



PathWay

THE ROYAL COLLEGE OF PATHOLOGISTS OF AUSTRALASIA



Issue #003

MAY 2011 | Published by RCPA

In This Issue

- Bowel cancer screening saves lives
- What's the buzz about vitamin D?
- How the flu brew is made
- Pathologists will be key players in controlling obesity

Interesting Facts

61

The percentage of adults classified as overweight or obese in Australia

25

The percentage of children (5-17 years) classified as overweight or obese in Australia

Welcome to the May edition of ePathWay

The easy way for you to stay in touch with pathology

This month's articles look at the genetics of obesity, why bowel cancer screening is a lifesaver and how the influenza vaccine is made. There is also an update on the very topical vitamin D.

While these may seem like an eclectic range of topics, there is one element that links them together— they all involve pathologists. It's fair to say that pathology is like the engine room of medicine. Imagine for a moment if there was no one in the background identifying influenza strains, or researching how to tackle obesity from a cellular level, or experts diagnosing cancer cells!

We welcome your feedback about the stories covered in ePathWay, and hope you find it an invaluable way of being kept up to date about pathology in Australasia.

Bowel cancer screening saves lives



Bowel cancer is a silent killer. There are no symptoms in the early stages, and by the time symptoms occur it is more extensive, has probably spread and is harder to treat. Yet fewer than 40 percent of bowel cancers are detected early, the disease kills about 80 Australians every week and it is the third most

58 billion

The total annual cost of obesity in Australia

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common cause of cancer related death in this country. The question is why?

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What's the buzz about vitamin D?

It seems the more scientists discover about vitamin D, the more they realise there is to learn. There is also the surreal element of how almost one third of Australia's population are believed to have insufficient levels of a vitamin that is delivered through the sun, when they live in a sun burnt country. In cases like this, it's best to start with the facts and go from there.



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How the flu brew is made



It's almost flu season, and for many people that means a yearly flu shot. But who determines the flu brew, and how is it made? Many of the answers lie in the hands of pathologists who are acutely involved in the diagnosis and collection of the influenza virus.

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RCPA Message



Pathology gives life's most important answers.



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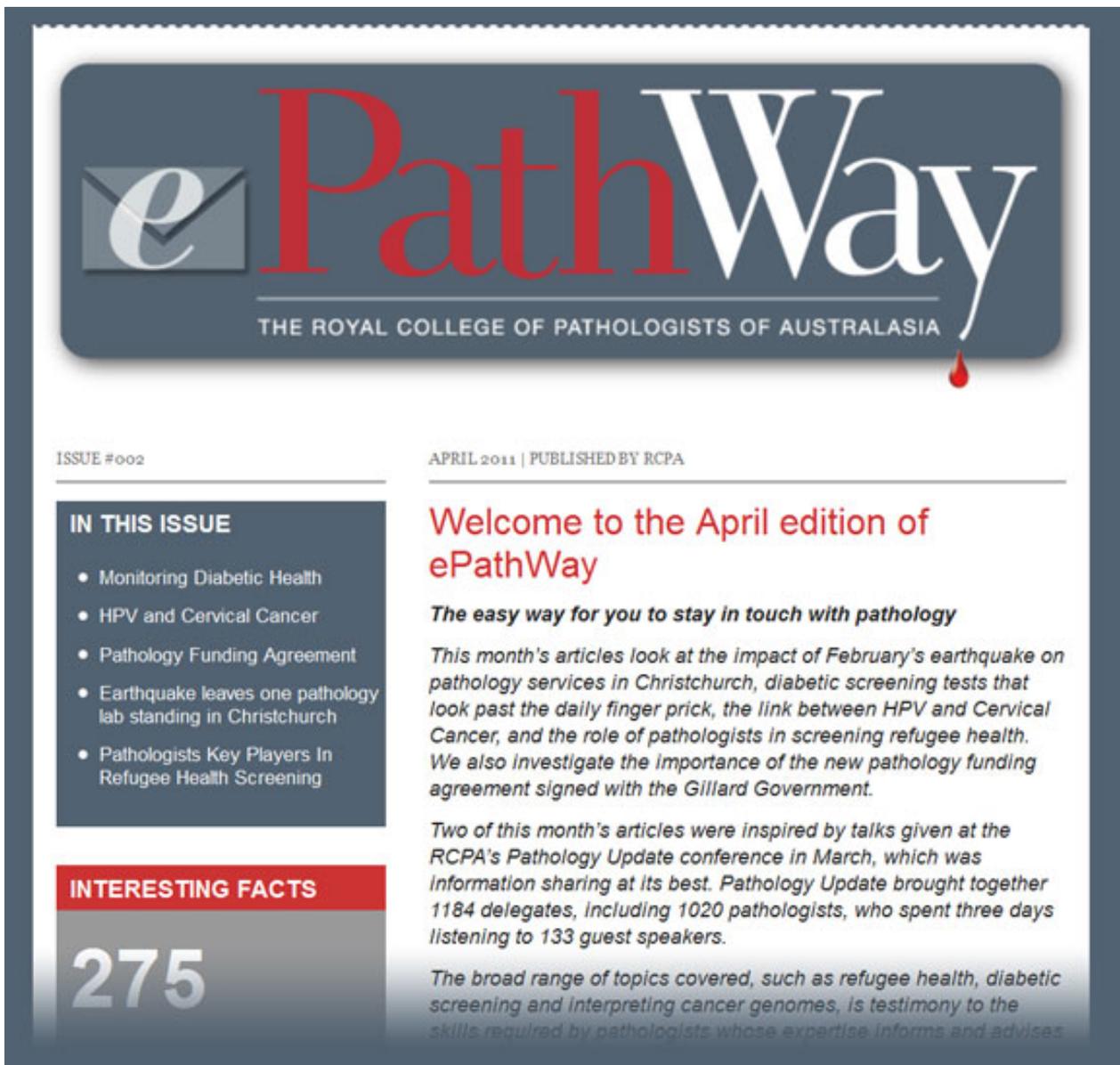


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Previous Editions



ISSUE #002

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IN THIS ISSUE

- Monitoring Diabetic Health
- HPV and Cervical Cancer
- Pathology Funding Agreement
- Earthquake leaves one pathology lab standing in Christchurch
- Pathologists Key Players In Refugee Health Screening

INTERESTING FACTS

275

Welcome to the April edition of ePathWay

The easy way for you to stay in touch with pathology

This month's articles look at the impact of February's earthquake on pathology services in Christchurch, diabetic screening tests that look past the daily finger prick, the link between HPV and Cervical Cancer, and the role of pathologists in screening refugee health. We also investigate the importance of the new pathology funding agreement signed with the Gillard Government.

Two of this month's articles were inspired by talks given at the RCPA's Pathology Update conference in March, which was information sharing at its best. Pathology Update brought together 1184 delegates, including 1020 pathologists, who spent three days listening to 133 guest speakers.

The broad range of topics covered, such as refugee health, diabetic screening and interpreting cancer genomes, is testimony to the skills required by pathologists whose expertise informs and advises

[PathWay 002](#)

[PathWay 001](#)



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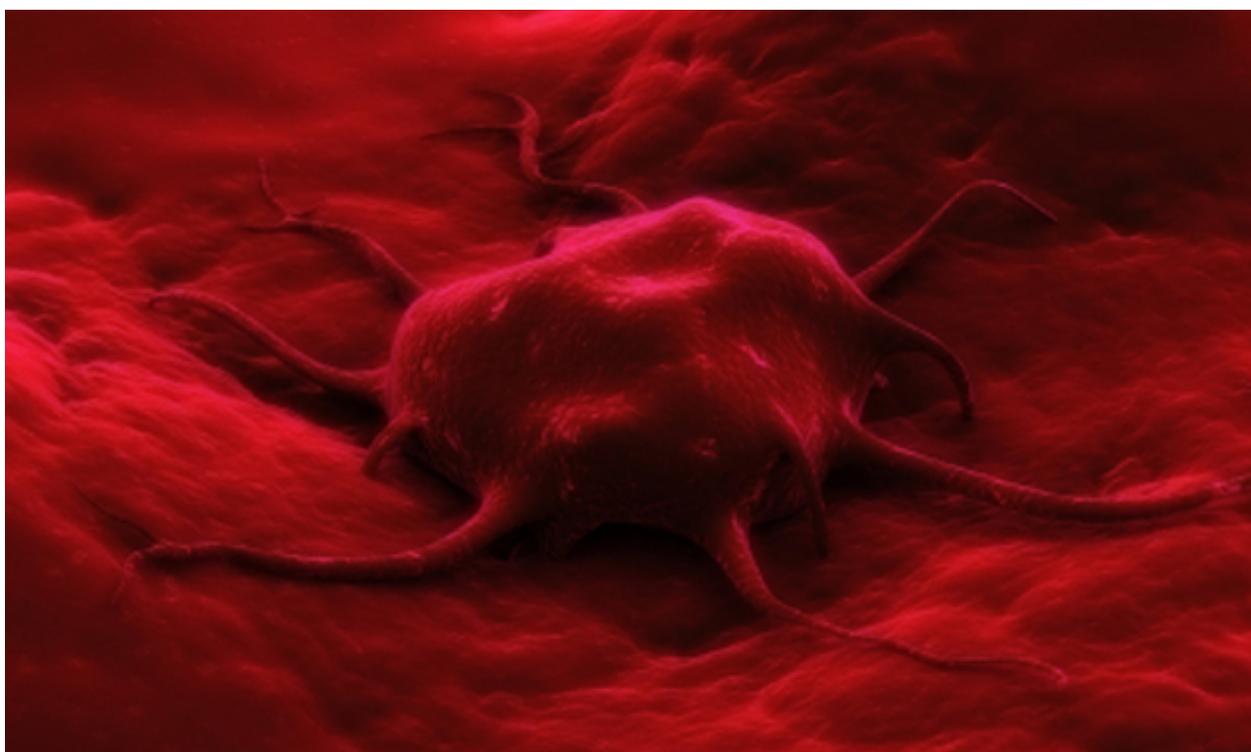
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Bowel cancer screening saves lives



Bowel cancer is a silent killer. There are no symptoms in the early stages, and by the time symptoms occur it is more extensive, has probably spread and is harder to treat. Yet fewer than 40 percent of bowel cancers are detected early, the disease kills about 80 Australians every week and it is the third most common cause of cancer related death in this country. The question is why?

Bowel cancer generally takes years to develop, leaking small amounts of blood not visible to the naked eye long before any overt symptoms occur. This blood is then passed into the faeces where it is still invisible to the naked eye but can be detected using special techniques in a laboratory. Early detection is therefore vital, and is the focus of screening programs which research shows can prevent about one in every six deaths from bowel cancer.

“Experts have promoted population screening due to the relatively high incidence of bowel cancer,” says Dr David Deam, Head of Chemical Pathology at Healthscope Laboratories in Melbourne. “A screening program was started by the Australian Government as a pilot program between 2002 and 2004, and then expanded to a national program from 2008 until 2010.”

The future of this program is looking secure as Treasurer Wayne Swan announced in this month’s budget that bowel cancer screening will be supported to the tune of \$137.8 million over the next four

years.

Screening programs generally involve a Faecal Occult Blood Test (FOBT) which can be completed at home. As cancer and precancerous growths bleed intermittently, the test requires collecting a sample from two separate bowel motions which are then sent to a pathology lab for analysis.

“In the laboratory the faeces specimen is tested for the presence of human haemoglobin,” explains Dr Deam. “These new tests don’t involve any change in diet or medication beforehand. Pathologists are involved in the selection of the testing methods, the interpretation of the results and the maintenance of the quality of the results.”

Dr Deam says positive screening tests are often followed up with a colonoscopy, and any biopsies taken are examined by pathologists to determine if they are cancerous.

Dr Deam says individuals can also obtain FOBT kits outside of the national screening program from some doctors, pharmacists and various companies. This is useful for people who want to be tested but do not fall into the appropriate age category or want to be tested more frequently.

Link: <http://onlinelibrary.wiley.com/o/cochrane/clsysrev/articles/CD001216/frame.html>

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What's the buzz about vitamin D?



It seems the more scientists discover about vitamin D, the more they realise there is to learn. There is also the surreal element of how almost one third of Australia's population are believed to have insufficient levels of a vitamin that is delivered through the sun, when they live in a sun burnt country. In cases like this, it's best to start with the facts and go from there.

"There are two major types of vitamin D," explains Dr Margaret Janu, Chemical Pathologist at Concord Hospital and Sydney South West Pathology Service. "Vitamin D3 is formed through exposure to ultraviolet light, while vitamin D2 is synthesised by plants and not produced by the human body."

Dr Janu says a significant number of Australians and people from specific groups within the community are vitamin D deficient. It is therefore wrong to assume that living in Australia guarantees receiving adequate amounts of vitamin D from casual exposure to sunlight.

"Factors contributing to this trend include an increasing indoor sedentary life and the rise of UVB-blocking sunscreens which have caused a marked decrease in exposure to the sun," explains Dr Janu. "This has resulted in a decreased opportunity to synthesise vitamin D. Having said that, very few people are deficient where their bones are at risk, but lots are insufficient, and this is the area of debate about vitamin D."

Dr Paul Glendenning, consultant Endocrinologist and Chemical Pathologist at the Royal Perth Hospital, says there is a lot of interest and studies in vitamin D, but the level of evidence is not strong enough to come to any major conclusions. There is, however, one group that he believes should always be tested.

"Those people in the population who engage in normal ambulatory activity but are increasingly having falls or sustaining fractures should have their vitamin D levels checked," advises Dr Glendenning. "This

is due to the fact that vitamin D has a major effect on maintaining muscle and bone strength.”

Dr Glendenning says there is also a case for giving vitamin D supplements to groups of people who spend long periods of time indoors, such as nursing home residents. However, he says they do not need routine vitamin D testing unless there is a clinical indication. Dr Janu agrees.

“There is so much still to be worked out with its role in disease, and while a lot of people have low levels, if there are no other underlying factors then there is no need to look further,” she says.

Emerging evidence is linking vitamin D with non-skeletal conditions such as cardiovascular and autoimmune diseases, diabetes, rheumatoid arthritis, inflammatory bowel disease and cancer. However, there are still many questions to be answered and further studies are needed to define the role of vitamin D in chronic disease.

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How the flu brew is made



It's almost flu season, and for many people that means a yearly flu shot. But who determines the flu brew, and how is it made? Many of the answers lie in the hands of pathologists who are acutely involved in the diagnosis and collection of the influenza virus.

"Pathologists isolate and diagnose the types of influenza virus seen each year and send samples of those viruses to the World Health Organization (WHO) Collection Centre in Melbourne," explains Professor Bill Rawlinson, Head of a Reference Virology Laboratory at the South East Area Laboratory Service (SEALS) in Sydney. "Pathologists are also members of the Influenza Specialist Group who, amongst other duties, educate the public and are often members of committees providing advice to the government about the flu virus each year."

The influenza virus is not a harmless visitor. In Australia alone it causes about 18,000 hospitalisations and around 300,000 doctors' visits each year. The flu season reaches its peak between July and September, and that is the time when pathologists are busy detecting virus strains using modern molecular techniques. Pathologists also grow the virus in special cells to send off to the WHO for use in vaccine studies.

“The virus is only grown in a few selected laboratories in Australia where they are classified and named,” says Professor Rawlinson. “The classification refers to type A or B, with most epidemics being type A. They are also named according to the first place the virus is found, and that doesn’t mean that’s where the most cases were found.”

Once this year’s influenza viruses have been identified and named, it’s time to start making the following year’s flu vaccine. This involves the Therapeutic Goods Administration working with manufacturers through meetings with WHO scientists and pathologists around the world to monitor international trends before deciding which strains should be used in the vaccine.

“The flu season in the southern hemisphere finishes in October, and there are usually only one or two types circulating,” says Professor Rawlinson. “The WHO lab then releases samples of the viruses that will go into next year’s vaccination to the laboratories where the vaccines are made.”

This is where it gets really interesting. Because viruses can only replicate (grow) in living cells, the flu vaccine is made by first injecting the chosen virus strains into the fluid that surrounds the embryo of specially grown chicken eggs. And we’re not talking eggs by the dozen! Tens of thousands are injected with the flu virus each day and, when they’re ready, machines open the eggs and harvest the virus. It is then purified and the live viral cells are killed before being used to produce the vaccine. It takes, on average, one to two eggs to produce one dose of the vaccine.

Once this season’s flu brew is made, the whole process starts again because the influenza virus changes and evolves each year. So, while we’re all breathing in the warm spring air, pathologists will be busy identifying the latest influenza strains that came in from the cold.

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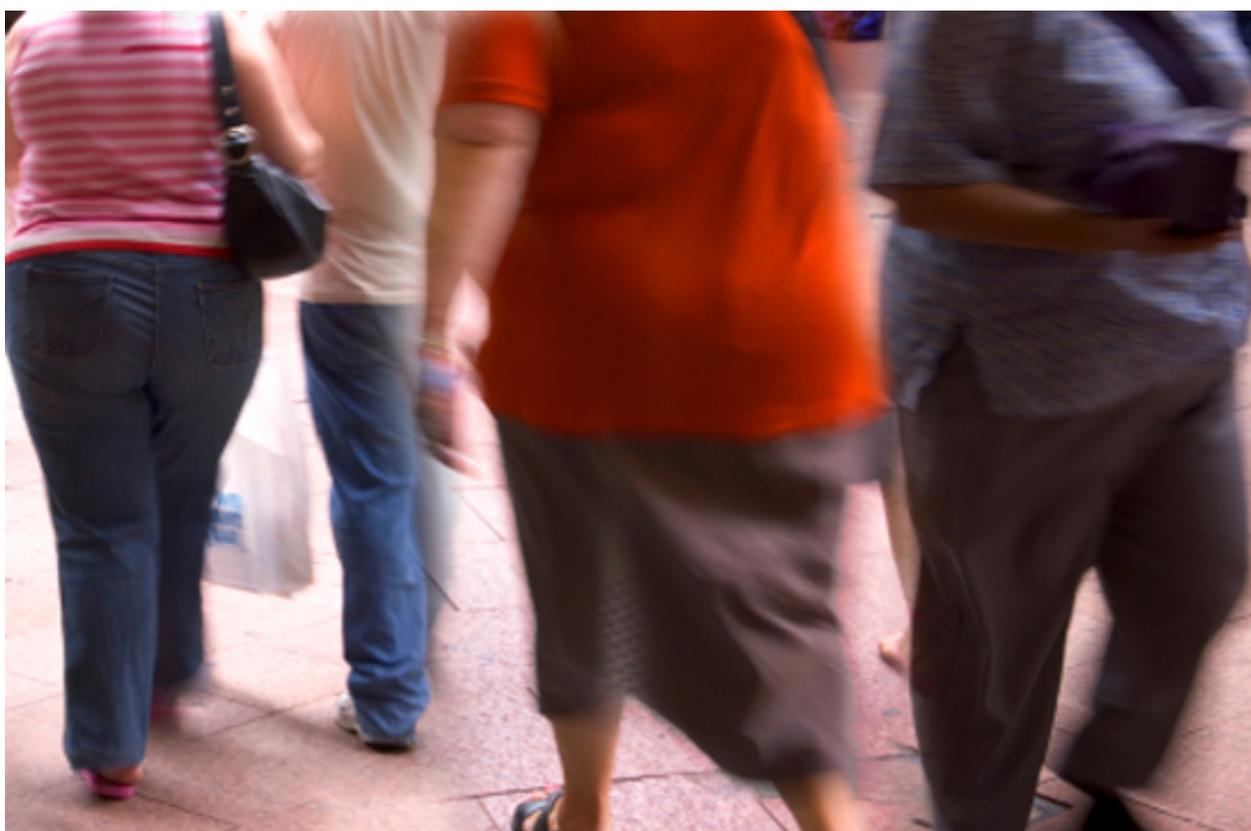
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Pathologists will be key players in controlling obesity



It's a familiar story. Some people seem to eat anything they like and don't gain weight, while others just look at a hamburger and their thighs start expanding. Apart from the obvious lifestyle factors, obesity is also the result of a complex biochemical feedback loop that dates back to our hunter-gatherer days. In a reversal of fortune, the people able to store fat were considered genetically superior back then, as it was a key survival mechanism. How times change!

Fast-forward to 2011, and those hunter-gatherer genes are now at odds with our modern lifestyle. Half of Australia's population is now either obese or overweight, which costs the country around \$58 billion a year. In response to this growing epidemic, researchers at the Garvan Institute of Medical Research are investigating the genetics of obesity and how to control it.

"We know about environmental factors related to obesity, but the lesser known area of genetics is where the breakthroughs will come," explains Executive Director Professor John Shine. "We are going to be able to identify individual genes and individual biochemical pathways with respect to appetite,

preference for foods such as protein, carbohydrates or fat, and metabolic rate, and then look at the complex matrix of these biochemical pathways.”

Genes of interest include neuropeptide Y (NPY) which controls hunger and satiation, and leptin which regulates body fat.

“There is a complex feedback loop in the body,” says Professor Shine. “For example, if there is a slight change in the leptin gene and the leptin receptor in the brain doesn’t receive a strong signal then this can lead to an increased appetite in an effort to lay down fat stores. Similarly, we can get rats to eat so much food that they cannot move, but when we stimulate their NPY gene they start eating again.”

Professor Shine says scientists are using this sort of information to develop a system of delivering treatment targeted to an individual’s genetic make-up in the form of anti-obesity medication.

“We will be able to tell if it’s a problem with the NPY receptor, or something else, and then use medication to modify it so you get the desired reaction,” explains Professor Shine. “This ability to provide treatment based on an individual’s genetic makeup will happen in the next decade.”

Molecular pathologists will be key players in this process, as they will map the individual’s complete genome sequence and identify the genes that will determine the treatment. Such genome sequencing builds on the human genome project that was completed in 2003.

“The whole human genome sequencing project took 13 years and cost \$3 billion,” said Professor Shine. “Today we could do that same project in 2 weeks at a cost of \$10,000. The next step is it will cost about \$300 and take a day to complete.”

Once this step is taken, the ability to develop anti-obesity medication will be within reach representing an innovative approach to tackling a \$58 billion problem.

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