ePathway
THE ROYAL COLLEGE OF PATHOLOGISTS OF AUSTRALASIA

OCTOBER 2018 | PUBLISHED BY RCPA ISSUE #085

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INTERESTING FACTS

5

The level at which lead in the blood has to be reported to the health authorities (in micrograms per litre)[1].

1.2 million

The number of people in Australia affected by osteoporosis.[2] In New Zealand it is estimated that at least 1 in 3 women and at least 1 in 5 men will suffer from an osteoporotic fracture during their lifetime.[3]

3

The number of different

Welcome to the October issue of ePathway

ePathway is an an e-magazine designed for anyone who is interested in their health and wellbeing and the integral role pathology plays in the diagnosis, treatment and management of diseases.

This month, we discuss

- Diagnosing and treating osteoporosis
- Troponin, an important biomarker in the diagnosis of heart attacks
- The risks of lead exposure and toxicity
- An insight into life away from the major cities

Osteoporosis is a disease which makes bones become brittle, leading to a higher risk of breaks than in normal bone. We speak to Dr Ailie Connell, who explains more about this common disease, which occurs when bones lose minerals such as calcium more quickly than the body replaces them. Those most at risk are postmenopausal women; however, the risk of osteoporosis also increases with age.

We explore troponin, an important biomarker in the diagnosis of myocardial infarction, or heart attack. We discuss the fourth universal definition of myocardial infarction, which was published in August 2018.

We chat with RCPA past president, Associate Professor Peter Stewart, to discuss the risks of lead poisoning and exposure. Whilst lead poisoning is not common today, lead exposure remains of key concern to public health officials worldwide. We discuss the circumstances in which you would see lead poisoning, including when you would test blood lead levels.

Finally, we speak to Dr Penny Yarrow and Dr Archana Pandita to discuss the advantages of living and working away from the major cities. Shorter commute times, better work-life balance and an increased variety of interesting and complex cases are all reasons why these two pathologists enjoy living and working in Hobart or Hamilton.

Remember to follow us on Facebook (@TheRoyalCollegeofPathologistsofAustralasia), Twitter (@PathologyRCPA) or on Instagram (@the_rcpa). CEO, Dr Debra Graves can be followed on Twitter too (@DebraJGraves).

troponins[4]

Source:

[1] https://www.health.nsw.gov.au/infectious/controlguideline/pages/lead.aspx

[2] https://www.osteoporosis.org.au/about-osteoporosis

[3] https://osteoporosis.org.nz/wp-content/uploads/ONZ-2017-Strategic-Plan-WEB.pdf

[4] https://www.labtestsonline.org.au/learning/test-index/troponin

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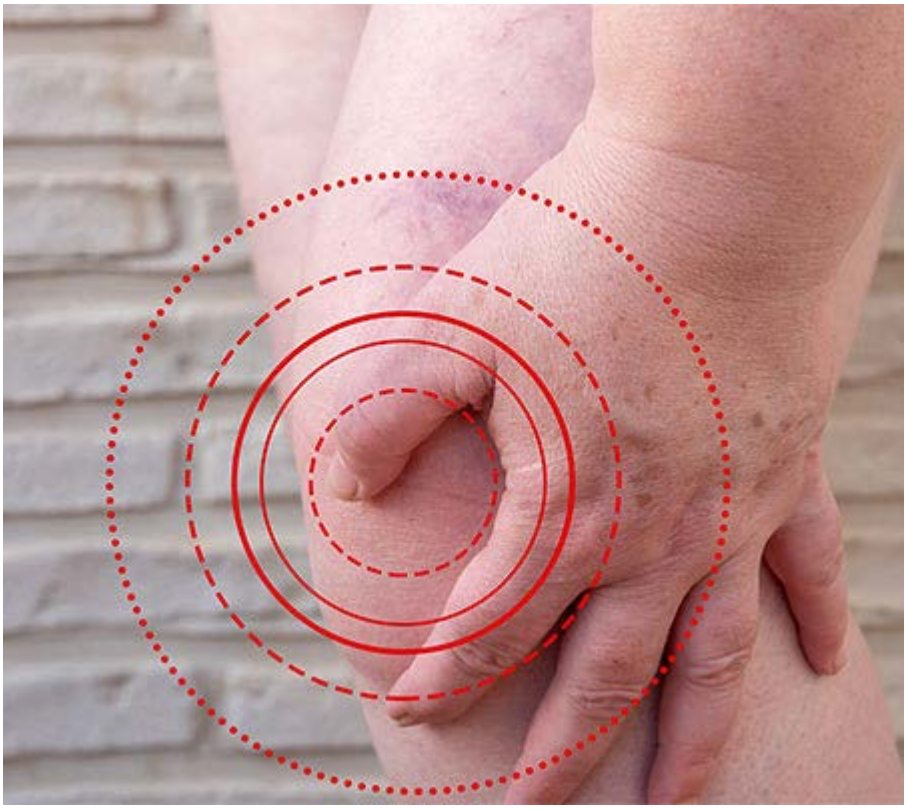

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Doctor Penny Yarrow is an anatomical pathologist at Hobart Pathology, a private lab in Hobart, Tasmania. Doctor Archana Pandita is an anatomical pathologist at Waikato District Health Board in Hamilton, New Zealand. We spoke to Dr Yarrow and Dr Pandita to get a sense of what it's like to work somewhere like Tasmania or Hamilton.

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Diagnosing and treating Osteoporosis

Osteoporosis is a disease which makes bones brittle, leading to a higher risk of breaks than in normal bone. It occurs when bones lose minerals, such as calcium, more quickly than the body can replace them, causing a loss of bone thickness (bone density). Osteoporosis is a common disease in Australia with 1.2 million people estimated to be affected[1]. In New Zealand, it is estimated that at least 1 in 3 women and at least 1 in 5 men will suffer from an osteoporotic fracture during their lifetime.[2]

We spoke to endocrinologist and chemical pathologist, Dr Ailie Connell, to discuss the role of pathology in the diagnosis and management of the disease.

“Those most at risk of developing osteoporosis are post-menopausal women. During the menopause, oestrogen levels rapidly decrease, causing bones to lose calcium and other minerals at a quicker rate. In addition, as a person ages they lose bone density, so the older you are, the more fragile your bones become. There are also specific risk factors for osteoporosis including some diseases such as rheumatoid arthritis, chronic liver and kidney disease.

“Unfortunately most osteoporosis is asymptomatic; there are no early signs. The first sign that someone is developing osteoporosis would be if they broke a bone in a situation where you wouldn’t expect to break a bone. This would be called a minimal trauma fracture. Osteoporosis can also be picked up in people who are at risk by doing bone mineral density testing, which is a type of X-ray” said Dr. Connell.

A bone mineral density test is performed to determine how rich a person’s bones are in minerals such as calcium and phosphorus. The higher the mineral content, the stronger, denser and less likely to break is the bone. The bone density scan will determine if

bones are in the range of normal, low bone density (osteopenia) or osteoporosis, and whether any action is needed to improve bone health.

“The pathologist’s role is to look for reversible causes of osteoporosis, including imbalances in calcium levels. In terms of managing the disease, one of the major therapies for osteoporosis involves stopping the normal bone mechanism for removing and replacing bone so the bone is only replaced. This means that your bones can become stronger and it also means that the turnover is significantly decreased, so there is less renewing of the bones. We can monitor that through the use of assays called bone turnover markers”, said Dr Connell.

Most osteoporosis medicines work by making the cells that break down bone (osteoclasts) less active but allowing the cells that form new bone (osteoblasts) to remain active, therefore reducing bone loss and increasing bone strength over time.

“Bisphosphates, widely prescribed for the treatment of osteoporosis, include alendronate, risedronate, ibandronate and zoledronic acid. There is another drug on the market called denosumab which is very similar, and these are all known to reduce the risk of fractures significantly and to offer a good prognosis. However, I do find it difficult to say ‘prognosis’ because, while these drug therapies reduce the risk of fracture by 30%, the patient still has a significant risk of fracture, which can still get worse over time. This risk of fractures is still there, it is just less than it would have been.

“There are new drug therapies but they are not in practice yet and they are still a few years away yet” said Dr. Connell.

It is important not to rely solely on medications for the treatment of osteoporosis. Regular exercise, good nutrition including calcium-rich foods, avoiding smoking, and limiting alcohol consumption can all have positive effects on bone health.

[1] https://www.osteoporosis.org.au/about-osteoporosis

[2] https://osteoporosis.org.nz/wp-content/uploads/ONZ-2017-Strategic-Plan-WEB.pdf

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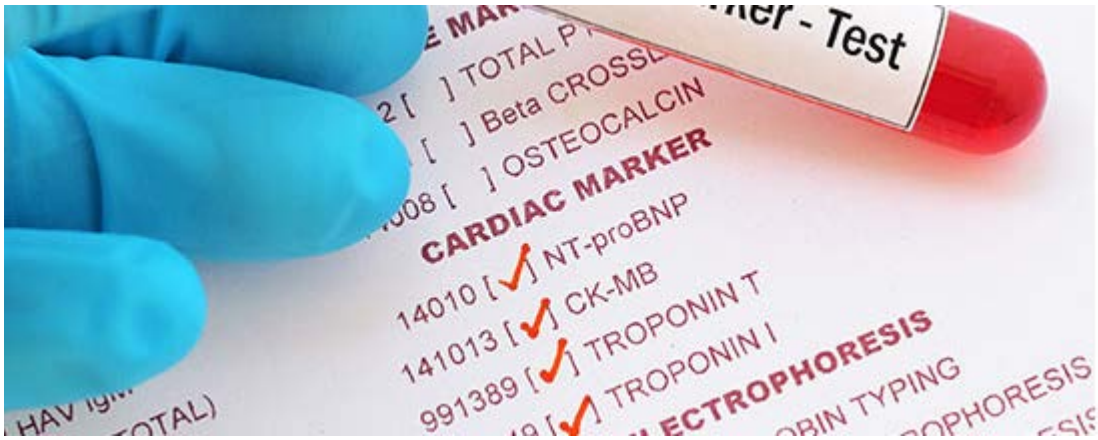
Troponin, an important biomarker in the diagnosis of heart attacks



We spoke to Dr Jacobus Ungerer, chemical pathologist at Pathology Queensland, to discuss troponin testing in relation to myocardial infarction.

Myocardial infarction (MI), or heart attack, is an important cause of death worldwide. It is caused by a decrease in oxygen supply to the heart muscle, resulting in cell death. Early diagnosis and treatment is critical. However, the clinical presentation is variable and non-specific; electrocardiograph (ECG) changes may sometimes be absent. Cardiac troponin is a biomarker that is released from injured cardiac muscle cells and can be measured in blood. Cardiac troponin is such a relatively specific and sensitive marker for cardiac injury that cardiac troponin testing now forms the basis for the diagnosis of MI.

Earlier this year the Fourth Universal Definition of Myocardial Infarction Consensus Document was published. In the document the role of troponin testing is clearly described.

“Cardiac troponin I (cTnI) and cardiac troponin T (cTnT) are components of the contractile apparatus of heart cells and are only found in heart muscle. Levels of these troponins in the blood can be used as a specific marker for heart muscle (myocardial) damage. Damage to cardiac muscle will result in a release of cTnI and cTnT into the blood, therefore measuring the concentration of troponin in the blood is an accurate and specific indicator of the degree of damage.” said Dr Ungerer.

Cardiac troponin tests are mainly used to assist in the diagnosis of acute MI. However, cardiac troponin is also a marker for all myocardial damage, irrespective of the cause. Other causes of myocardial injury (not due to acute MI) include, heart failure, myocarditis

(inflammation of the heart muscle), chemotherapy and pulmonary embolism (blood clot in the lung).

If myocardial ischaemia (reduced blood flow, and therefore oxygen to the heart) is present clinically (e.g., chest pain) or detected by ECG changes together with a rising and/or falling pattern of cardiac troponin values, then a diagnosis of acute MI is likely. If there are no symptoms of myocardial ischemia, then elevated cardiac troponin levels may indicate acute myocardial injury (not related to MI) if the pattern of values is rising and/or falling, or may be related to more chronic ongoing myocardial injury if the pattern is unchanging.

“According to guidelines, the term MI should be used when there is clinical evidence of acute myocardial ischemia with an increase in troponin, as well as an acute rise and/or fall in levels. The increase in troponin is evidence of heart muscle injury. To summarise, in the appropriate clinical context, an increased cardiac troponin result, together with an acute change in concentration, is indicative of a myocardial infarction.

“The upper reference level of troponin is defined as the level below which 99 percent of healthy individuals would be. Any troponin value above this cut-off is assumed to be increased,” said Dr Ungerer.

Due to the clinical importance of troponin, accurate measurement is needed. Cardiac troponin levels in healthy individuals are extremely low – only a few nanograms per litre – which makes measuring it technically challenging. However, troponin assays are continuously improving and the latest assays have the ability to measure troponin with high precision at low levels, even in healthy individuals.

“Early diagnosis of myocardial infarction is important. In practice however, the diagnosis is often difficult. Patients usually present with chest pain symptoms that is not specific for MI. In fact, only about 10% of patients presenting to an emergency department with these symptoms will be diagnosed with MI. With the introduction of cTnI and cTnT testing, it is now possible to diagnose MI accurately within a few hours after presentation.” concluded Dr Ungerer.

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International Lead Poisoning Prevention Week takes place from 21 to 27 October 2018. Although there is wide recognition of lead poisoning, and many countries have taken action against it, exposure to lead, particularly in childhood, remains of key concern to healthcare providers and public health officials worldwide. [1]

We spoke to Associate Professor Peter Stewart, chemical pathologist at Royal Prince Alfred Hospital, to discuss lead exposure and toxicity.

“Lead poisoning occurs when we accumulate the element lead in the body. It acts in the body through inhibiting enzymes which are essential for metabolic processes throughout the body. Of particular concern is the brain, but also bone, intestine, and blood - in particular the red blood cells,” said A/Prof Stewart.

Lead is a naturally occurring metal. It is still used in industry and historically was added to petrol and household paint. Lead is hazardous when taken into the body, either through swallowing or breathing. Young children, including unborn babies, are at the greatest risk of the health effects of lead exposure.

“It is important to distinguish between clinical lead poisoning and lead exposure. Lead toxicicity or lead poisoning is not common today. This is firstly because we have removed lead from petrol, so people living by highways or busy roads are no longer inhaling those fumes. Secondly, we don’t put lead in residential paint anymore so that has limited exposure. Also industrial laws have made workers in lead industries much safer. However, lead stays around forever, so old houses that were painted with lead paint can still be a source of exposure, especially when people are renovating houses. Although there is no longer lead in petrol, lead still remains in the soil next to roads etc.

“The circumstances where you would now see lead poisoning is in children who may have eaten lead paint. Interestingly, lead paint is actually sweet to taste so animals and children will often lick it. In locations close to lead factories, or where lead is being mined, you find that the people living there will have blood lead levels that are higher than average and children in those areas often have blood lead levels well above the safe cut-off.

“A common cause of lead poisoning in our community is medicine brought back from overseas. Quite often, there are high levels of lead in these medicines. Also, pottery may be lined with lead paint and people may use that to heat up food or to put candles in so they will get exposure through what they consume from the container or from the fumes. Sometimes you have to do a bit of detective work to see how lead poisoning has happened.

“It is lead exposure which people really focus on these days and in most states in Australia. If blood lead levels are found to be higher than average then that is a reportable disorder. So, if someone measures the blood lead in a child and the blood lead is above 5 micrograms per decilitre, which is actually quite low, then that gets reported to the public health unit. We do this because there is evidence to show that children with even low levels of blood lead have statistically lower IQs than that of their peers who have not been exposed to lead,” said A/Prof Stewart.

Symptoms of lead exposure can often be difficult to recognise.[2] In cases where lead exposure is expected then a GP or medical specialist should be consulted.

“In terms of testing for lead exposure, the investigation of children is often targeted. For example if children live near where lead is mined, those children may be subject to periodic screening. Testing is not something which is generally done in the community, unless there is a particular reason why you might be concerned. For example, if their cat or dog has become ill and the vet suspects it could be lead. Often, we find that animals are the first ones to get sick and, therefore, this is one of the first signs that there is exposure to lead.”

The absorption of very high levels of lead into the body is considered a clinical emergency. Symptoms can include convulsions, stomach pain, vomiting and loss of consciousness.[3]

“The primary method for diagnosing, monitoring and reporting abnormalities is to measure blood lead. If the blood lead levels are only mildly elevated, then we would look at locating and removing the source of the lead. If the blood lead level is high and the person is symptomatic, for instance, with headaches, nausea or convulsions, then these people are treated as a medical emergency. Lead is removed from the body through a process called chelation. We infuse chemicals or give them chemicals orally that bind to the lead and extract it from the body and excreted in the urine.

“The body could also have a large burden of lead which is not able to be mobilised as it is stuck away in bone, therefore chelation would not be able to remove it. Interestingly, there are clinical stories of people with significant lead exposure who would have lead locked away in their bones; if something then happened to them, for example they fractured their leg or arm then they would get acute lead poisoning because the lead would be released out of their bones into their brains and red cells,” said A/Prof Stewart.

[1] http://www.who.int/ipcs/lead_campaign/en/

[2] Wijeratne NG et al., Occult lead poisoning from Ayurvedic medicine produced, prescribed and purchased in India. Med J Aust 2011;194(4):205-6.

[3] https://healthywa.wa.gov.au/Articles/J_M/Lead-exposure

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An insight into life away from the big cities



Doctor Penny Yarrow is an anatomical pathologist at Hobart Pathology, a private lab in Hobart, Tasmania. Doctor Archana Pandita is an anatomical pathologist at Waikato District Health Board in Hamilton, New Zealand. We spoke to Dr Yarrow and Dr Pandita to get a sense of what it's like to work somewhere like Tasmania or Hamilton.

Dr Penny Yarrow – Tasmania

"I'm not Tasmanian originally, I grew up in NSW and trained at Prince Alfred and Concord Hospital; I also spent some time overseas training in Scotland. My husband and I decided we wanted to move out of Sydney to live and raise our family, to get out of the big city. What drew us to Hobart was the fact that there is a medical school here, all of the major specialties and required services are available. My husband is a specialist too so we needed a city which we could live in and which would have those tertiary level services. Hobart really ticked the boxes for us in terms of size and liveability of the city and work opportunities.

"At Hobart Pathology we are all general anatomical pathologists, I do histopath reporting for all the major subspecialties, including breast, gynaecological, genitourinary, colorectal, upper GI, lung, and just recently we've started doing cardiothoracic work because there is a new private cardiothoracic service at the private hospital. We have a pretty broad range of work.

"I think there is a perception that private pathologists, and particularly private pathologists based somewhere like Hobart, wouldn't see a huge variety of work but in my experience, that really isn't the case. We have a couple of private hospitals in Hobart that really do many of the many major specialties so we get a pretty broad range of

pathological specimens.

“In addition to the work benefits of living here, there are certainly other things that are a bit easier about living in Hobart. For example, my commute to work is really short and I can ride to work if I want to. It’s easy if the kids need to come into work after school before they go to their after-school activities. It’s because things are so much closer together, the practicality of getting everything done is so much easier.

“Being part of a smaller professional community also means that I have found it easier to get involved in other professional endeavours outside my day-to-day job. For example I was the state councillor for the RCPA for a couple of years, and I’m on the state committee. I think this is partly due to the smaller professional community here, meaning there are more opportunities for different people to step up and get involved. Also, I know all the anatomical pathologists in Hobart. I would say those types of relationships are a bit easier to nurture, I suspect I wouldn’t have engaged in the same way in Sydney.”

Dr Archana Pandita – Hamilton

“I work in Waikato DHB as a general anatomical pathologist and also do non-gynae cytology. This is my first job as a consultant and I will complete my first three years in two months' time. I trained for five years in Wellington before I started my job here in early 2016. Although we cover all the specialties, my two special interests are gynaecological pathology and neurosurgery.

“I had a few options to work in various places when I finished my training, including Hamilton, Auckland, Palmerston North and Christchurch. However, as I had worked in Hamilton before I went for my training in Wellington, the area was quite familiar to me and we love the country life. So, because we had family friends here and we had a house, all those factors contributed to our decision to live and work in Hamilton.

“Waikato hospital is one of the largest tertiary hospitals in Australasia so we get a large variety of specimens, ranging from hugely complex specimens to skins and melanomas etc. Because we get such a large variety of cases to work with, it is very interesting. I love the diversity, the challenging situations and cases we need to solve. I like that Hamilton has such a variety of cases to be solved in pathology, and the cases go all the way from the very complex cases to the more simple cases, which makes the role more diverse and interesting. There is often a bit of a challenge with the complex cases but I would say that’s what makes this job fun.

“I’ve had a very positive experience throughout my first consultant job in Hamilton. I have had great support from my colleagues here, which matters a lot when you are starting in a consultant job. I also find living and working in Hamilton very peaceful; I have a family and the kids go to school nearby and my commute to work is very short (around 15 minutes). I have a lovely neighbourhood and a good work environment at the hospital so all those things contribute to me staying here.

“People think that Hamilton is a remote area but it’s not isolated at all; it’s only 1-1.5 hours from Auckland, Taupo, Tauranga, Rotorua and Raglan, and has every facility you can think of. I think if someone wants a balanced work and family life, with less time spent on the commute and a nice work environment, I would recommend that they consider Hamilton.”

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