



# Nutrigenomics **NewZ**

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## *New Zealand leading the world*



*Dr Jim Kaput and TVNZ's Paul Henry*

Nutrigenomics New Zealand is a reputed world leader with its comprehensive approach to research and its strong links to other programmes. These strengths were highlighted at the International Conference on Nutrigenomics & Gut Health, hosted in May by Nutrigenomics New Zealand, in Auckland.

"I'm finding that progress in nutrigenomics in New Zealand is nothing short of remarkable," says Dr Jim Kaput, a senior nutrigenomics researcher based at the University of California, Davis. "The New Zealand Centre is one of the leaders and is the only centre taking an integrated approach from agriculture and horticulture right through to the people who eat the foods."

Two hundred people from 19 countries attended the conference, including food industry representatives, health workers and scientists from the European Nutrigenomics Organisation (NuGO), the Centre of Excellence in Nutritional Genomics at the University of California, the Southeast Asia Region International Life Sciences Institute (ILSI) in Singapore, and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia. They shared their latest findings on diet-gene interactions, digestion, bioethics, and food regulations.

"We have all gained tremendously from the exchanges that went on among the exceptionally gifted group from 19 different countries," says Professor Lynnette Ferguson, who chaired the conference organising committee and who leads a New Zealand nutrigenomics research programme. "Challenges and excellent

potential for progress emerged from the interactions of people who had very different areas of expertise."

The conference theme was on taking the science to a marketable food product. Such products may be here soon. Genetic testing is available and rapidly offering more comprehensive results. There are commercial companies offering personalised nutrition services based on testing. And personalised foods are predicted to arrive in the marketplace in 3 to 10 years.

The technologies needed for nutrigenomics research are rapidly becoming better, cheaper, and better understood, says Professor Ferguson.

"Soon we will have the opportunity to be healthier for longer, as nutrition advice is tailored to individuals rather than to whole populations," she says.

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# Finding functional ingredients

Scientists are finding food extracts that might help people who have genes that predispose them to Crohn's disease. These extracts can reduce inflammation, improving the general health of people who are prone to this inflammatory bowel disease.

Forty common New Zealand foods, including fruit, vegetables, cereals, culinary herbs and tea, are being tested in a food screening programme led by HortResearch's Margot Skinner, which is part of Nutrigenomics New Zealand.

"We're looking for foods that minimise inflammation," she says. "The ultimate goal is then to work with the food industry to develop foods for people with Crohn's disease."

To test each food, Dr Skinner's team uses a cell-based anti-inflammatory assay. The assay involves inducing an inflammatory response in healthy cells and then introducing one or more extracts from each food to see if it will 'block' the chemical that causes inflammation.

Preliminary results suggest several kiwifruit extracts may have strong anti-inflammatory properties, says Dr Skinner. Extracts from apple, avocado and black tea also have promise.

Food extracts with the anti-inflammatory properties were also tested for their effect on different biochemical pathways that lead to bowel inflammation.

"We found some food extracts might be beneficial, but the efficacy of individual extracts depended on which particular pathway was involved in the inflammation – this can vary from person to person," says Dr Skinner.

Another focus of the Nutrigenomics New Zealand programme is investigating the effect of food extracts on the genes that cause Crohn's disease. This work is conducted at AgResearch Ltd. in a programme headed by Warren McNabb and at the University of Auckland under a gene screening programme headed by Martin Philpott.

Dr Philpott's team is developing tests to identify food extracts that can be used as ingredients in functional food products. Again, a cell-based assay is used. In these assays, genes associated with Crohn's disease are introduced into healthy cells. The food extracts are then added to see if they make those genes behave like a "healthy" gene.



*Dr Martin Philpott and Dr Margot Skinner*

"This knowledge will help us identify constituents in foods and herbs that may benefit people who have Crohn's disease, and it will help identify foods that these people should avoid," says Dr Philpott. "It may even help us identify foods that can prevent or slow the onset of the disease."

The information gained from the gene-nutrient interaction tests will be used to formulate food products.

## Using nutrigenomics to develop functional foods

The cell-based screening and gene-nutrient interaction tools being developed to test food extracts can be applied to different genes. In future, the tests will be used to identify food extracts that influence genes involved in a range of diseases. These tools may be used to identify food extracts that promote better physical and mental performance.

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# Bringing nutrigenomic foods to market

Potentially, nutrigenomics is the giant leap forward needed by the New Zealand food industry says Tony Nowell, co-chair of the New Zealand Government Food & Beverage Taskforce and managing director of Griffin's Foods.

"Health, convenience and pleasure are key drivers for increased food product sales and nutrigenomics has the potential to encapsulate these attributes," says Mr Nowell.

Product sales of healthy foods and drinks are increasing, as are sales of indulgence food items. For example, in New Zealand, the health snack bar market is growing at 9.5% per year and was valued at NZ\$102.5 million last year. New Zealand sales of chocolate rose by 3.7% in value last year, to NZ\$151.8 million.

"It is essential to start talking about nutrigenomics now. An increased awareness of the science is critical to product sales later," says Mr Nowell. "Simplicity will be important and production must be cost-effective."

Nutrigenomics is too important for food companies to ignore, he says.

Mr Nowell believes that functional foods are a precursor to progress in nutrigenomics, but he warns that there are some challenges in taking this new science through to marketable food products.



Tony Nowell

"Progress with research and development, protection of intellectual property and the consolidation of food retailing must all be addressed if New Zealand is to become successful in delivering easy, delicious, healthy foods to the world," he says.

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## Growing knowledge

How do you measure the effect of diet on disease prevention? This is one of the challenges of nutrigenomics research, Dr Ben van Ommen told leading researchers gathered at the recent International conference on Nutrigenomics & Gut Health in Auckland.



Dr Ben van Ommen, Dr José Ordovás and Shane Ruwhiu watch the Powhiri (Maori welcome)

The executive director of the European Nutrigenomics Organisation (NuGo), Dr van Ommen, spoke of the growing knowledge of the human genome, related biology and available technologies. He said these areas were merging into nutritional systems biology, allowing a focus on prevention of disease and stimulation of health.

Other leading international researchers who presented at the conference were:

- Dr José Ordovás, of Boston's Tufts University, spoke about genes predisposing to cardiovascular disease and their interaction with the environment and behaviour, with special emphasis on diet.

- Dr Michael Fenech, of Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO), told of the growing evidence of a direct link between increased genome damage and elevated risk for adverse health outcomes during life, such as infertility, foetal development and cancer.

- Dr John Hesketh, of the UK's Newcastle University, talked of some people needing more selenium than others.

# How do food regulations cater for innovation?

An outcome focused approach to food safety, as outlined in the Australia New Zealand Food Standards Code, lends itself well to novel products.

"I believe our outcome focused system fosters innovation and gives the food industry increased freedom to act," says Dean Stockwell, FSANZ General Manager, Wellington.

While most new foods can fit within the existing requirements of the Code, some new foods may be sufficiently 'new' or 'different' that they fall outside the current standards. Then, manufacturers may apply to have the food assessed as a novel food under the Novel Foods Standard. The key requirement of this standard is an appropriate safety assessment of new foods.

"But not all new foods will be considered novel or non-traditional," says Mr Stockwell. "Sometimes it is difficult to know if a new food is novel, so we encourage you to discuss this with FSANZ staff early in the development process".

The Novel Foods Standard is currently under review and a draft revision has been available for public comment. A new standard will be finalised in late 2006.

A new standard related to nutrition and health claims is being developed for inclusion in the Code in 2007. Three levels of claim – nutrient content, general level and high level health claims including biomarkers - have been identified.

"All claims must be accurate and supported or substantiated by scientific evidence," Mr Stockwell says.

There will be criteria and conditions relating to the foods able to make claims. Manufacturers will be required to establish and hold the necessary evidence for nutrient content claims and general level claims. High level claims and biomarker claims will require full pre-market assessment and approval by FSANZ, before product launch. Several high level claims will be pre-approved and included in the new standard. Once finalised, this standard will support introduction of many new and innovative foods.

During a recent review of FSANZ processes and procedures it was recognised that requirements for public comment on proposals and applications could compromise product innovation and confidentiality. Mr Stockwell says amendments to the statutory requirements are being considered and if accepted will address this important aspect of innovation.

"FSANZ is willing to discuss these aspects, prior to the formal application process, to find the most appropriate process for introducing new and innovative foods," he says.

Draft assessments of the Novel Foods and Health Claims Standards are available on the FSANZ website [www.foodstandards.gov.au](http://www.foodstandards.gov.au)

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## Young investigators present excellent science

Excellent science and entertaining presentations by young scientists at the International Nutrigenomics & Gut Health conference in Auckland made choosing winners difficult.

"Overall the standard of presentations was particularly high," says Matthew Barnett, convenor of judges and nutrigenomics researcher with AgResearch Ltd. "The 'Young Investigators' session was one of the more enjoyable at the conference – a tribute to all of the young scientists who took part."

The session was open to all PhD research students and those who graduated fewer than five years ago. Awards made were:

### Nutrigenomics New Zealand Travel Awards (\$500 each)

- Bianca Benassi, CSIRO Human Nutrition and the Department of Physiology at University of Adelaide, for "Inter- and intra-individual variation in DNA damage potential of faecal water assessed in the WIL2-NS cell line".
- Gunaranjan Paturi, Centre for Plant and Food Science at the University of Western Sydney, for "Microarray analysis of gene expression in murine small intestine modulated by *Lactobacillus acidophilus*".

### Nutrigenomics New Zealand and Agilent Technologies Best Oral Presentation Awards (\$250 each)

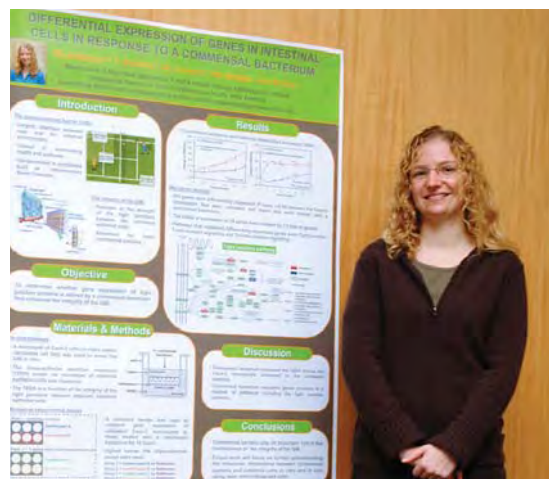
- Simon Hughes, School of Food Biosciences, University of Reading, UK, for "Effect of cereal cell wall fractions on fermentation by human gut microflora."
- Todor Arsov, John Curtin School of Medical Research Australian National University in Canberra, for "Genotype - food environment interactions".

### Nutrigenomics New Zealand and Agilent Technologies Best Poster Award (\$250)

- Rachel Anderson, AgResearch Ltd. Palmerston North, for "Differential expression of genes in intestinal cells in response to a commensal bacterium".

Highly commended by several judges were:

- Bart Penders, Maastricht University Netherlands, for "Shaping nutrigenomics practices: Constructing a 'new' health and a 'new' diet?"
- Yvonne Dommels, Crop & Food Research Palmerston North, for "A novel model to study nutrient-gene interactions in inflammatory bowel disease".



Dr Rachel Anderson



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