PhD Project Advertisement

Project title: *Beyond bone health: How does vitamin D protect our DNA?*

Project No: FBS25-20-Elliott-sr

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Co-supervisors:

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Project description: This exciting collaborative project between the Universities of Surrey and Reading offers you the opportunity to develop multidisciplinary skills in research studying a novel mechanism of action of vitamin D in human health. Vitamin D is best known for its vital role in bone health and vitamin D deficiency is a global public health concern. In the UK, for example, 13-21% of people have vitamin D insufficiency as assessed based on minimum requirements for bone health. The situation is similar or worse in many other countries. Furthermore, higher vitamin D status may be needed to obtain the full health benefits of its many other, non-skeletal, biological effects. However, the mechanisms by which vitamin D exerts these different effects, and the levels of vitamin D needed to activate these processes are not fully understood.

This project focuses on one such biological activity; the capacity of vitamin D to help protect cellular DNA. This is important because the accumulation of DNA damage is associated with the aging process, increased cancer risk, and other non-communicable diseases. The capacity of vitamin D to improve the protection of cellular DNA has been demonstrated in skin cells. This is particularly interesting because most vitamin D in humans is synthesized in the skin by exposure to UV light from the sun. However, UV also damages cell components, including DNA. Therefore, high vitamin D levels in the skin may act as a signal of UV exposure, triggering adaptations to better protect skin cells from the damaging effects of UV. Importantly, vitamin D also protects skin cells against other sources of damage such as nitrosative and oxidative stress. Exactly how this protection is achieved, and whether it is unique to skin cells, is unknown as is whether the protection could be achieved by increased dietary vitamin D intake without the inherent risks of UV light exposure.

In this project, you will test this hypothesis that vitamin D protects against DNA damage in skin and other tissues by modulating cell proliferation/cycling and enhancing DNA repair. You will start by investigating the effects of vitamin D on human cells in culture and then evaluate the relevance of those findings in human populations by taking advantage of a sample bank available from a large vitamin D supplementation study. You will also learn how to model biological data and use your experimental data to understand how vitamin D regulates the DNA damage-repair balance.

Training opportunities: You will be based primarily at the University of Surrey where you will develop skills in cell culture, real-time cell proliferation and apoptosis analysis, flow cytometry, DNA damage and repair analyses. The team at Reading will train you, from fundamental principles, to analyze your data using mathematical modeling techniques (note that no prior experience of this type of work is required). You will learn about the ethical and legal frameworks for research involving human participants and gain first-hand experience working with human study participants. You will have access to a wide range of training courses, workshops, research seminars/events, and plentiful opportunities to present and discuss your research within the two Universities, across the Doctoral Landscape Award, and at conferences. You will also complete a 3-month professional internship, potentially with one of our commercial or non-governmental partners, to gain a broader perspective on the contribution of research to the agri-food sector.

Project supervision style: The student will have brief informal meetings with their primary supervisor on most days. This regular supervisory support will be layered on top of the university's standard framework consisting of monthly meetings

with brief notes recorded online and 6-monthly review meetings involving the full supervisory team for which a report is completed that provides the student with feedback on progress and sets out agreed objectives for the next 6 months. We will ensure the student feels part of the research groups of the supervisors at both Universities. They will participate in regular research group meetings at both sites, giving presentations on their work periodically at these and also at departmental PGR seminars. Feedback on written work will be provided within mutually agreed timeframes. These will normally be a few days while slightly longer timeframes may be agreed for longer items such as thesis chapters.

Student profile: The ideal candidate will be a life sciences graduate who is confident in mathematics to at least A level standard and interested in developing their mathematical skills further. Full training in all aspects of mathematical modeling will be provided. We will also consider graduates from relevant physical sciences who have a good understanding of the concepts for the mathematical modeling elements of this project and who can also demonstrate a good understanding of biology, to at least A level standard, as well as particular enthusiasm to learn more about human biology and nutrition.

Stipend (Salary):
FoodBioSystems DTP students receive an annual tax free stipend (salary) that is paid in instalments throughout the year. For 2024/25 this is £19,237 and it will increase slightly each year at rate set by UKRI.

Equity Diversity and Inclusion:
The FoodBioSystems DTP is committed to equity, diversity and inclusion (EDI), to building a doctoral researcher(DR) and staff body that reflects the diversity of society, and to encourage applications from under-represented and disadvantaged groups. Our actions to promote diversity and inclusion are detailed on the [FoodBioSystems DTP website](#) and include:

- Offering reasonable adjustments at interview for shortlisted candidates who have disclosed a disability or specific learning difference.
- [Guaranteed interview](#) and [applicant mentoring](#) schemes for applicants, with UK home fees status, from eligible under-represented ethnic groups.

These are opt-in processes**.**

Our studentships are offered on a part time basis in addition to full time registration. The minimum registration is 50% FT and the studentship end date will be extended to reflect the part-time registration.

The closing date is 3 February 2025 (10.00 GMT). Please visit the [FoodBioSystems website](#) to access the [2025 cohort applicant guidance document](#); and for up to-date information on how to apply, eligibility, studentship rates, and part time registration.