

FoodBioSystems DTP - PhD Project Advertisement

Project title:

FBS2021-85-Grassb: The structure and function of resistant starch in glycaemia

Lead supervisor:

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Co-supervisors:

Dr Brendan Howlin, University of Surrey

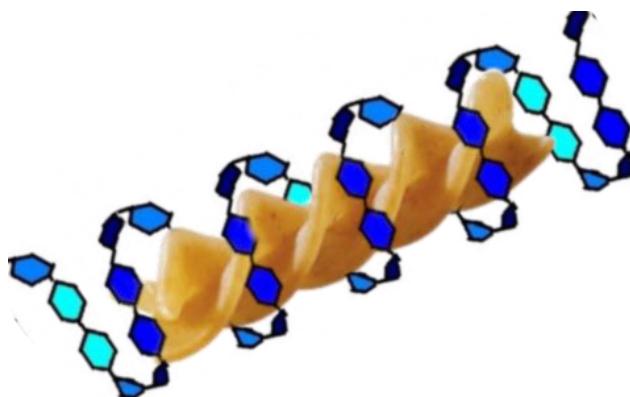
Dr Jane Parker, University of Reading

Dr Marco Sacchi, University of Surrey

Project description:

Come and join an enthusiastic multidisciplinary team working at the forefront of chemistry, food science and molecular modelling. Research, that was featured on the BBC, shows that heating pasta and adding olive oil, then chilling and reheating produced the lowest blood glucose levels compared to fresh or chilled pasta meals^{1,2}. We think this is due to the formation of novel resistant starches (specifically amylose-lipid complexes) which can limit the rise in blood glucose (glycaemia) after a meal, but this has not yet been proven³.

In your PhD, you will be characterising and investigating the formation of amylose-lipid complexes from starch in the pasta and fatty acids in the olive oil.



You will produce amylose-lipid complexes in the lab and then characterize them using a combination of analytical techniques and an *in vitro* model of digestion,⁴ and quantify them with differential

scanning calorimetry, X-ray diffraction, nuclear magnetic resonance spectroscopy, complexing index and total resistant starch assays. This combination of experiments has not been done before.

An important part of the project involves molecular modelling of complex formation with different fatty acids and the interactions of the complexes with the digestive enzyme, alpha-amylase, to investigate how and why their structure may be responsible for them being resistant to digestion in the small intestine.

Finally, having produced foods with increased content of amylose-lipid complexes, sensory analysis will be carried out to determine if the sensory characteristics are adversely affected.

This sounds like a lot, but you will be supervised by international experts in their field who will train you in all the techniques so that when you graduate you will have a battery of cutting-edge techniques (not to mention research and critical thinking skills) to offer future employers in a wide range of disciplines.

The research is important because it supports the “Healthy Ageing Grand Challenge” of the UK Industrial Strategy, and the policy on “Tackling obesity: empowering adults and children to live healthier lives”.

Keywords: resistant starch, molecular modelling, food, sensory, amylose lipid complexes

Training opportunities:

Training in all the techniques required will be provided at the University of Surrey or the University of Reading as appropriate. In addition, you will be encouraged to take courses accredited by the Institute of Food Science and Technology in sensory science (which could lead to Registered Sensory Scientist status), to engage with a career mentoring scheme, and will have the opportunity to demonstrate in laboratory practicals following training in learning and teaching from the Surrey Institute of Education (which may be an additional source of funds).

Student profile:

This project would be suitable for students with a minimum of a 2:1 degree in chemistry, food science/technology, biology, biochemistry, nutrition, or a closely related subject. Significant laboratory experience is desirable. Expertise in all aspects is not required/expected as full training will be given. Students should be keen to be involved in a multidisciplinary project which takes research from the bench/model to real-world applications.

The School of Biosciences and Medicine (University of Surrey) and the School of Chemistry, Food and Pharmacy (University of Reading) have Athena Swan silver awards. Both universities have policies in place to ensure an inclusive working environment, such as flexible working hours, unconscious bias training and on-campus child-care. The supervisory team is committed to making research accessible. Collaborating between the University of Surrey and University of Reading allows for easy commuting by train when required, reducing the need to stay away from home overnight. Time spent at the University of Reading could also be taken as short blocks with temporary accommodation on campus if that is preferred. The project will not involve animal studies.

Informal enquiries can be made to Terri by email: t.grassby@surrey.ac.uk or any of the supervisory team

References:

1. BBC Two – Trust Me, I’m a Doctor (series 2, episode 1)
<https://www.bbc.co.uk/programmes/articles/3LncBcDcCXKgtpFvrDZVnNQ/can-my-leftovers-be-healthier-than-the-original-meal>
2. T. Robertson et al (2020) The cumulative effects of chilling and reheating a carbohydrate-based pasta meal on the postprandial glycaemic response: a pilot study, Eur. J. Clin. Nutr.,
<https://doi.org/10.1038/s41430-020-00736-x>
3. A. E. Panyoo and M. N. Emmambux (2017) Amylose-lipid complex production and potential health benefits: A mini-review, Starch/Stärke, 69: 1600203
4. A. Brodkorb et al (2019) INFOGEST static in vitro simulation of gastrointestinal food digestion, Nat. Protoc., 14(4): 991-1014

Funding Note

This project is part of the FoodBioSystems BBSRC Doctoral Training Partnership (DTP), it will be funded subject to a competition to identify the strongest applicants.

The studentship is open to UK and international students (including EU countries) however due to funding rules, no more than 30% of the projects can be allocated to international students.

The funding will include a tax free stipend (minimum £15,285 per year), support for tuition fees at the standard UK rate (currently £4,407 per year) and a contribution towards research costs. **Please note** that the host universities have not yet confirmed the level of fees charged to international students funded by the DTP. Fee levels may vary across the institutions. This information will be shared on the FoodBioSystems DTP website as soon as it becomes available.

To apply

Please go to [FoodBioSystems DTP website](#) for information on how to apply for this studentship. The closing date for applications will be 8 February 2021.