INVESTIGATING THE ROLE BLEACH PLAYS IN COMBATING INFECTIONS

Two PhD students in the Free Radical Research Group are deeply engaged in finding out what happens when bleach is used to attack bacteria which threaten the body's health. It is believed, but not proven, that the main oxidant used by white blood cells, or neutrophils, to attack invading bacteria is hypochlorous acid or bleach.

However the challenge for science is to understand this process and many questions still remain as to how white blood cells carry out this vital bodily function.

Melanie Coker is trying to determine if bleach or hypochlorous acid is the main oxidant involved in killing bacteria. She is doing this by examining in close detail the way in which Staph bacteria are disposed of by white blood cells.

"The interesting and cunning thing about Staph bacteria is that it coats the surface of its cell with orange antioxidants called carotenoids. This may be a specific defence mechanism against white blood cells," she explains.

"When Staph is attacked by bleach from these neutrophils, the carotenoids deteriorate. When the bacteria have lost their orange colour they die because the antioxidant carotenoids can no longer protect them from free radicals used by the white blood cell in its attack."

Melanie says each oxidant, like bleach, leaves its own chemical footprint and by isolating these footprints, she expects to determine whether bleach is the key molecule responsible for protecting humans against dangerous bacterial infections.

Tim Harwood is looking at another aspect of hypochlorous acid; with regard to premature babies. Some 'prem' babies develop chronic lung disease and it is still not known exactly why this happens.

One of the reasons may be that their lungs often become infected with bacteria or fungi. The bleach used by white blood cells to attack the bugs may also have harmful side-effects. "We've shown that a product formed by bleach reacting in the lungs is twice as high in these 'prem' babies than those without the bacteria and fungi," he says.

"Also we've demonstrated that 'prem' babies with bugs in their lungs have a 70% chance of developing chronic lung disease, which is very high, and three times the rate observed in babies without bacterial infection."

Importantly Tim's research suggests that white blood cells contribute to the development of chronic lung disease. "One other spin-off from my research is that by measuring the level of this product, called chlorotyrosine, we may in future be able to detect the presence of bacteria and fungi in the lungs of 'prem' babies and take appropriate clinical action to minimise the risk of developing chronic lung disease."

Funding for Tim's study has come from Lotteries Health Research. The Health Research Council funds Melanie's research.

HEALTH LECTURE SERIES 2007

Rolleston Lecture Theatre

CHRISTCHURCH SCHOOL OF MEDICINE AND HEALTH SCIENCES. 2 Riccarton Avenue.

Wednesday February 28, 7.30pm
BREAST CANCER ADVANCES THROUGH TEAMWORK AND RESEARCH
Associate Professor Bridget Robinson. Oncologist, Christchurch Hospital

Wednesday March 7, 7.30pm
HOW HORMONES HELP HEAVY HEARTS
Professor Mark Richards. Director,Christchurch Cardioendocrine Research Group
National Heart Foundation Chair in Cardiovascular Studies. Christchurch Hospital.

Wednesday March 14, 7.30pm
THE CHRISTCHURCH HEALTH AND DEVELOPMENT STUDY. HIGHLIGHTS OF 25 YEARS OF RESEARCH
Professor David Fergusson. Department of Psychological Medicine

Wednesday March 21, 7.30pm
TRANSFORMING HEALTH CARE. REDESIGNING CANTERBURY'S HEALTH SERVICES
Dr Nigel Millar. Chief Medical Officer, Canterbury District Health Board

Wednesday March 28, 7.30pm
LATEST ADVANCES IN TREATMENT OF OSTEOARTHRITIS
Dr Lisa Stamp. Rheumatologist, Christchurch Hospital
Mr Gary Hooper. Orthopaedic Surgeon, Christchurch Hospital

Wednesday April 4, 7.30pm
HIV/AIDS IN NZ AND OVERSEAS. WHERE TO FROM HERE?
Professor Steve Chambers. Infectious Diseases, Christchurch Hospital

Free entry. Discussion and questions. Displays from support groups.
The School of Medicine and Health Sciences is at the front of Christchurch Hospital. Parking available hospital car park, corner Tuam and Antigua Streets. Queries 364 1199

UNIVERSITY OF OTAGO
Christchurch School of Medicine and Health Sciences
February 2007

Connecting with the Community

It is a great pleasure for me to introduce the February 2007 newsletter, which connects the University of Otago, Christchurch, with our community. The coming year will be an exciting and challenging one. At the end of 2006, Tertiary Education Minister, Dr Michael Cullen, announced additional funding for medical and dental education. This substantial additional money will allow us to deal with all historical financial problems, and over coming years allow for new initiatives to be undertaken.

It is therefore very appropriate that we had already planned to undertake a review of the School's strategic plan through to 2012 during the first part of the current year. A draft vision statement is that we will be; "A research–led campus, within the University of Otago, with an international reputation for excellence."

This year we will have our largest ever class of fourth year medical students with numbers over eighty, and this will lead to over 200 medical students for the first time. In addition we have over 60 PhD students and over 500 postgraduate health science students. Last year Nick Douglas, a final year medical student, became our sixth Rhodes Scholar in our 35 year history, which is an outstanding record, given that New Zealand Universities award only two Rhodes Scholarships each year.

New Zealand Universities are waiting with interest the outcomes for the development of Centres of Research Excellence (CoREs). Although the number will only increase from seven to nine, we are leading bids for two CoREs; one in Heart Health and the other in Mental Health and Addictions.

Other leading research groups in the School, such as the Free Radical Research Group, Infectious Diseases Research Group and the Christchurch Health and Development Study, are also involved in CoRE bids. Even research group bids which are not successful will obtain additional benefits through the University of Otago.

This newsletter highlights other research from the University of Otago, Christchurch, and provides insights into some of our internationally renowned research groups.

Professor Peter Joyce
Dean

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DRINK AND DEPRESSION: IS SIMULTANEOUS THERAPY THE ANSWER?

If you drink too much, and are dependent on alcohol, you are very likely to be also depressed according to recent figures.

Some 30-40% of people with drink problems also have major depression, and with 100,000 people battling alcohol dependence in New Zealand, this is a growing mental health issue.

Professor Doug Sellman, Director of the National Addiction Centre says the problem is that we don't know what comes first, the drink problem or the depression and clinicians are unsure sure whether they should treat a person for both at the same time.

"Traditionally, before the development of new alcohol anti-craving medication in the 1990's and even today, many clinicians still believe that alcohol dependence should be treated first," he says. "Past experience shows that if you solve the alcohol problem then often depression is also solved; but not always, and this is where our research is trying to clarify the situation."

Professor Sellman, one of NZ's most experienced addiction specialists, is launching a feasibility study over five centres to see if it is worthwhile carrying out a much wider randomised controlled study investigating the effectiveness of treating both alcohol dependence and depression at the same time. This will be the first study to look at the simultaneous treatment of alcohol dependence and depression with combined medication.

"Previously, before the development of new drugs like Naltrexone, we used to treat people with major alcohol problems by isolating them in places like Queen Mary Hospital at Hanmer. Now we do most treatment in the community, but we simply don't know if it is better to treat the alcohol problem first, then the depression, or both together."

Naltrexone has been around since the early 1990's and is an anti-craving drug which works well for most people, helping decrease the amount of alcohol used. The use of antidepressants in combination with naltrexone is less certain, as it is not clear if specific treatment for depression like this is necessary when naltrexone is used. There is simply no hard data on using both naltrexone and an antidepressant such as citalopram at the same time.

"Some clinicians are using both, some aren't, and there is constant debate about what does and does not work so we really need to clarify what is the best clinical approach with these addiction and mental health conditions which blight the lives of thousands of people and their families," says Professor Sellman.

The strength of this study will be its size, around 200 participants, and the fact that it will be administered by doctors who are specialists in this area. Professor Sellman says it will take two or three years to get results. Running a randomized controlled study is a complex undertaking, particularly with a potentially problematic patient group.

This research is funded by the Ministry of Health and the University of Otago.

RESISTIN, OBESITY AND SURVIVING HEART ATTACK

For the last three years Dr Sarah Rothwell has been investigating a little known protein called Resistin which could play a major role in how well people recover from a cardiac event such as a heart attack.

Sarah is part of the Christchurch Cardioencocrine Research Group at the School which has forged an international reputation through its innovative research into the role that heart hormones play in heart failure. Recently she has published a research paper on her findings regarding Resistin which shows that obesity and Resistin in combination result in poor recovery from cardiac events.

"The key is that this protein, Resistin, is secreted from fatty tissue. We're now finding that all kinds of bad proteins and hormones can come from fat tissue in obese people. This isn't just fat which sits there and does nothing, it's having all kinds of active negative effects on the body."

Sarah explains how this happens from the Endolab where she does her research with colleague Dr Chris Pemberton. She says when Resistin levels are high and then an obese person has a cardiac event, the heart takes much longer to recover and doesn't contract nearly so well to pump blood around the body.

"What our study shows, is that the heart only recovers 68% of its previous contracting function when blood levels of Resistin are elevated in an obese person. Normally it would recover to about 90%, so this reduction has major implications for survivability following a cardiac event."

She says another interesting finding is that Resistin seems to be linked with the release of the potentially harmful protein, TNF Alpha, already associated with inflammation and heightened cell death.

Dr Rothwell's results add another piece of important information to the cascading effect of heart proteins and hormones which have been revealed over the last 15 years by the Cardioendocrine Research Group. The CCERG is in the running for a Centre of Research Excellence grant from the Government, together with other key heart researchers around NZ.

Drs Rothwell and Pemberton are now analysing patients who have had a cardiac event with associated high Resistin levels, to determine their survivability under normal medical management. She says it may be possible to use Resistin as a guide or biomarker for physicians during the acute phase of a cardiac attack.

"Eventually medical science may consider it valid to develop a drug to block Resistin and prevent its possible negative effect on people with heart problems, but that's down the track a bit," she says. "There are no instant solutions in this business, but unravelling the mysteries of the heart makes it all worthwhile."

This research was funded by the Canterbury Medical Research Foundation and the Maurice and Phyllis Paykel Trust

canterbury medical research foundation