOLOGISTS OF AUSTRALASIA

SEPTEMBER 2016 | Published by RCPA

Issue #062

In This Issue

Interesting Facts

1995

The year the first Australian Standard (AS-4308) to guide urine drug testing was developed.

25-30%

The suggested increase in workplace drug testing in Australia each year.

Welcome to the September edition of ePathWay

It wouldn't be an Olympic year without some kind of drug testing scandal, and this year was no different. The Russians were caught out manipulating the doping control process, but elaborate methods to avoid detection of illicit drugs also happen in our own backyard.

Our other stories cover:

- The *Campylobacter* outbreak on New Zealand's North Island.
- How Forensic Odontology helps solve cold cases.
- How our Lay Committee provides a valuable consumer voice within the College.

Heads up - International Pathology Day is Wednesday 16 November this year. Check out the website to see what is being organised and to find out how you can participate.

Don't forget to check the topical posts on our Facebook page and follow our CEO Dr Debra Graves (@DebraJGraves) or the College (@PathologyRCPA) on Twitter to keep up to date with pathology news.

Cat and mouse drug testing 'games' are not limited to the Olympics

1 in 5

The proportion of 67 common supplement products available for purchase in Australia found to be tainted with banned substances that could register a positive doping test for athletes.

Sources: Australian Drug Foundation, ASADA

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The World Anti-Doping Agency (WADA) investigation that exposed Russia's manipulation of the doping control process highlighted the cat and mouse 'games' that happen at an elite sporting level. But elaborate methods to avoid detection of illicit drug use are not limited to the Olympic arena. They happen every week across Australia, and some of the attempted cover-up methods are astonishing.

Dr Charles Appleton, Chemical Pathologist and Director of Biochemistry and Toxicology at QML Pathology in Brisbane, says there are many reasons to test for illicit drugs including workplace safety and to provide evidence for legal cases. Most drug tests are performed on urine samples, and sometimes the collection process becomes a game of cat and mouse.

"We have had mothers with nursing experience collect drug-free urine from a friend or from their child. When they are called on to provide a urine sample for a drug test, they will pass a catheter through their urethra up into their bladder, and use this catheter to fill their bladder with the acquired drug-free urine before the drug test," explains Dr Appleton.

"I have seen another case where a man using illicit drugs obtained urine from other people, and was then injecting it into his bladder through his lower abdomen using a lumbar puncture needle before each test. He was finally caught when one batch of his acquired urine turned up positive for cocaine. On that occasion the laboratory caught two people from the one sample!"

Dr Appleton says urine samples for drug testing must be collected according to the Australian Standard and tested at appropriately accredited laboratories. Some are collected under direct supervision, such as in legal disputes and from elite athletes and medical professionals. Other situations, such as workplace testing, require a pathology collector to stand outside the toilet while the sample is being obtained.

"When the pathology collector doesn't witness the collection, the temperature of the urine must be taken within four minutes.

This is to ensure the urine is close to body temperature which should indicate it has just been passed. But some people have 'clean' urine samples hidden on them, including stored in body cavities, to ensure it is as close to body temperature as possible in order to evade detection," explains Dr Appleton.

He says drug testing for athletes is performed at a group of specialised laboratories that are set up to test for the vast array of banned substances for elite athletes. The list includes illicit and legal drugs, and the substances each athlete is tested for depends on their sport. For example, athletes whose sport requires strength might be tested for anabolic steroids, while athletes whose sport requires a high level of precision, such as pistol shooters, might be tested for blood pressure drugs that reduce the normal tremor which we can all experience.

Urine is the most common sample collected for drug testing, but Dr Appleton says you can test almost anything for drugs including blood, saliva, hair, sweat and fingernails. There are benefits and risks for each kind or specimen, and he says you need to keep sight of what they are being collected for and the desired outcome, which is to detect minimal levels of a drug in a person's body.

Doping scandals in sport are nothing new, although the Russian team took this blight on sport to another level. Unfortunately the cat and mouse games associated with drug testing are not limited to the international sporting arena. They happen in our own backyard. Procedures to thwart attempts to evade detection are only as good as the staff enforcing them, so perhaps we could issue medals to the pathology staff involved in these cases to reward them for their outstanding efforts as well.

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A large gastro outbreak traced to a contaminated water supply affected around 5000 Havelock North residents on New Zealand's North Island last month. Rigorous testing found the water supply was infected with the bacteria *Campylobacter*, which is also the leading cause of foodborne disease in New Zealand. If this is the case, how did the bacteria get into the water supply?

"There have been a number of waterborne *Campylobacter* outbreaks in New Zealand over the years, and it is thought that most are from contaminants from agriculture, with cattle or dairy stock being the *Campylobacter* source," explains Dr Arthur Morris, Clinical Microbiologist at Auckland City Hospital.

"What happens is stock contaminate the ground with their faeces. Then when it rains, contaminated water seeps into the source of a water bore and so contaminates the water supply."

Campylobacter bacteria normally inhabit the intestinal tract of warm-blooded animals such as poultry and cattle. Infections cause campylobacteriosis which produces symptoms such as abdominal pain, fever and diarrhoea, often with bloody stools.

"Pathology laboratories play an important role in recognising these types of outbreaks. For example, the laboratory staff can recognise an increase in positive results from faecal specimens for the same organism in a short space of time, and this raises a red flag that something is going on," explained Dr Morris.

"The labs can also store outbreak isolates, and have them sent for typing. This is important for confirming a single source outbreak rather than a lot of mini outbreaks from different strains of the bacterium. The lab will also test the same faecal specimen for other pathogens such as salmonella, shigella, giardia and cryptosporidium to rule them out."

Dr Morris says *Campylobacter* infection is a notifiable disease in New Zealand and the positive test results are

automatically sent to the relevant Public Health Service. This means a lot of positive results for the same isolate being sent over a short space of time also raises the red flag an outbreak may be occurring.

The outbreak in Havelock North is now contained although the hunt is still on for the contaminant's source. If more gastro illness breaks out in the meantime, then pathologists will be able to determine the cause to establish whether it's more of the same, or a new outbreak.

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Forensic Odontology solves more than cold cases

Solving cold cases provides endless storylines for popular TV shows, yet the truth is usually more interesting than fiction. Forensic Odontologist Professor Chris Griffiths, current chair of the RCPA Faculty of Oral and Maxillofacial Pathology, has a career's worth of experience with solving real cases, and kindly shared his insights with us.

Before we delve into his career, it's important to define forensic odontology. It is a specialist branch of dentistry that applies extensive dental-specific knowledge to legal and criminal issues. It involves cranio-facial trauma analysis, estimating a deceased person's age, dental evidence related to child abuse, bite mark analysis, dental malpractice/insurance fraud investigations, and identifying individuals after death.

"According to Interpol standards there are only three identifiers for a deceased person that can legally stand alone as a single identifier. These are the deceased person's DNA, their fingerprints and dental evidence. Identification of the deceased by a single one of these 'official identifiers' is considered positive and doesn't require corroboration by another technique," explains Prof Griffiths.

"I would also stress that identification is a team process with involvement from forensic pathologists, anthropologists, police and forensic odontologists. It is also very important to accurately identify a body using a reliable method. For example, you can't charge a person with murder unless their victim is positively identified."

Prof Griffiths has had first hand experience with this law. He played a key role in identifying the backpackers murdered in Belanglo State Forest in NSW by Ivan Milat during the 1990s.

"I used to play in Belanglo State Forest as a 12 year old and I knew it well. It was different to go there with detectives and a forensic pathologist to exhume the murder victims after the police had found them. The victims were mostly only covered with

branches and logs. We identified six of the seven victims using dental records, but couldn't do so for the seventh victim because the head was never recovered."


Prof Chris Griffiths

Prof Griffiths and Professor John Hilton were also the first Australian forensic specialists to arrive in Bali after the 2002 bombing of the Sari Club.

"The bombing happened on Saturday and we arrived the following Monday. By then relatives and friends had allegedly visually identified some victims but we had to comply with Interpol standards and formally identify the deceased using one of the three official identifiers. Interestingly, dental evidence showed that out of the 18 victims that had been visually identified by families, nine were wrong. Dental records were then able to identify the victims accurately."

When asked how this could happen, Prof Griffiths explained that statistically, visual identification after a mass disaster usually misidentifies one in five victims.

"People look different when they are dead. There is a picture illegally taken of Marilyn Munroe a couple of hours after she died, and when it is shown to medical students they don't recognise who it is despite her being such a famous and recognisable person."

One aspect that presumably doesn't change after death is our teeth, and to the untrained eye they may all look very similar from one person to the next. This leads to the question, how is a deceased person identified dentally? Prof Griffiths explained that it is all about pattern matching, looking for visual clues and points of concordance.

"Restorative work such as fillings and crowns, and the patterns and grooves of a person's teeth, are unique to them. Once we get a post-mortem x-ray of the deceased person's teeth, and we have their previous dental records, then the visual process of matching can take as little as ten minutes. If a person is young and they haven't had much dental work done, such as with many of the Bali bombing victims, then we start looking at the anatomical shape of the teeth, jawbone and maxillary sinus, and these give us many points of concordance."

Even when previous dental records don't exist, Forensic Odontology can still provide valuable evidence about the age a person died. Prof Griffiths has also had experience in this area, including after a massacre in Timor in 1999.

"It was after the independence vote and there was a massacre in a village in the Oecussi enclave of West Timor. Women, children, men and boys were killed, and then about 70 more boys were rounded up and executed simply because they were educated. I went with Dr Alan Cala (a forensic pathologist) as part of the United Nations Human Rights Commission team, and we were able to exhume the bodies, determine their age and what happened to them, and importantly tell their story to the world."

Prof Griffiths says telling a person's story is an important part of identifying victims, including recording their age and the manner in which they died. Early in his career he was part of an Australian team sent to Ukraine with RCPA Fellow Dr Godfrey Oettle as part of the Commonwealth Government's Special Investigations Unit into war crimes. This delegation was dispatched in response to sightings of possible war criminals in Adelaide who were allegedly involved in a mass execution of Russian Jewish citizens in Ukraine during World War II.

"Our job was to research where the gravesite would be, find it, exhume the bodies and determine the age of the children who were killed. This would allow the authorities to place the person of interest in the same place and time that the people were executed, and to match the age of the bodies with the age of the people who went missing at that time. This evidence could then be used to bring the perpetrators to justice," he explains.

"We found the grave, exhumed the bodies, determined their age of death from their teeth, and when we came back and presented our evidence the people of interest were charged as war criminals," he explained.

The exploits of the Special Investigations Unit into war crimes that was dispatched to Ukraine formed the basis of a novel published in 2005 titled Winter Journey by Diane Armstrong.

While bringing the people to justice was the main objective, Prof Griffiths says there are other important aspects to ponder as well.

"It's not about retribution as much as telling the victims' stories. By putting the pieces of the crime together, identifying the age of victims and the manner in which they died, it shows people what happened to them. If we can do this using forensic techniques, then perhaps someone in the future who is about to commit an atrocity will pause and think that at some point in their future they won't be able to hide from what they are about to do."

That is certainly another aspect to Forensic Odontology, and demonstrates that the truth can be more interesting - and more confronting - than fiction.

Forensic Odontologists and the RCPA

While Forensic Odontologists are not trained as pathologists, Prof Griffiths says a number of them were accepted into the

RCPA's Faculty of Oral and Maxillofacial Pathology via a grandfathering process in 2013.

"The RCPA has been setting up training programs that can satisfy the boards of Australia for specialist registration. Hopefully all Forensic Odontologists will be trained under the RCPA system in the future."

The RCPA's Faculty Fellowship in Forensic Odontology training is open to registered dental practitioners in Australia, New Zealand, Hong Kong, Singapore and Malaysia.

Prof Griffiths works in the Identification Unit at the Department of Forensic Medicine in Sydney.

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Lay Committee Chair Ms Andrea Plawutsky says the committee's primary purpose is to provide the College with input and guidance from a consumer perspective, and to support the College in responding to consumers' concerns and questions regarding pathology.

"We help the College engage with their end user, i.e. the consumer, in terms of understanding the perceptions and level of knowledge in the community about pathology, and then help them tailor their messages."

She said the Lay Committee's members also provide engagement with other lay committee advisory groups in the medical area, such as Cancer Voices, which has the benefit of providing linkage and insights to these other groups.

"Our committee is made up of a combination of lay people and pathologists from the public and private sector, and from different pathology disciplines. Many of our members, including the pathologists, are also on other committees and advisory boards, and they take the information and guidance from our meetings back to their various committees."

Ms Plawutsky says the college takes the Lay Committee's feedback and input very seriously. The Committee also keeps members up-to-date with College initiatives, and responds to their concerns.

"For example, we raised the issue of privacy and confidentiality around pathology results, and we are now in the process of producing a fact sheet for consumers on these topics. We also provide input about position statements, social media trends relating to pathology, and on publications that are being updated such as the brochures representing a day in the life of a pathologist. We represent a fairly educated group, so in that regard we are a litmus test for the effectiveness of the College's communications to consumers."

This perspective is important because the College's membership base of specialist doctors could easily remain entangled in medicine's minutiae and isolated from the general public. The Lay Committee therefore provides a valuable and valued voice that ensures the voices of consumers from Australia and New Zealand are represented and listened to in an official and respectful way.

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