Research with bite

It has been dubbed The Barbecue Stopper: an aggressive mosquito spreading a crippling virus through Asia. Both the mosquito and the virus are now knocking on Australia’s door, to the alarm of public health authorities worried about a major outbreak.

The mosquito is the Asian Tiger Mosquito, or *Aedes albopictus*. The virus is Chikungunya. Both are well and truly on the radar of scientists at QIMR Berghofer.

Chikungunya is an African word meaning ‘that which bends up’ and describes the posture of people suffering from the disease, curled up in pain. There is no vaccine, cure, or specific treatment.

It is caused by a virus similar to Australia’s Ross River and Barmah Forest viruses. They all belong to the alphavirus family, and they all cause arthritis that can last for months.

The debilitating disease is sweeping through Papua New Guinea and south-east Asia and is being brought home by Australian tourists travelling to popular holiday destinations. In 2013 there were also outbreaks in the Pacific and, for the first time in recent history, the Caribbean.

Chikungunya wasn’t a major disease concern until it mutated around 2005 on Reunion Island in the Indian Ocean. It was only a small change, but it helped the virus adapt to the Asian Tiger Mosquito.

QIMR Berghofer scientists are approaching Chikungunya from different angles. The Inflammation Biology Laboratory, led by Professor Andreas Suhrbier, is studying the virus, working to understand why it causes arthritis.

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The Mosquito Control Laboratory has a new insectary in the Bancroft building, housing a range of mosquito breeds, to help the team develop new surveillance and control strategies. It is the largest quarantine approved insectary in Australia, and is designated by the World Health Organisation (WHO) as an official global Collaborating Centre for Environmental Management for Vector Control. In 2014 QIMR Berghofer will house Asian Tiger Mosquitoes in its new, highly secure quarantine unit.

Professor Greg Devine inside QIMR Berghofer’s new insectary.
It has been a pleasure to witness the public recognition of QIMR Berghofer scientists in recent times. Medical researchers are not driven by glory, but it is an enormous morale boost for them to know the community appreciates their toil and the difference their work makes to all our lives.

Professor Adele Green, AC spent a fruitful 12 months as Queensland Australian of the Year, an award honouring her pioneering skin cancer research. But more recently she won the Innovation category and was named overall winner from an extraordinary field at the Australian Financial Review and Westpac 100 Women of Influence Awards.

Here are some of our other award winners from recent times, showing the depth and breadth of research underway at QIMR Berghofer:

- **Professor Brian Kay** has just retired after 51 years at QIMR Berghofer’s Mosquito Control Laboratory, but not before receiving an Australian Museum Eureka Award for Excellence in Science. He was part of the Eliminate Dengue team, and their game-changing use of wolbachia bacteria to inhibit mosquitoes’ ability to spread Dengue.

- **Dr John Miles**, Head of the Human Immunity Laboratory, was awarded a Young Tall Poppy Science Award. These hotly-contested awards recognise outstanding young scientific researchers and communicators. You can read more about John’s fascinating work with venoms on Page 6.

- **Dr Franziska Bieri** (pictured right) won the Discovery Award at the Research Australia awards. Franziska worked with Professor Don McManus on the wonderful animated cartoon “Magic Glasses” to promote hygiene to schoolchildren, to counteract intestinal worm infections in rural China.

In this edition of Lifelab, I hope you will gain insights into some of the many other research projects underway, thanks to your support. On page 6 you can read about the new cancer projects funded by the Rio Tinto Ride to Conquer Cancer. And on Page 7 enjoy a look back on all the colour of the inaugural Weekend to End Women’s Cancers. As ever, thank you for making this work possible.
Meanwhile the Mosquito Control Laboratory, headed by Associate Professor Greg Devine, monitors the Asian Tiger Mosquito’s movements, and studies the insect’s biology. This team is also working with Queensland councils, economists in the US and the CSIRO to gauge the potential costs of the mosquitoes becoming established on the Australian mainland.

“The Asian Tiger Mosquito is well established in the Torres Strait, where the local authorities do a tremendous job of controlling them on the main transport and population hubs of Thursday and Horn Islands,” Associate Professor Devine said.

“Despite that, a few of these aggressive biters still find their way into traps at Australian ports. So far, we’ve managed to contain them, but most researchers believe it is just a matter of time before they slip through and become established.”

If the Asian Tiger Mosquito does become established in Australia, it would dramatically complicate local disease prevention programs because the species could also spread dengue fever south from North Queensland.

“Dengue is limited to North Queensland because of the limited geographic range of another, largely tropical mosquito, Aedes aegypti. The Asian Tiger Mosquito is a closely related cousin that can also carry dengue and can adapt to a far greater range of climates. It could establish in all of Australia’s major population centres,” Associate Professor Devine said.

New sun spot gel available in Australia

The Therapeutic Goods Administration (TGA) has approved Picato® gel as a topical treatment for solar keratoses, or sunspots, a precursor to the second most common type of skin cancer: squamous cell carcinoma.

The gel is applied once a day for two or three days, depending on the area of the body treated. It is only available on prescription from GPs and dermatologists and is not available on the Pharmaceutical Benefits Scheme.

QIMR Berghofer researchers were important contributors to the isolation and development of the active ingredient in Picato® gel.

Dr Jim Aylward first explored the potential of Euphorbia peplus, the plant commonly known as radium weed.

In 1997 he approached QIMR Berghofer scientists, including Professor Peter Parsons and Professor Andreas Suhrbier, to further isolate the active ingredient - ingenol mebutate - and explore its potential and how it could work as a treatment.

“Jim Aylward had the drive and intelligence to develop a new anti-cancer treatment. He’s left a lasting legacy of jobs and expertise, as well as providing a new treatment for sun spots.” QIMR Berghofer’s Director, Professor Frank Gannon said.

“QIMR scientists have benefitted from participating in the processes involved in the long road from concept through to regulatory approval of a drug.

And, of course, hundreds of thousands of Australians stand to benefit from the product, which has the potential to reduce lengthy treatment times, pain and irritation.”

Picato® is not available from QIMR Berghofer, please contact your GP or dermatologist for further information.

Solar keratoses FACTS:

- Sun spots often appear as red scaly lesions on skin that has been frequently exposed to the sun.
- Sixty-five per cent of squamous cell carcinomas arise from lesions previously diagnosed as sun spots.
- Almost half a million new cases of non-melanoma skin cancers are diagnosed in Australia each year.
QIMR Berghofer Medical Research Institute scientists have launched one of the world’s biggest studies of vitamin D’s role in our health.

D-Health, led by Associate Professor Rachel Neale, will follow 25,000 Australians for five years, to establish the role vitamin D plays in preventing a range of diseases.

“Vitamin D is often considered the latest magic cure for almost every disease, from cancer and heart disease, to mental health disorders and multiple sclerosis,” Associate Professor Neale said.

“But in reality, the jury is still out in terms of proven benefits,” Associate Professor Neale said.

“We hope that this study, linking with Medicare records and cancer registries, will be able to provide some definitive answers and advice.”

The study requires people aged 60-79 to take a supplement or a placebo – they won’t know which – once a month for five years. People across Australia will be receiving a letter in the mail inviting them to participate, but people who don’t receive a letter can also sign up.

“We are calling on Australians to become involved, to make a difference. It requires very little of their time but will make an enormous difference to our understanding of the role of vitamin D in preventing disease,” Associate Professor Neale said.

Vitamin D is found in oily fish and made in the skin when it is exposed to sunlight. It has long been known for its importance to bone health. However nutrition scientists now recognise that vitamin D is involved in a wide variety of other functions, including modulation of the immune system.

“Vitamin D testing has become a huge trend. This country spends $150 million a year on individuals having their levels checked, despite the fact that testing is unreliable and we don’t even really know what blood level to aim for,” Associate Professor Neale said.

“And there’s another complicating factor in Australia, where our skin cancer rates are so high and people receive conflicting advice about how much sun exposure they need to maintain vitamin D levels. It may be that a vitamin D supplement is enough but we need a study like D-Health to find out.”

WE NEED YOU!

Would you like to help our study? Are you aged 60-79 and currently not taking more than 500 IU per day of vitamin D supplements? To volunteer for D-Health phone 1300 735 920 or visit the study website at dhealth.qimrberghofer.edu.au
Like many of the 2,000 people diagnosed with pancreatic cancer each year in Australia, 67 year-old Christine Lindsay had no idea anything was really wrong. After a bad bout of heartburn, she visited her GP. The cautious GP ordered an ultrasound and when the results came back, further tests were ordered. The follow-up CAT scan confirmed pancreatic cancer, with secondary cancer in the liver.

The news was life changing. Within a week, Christine had gone from believing she had a minor ailment to dealing with the shocking diagnosis of a terminal cancer.

“It was scary,” Christine recalled.

“You want to keep it to yourself, but you can’t.”

QIMR Berghofer researcher, Dr Nicole Cloonan, said one of the difficulties with pancreatic cancer was that it often had no obvious symptoms.

“The symptoms are very non-specific, such as being overly tired, or having a sore back. Most people diagnosed with pancreatic cancer only discover they have it when it is too late.”

Pancreatic cancer is most common in people over the age of 60. By the time it is diagnosed, it has often spread to nearby organs and lymph nodes. It is the fourth most common cause of cancer death in developed countries.

“Only half of those diagnosed with pancreatic cancer will survive the first six months. By five years, the survival rate is only five per cent,” Dr Cloonan said.

“We still don’t know what causes it, or how to stop it. But we do know it spreads quickly, giving little opportunity to test various treatments.”

Dr Cloonan’s current research, under the umbrella of genome biology, aims to explore whether treatments which have been effective in other cancers, can also work for pancreatic cancer patients.

She is keen to progress research into a particular molecule known as microRNA. Found in all plants and animals, microRNAs regulate gene expression and play a vital part in influencing the pathways responsible for many disease processes.

By better understanding exactly their biological role, she believes the door could open to more effective treatments.

“While many other cancers have improved, the odds of surviving pancreatic cancer haven’t changed in 40 years. It’s why investing in pancreatic cancer research is essential,” Dr Cloonan said.

“The right treatment may already exist. We just need the funding to run research trialling the effectiveness of these treatments specifically against pancreatic cancer.”

While Christine knows the odds, she trusts her doctors to guide her cancer journey.

“I have an amazing doctor, and I’m trusting him to tell me what’s best. I have never asked him ‘how long?’ It’s not something I want to focus on,” Christine said.

“You’ve got to play the cards that you’re dealt. You can’t pick and choose. If this is my future, my time, then I’m not frightened of that.

“I just need to make the most of the time I have left.”

Christine, who is currently battling pancreatic cancer remains positive and accepting. It’s been harder for her husband of 48 years, Sam, however. He along with her three adult sons, their wives and her grandchildren have been incredibly supportive.
The perfect poison

Australia is home to some of the world’s most venomous creatures: spiders, snakes and jellyfish with global infamy.

But in a glorious irony, the properties that make these venoms so deadly are precisely what makes them a force for good in medicine.

Dr John Miles, head of QIMR Berghofer’s Human Immunity Laboratory, says venoms are a seemingly perfect drug.

“The fast acting peptide fragments within venoms target vital molecules in our bodies and work like keys in a lock,” Dr Miles said.

“Venoms can turn biological pathways, cells and even whole organs on and off like switches.”

Given these unique abilities, a number of venom-based drugs are already in clinical trials for chronic pain and heart disease.

“If venom based drugs can be harnessed to control immune system function, we could open treatments for cancer and across a plethora of human diseases,” Dr Miles said.

“Just like a volume knob on a stereo, we could turn the power of the immune system down to one to silence autoimmune disease and turn it all the way up to 11 to kill cancers.”

Dr Miles’ study is one of a series of new research projects which received funding from the 2013 Rio Tinto Ride to Conquer Cancer.

More than 1,236 riders helped raise over $4.2 million for QIMR Berghofer in the third annual ride on 17-18 August last year.

Other projects funded by the 2013 Ride include research into:

• Individualised treatments for blood cancer
• New strategies to detect and treat brain cancer
• Patterns of care and quality of life for pancreatic cancer patients
• Combination therapies for melanoma
• A potential new treatment for prostate cancer
• Blocking breast cancer’s spread by binding a drug to the tumour surface
• Provoking an immune reaction in cancers
• Identifying new targets to stop the spread of lung cancer

Now, thanks to the 2013 Rio Tinto Ride to Conquer Cancer, Dr Miles has received funding to explore the ability of snake, cone snail, hookworm and jellyfish venom to control our body’s immune system, and potentially play a role in cancer treatments.

The 2014 Ride will be held on 16-17 August 2014.
If you’d like to ride in the 200 kilometre two-day cycle event, be part of a support team, or make a donation, visit www.conquercancer.org.au
In October 2013, QIMR Berghofer was overwhelmed by the support for the inaugural Weekend to End Women’s Cancers. 1,346 participants including our very own QIMR Berghofer team, created a sea of pink, purple and blue as they walked 60 kilometres through the streets of Brisbane. The Weekend raised $3.5 million, to support life-saving research programs at QIMR Berghofer, and treatment, care, research and survivorships programs at Royal Brisbane and Women’s Hospital.

To sign up for the 2014 event on 25-26 October, visit www.endcancer.org.au
Every year, QIMR Berghofer recognises donors who have generously given over $1,000 as a cumulative total in the previous year, on our Wall of Appreciation (WOA).

Situated with pride outside our auditorium, the Wall of Appreciation acts as a reminder that without our donors, QIMR Berghofer would not be able to carry out its inspirational and life changing research.

For the past decade, 87-year-old Sunny Drescher has worked tirelessly to raise vital funds for cancer research. She has held over 50 cent auctions since 2004, raising more than $100,000 for QIMR Berghofer.

A special thanks also to our community fundraisers:
- Lorraine Duckwitz
- Walking on Sunshine
- G V Memorial Golf Day
- Happy Face Cent Auctions
- Fitton Insurance (Brokers)
- The Rockhampton Grammar School Musical
- Eastern Suburbs Soccer Club
- All British Day (MG Car Club of Queensland Inc)
- King’s College
- Riverside Precinct Charity Golf Day
- Davis Family and Queensland Historical Bottle Club Inc
- Valerie Wolff
- Mount Coolum Golf Club
- Redcliffe National Seniors

We are taking our research on the road and visiting regional areas to update supporters on QIMR Berghofer’s latest achievements.

We understand that it can be difficult for some of our donors to travel to QIMR Berghofer so this is another way we can keep in touch and answer any questions they may have about how their donations are being used.

If you live outside of Brisbane then we may be coming your way soon! Keep an eye out for an invitation in the mail – we will be sending them to all our friends and donors in the areas we are visiting.

THANK YOU!

QIMR Berghofer are proud to once again open their doors for free public forums in 2014 giving you a chance to visit the Institute and hear latest research highlights firsthand from our scientists. Dates and topics:
- Cancer: Wednesday 9 April 10am-12pm
- Cancer: Tuesday 15 July 6pm-8pm
- Genetics: Wednesday 24 September 10am-12pm

To register your interest, please email enquiries@qimrberghofer.edu.au or call 1800 993 000.

SAVE THE DATE