

Probiotic Bulletin

AN UPDATE FOR HEALTHCARE PROFESSIONALS

Microbes & Mankind – How bacteria and viruses shape humanity

Report from the Public Forum held in University College Cork on 12th November

The panel was made up of eminent speakers, experts in the area of microbes; Professor Colin Hill, Professor of Microbiology UCC and Principle Investigator APC, Professor Fergus Shanahan, Consultant Gastroenterologist Cork University Hospital and Director APC, Dr Mary Horgan, Consultant Physician in Infectious Diseases at Cork University Hospital and Professor Paul Ross, Head of Food Research in Teagasc. The Forum was chaired by Claire O' Sullivan, Senior News Reporter with the Irish Examiner.

In the opening presentation titled 'How Microbes have Shaped our History' Professor Colin Hill discussed how microbial disease shaped our history at individual level and at the level of entire civilisations. The lives of extraordinary people were cut short due to infectious disease for example Alexander the Great died of typhoid at 33 years of age while preparing to invade Arabia. At civilisation level, global pandemics have threatened the survival of our very species. Pathogen causing diseases such as smallpox, plague, tuberculosis and typhus have brought ruin to civilisations, including the Roman Empire, the Incas and the Aztecs of South America and the native Indian population in North America to name but a few. In the 14th century the Black Death led to the Dark Ages in Europe. In Ireland we had our own disaster, the Great Hunger, when blight as a result of a potato pathogen (*Phytophthora infestans*) led to a severely weakened nation which fell prey to a series of human pathogens and over a million deaths due to typhoid, typhus and cholera. Professor Hill pointed out that in these battles between pathogens and humans, modern society has a weapon which was

not available to those who lived and died in earlier times and that weapon is science. Smallpox, for example, once a devastating killer, was the very first pathogen to be eliminated in 1979. Despite scientific advances, global pandemics are not a thing of the past; we are currently undergoing a resurgence of plague in China, of AIDS in Africa and of tuberculosis, again primarily in Africa however with further advances in science these too may be eliminated in years to come.

“In these battles between pathogens and humans, modern society has a weapon which was not available to those who lived and died in earlier times and that weapon is science.”

Professor Fergus Shanahan discussed immuno-allergic conditions such as Crohn's disease, colitis, asthma, eczema, multiple sclerosis and early onset diabetes. These conditions are uncommon in 'developing' regions of the world but increase swiftly in frequency when modernisation occurs with the transition from 'developing' to 'developed' nation status. Evidence therefore suggests that there is a substantial environmental or lifestyle contribution to the risk of developing these immune-allergic disorders. Although the immune system is intact at the time of birth, it requires input from the environment for full maturation. The immune system is essentially a sixth sense; it is the sense of danger in the microbial environment, sensing the difference between harmless organism versus dangerous pathogens. To perform optimally in adult life, the immune system, like other senses, needs to be educated. It obtains this education by interacting with the normal microbes that colonise the skin and gut immediately after birth.

DETAILS OF THE YAKULT SYMPOSIUM ON PAGE 3

The Forum was hosted by the Alimentary Pharmabiotic Centre (APC) which is a UCC/Teagasc Research Centre funded by Science Foundation Ireland and industry, focusing on gastrointestinal health and development of therapies for debilitating disorders such as Crohn's disease, colitis, irritable bowel syndrome (IBS) and food poisoning. The Forum was supported by a grant from Yakult Ireland.



Colin Hill, Mary Horgan, Paul Ross and Fergus Shanahan

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Any disturbance of this microbial-mediated education of the immune system might predispose to misbehaviour of the immune system. Prof Shanahan also pointed towards which elements of the modern lifestyle may be responsible for increasing risk of disease by virtue of an influence on the normal gut flora. The most obvious influence was antibiotic usage but dietary or nutritional factors also play an important role. Other influences include sanitation and hygiene, refrigeration, life on concrete, urbanisation, smaller family size, and even a sedentary lifestyle and obesity have been associated with a shift in the bacterial composition of the gut.

With the first phase of the vaccination programme against Swine Flu (H1N1) underway in Ireland, Dr Mary Horgan discussed the current outbreak which at the time had claimed the lives of ten people in Ireland. The closely related Spanish Flu caused by influenza A virus strain of subtype

H1N1 killed in excess of 40 million people around the world in 1918–1919.

Professor Paul Ross' presentation focused on how bacteria which reside in our gut influence human health and in doing so he addressed such concepts as probiotics, prebiotics and the scientific evidence which surrounds them. He discussed the interest in the APC of developing new functional foods which positively impact human health by mining bacteria for health-promoting substances. A recent development in the APC has been the discovery of thuricin, an antimicrobial protein which can kill the dangerous human pathogen *Clostridium difficile* – which in Ireland has been the cause of recent deaths due to gastrointestinal infection. Thuricin, he stated, may represent a radical movement over conventional antibiotic therapy in that it is extremely potent at targeting the pathogen but does not affect the good bacteria in the gut. This technology has been patented by the UCC/Teagasc team and licensed to the Irish company Alimentary Health.

The Gut Translator: deciphering the digestive system

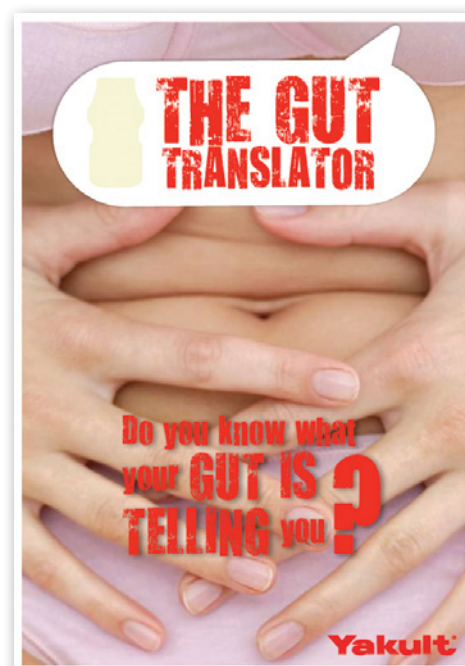
Following a recent survey revealing that the vast majority of people in the UK (81%) fail to understand the important signs and signals of health associated with the digestive system, Yakult is pleased to announce the launch of a new booklet, *The Gut Translator*.

This free full-colour booklet introduces readers to the gut, explaining what it is, how it works and how to interpret its signals. Readers discover that the gut is the only organ in the body that can use all five senses to 'communicate', and learn how to interpret various digestive sights, sounds, tastes, smells and feelings.

The book also dispels some common digestive health myths, offers advice on symptoms to look out for, summarises some of the most common digestive disorders, and provides tips on maintaining good gut health through diet, exercise and lifestyle.

The Gut Translator is aimed at members of the public interested in understanding more about the digestive system and is available as a free download from the Yakult website. Yakult also has a limited stock of booklets for healthcare professionals; if you would like to order copies, please email info@yakult.co.uk giving your address and the quantity (up to ten) required.

Visit www.yakult.co.uk/publications to download your free copy.



Just some of the questions answered by **The Gut Translator**

SEE: What can the appearance of stools tell you about digestive health?

HEAR: What causes burping and a rumbling tummy; are these noises normal?

SMELL: What is behind those 'nasty niffs' – and are they anything to worry about?

TASTE: What can a 'bad taste in the mouth' mean; is it time to see a doctor?

FEEL: What are the main reasons behind pain, bloating and itching?

Yakult UK Symposium BOOK NOW!



Yakult UK Symposium 12th October 2010

A programme of eminent speakers has been confirmed for our next symposium, including two Irish speakers Professor Eamonn Quigley and Professor Dermot Power, to be held at 76 Portland Place, London on 12th October 2010. Keep this date free!

This is an opportunity to be updated on probiotic evidence, including exciting new areas of research. Topics include gut disorders, allergic disease and the potential benefit of probiotics for population groups vulnerable to infection.

Our 2008 symposium received very positive feedback, with appreciation expressed for the high calibre of speakers and the relevance and objectivity of the talks. One dietitian commented; *"Thank you for allowing me the opportunity to attend, I really enjoyed the day and found the speakers fascinating"*.

The 2010 symposium is aimed at all healthcare professionals, students and researchers, and will be of particular interest to those specialising in nutrition and dietetics, primary care, infection control, care of the elderly, sports science and gastroenterology.

The symposium costs £100 but there is a half-price discount for HSE employees and students. Email science@yakult.co.uk to express your interest in this event.



Probiotics and inflammatory bowel disease (IBD) (Van Immerseel *et al* 2010)

IBD is a debilitating disease resulting from an inappropriate immune response, due to a combination of genetic and environmental factors, and involving an imbalanced intestinal microbiota.

This review addressed the therapeutic potential of butyric acid. This short chain fatty acid, produced by certain species of the gut flora, is used by the colonic epithelial cells as an energy source and positively influences their growth and health. It is thought to strengthen the colonic defences by increasing production of mucins and antimicrobial peptides, and

decreasing intestinal permeability. It also has anti-inflammatory properties.

The problem is – how can levels of this metabolite be manipulated in the gut for therapeutic value? Most gut species producing butyric acid are highly oxygen-sensitive anaerobes, such as *Faecalibacterium prausnitzii* and *Butyricoccus pullicaecorum*.

- Van Immerseel F, Ducatelle R, De Vos M, Boon N, Van De Wiele T, Verbeke K, Rutgeerts P, Sas B, Louis P & Flint HJ (2010) Butyric acid-producing anaerobic bacteria as a novel probiotic treatment approach for inflammatory bowel disease. *Journal of Medical Microbiology* 59: 141–143.

Research round-up

The intestinal microbiota and diabetes (Larsen *et al* 2010)

Type 2 diabetes, which affects about 4% of the EU population, is a metabolic disease primarily caused by obesity-linked insulin resistance. This study with 36 men, conducted by researchers at the University of Copenhagen, used molecular techniques to show that the intestinal microbiota of the 18 volunteers with type 2 diabetes differed from those without the disease. The strongest differences were a reduction in the relative abundance of *Firmicutes*, and increases in the proportion of *Bacteroidetes* and *Proteobacteria*. There was also a positive correlation between the ratios of

Bacteroidetes: *Firmicutes* and reduced glucose tolerance.

Firmicutes, *Bacteroidetes* and *Proteobacteria* are three major bacterial taxonomic groups (phyla) that encompass a very broad range of species. At a lower taxonomic level, it was found that the ratio of the *Bacteroides-Prevotella* group to *Clostridium coccoides-Eubacterium rectale* group and levels of the class *Betaproteobacteria* correlated positively with plasma-glucose levels.

- Larsen N, Vogensen FK, Van den Berg FW, Nielsen DS, Andreasen AS, Pedersen BK, Al-Soud WA, Sørensen SJ, Hansen LH & Jakobsen M (2010) Gut microbiota in human adults with type 2 diabetes differs from non-diabetic adults. *PLoS One* 5: e9085.

The effect of diet on the human gut microbiome (Turnbaugh *et al* 2009)

This study also focussed on the gut microflora and obesity, using an animal model to represent the human gut microbiota in order to eliminate variations that can affect human studies. Using faecal samples, microbial communities from obese people were transferred into germ-free mice to establish a gut ecosystem similar to the human microbiota. The mice were then fed a high-fat, high-sugar, and Western-style diet. In comparison to mice fed a low-fat, plant

polysaccharide-rich diet, this rapidly changed the microbiota composition, and increased body fat.

This research adds to a growing body of scientific data in this area. Previous studies have indicated that there may be differences in the intestinal microbiota of obese and lean people, for example obese animals have been shown to have significantly lower levels of bifidobacteria compared to non-obese animals.

- Turnbaugh PJ, Ridaura VK, Faith JJ, Rey JJ, Gordon JI & Knight R (2009) The effect of the diet on the human gut microbiome: A metagenomic analysis in humanized gnotobiotic mice. *Science Translational Medicine* 1: 6ra14.

A novel use for probiotics (Sanz-Penella *et al* 2009)

Although wholegrains are an important source of dietary fibre, some studies suggest that wholegrains or fibre-enriched bread can impair mineral absorption. This may be related to the level of phytate and phytic acid content in these products. Bran-enriched bread fermented with selected phylase-producing bifidobacteria had significantly lower phytate levels. Residues of myo-inositol triphosphates (suggested as beneficial to human health) were also recorded.

- Sanz-Penella JM, Tamayo-Ramos JA, Sanz Y & Haros M (2009) Phytate Reduction in Bran-Enriched Bread by Phytase-Producing Bifidobacteria. *Journal of Agricultural and Food Chemistry* 57: 10239-10244.

New review about intestinal dendritic cells (Ng *et al* 2010)

The antigen-presenting and regulatory roles of dendritic cells (DCs) are particularly important in the gut, where they play a key role in distinguishing between pathogens and commensal bacteria. DCs interact with the intestinal microbiota, orchestrating both a protective immune response and immune tolerance in the host. This expert review gives an overview of developments in this field, including the latest research exploring DCs as a potential therapeutic target in inflammatory bowel disease.

- Ng SC, Kim MA, Stag AJ & Knight SC (2010) Intestinal dendrite cells: their role in bacterial recognition, lymphocyte homing, and intestinal inflammation. *Inflammatory Bowel Diseases*. DOI 10.1002/ibd.21247

The first two papers cover emerging research that suggests the possibility of future strategies for metabolic diseases such as obesity, metabolic syndrome and type 2 diabetes, which could involve manipulation of the intestinal microbiota.



Gala Night



Aine O'Connor, Aileen Connolly, Aifric O'Sullivan, Celine Murrin, Sinead O'Brien and Celine Murray

Yakult sponsorship

The 19th International Congress of Nutrition

Conference report from postgraduate researchers from the UCD Institute of Food and Health

We are a team of six postgraduate researchers from the UCD Institute of Food and Health who recently attended the International Congress of Nutrition (ICN), which was held in Bangkok from 2nd to 9th October, 2009. The conference takes place every four years and is often referred to as 'The Olympics of Nutrition' with over 4,000 delegates from over 106 countries. The theme of this year's conference was 'Nutrition Security for All'. Security was tight at the opening ceremony, due to the attendance of a member of the Royal family – the princess of Thailand, HRH Princess Maha Chakri Sirindhorn.

Some of the topics covered included the following: Agriculture, Food and Nutrition; Nutrition and Infection; Advances in Nutrition Research; Bioactive ingredients; Nutrition through the life course and Obesity and Chronic Diseases. Throughout the week we presented six abstracts between us, in the form of five posters and one oral communication on a diverse range of topics including metabolomics and the gut microbiota, nutrigenetics, food additives and obesity in childhood, and we met with other researchers in each of our fields from all around the world.

One cannot visit Bangkok and not embrace the wonderful Thai culture. We found some time to see some of the famous Temples in Bangkok, near the royal palace. Our hotel was conveniently a short train ride away from two of the largest shopping centres in Thailand, the Paragon and the MBK, which has shops on seven floors – and proved a little too much even for the most devoted of shopaholics amongst us!



Celine Murrin, Aifric O'Sullivan, Aileen Connolly, Emma Feeney, Aine O'Connor and Sinead O'Brien

The Institute of Food and Health is a major campus-wide initiative at University College Dublin to develop and conduct world class, multidisciplinary research into food and health. The Institute is unique in Ireland and Europe in bringing together leading academics from all areas of food and health research, including: food, food and the consumer, food production, food regulation, food and nutrition, food science and food biosystems. The Institute's aim is to foster research across disciplines in order to: influence national and European policy, promote public awareness of food and health issues and to engage with international peers.

Conference themes

- Agriculture, food & nutrition security
- Food culture, indigenous food system
- Maternal and child under-nutrition
- Nutrition throughout life course
- Obesity and chronic diseases
- Macronutrients (protein / carbohydrates / lipids)
- Micronutrients
- Bioactive ingredients / functional or healthy foods
- Nutrition assessment
- Advances in nutrition research
- Nutrition and infection
- Nutrition / food policy and programme
- Clinical nutrition
- Food practices / regulation / claims

A popular mode of transport in Bangkok is the 'Tuk-Tuk' – a motorised cart that holds about four people. You have to be brave to get one of these in the heavy Bangkok traffic, but one evening we did pluck up the courage, and we weren't disappointed! We weaved in and out of traffic in true Thai style!

The food in Thailand is delicious and delicately spiced, and includes a lot of sauces. Coconut milk, lemongrass and kafir lime leaves feature heavily in their recipes. Although none of us were quite brave enough to try food from the many portable stalls that line every street, we did sample some mouth-watering authentic Thai food in some of the local restaurants, and one of us even attended a morning course in Thai cuisine with the renowned 'Blue Elephant cooking school'!

Of course, we could not leave Bangkok without having a Thai massage and so on our last evening, we visited a local spa and relaxed with the scents of jasmine, rose, lemongrass in preparation for the long flight home.

We would like to thank Yakult for their generous sponsorship to attend this conference, which was both informative and thoroughly enjoyable.

Science team notice board

How can we support you?

- Free probiotic literature
- Free educational talks by our team of nutritionists
- Probiotic Bulletin newsletter
- Advice on probiotics
- Dedicated website for healthcare professionals, www.yakult.ie/hcp

Pass it on

If you enjoy reading the Probiotic Bulletin and think your colleagues would like to subscribe to it, please forward it on and encourage them to email science@yakult.ie to sign up.

Diary Date



2010 Yakult UK Symposium

The next Yakult UK Symposium will be held in London on 12th October 2010; more details will follow in future issues of the Probiotic Bulletin, email science@yakult.co.uk to be kept updated.

Conferences and Events

Where to meet the science team

Come and visit the science team and the Yakult stand for information about the latest probiotic research at the following events:

5th-7th May:

Irish Nurses & Midwives Organisation ADC, Trim

3rd June:

AIGNA Conference, Castletroy Park Hotel, Limerick

Contact us

If you have any questions about probiotics, please don't hesitate to get in touch.

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