



# PathWay

THE ROYAL COLLEGE OF PATHOLOGISTS OF AUSTRALASIA



Issue #012

MARCH 2012 | Published by RCPA

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- Liver disease can be diagnosed earlier with a new blood test on the horizon
- Researchers haven't forgotten Alzheimer's disease
- Let's talk about the 'R' word
- Immunisation is an 'all for one and one for all approach' to public health

## Welcome to the March (and first anniversary) edition of ePathWay

*Three of this month's articles have been plucked from presentations given at this month's Pathology Update Conference where more than 1100 pathologists and scientists descended on the Sydney Convention & Exhibition Centre to listen to 135 speakers share the latest research and information on pathology.*

*The breadth of topics at the conference was extraordinary, with information presented from eight disciplines of pathology: anatomical, chemical, forensic, genetics, haematology, immunopathology, microbiology and oral & maxillofacial.*

*The topics covered in this edition include the possible benefits of low dose radiation and the possible early detection of liver diseases and Alzheimer's disease. A strange mix, but they do have one theme in common; they all present new evidence that will help with the future diagnosis and treatment of diseases. The fourth article highlights the importance of childhood immunisations.*

*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.*

## Interesting Facts

# 1127

The number of attendees at this month's Pathology Update Conference in Sydney

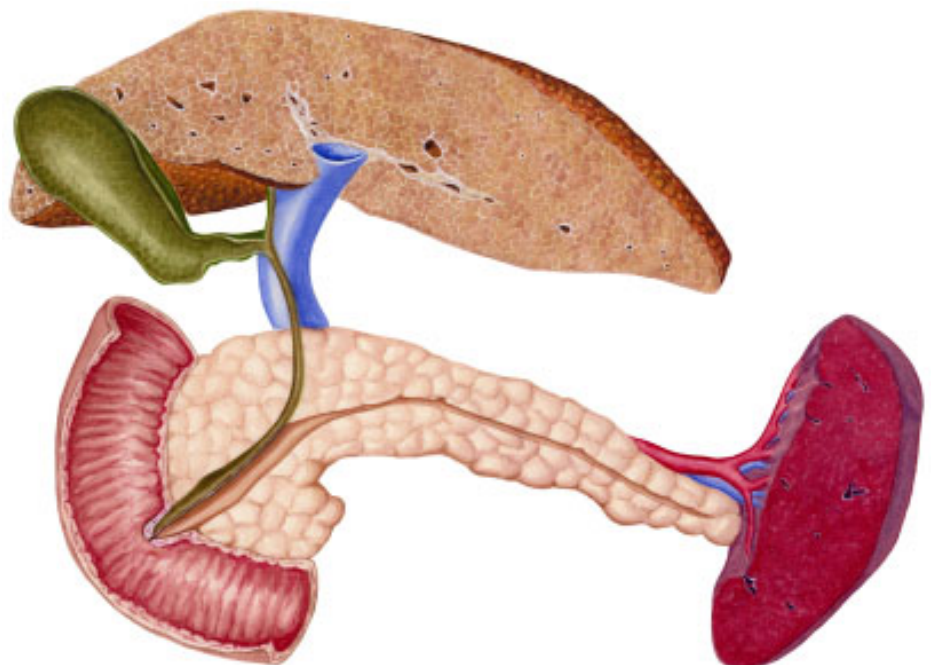
# 135

The total number of speakers at the conference

# 11

The number of international speakers at the conference

## Liver disease can be diagnosed earlier with a new blood test on the horizon



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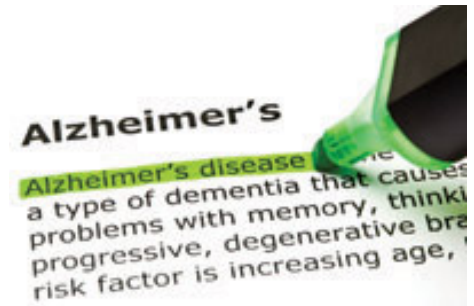
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## Researchers haven't forgotten Alzheimer's disease

Imagine a city with a population of 87 million. This city would be the equivalent of Mexico City, New York, London, Seoul, Lima, Rio de Janeiro, Johannesburg and Sydney combined. 87 million is also the projected number of people in the world who will have Alzheimer's disease by 2030. Early diagnosis and prevention could be the only hope of avoiding this situation.



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## Let's talk about the 'R' word

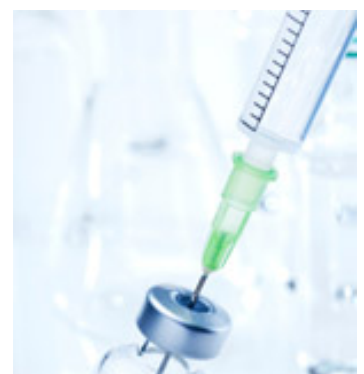


Why are people so scared of the 'R' word? That's the question Professor Pamela Sykes, Molecular Geneticist from the Flinders Centre for Innovation in Cancer at Flinders University put to delegates at this month's 11th Pathology Update Conference in Sydney. The "R" word is radiation, and it's everywhere. So why are people worried about it?

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## Immunisation is an 'all for one and one for all approach' to public health

Childhood immunisation programs have been so successful that many people don't think there is a problem with diseases such as polio or measles anymore. And that's the problem! Professor Lyn Gilbert clearly remembers coping with major measles epidemics every two to three years as a young doctor in the late 1960s and early 1970s. "We had to open extra wards at hospitals because a significant proportion of children were very ill with serious secondary complications such as pneumonia and encephalitis. Sadly, quite a number of those children died."





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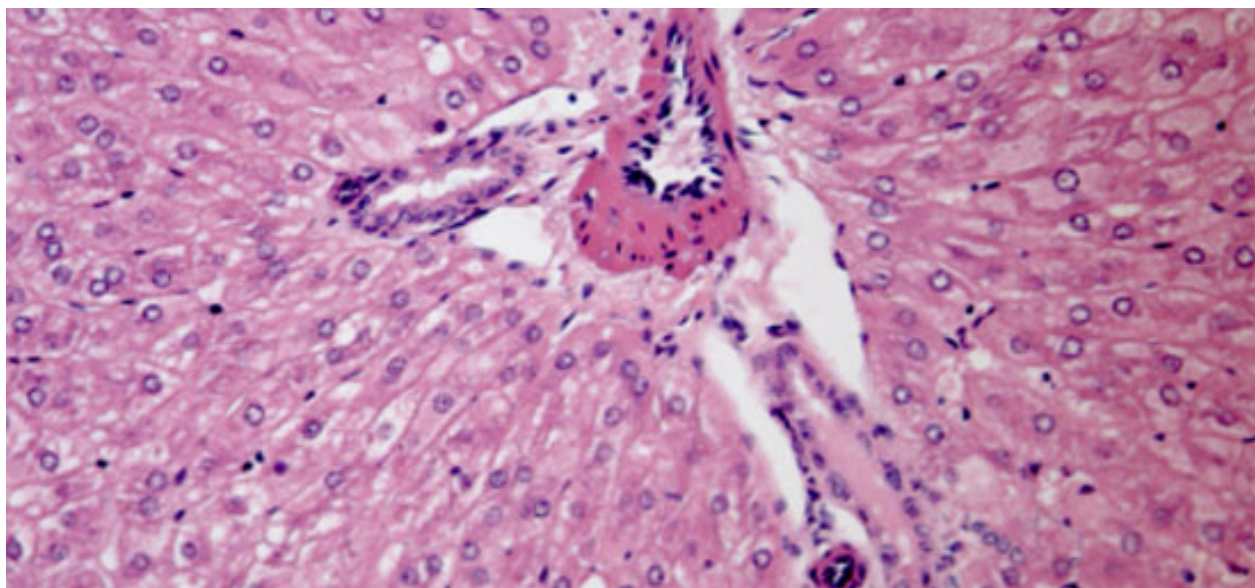
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"For a long time the usual way to measure liver disease was with an enzyme called Alanine transaminase (ALT). The trouble was its level remained normal until people are quite advanced with liver disease," explains Professor Chiu. "So we wondered if there were other liver cell contents that we could measure as the liver cells died in response to liver disease."

The answer they came up with was a substance called messenger ribonucleic acid (mRNA). And as it turns out, the liver has lots of mRNA and releases it into the surrounding plasma (the liquid component of blood) when liver cells die in response to a disease. Their level can then be measured via a simple blood test, including picking up liver changes in the early stage of the disease process.

The liver diseases mRNA can be used to detect are cancer of the liver, cirrhosis and hepatitis. The big question is when will this test be available? Professor Chiu's laboratory does academic research, so it's up to commercial laboratories to pick this up and conduct a large-scale study. And if this happens, Professor Chiu says the benefits will be detecting liver diseases at an earlier stage, treating them earlier and hopefully preventing further deterioration.

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"There is currently no means to accurately diagnose Alzheimer's disease at an early stage, and there is no simple test for it either," explains Dr Simon Laws, Scientist with Edith Cowan University, the Australian Imaging Biomarker and Lifestyle (AIBL) research group and deputy Chief Scientific Officer for the Cooperative Research Centre (CRC) for Mental Health. "We know the symptoms don't occur until fifteen to twenty years after pathological changes have occurred in the body, and by then the horse has already bolted. Detecting and treating Alzheimer's disease early is paramount to preventing it from causing widespread damage to the brain."

German Psychiatrist and Neuropathologist Alois Alzheimer first described Alzheimer's disease in 1906. It is the most common form of dementia in the world, is usually diagnosed in people over 65 years of age, degenerates as it progresses and eventually leads to death. There is also an early-onset form of Alzheimer's disease which occurs in people diagnosed before the age of 65. In short, the current situation is bleak.

If this prognosis isn't bad enough, there is also no known cure for Alzheimer's disease, mostly because it is usually quite advanced and 'irreversible' when it is diagnosed. This is why finding a way to diagnose it at a much earlier stage will have significant implications for the future diagnosis, prediction and monitoring of this debilitating disease, and is the goal the AIBL project is working towards.

"Alzheimer's disease can't be definitively diagnosed prior to death at present so we are developing assays (tests) which measure certain biomarkers<sup>1</sup>," he says. "This means that in five to seven years, doctors may be able to request a blood test which checks the levels of these biomarkers and will hopefully enable them to diagnose Alzheimer's disease early."

The AIBL project has also discovered a close association between sex hormones and Alzheimer's disease, which has significant implications for future treatments. A clinical trial is in the next stage in assessing how effective this approach will be. Such a trial will be undertaken through the CRC for Mental Health which is a research consortium focused on the early detection and effective treatment of neurodegenerative diseases.

"These trials are important because Alzheimer's disease and its associated dementia will be a major drain on socioeconomic funding in the future," Dr Laws says. "Delaying the onset of the disease will have a significant impact on society and lead to a healthier population working and contributing longer. But preventative measures can be put in place now."

Dr Laws says everyone should participate in regular exercise with the mantra 'if it's good for the heart, then it's good for the brain.' He also advises people to adopt a diet high in antioxidants and exercise their brains with mental stimulation such as Sudoku or crosswords.

“It really is a case of use it or lose it, and the earlier people start with these measures the better,” he says.

Prevention is definitely the preferable option, especially when there is no cure and the statistics for Alzheimer’s disease are so alarming. Spending on dementia is projected to surpass any other health condition by 2060, and it will be the third greatest source of health and residential aged care spending within two decades. It’s just as well researchers haven’t forgotten Alzheimer’s disease, because 87 million sufferers worldwide by 2030 is an alarming prospect.

<sup>1</sup> A biomarker is a protein measured in blood, and its concentration reflects the severity or presence of some disease state.

Information about AIBL can be found at: <http://www.aibl.csiro.au>

Information about the CRC for Mental Health can be found at: <http://www.mentalhealthcrc.com/>

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## Let's talk about the 'R' word



Why are people so scared of the 'R' word? That's the question Professor Pamela Sykes, Molecular Geneticist from the Flinders Centre for Innovation in Cancer at Flinders University put to delegates at this month's 11th Pathology Update Conference in Sydney. The "R" word is radiation, and it's everywhere. So why are people worried about it?

"We have evolved on a planet with radiation and it is everywhere according to the geology of the area. For example, granite is especially high in radiation and a lot of people have granite bench tops in their kitchen," explains Professor Sykes. "We are also exposed to it from the sun, the air we breathe, from plants and the rocks on the ground to the fruit we eat. People are also radioactive, so radiation is not the poison, the dose is."

Professor Sykes says we live in a litigious society, and if authorities are trying to protect everyone from even tiny doses of radiation then people naturally think all radiation is dangerous. But research has proved this is wrong.

"I'm not saying high dose radiation is safe, but we need to put low dose radiation into perspective," she says. "While we can medically prove too much and too little radiation such as ultraviolet (UV) light is unhealthy, there is increasing evidence that low doses of radiation may be protecting people from cancer and other diseases."

Professor Sykes says exposing mice to small amounts of radiation can protect them against larger doses.

"Mice that were exposed to a small "tickle" dose of radiation before the large dose of radiation lived longer than the mice that received only a large dose of radiation," explains Professor Sykes. "We are now looking at harnessing radio-protection mechanisms to prevent cancer and other diseases."

There is still more research required to identify the threshold where low dose radiation becomes therapeutic, but this research has certainly highlighted the 'hype' surrounding radiation.

"Chernobyl happened in 1986 and they predicted about 4000 to 9000 people would die from cancer," says Professor Sykes. "There were 28 early deaths from the explosion, and about this number again in the decades that followed, but there was no increase in leukaemia, solid tumours or hereditary disorders. The only increase was in thyroid cancer, but this may be partially due to the population being screened for these diseases every year and therefore every case was picked up. Fukushima will probably have even less consequences."

Professor Sykes says people living within 80 kms of a nuclear power plant are exposed to the same amount of radiation each year as a normal smoke detector installed in a home, but less than sleeping next to a person for a year. There is also a greater exposure to radiation in the Vatican and the US Capitol buildings, which contain huge amounts of granite, than living near a nuclear power plant.

"It's ironic that people are worried about tiny amounts of radiation, but not their granite bench tops!" says Professor Sykes. "But, they shouldn't worry about these bench tops either."

## Typical radiation exposure levels

The amount of radiation received by people is measured in millisieverts (mSv).

Exposure	Approximate Dose in mSv
Radiotherapy to a tumour	70000
Living in the Vatican for a year	8
Mammogram	2.5
Living in the US Capitol building for a year	0.85
Dental x-ray	0.6
Chest x-ray	0.1
Sleeping next to someone for a year	0.02
Adelaide to Sydney flight	0.01
Living within 80 kms of a nuclear power plant for a year	0.0001

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Professor Gilbert, who is the former Director of Laboratory Services at the Centre for Infectious Diseases and Microbiology in Sydney, also remembers *Haemophilus influenzae* type b (Hib) being the major cause of meningitis. She saw up to three children each week under the age of two with a high risk of brain damage from this infection.

"Many of these diseases have disappeared off the radar because of successful immunisation programs. But it won't remain that way if people don't immunise their children," she says. "Last year in Australia there were outbreaks of measles in 70 schools, mostly amongst adolescents."

Professor Gilbert attributes this to adolescents who may have immigrated to Australia or New Zealand and were not vaccinated at all, or to children in this age group not receiving the measles, mumps and rubella (MMR) booster before they started school.

"When only one single dose of the MMR vaccine was given in infancy there were recurring outbreaks which had fallen away until the last few years," she says. "The before-school booster was introduced in 1998 and it is important because no vaccine is 100 percent effective."

The aim of immunisation is to protect the individual and build up "herd immunity". Children who don't produce antibodies in response to a vaccine are then protected by the herd's immunity. However, there is a noticeable swing away from vaccinating children for a variety of reasons, including the widely reported but unsubstantiated link between the MMR vaccine and autism.<sup>1</sup>

"The autism link to the MMR vaccine was a tragic mistake. A practitioner in the UK became convinced that the increased diagnosis of autism was linked to the MMR vaccine in infancy," explains Professor Gilbert. "It received a lot of publicity and that link has been completely disproved by independent studies since then. But once an issue like this is raised it circulates for a long time."

Another issue amongst parents is the concern that the simultaneous administration of multiple vaccines might overwhelm or weaken the immune system. Professor Gilbert says there is no evidence this is the case.

"All adverse events are reported so they are known, and a lot of effort is put into improving vaccines," she explains. "With the exception of some localised reactions, which happen in about three to five percent of children, serious side effects are very rare. It's just that they make headlines when they do occur."

When serious childhood diseases are kept under control through vaccination programs it's easy to say vaccinations don't matter any more. But they do! And we probably need distinguished professors like Lyn Gilbert to remind us of the 'bad old days' more often, so we remember why vaccinations matter to individuals and society as a whole.

<sup>1</sup>An overview of some studies examining the allegation of a link between vaccines and autism can be found at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2908388/pdf/nihms-212222.pdf>

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