LAYPERSON SUMMARY: THE ROLE OF SUBLIMINAL BRAIN-GUT SIGNALLING IN THE REGULATION OF SATIETY AND EMOTION

Obesity is a major cause of a range of serious chronic illnesses such as diabetes and cardiovascular diseases, which impact not only on individual’s, but society as a whole. England has one of the highest obesity rates in Europe (DoH, 2011); resulting from a complex interplay of biological, psychological and environmental factors. In order to tackle this epidemic, decision-makers need to focus on the key areas or ‘leverage points’ where interventions will have the greatest impact. According to a landmark report from Foresight “Tackling Obesities: Future Choices”, a priority for effective intervention is to target the ability of the brain to control appetite in response to food (Butland et al. 2007).

The link between hunger and food consumption is not fully understood, but we know that one of the ways that the gut communicates with the brain is through hormonal signals which are released when we eat (Welten et al. 2014). Research has indicated that these subliminal signals depend on the nutritional content of food (e.g. fatty vs. carbohydrate) and emotional state. Gut hormones, such as ghrelin (known as the ‘hunger hormone’) could be the link between what people eat and how they feel. However, more research is needed to clarify the mechanisms involved in order to develop effective interventions.

In a recent study, we found that a fatty meal reduced the effect of sad emotion when compared to a calorie-free meal in terms of how people rated their mood, but also their brain activation. The timing and regions of brain activation in this study suggest that gut hormones could be the link between food, emotion and appetite regulation (Van Oudenhove et al. 2011). To investigate this further, we first want to look at the hormonal response following a high-fat meal and how this is altered by negative emotional state. We will also see how this corresponds to the areas of brain activation using functional MRI (fMRI) and Positron Emission Tomography (PET) and feelings of hunger, fullness and emotional state. We will also use a computer based task to find out about the food choices people make in terms of portion size, food preferences and how much they would pay for certain foods. Finally, we will offer volunteers a buffet meal and ask them to eat until they feel comfortably full to see how the hormonal and emotional responses affect actual food consumption.
The main questions we aim to address with this research are:

1. Do subliminal signals between the gut and the brain in response to food, influence our emotional state?
2. How does these signals impact upon food choices and food intake?
3. Do individual eating habits (e.g. emotional eating) alter this relationship between food and emotional state?
4. What are the brain mechanisms that link gut hormones to emotional responses?
5. How do subliminal signals from the gut activate reward circuits in the brain?

This will improve our understanding of how emotions, gut hormones and eating habits, influence appetite, food choice and intake which play a role in normal phenomena such as “comfort eating”, but is also likely to be important in our understanding of the link between mood & eating disorders. An understanding of these gut-brain signals, provides the opportunity to develop effective interventions, either through diet or by using gut hormones to treat obesity and related disorders. What we find in relation to dietary and consumer decision-making, may help the food industry to develop healthier foods which are also appealing. Finally, understanding the role of emotion in eating behaviour will allow for specific psychological therapies to be designed for the management of obesity.

References


ROLE DESCRIPTION: Patient and Public Involvement Group

THE ROLE OF SUBLIMINAL BRAIN-GUT SIGNALLING IN THE REGULATION OF SATIETY AND EMOTION

We are looking for patient and community representatives to collaborate on this research project and inform project design, ethics, recruitment, analysis, report writing, dissemination of results and identification of future research avenues.

Your responsibilities: Members will be invited to meet up to three times per year to be updated on progress and also consulted online (via email and/or Skype) as relevant topics and questions arise. One patient representative and one member of the public will also be invited to be part of a steering committee related to grant management. We would ask that member bring their perspective as a patient or member of the community on topics such as;

- Potential interventions to be used in studies
- Recruiting patients to studies
- Designing patient participation leaflets
- Ethical issues
- Developing research questions for staff and patients
- Developing interview schedules for staff and patients
- Piloting interview schedules and questionnaires
- Discussing initial findings and results
- Dissemination of results (including planning of Public Engagement events)

Some preparatory reading will be required in advance of these meetings and other information may be sent to you for consultation in between face-to-face meetings. The time commitment is flexible and will be agreed upon taking up the role. We expect the role to last for the duration of the study, including time for dissemination of the results on completion.

Our responsibilities: To ensure mutual benefit from your participation, members of the Patient and Public Involvement Group will be registered as honorary QMUL associates in order to access training and development opportunities such as information and communication skills, research methods, ethics, research governance, developing research proposals, writing and presenting
results. They will also be invited to attend open meetings at the Wingate Institute of Neurogastroenterology

**Payment and expenses:** Members will not be reimbursed for their time, however travel and other reasonable expenses will be reimbursed where appropriate documentation (e.g. Receipts) are provided.

**Person specification:**

- Must be able to work as part of a team
- Have a friendly and approachable manner
- Have an interest in the research topic
- Reliable and trustworthy

**Contact details:** Please contact Heather Fitzke (h.e.fitzke@qmul.ac.uk or 0207 882 2650) with any queries or to express an interest in relation to this role. To find out more about our work, see our website http://www.blizard.qmul.ac.uk/research-groups/61-neurogastroenterology-group.html

To find out more about our research, you can watch this YouTube video: https://youtu.be/jzomtLcee2Y

Or what it’s like to be part of a Patient & Public Involvement Group, see:
City University’s Service User and Carer Group Advising on Research (SUGAR) https://blogs.city.ac.uk/sugar/
ROLE DESCRIPTION: Pathways to Impact Partners

THE ROLE OF SUBLIMINAL BRAIN-GUT SIGNALLING IN THE REGULATION OF SATIETY AND EMOTION

We are seeking representatives and key opinion leaders from clinical, business, policy, not-for-profit / voluntary sector, academic disciplines and public/patient representatives to be part of a steering committee related to grant management. They will advise on the communication and dissemination strategy for this study and act as ambassadors in their respective sectors for evidence-based policy and practice.

Your responsibilities: Members will be invited to meet at the Wingate Institute of Neurogastroenterology or attend via teleconference or Skype on a quarterly basis to advise on strategic issues and maximise the academic and societal impact of this study in terms of;

6. World wide academic advancement
7. Innovative methodologies, equipment, techniques, technologies and cross-disciplinary approaches
8. Contributing towards the health of academic disciplines
9. Enhancing the knowledge economy
   • Evidence based policy-making and influencing public policies
   • Enhancing the effectiveness and sustainability of organisations including public services and businesses
   • Attracting R&D investment
   • Improving social welfare, social cohesion and/or national security
   • Commercialisation and exploitation
   • Enhancing the research capacity, knowledge and skills of public, private and third sector organisations
   • Changing organisational culture and practices

Outside of the quarterly meetings, the time commitment is flexible and will be agreed upon taking up the role. We expect the role to last for the duration of the study, including time for dissemination of the results on completion.

Payment and expenses: Members will not be reimbursed for their time, however travel and other reasonable expenses will be reimbursed where appropriate documentation (e.g. Receipts) are provided.

Person specification:
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<td>Experience</td>
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<td>Knowledge</td>
<td>Knowledge of perspectives from the group you represent</td>
<td>To have some understanding of research</td>
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<td>Skills</td>
<td>Willing to familiarise yourself with some medical and research language</td>
<td>To keep up to date with obesity issues via media and information provided by the research team.</td>
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<td>Personal qualities</td>
<td>Good communicator</td>
<td>Self confidence in mixed group of professionals</td>
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<td>Ability to listen to others and express own views</td>
<td>Willing to give feedback to MECANUT study team to help in developing their work</td>
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<td>Openness to other people’s views</td>
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**Contact details:** Please contact *Professor Qasim Aziz*, Director of The Wingate Institute of Neurogastroenterology (Email: q.aziz@qmul.ac.uk; Tel: +44 (0)20 7882 2630; Tel Sec: +44 (0)20 7882 2655) with any queries or to express an interest in relation to this role.

To find out more about our work, see our website [http://www.blizard.qmul.ac.uk/research-groups/61-neurogastroenterology-group.html](http://www.blizard.qmul.ac.uk/research-groups/61-neurogastroenterology-group.html)