

Welcome by Professor Julian Mercer

I am pleased to welcome you to the latest Newsletter from the Full4Health Project Office here in Aberdeen. This will be an important and exciting year for the project and for consortium members, with our upcoming project meeting in Lille, and later on in the year our mid-term review meeting based on the 2nd Periodic Report due at the end of September and covering the period to the end of July 2013.

As well as these contractual milestones, we are also planning a number of other initiatives which are being driven forward by Gabi Wagner, our Project Manager. I would especially like to draw your attention to the Alison Douglas Summer School for Early Career Researchers. This initiative is a collaboration with the British Society for Neuroendocrinology ([BSN](#)) on the theme of hunger and satiety. Professor Alison Douglas was Chair of the BSN for 2 years until her untimely death in 2012. She was much loved within the BSN and by those who knew her. In recognition of Alison's commitment to career development for Early Career Researchers, which is also an important component of EU-funded projects, we are honoured to be able to organise the first event in commemoration of her career and values. We have a unique opportunity to bring together young (and not so young!) scientists from across 4 current FP7-funded projects which address the hunger and satiety area, along with ECRs from the BSN who have interests in this research field. The 'Food for Thought' Summer School that we are planning will provide ECRs with unrivalled access to senior PIs, their expertise, experiences and thought processes (where these are



still all present and correct!), and a range of networking and career development opportunities in a relaxed, but intensive, environment. We hope this will be a memorable and shaping experience, and we are grateful to the [BSN](#) for providing generous support for this initiative, which is especially timely given the temporal alignment of the [EuroCHIP](#), [NeuroFAST](#), [Full4Health](#) and [SATIN](#) projects. More details of the School are included below and are available from the Project Office. We have a packed Newsletter this time due to Gabi's efforts and with contributions from a number of PIs and ECRs from within Full4Health. Thanks to everyone for their input. I would encourage all members of the Full4Health consortium to distribute the Newsletter as widely as possible within their own institution and actively to other contacts in academia, industry and policy. This will be a valuable action to augment the more formal dissemination, knowledge exchange and public engagement activity that we are already engaged in to promote the Full4Health project as widely as possible to our various stakeholders.

Best wishes for 2013

Full4Health Consortium to meet in Lille in March 2013

Partners on the Full4Health project will meet in Lille 6.-8. March 2013 to discuss project progress and prepare for the mid-term review. The meeting will be hosted by Sebastien Bouret at the Université de Lille II - Droit et Santé and is open to members of the Full4Health Project.





Food for Thought

The Alison Douglas Summer School 2013

The Alison Douglas Summer School is a new initiative for Early Career Researchers (ECRs), who are members of the British Society for Neuroendocrinology ([BSN](#)) and/or are working on FP7 funded food-related EC projects. The meeting is open to non tenured researchers in food-related research and will be held 14.-18. July 2013 at Frauenwörth, a small island in Bavaria's Chiemsee, Germany.

Alison Douglas, then chair of BSN, tragically died of cancer in 2012. The Summer School bears her name in recognition of her commitment to career development for younger members of the community, and will be jointly funded by the BSN and collaborating FP7 funded EC projects.

The Summer School will prepare the next generation of experienced researchers, and will facilitate networking and nurture Europe-wide collaboration. Internationally leading researchers, as well as experts in science communication, will provide overview and discuss their work and future challenges in an informal, interactive format. The 5 day programme covers major topics in hunger and satiety research, technical workshops, data blitz and posters sessions and a number of plenary lectures and open forum discussions.

The initiative is a unique event which brings together several FP7 funded feeding related projects: [Full4Health](#), [NeuroFAST](#), [SATIN](#), [EurOCHIP](#) and [MAITRE](#).

Speakers and instructors include

- Prof. Roger Adan & Dr. Paul Smeets (University Utrecht, NL)
- Prof. Jens Bruening (University of Cologne, DE),
- Prof. Johannes Hebebrand & Dr. Özgür Albayrak (University Essen, DE),
- Prof. John Blundell and Dr. Graham Finlayson (University of Leeds, UK),
- Dr. Sebastien Bouret (Universite de Lille II, FR),
- Prof. Julian Mercer (University of Aberdeen, UK),
- Prof. Thorkild Sørensen (University of Copenhagen & Institute of Clinical Health, DK),
- Dr. Giles Yeo and Prof. Fiona Gribble (University of Cambridge, UK),
- Prof. Margriet Westerterp-Plantenga (University of Maastricht, NL).

Details will soon be made available on the Full4Health and BSN websites and registration will open in January 2013. For preliminary enquiries please contact the Full4Health Project Office.



How the Brain Prepares us for Food

Converging signals as we get ready to eat

by Geoffrey van der Plasse, Universitair Medisch Centrum Utrecht, The Netherlands



Energy balance (energy consumed as food vs energy expenditure) is regulated by a network of brain areas, neurotransmitters and feeding hormones, but also by environmental stimuli. Cues that signal the availability of food (e.g. turning on a light or ringing a bell) are known to induce anticipatory behaviour. This may involve waking up, running around, preening or looking for food. Rats and humans may even start eating despite having satiated their appetite previously. It is thought that such food anticipatory behaviour prepares animals to make maximal use of available food. Unraveling what happens in the brain when food

is expected is fundamental to our understanding of the mechanisms underlying obesity and eating disorders in humans.

The hypothalamus is an area of the brain known to regulate energy balance and mediate food anticipatory behaviour. This area is also responsive to feeding hormones. Ghrelin (increases food intake) and leptin (reduces food intake) are known to modulate nerve cell (neuronal) activity, feeding in general, and anticipation of food in particular. Exactly how the hypothalamus regulates food anticipatory responses is largely unknown.

The research team led by Prof. Roger Adan at the University of Utrecht wanted to know how feeding hormones regulate food anticipatory behaviour. Post-doctoral researcher Geoffrey van der Plasse examined brain activity in rats awaiting food. One particular neuronal cell population in the hypothalamus was seen to respond to both a cue signaling food delivery and to the hormone ghrelin. This convergence of environmental and hormonal signals at the level of individual brain cells with likely involvement in food anticipatory behaviour represents an important step in our understanding of processes within our brains when we are getting ready to eat.

ORIGINAL ARTICLE: Food cues and ghrelin recruit the same neuronal circuitry

G van der Plasse, M Merkestein, MCM Luijendijk, M van der Roest, HGM Westenberg, AB Mulder & RAH Adan
International Journal of Obesity advance online publication 16 October 2012; doi: 10.1038/ijo.2012.174

New lessons in weight loss surgery

Understanding what happens after weight loss surgery may reveal new strategies to control diabetes

by Helene Johannessen, Norges Teknisk-Naturvitenskapelige Universitet, Trondheim, Norway



Understanding what happens after weight loss surgery may reveal new strategies to control diabetes. Weight loss surgery refers to a group of similar operations prescribed to treat morbid obesity (defined as a body mass index greater than 40) and type 2 diabetes. Most patients who undergo this massive intervention experience rapid resolution of type 2 diabetes after surgery. It is believed that this is not simply the result of gastric restriction and weight loss, but that other factors are in play. Researchers in Prof. Duan Chen's group

at the Norwegian University of Science and Technology in Trondheim asked the question "How does the surgical rearrangement of the intestine improve diabetes?"

The "hindgut hypothesis" suggests that food in the rearranged hindgut stimulates the production of a gut hormone called glucagon-like peptide 1 (GLP-1). This peptide increases production of insulin in the pancreas, and thereby has a beneficial effect on type 2 diabetes.

Based on this hypothesis, a special surgical procedure called ileal interposition has been developed and successfully applied to patients. Researcher Helene Johannessen and her colleagues from Trondheim have established an animal model to help understand the mechanisms underlying the effects of weight loss surgery. She says "We have found evidence to support the hindgut hypothesis. Furthermore, when this procedure was combined with one of today's most used weight loss surgeries, sleeve gastrectomy, the production of GLP-1 was increased not only in the ileum (a part of the hindgut), but also in the pancreatic islets."

This may explain, at least in part, the remission of diabetes after weight loss surgery, and suggests a new strategy to control diabetes by targeting GLP-1 in the pancreatic islets.

The mechanisms underlying postsurgical weight loss and/or weight regain in patients still remain unclear. A major point of controversy is whether this is due to biological or behavioral factors. It has been difficult to directly and precisely measure eating behavior in humans. Using a "Big Brother" type cage to observe animals after surgery, the research team found that the animals took more time to finish their meals. This is likely to be a beneficial behavior contributing to weight loss.

ORIGINAL ARTICLE: Eating Behavior and Glucagon-Like Peptide-1-Producing Cells in Interposed Ileum and Pancreatic Islets in Rats Subjected to Ileal Interposition Associated with Sleeve Gastrectomy

H Johannessen, Yosuke Kodama, Chun-Mei Zhao, MML Sousa, G Slupphaug, B Kulseng & Duan Chen
Obesity Surgery advance online publication 5 September 2012; doi: 10.1007/s11695-012-0750-9

**Measuring gut hormones
Full4Health partners meet in Copenhagen
to discuss the latest technology**

**by Gabi Wagner, University of Aberdeen,
United Kingdom**



Over 20 participants met at the Full4Health organized “Measuring Gut Hormones” workshop in Copenhagen, 24th August 2012. Prof. Jens Holst of the Panum Institute (University of Copenhagen, DK), a world leading expert in the field of gut hormones, introduced the field and its problems. His presentation was expertly complemented by PhD student Monika Bak from Holst’s group, who shared her extensive studies of commercially available gut hormone measuring kits. Dr. Dan Crabtree of the Rowett Institute of Nutrition and Health (University of Aberdeen, UK) gave an overview of the blood and saliva sampling protocol about to be initiated in the Full4Health project.

The workshop allowed researchers who work on different aspects of the project to recognize putative problems in sample generation, measurement and analysis, and organize procedures accordingly. Through the interdisciplinary exchange the team resolved a strategy to accommodate the scientific and logistic problems posed by the substantial numbers of samples to be generated during the lifetime of this project.

The workshop furthermore provided an excellent opportunity for early stage researchers to network, initiate and develop working contacts and exchange ideas.

**Full4Health researchers contribute
to teaching and dissemination
innovation**

**by John Menzies, University of Edinburgh,
United Kingdom**



University of Edinburgh fellows have developed an online course to introduce concepts in critical thinking. There is currently much interest in extending participation in higher education. A recent innovation is the development of Massive Open Online Courses (MOOCs). MOOCs were pioneered in the United States, and the University of Edinburgh is one of only two European universities providing such courses.

MOOCs are designed to reach learners in very large numbers. Their main characteristics are large-scale participation and open access. The five-week course is entitled Critical Thinking in Global Challenges and starts in January 2013. The course is free and open to anyone with an internet-linked computer, it already has >40,000 learners registered. It will feature issues surrounding the health risks of obesity and the concept of food addiction. These topics are used as a basis for discussion and exercises to improve the learner’s critical thinking skills. In addition to educational aims, the course will also drive traffic to the public engagement sections of FP7 websites and encourage discussion of these important public health issues.

Engagement with the EU Platform for Action on Diet, Physical Activity and Health

by Julian Mercer, University of Aberdeen, United Kingdom



EU Platform on Diet, Physical Activity and Health

Contributing to the activities of the [EU Platform for Action on Diet, Physical Activity and Health](#) was identified as one of the 'Expected impacts' of projects submitted in response to the KBBE.2010.2.2-01 call published in 2009, from which Full4Health emerged as the successful application.

The Platform is a 'forum for European-level organisations, ranging from the food industry to consumer protection NGOs, willing to commit to tackling current trends in diet and physical activity'. The Platform is composed of the following members [pdf](#). With its emphasis on prevention of chronic disease through dietary and lifestyle change, the platform, 'led by the Commission, will provide an example of coordinated action on this problem by different parts of society that will encourage national, regional or local initiatives across Europe'.

To initiate this interaction we contacted Mr. Philippe Roux, Deputy Head of Unit, European Commission, DG Health and Consumers, Health Determinants, and produced a briefing document for the Platform meeting in Brussels on September 20th 2012. This first contact was designed to draw the attention of the delegates to the 3 related EU projects funded in Food, Agriculture and Fisheries, and Biotechnology, [Full4Health](#), [NeuroFAST](#) and [SATIN](#), and to provide some research highlights for a 'What is new?' presentation delivered by Philippe Roux.

The projects were summarised as follows:

- [Full4Health](#) – 'Understanding food-gut-brain mechanisms across the lifespan in the regulation of hunger and satiety for health' (www.full4health.eu). This project is examining mechanisms of hunger and satiety ("feeling full"), how these change across the life course, and the potential for using food to control calorie intake.
- [NeuroFAST](#) – 'The Integrated Neurobiology of Food Intake, Addiction and Stress' (www.neurofast.eu). This project aims to strengthen the evidence base for or against food addiction through a number of complementary clinical and preclinical studies. It will generate findings of interest to academia, policy makers, and the food and drink industry.
- [SATIN](#) – 'Satiety Innovation' (www.satin-satiety.eu). This project, which started in 2012, draws together experts from academia and industry to produce new food products using state-of-the-art processing innovation. By exploiting better understanding of the biological processes in the stomach and the brain that underpin what makes us feel "full", the project will evaluate whether this approach is a viable weight management tool.

We will continue to pursue further opportunities for engagement in the future, especially if future meetings have agendas more closely related to research issues.

Engaging with science

(by Sue Bird, University of Aberdeen, United Kingdom)



The European Commission has a strong commitment to engaging the public in dialogue about the science that it funds ([see the Science in Society portal](#))

The two main reasons for encouraging the public to engage with scientific research cited by the Commission are:

1. Ensuring that the right policy decisions are made by the Commission by facilitating appropriate dialogue between scientists, the public and policy stakeholders;
and
2. Increase the number of people who choose to study scientific subjects and work in research and scientific careers.

Projects that the EU funded as part of its Seventh Framework Programme for Research (FP7) were encouraged to include a dissemination plan which addressed several audiences including public and policy. Full4Health is no exception, and has a workpackage on Stakeholder engagement and Knowledge Exchange.

How to engage

There are many different ways of engaging people with research, from illustrated lectures, exhibitions and shows, to the more interactive and discursive forms of engagement such as informal 'Café' settings for discussions and interactive workshops, and the more structured but intensive engagement models such as Citizens' Juries, which can examine contentious topical issues and look at possible options put forward by policy makers.

British Science Festival

Science festivals are a great opportunity to reach a reasonably-sized audience with an event such as an interactive workshop. The British Science Festival is held every year in a different city in the UK. It is organised by the [British Science Association](#) and is one of Europe's largest celebrations of science, engineering and technology. Over 250 events, activities, exhibitions and trips take place during the week-long programme.

In September 2012, the Festival was hosted by the University of Aberdeen, and partners in a sister FP7 project (the NeuroFAST project) organised an event to discuss some of the research being undertaken in this project. Over 170 people attended the NeuroFAST workshop, which had the appealing title of 'Food Addiction: fact or fiction?' The audience were able to express their views at a number of points during the event via the use of hand-held voting sets, and an interactive activity was organised for the last part of the session. Positive feedback was generated by this event and it is hoped to use this as a model for organising a similar event for Full4Health in 2014.

ILSI Europe Workshop on 'Satiety and appetite control claims: getting it right for consumers'

by Julian Mercer, University of Aberdeen, United Kingdom



Eating Behaviour & Energy Balance Task Force, Brussels, 27 NOV 2012

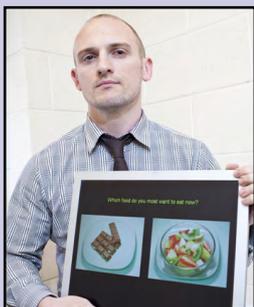
I was invited to attend this meeting, almost certainly in my capacity as co-ordinator of Full4Health. For those who do not know, the International Life Sciences Institute ([ILSI](#)) was established over 30 years ago as a non-profit foundation to advance understanding of scientific issues relating to nutrition, food safety, toxicology, risk assessment, and the environment, bringing together scientists from academia, government, industry, and the public sector. Established in 1986, [ILSI Europe](#) is mainly funded by food industry members. It has established a number of task forces in areas related to nutrition, food safety and the environment, one of which is the Eating Behaviour & Energy Balance Task Force, which was originally established as the Appetite Regulation Task Force in 2008.

Since its inception the Task Force has supported a number of expert groups around the theme of satiety benefits and claims. This has resulted in a number of publications relevant to this area (see below), and participation in the EFSA consultation on evaluation of satiety and weight management claims:

- Delzenne N, et al. 2010. Gastrointestinal targets of appetite regulation in humans. *Obesity Reviews* 11(3):234-50
- Blundell J, et al. 2010. Appetite control: methodological aspects of the evaluation of foods. *Obesity Reviews* 11(3):251-70
- Hetherington MM, et al. Benefits of satiety to the consumer: scientific considerations. (in press)
- Bilman E. et al. Consumer understanding, interpretation and perceived levels of personal responsibility in relation to satiety-related claims. *Appetite* 59:912-920

The objective of the workshop was to raise awareness of the work undertaken by the Task Force on the satiety effects of foods, and specifically the methods used in evaluation and consumer benefits. The workshop was opened by Kees de Graaf (Wageningen) and Toine Hulshof (Kellogg Europe). Both ILSI Europe initiatives and the [Full4Health](#) and [SATIN](#) projects were highlighted in this latter presentation. A session entitled 'Setting the scene on satiety-related claims' followed – speakers Astrid Postma-Smeets (The Hague), Inge Tetens (Soborg, Denmark) and Marjo Misikangas (Helsinki). Topics covered included consumer expectations, the desirability of more specificity in health claims, issues considered in the evaluation of appetite and weight management health claims by EFSA, and the process of translation into action. The session 'State of the science' was delivered by John Blundell (Leeds & Full4Health) and Monica Mars (Wageningen), and covered concepts and methods, including the satiety cascade, ways of strengthening appetite control, and the value of physiological markers in assessing the satiating properties of foods. The third session entitled 'Consumer benefits and understanding' featured presentations by Marion Hetherington (Leeds) and Hans van Trijp (Wageningen), and focussed on properties of food that enhance satiety, the range of potential benefits of enhanced satiety to the individual, and the level of consumer understanding and expectations of satiety related claims. Further details of the workshop should be available on the ILSI Europe website in the near future.

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Eating on the run!

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What is the problem that this research is addressing?

In modern Europe, the combination of low physical activity levels and high energy foods in the diet encourage patterns of 'passive overeating'¹ that have become the norm (nearly 3 in 4 men and women in the European Region are overweight or obese).

Against this background, powerful biological mechanisms exist which determine how hungry and how full we feel both during² and after³ consuming snacks and meals throughout the day. More recently we are starting to understand how these mechanisms can also determine our enjoyment of food⁴ and the motivation to consume palatable – often high energy – food⁵. Understanding how these processes influence eating behaviour in hungry and fed states, in response to different types of food, and in lean compared to overweight people is important to inform strategies for keeping our appetites under control.

In efforts to raise physical activity levels across the population, a further issue to address is the problem of 'compensatory eating'⁶. This is when people consume more food (voluntarily or inadvertently) in response to a period of exercise. The role of both hunger and reward in compensatory eating is thought to be crucial, but very little is known about how these processes

adapt with the biological changes that occur when people increase physical activity over sustained periods of time (long enough to reduce overweight and improve health).

Research in this area will help to tackle the prevalence of passive overeating and support the transition to a healthier diet and better appetite control as Europeans start to incorporate physical activity in their lives.

Glossary:

1. When people unintentionally overeat because of the high energy content in their food it is known as 'passive overeating'
2. The development of fullness and reduction of hunger during a meal is known as 'satiation'
3. The continuation of fullness and suppression of hunger between meals is known as 'satiety'
4. The pleasure experienced from the sensing of food is known as 'liking'
5. The motivation to choose and eat a food is known as 'wanting'
6. When people eat more after a period of exercise or dieting it is known as 'compensatory eating'



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What is already known?

The familiar stomach stretch and fullness that people experience after a meal is an important part of the satiety process, enabling them to control the amount of energy consumed over the day. However, due to the high energy density of fat, the amount of energy consumed for a 'normal' quantity of food can easily be doubled or more if high fat foods are chosen over low fat alternatives. This tendency to eat more when high fat foods are available is termed 'passive overconsumption' but the extent to which people are susceptible to this effect has been

studied and some of the findings have interesting implications for appetite regulation. For example, the sensitivity to a hormone called insulin (which is often impaired in obese people) is thought to be important for satiation with high fat food. This suggests obese people with a high fat diet could be more prone to passive overeating. Secondly, the ability to compensate for a high fat snack by eating less at a subsequent meal is enhanced in regular exercisers compared to sedentary individuals. Such findings could mean that engaging in exercise can reduce the risk of passive overeating in people who are obese. When overweight or obese individuals undertake a program of

physical activity, there are remarkable differences in their capacity to reduce body fat and improve health, even when adherence to the exercise is monitored and verified. Some individuals appear predisposed to compensatory responses that render them resistant to the benefits associated with exercise. The mechanisms behind this compensation could be regulatory – for example an increase in hunger to replenish depleted energy stores – or linked to altered use or response to food as reward after physical exertion. Whether these behaviours are 'wired-in' predispositions or responses that develop after changes in body composition or hormonal signals is unknown

What research are you undertaking in Full4Health?

For some individuals, altered liking or wanting of food can lead to unhealthy food choices or increased appetite that causes a strong resistance to reducing body fat or improving metabolic health. Our work will examine the behaviours and physiological mechanisms, which underlie resistance to weight loss during a program of supervised exercise under conditions relevant to European consumers at risk of obesity (under sedentary or physically active states, and in response to high or low fat diets). Previously sedentary participants come to our laboratory fitness facility 5-times a week for 3 months to exercise at a fixed intensity and level equivalent to 2,500kcal/wk.

On 6 occasions at the beginning, mid-point and end of the exercise program, 24hr food intake, appetite and passive overconsumption is assessed through laboratory test meals. We have developed a theoretical and methodological understanding of liking and wanting food behaviour in humans, and developed a methodology for detecting changes or differences in liking and wanting responses. This involves a computerised procedure (an

interactive task) in which the participant responds to a battery of food stimuli. Appetite-related hormones released in response to different meal compositions are examined on separate test days prior to and following the 12 week program. These hormones will be tested for their association with appetite, food reward and passive overconsumption.

What do you hope will be the major outcomes?

Major goals of the project are to identify biomarkers of exercise induced compensatory eating that might be used to improve the effectiveness of exercise as a means to improve health and well being. We also aim to understand why some people are more susceptible to compensatory eating and passive overconsumption than others, and how this vulnerability is expressed through hunger and/or reward driven behaviour. As all these factors can be measured in relation to meal size and sequences of meals, it will be possible to determine their importance in relation to food selected and the amount of energy consumed.