



PathWay

THE ROYAL COLLEGE OF PATHOLOGISTS OF AUSTRALASIA



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Issue #036

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Introduction

Whooping cough (pertussis) is back in the headlines due to concerns the vaccine is losing its effectiveness. We've asked Professor Lyn Gilbert, microbiologist and former Director of Laboratory Services at the Centre for Infectious Diseases and Microbiology in Sydney, to clarify what is happening and why.

It's also Bowel Cancer Awareness Month in June. We've lent our support to this important initiative from Bowel Cancer Australia and looked at the reasons why bowel cancer screening is important.

Last month heralded another step towards personalised medicine with the launch of the Centre for Personalised Immunology at the John Curtin School of Medical Research located within the Australian National University. Co-director Professor Matthew Cook has outlined the vision and purpose of this new venture for us.

And finally, we've always suspected pathologists have a life outside of their labs and Dr Brendan McMullan is living proof. He is also a tenor in the audition-only Brandenburg Choir which performs with the Australian Brandenburg Orchestra. Dr McMullan has kindly allowed us to highlight his hidden talent.

Don't forget to check our Facebook page regularly at www.facebook.com/TheRoyalCollegeOfPathologistsOfAustralasia. You can also keep up-to-date with what's happening in pathology by following our CEO Dr Debra Graves (@DebraJGraves) or the College (@PathologyRCPA) on Twitter.

Interesting Facts

7 to 20 days

The period between exposure to whooping cough (pertussis) bacteria and the appearance of the first symptoms of infection.

Every 3 to 5 years

The frequency of whooping cough outbreaks in Australia and New Zealand.

Whooping cough vaccine still protective against severe disease

August 2011

The beginning of the most recent outbreak of whooping cough in New Zealand with more than 11,200 cases reported as of February 2014. This outbreak is still ongoing.

Sources: Australian Government Department of Health, Ministry of Health New Zealand

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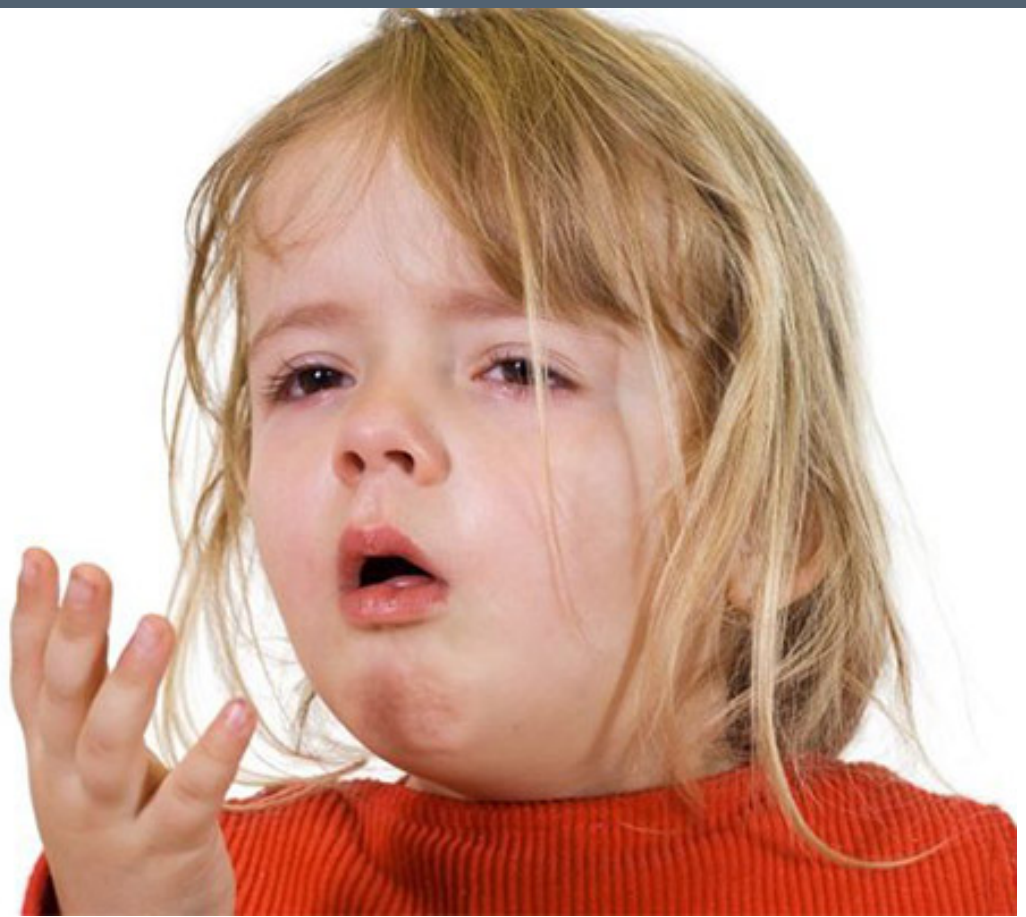
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Whooping cough (pertussis) is back in the headlines for the wrong reasons. Despite a high uptake of the pertussis vaccine, there is evidence of continuing relatively high infection rates, with large outbreaks every 3-4 years, including amongst those recently immunised. This type of information can lead to 'vaccination conspiracy theories' and alarmist headlines, so we've asked an expert to tell us what is going on.

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Saving lives through early detection is the message for Bowel Cancer Awareness Month

June is Bowel Cancer Awareness Month^[1] which is an initiative of Bowel Cancer Australia to raise the profile of one of the most common forms of cancer in Australia and New Zealand. Bowel cancer is preventable, treatable and beatable in about 90% of cases if it is detected in time, making it important to get past the 'yuck' factor of collecting poo for a potentially life-saving screening test.



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New Centre for Personalised Immunology aims to close the gap between research and clinical practice

It's only been 11 years since the Human Genome Project (HGP) revealed our genetic blueprint and started a mini-revolution towards

Professor Carola Vinuesa and Professor Matthew Cook, Directors, CPI



personalised medicine. Another step was taken in this direction at the Australian National University (ANU) when the Centre for Personalised Immunology was launched at the John Curtin School of Medical Research last month.

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RCPA Fellow sometimes sings for his supper

Dr Brendan McMullan is not only a microbiologist and paediatric infectious diseases physician at the Sydney Children's Hospital. He is also a tenor in the audition-only Brandenburg Choir, which performs with the Australian Brandenburg Orchestra (ABO), and weaves his musical commitments around his busy work schedule.



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Whooping cough vaccine still protective against severe disease



Whooping cough (pertussis) is back in the headlines for the wrong reasons. Despite a high uptake of the pertussis vaccine, there is evidence of continuing relatively high infection rates, with large outbreaks every 3-4 years, including amongst those recently immunised. This type of information can lead to 'vaccination conspiracy theories' and alarmist headlines, so we've asked an expert to tell us what is going on.

Professor Lyn Gilbert^[1], microbiologist and former Director of Laboratory Services at the Centre for Infectious Diseases and Microbiology in Sydney, says it's not absolutely clear what is causing the continued periodic outbreaks of pertussis because there are a number of issues to consider.

"The *Bordetella pertussis* bacteria, which cause pertussis, are changing compared to the strain used in the vaccine. We also have more sensitive pathology tests that may be picking up milder cases as molecular diagnostic tests have recently become widely available. A change from the whole cell to acellular vaccines for all doses from 1999, and dropping the 18 month booster from the immunisation schedule in 2003, has also reduced the level of protection in some age-groups."

The recent spate of headlines about the pertussis vaccine is in response to a UNSW-led team of researchers from around Australia finding that some strains of *Bordetella pertussis* are no longer producing a key surface protein called pertactin. The absence of this protein makes it harder for the antibodies made by the body's immune system in response to the vaccine to 'search and destroy' the invading bacteria. It's like removing the target flags from the bacteria and then expecting the antibodies to find them in a game of hide and seek.

Pertussis is highly infectious and anyone at any age can be infected. However, the disease is most serious in babies under the age of 12 months. It is spread through droplets in the air and can progress from an upper respiratory tract infection to a serious lung infection and death. Symptoms include a series of short, severe coughs that are often followed by a high-pitched

intake of breath that sounds like a 'whoop'; hence the name whooping cough. Symptoms can continue for months.

Australia has recently experienced an epidemic of pertussis (which reached its peak in 2010) with 142,000 cases from 2008 to 2012. The UNSW study analysed 320 bacterial samples from patients with pertussis from five states in Australia during this time, and found that the proportion of pertactin-free bacteria rose from five percent of cases tested in 2008 to 78% in 2012.

"Pertactin-free strains of pertussis have also been detected overseas including Europe and the USA," explains Prof Gilbert. "But this situation doesn't absolutely prove why there are increased cases of pertussis."

There is also no evidence that pertactin-free strains are more harmful than other strains, and it is not absolutely clear whether they reduce the effectiveness of the vaccine in the short or long term. The current pertussis vaccine produces antibodies against the pertussis toxin. This is the poison produced by the *Bordetella pertussis* bacteria that causes the most severe disease symptoms.

"The situation is being monitored and there are a few options on the table including developing better adjuvants to include in the vaccine to produce a better immune response, introducing the first dose at a younger age, and reintroducing the 18 month booster to carry the immune response over until the next booster at four years of age," says Prof Gilbert.

"But the current vaccine is still protective against severe disease, and nobody is suggesting that we shouldn't be immunised. We have to protect young babies. But we may have to improve the effectiveness of the schedule to evolve with the offending bacteria."

[1] Professor Lyn Gilbert was interviewed about immunisations in the [March 2012 edition of ePathWay](#)

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Saving lives through early detection is the message for Bowel Cancer Awareness Month



June is Bowel Cancer Awareness Month^[1] which is an initiative of Bowel Cancer Australia to raise the profile of one of the most common forms of cancer in Australia and New Zealand. Bowel cancer is preventable, treatable and beatable in about 90% of cases if it is detected in time, making it important to get past the 'yuck' factor of collecting poo for a potentially life-saving screening test.

Professor Graeme Young, Gastroenterologist at the Flinders University Centre for Innovation in Cancer in Adelaide, is a strong advocate for bowel cancer screening programs^[2] because he says they work.

"I get stopped in the street by people who have seen my picture and they thank the program for saving their life, or the life of their brother or mother," he explains. "I also receive letters from people with the same message, including from doctors, even though I am just part of a team associated with the screening program. This is the human side that isn't reflected in the statistics."

While these people represent the lucky ones, the statistics on the frequency of bowel cancer are chilling. New Zealand has one of the highest bowel cancer death rates in the western world, and the number of new cases diagnosed each year is projected to increase by 15% for men and 19% for women by 2016. On the other side of the Tasman, fewer than 40% of bowel cancers are detected early and about 80 Australians die from this disease each week.

"We need to raise the profile of Australia's National Bowel Cancer Screening Program^[3] because just under 40 percent of people complete the test when it is mailed to them at home," explains Prof Young.

"We know some people find collecting faeces distasteful, although I can see that community attitudes are changing in this respect. People are realising it is such a simple thing to do, and the fact that the screening program works is starting to filter

through as well. But we still need more funding to raise the program's profile, especially since it is Australia's only national screening program for both men and women."

Australia's National Bowel Cancer Screening Program is open to Australians turning 50, 55, 60 or 65 years of age who hold a Medicare card or DVA card. The program is still being expanded, and when fully implemented all Australians aged between 50 and 74 years will be offered free screening every two years. Based on conservative estimates, Professor Young says this will save between 300 and 500 lives each year because of much earlier detection of the disease.

New Zealand is currently running a bowel screening pilot^[4] in the Waitemata District Health Board area of North Shore Auckland for everyone aged 50 to 74 years who is eligible for publicly funded healthcare. The four-year pilot started in October 2011.

The screening test kit mailed to program participants in Australia is known as a Faecal Occult Blood Test (FOBT). However, a new technology called a Faecal Immunochemical Test (FIT) - to distinguish it from the older FOBT chemical technology - is now used. A FIT uses the latest technology, can be completed in the privacy of a person's home and mailed to a pathology laboratory for analysis. FIT kits can also be obtained outside of national screening programs from sources such as doctors or pharmacies.

"A positive FIT doesn't always mean a person has bowel cancer," says Prof Young. "It could be positive due to other causes of bleeding, but a positive test should be investigated further with a colonoscopy. A positive FIT leads to bowel cancer in about five percent of cases, and about 50 percent of cases have a precancerous adenoma (polyp) of some type."

Now that you know the stats about this preventable, treatable and beatable disease, put a red circle around Wednesday 18 June on your calendar. This is Red Apple Day in Australia when you can buy a \$2 red apple pin to support Bowel Cancer Australia and their positive message for Bowel Cancer Awareness Month – saving lives through early detection.

[1] <http://www.bowelcancerawarenessmonth.org>

[2] Bowel Cancer was also covered in [ePathWay in May 2011](#)

[3] <http://www.cancerscreening.gov.au/internet/screening/publishing.nsf/Content/bowel-about>

[4] <http://www.health.govt.nz/our-work/diseases-and-conditions/cancer-programme/bowel-cancer-programme/bowel-screening-pilot>

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New Centre for Personalised Immunology aims to close the gap between research and clinical practice



ANU Vice Chancellor Professor Ian Young, Professor Carola Vinuesa, Assistant Minister for Health Senator Fiona Nash, Professor Matthew Cook, JCSMR Director Professor Chris Parish, ANU DVC (Research) Professor Margaret Harding at the launch of the CPI.

It's only been 11 years since the Human Genome Project (HGP) revealed our genetic blueprint and started a mini-revolution towards personalised medicine. Another step was taken in this direction at the Australian National University (ANU) when the Centre for Personalised Immunology was launched at the John Curtin School of Medical Research last month.

Professor Matthew Cook, RCPA Fellow, clinical immunologist and co-Director with Professor Carola Vinuesa of the Centre for Personalised Immunology, hopes this new research enterprise will start to close the gap between research and clinical practice for immune diseases. It will be run by a team of 15 researchers at the ANU alongside a number of national and international collaborators including Westmead Hospital and Westmead Children's Hospital in Sydney.

"In one sense the centre represents an evolution of several research projects aimed at understanding the genetic and cellular basis of various immune diseases over a period of about 10 years," explains Prof Cook.

"Two recent and substantial technological advances make it timely to consolidate these efforts within the centre. These are efficient and cheap genome sequencing and the ability to generate very accurate mouse models of human genetically-determined disease relatively quickly and cheaply. We hope these advances will enable us to make substantial progress in understanding immune-mediated diseases," explains Prof Cook.

Prof Cook says the centre's focus will be on understanding how changes in the genetic code cause human disease, including rare diseases, and how these changes can be applied on an individual basis to guide diagnosis and therapy. This approach is especially important to people with rare diseases.

"We can now identify a genetic variant in a person and engineer the same mutation in mice quickly and cheaply. This means

we can combine the studies in the mice and of the person to see what has happened, and try to identify which biochemical pathways went awry. This will enable us to target treatment towards repairing that pathway," he explains. "This process was too time consuming and expensive until very recently."

Prof Cook says this new approach provides a pathway to identify which genetic variant a person has, which in time might provide a guide to precise therapy.

"Our work is patient focused in terms of identifying genetic variants and understanding how specific abnormalities in the immune system work."

Once this technique becomes routine, Prof Cook says his team will look at strategies to progress towards a clinic-setting to harness the powerful molecular tools currently at their disposal. But for now the Centre for Personalised Immunology is a research venture that aims to combine discovery and diagnosis to realise the promise of personalised medicine.

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"I have been singing for a while and am actively involved in a small community choir with the Australian Brandenburg Orchestra's Artistic Director Paul Dyer. Paul heard me sing and then invited me to join the Brandenburg Choir for the 2010 Noël Noël Christmas concerts. I have been singing with this choir since then," explains Dr McMullan.

The Australian Brandenburg Orchestra performs music from earlier centuries using original edition scores and instruments. Dr McMullan says the Brandenburg Choir performs with this prestigious orchestra twice yearly, including the annual Noël Noël Christmas concert, singing music from the eleventh century through to modern pieces.

"The time commitment for the choir's concert seasons involves about one week of rehearsals and two weeks of performing twice a year. This takes up most evenings during that time, and I can arrange my work commitments, including being on call, ahead of time to fit in with the choir's schedule. We have just finished the Bach Magnificat series, and the next concert for the choir this year is at Christmas."

Because the Brandenburg choristers only sing together for about six weeks each year, Dr McMullan says he has to keep his 'day job' as a pathologist and physician. However, he also sings with friends and small choirs in concerts or churches around Sydney during the year.

"I don't sing to my patients individually," he laughs. "We have a wonderful hospital band at the Sydney Children's Hospital called A Spoonful of Sugar who do that very well. But I enjoy singing in choirs, especially the Brandenburg Choir, and wouldn't give it all up for the world."

Information about the Brandenburg Choir can be found at <http://brandenburg.com.au/our-choir/>.

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