

## PhD Project Advertisement

**Project No/title:** FBS2026 50 MillsCE rs / *Harnessing the cardiovascular benefits of a combined intake of nitrate- and flavonoid- rich foods*

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**Co-supervisors:**

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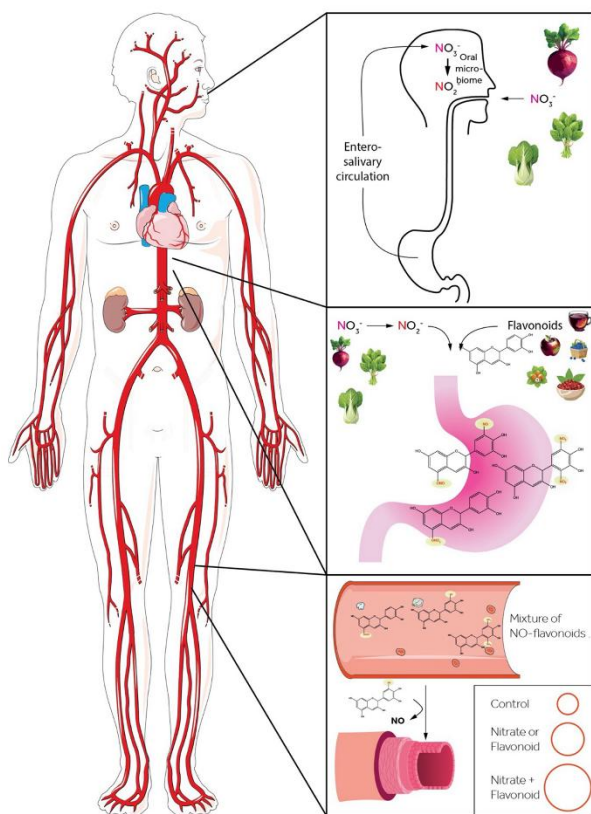
Dr Chris Jones, University of Reading

Prof. Jeremy Spencer, University of Reading

Prof. Gunter Kuhnle, University of Reading

### Project Details

Cardiovascular disease (CVD) affects over 7.5 million people in the UK and remains one of the biggest threats to public health and healthy ageing. High blood pressure is the leading preventable risk factor, impacting around 30% of UK adults and becoming more common with age. Improving diet, especially eating more fruits and vegetables, can significantly lower the risk of CVD, but long-term dietary change is challenging. This highlights the need for simple, targeted nutritional strategies.



**Figure 1.** Summary of project

Our research shows that combining dietary nitrate (e.g. from beetroot) with flavonoids (e.g. from citrus fruits, tea or cocoa) produces greater cardiovascular benefits than either compound alone. Surprisingly, these effects occurred even when levels of nitrite, a typical marker of nitric oxide production, remained low, suggesting an alternative pathway may be involved. We and others have identified “nitro-flavonoids,” formed in the acidic stomach environment when flavonoids react with nitrate-derived molecules, as promising candidates that may help deliver these enhanced vascular benefits.

**Research aims:** This project combines *in vitro* and *in vivo* methods to characterise interactions between flavonoids and inorganic nitrate for the first time.

**What you will do:** This multidisciplinary PhD will explore how bioactives in our diet interact in the stomach and how they may improve heart and blood vessel health. The project involves using laboratory models that mimic human digestion to study what happens when flavonoids or flavonoid-rich foods (like tea, cocoa or citrus fruits) mix with nitrate or nitrate-rich foods (like beetroot). This will help identify which new compounds are formed and how different bioactives and food combinations influence this process. It also involves running a randomised controlled trial where volunteers consume these bioactives, both alone and together, to see how they affect blood pressure over several hours. The study will also test how stomach acidity influences these benefits. Finally, how these newly

formed compounds affect platelets, the blood cells involved in clotting, will be explored. By studying platelet responses in detail, you will see to understand how these compounds contribute to better cardiovascular health.

## References:

1. <https://doi.org/10.1111/bcp.14420>
2. <https://doi.org/10.1016/j.freeradbiomed.2014.12.009>
3. <https://doi.org/10.1161/HYPERTENSIONAHA.116.08081>
4. <https://doi.org/10.1016/j.bbrc.2006.09.131>
5. <https://doi.org/10.3136/fstr.20.439>

## Student profile

### Essential for project:

- Background in health sciences, nutrition, biochemistry, physiology or related subject.
- Understanding of human biology, particularly cardiovascular, metabolic, or nutritional physiology.
- Basic laboratory skills.
- Basic statistics skills.

### Desirable for project:

- Experience with laboratory techniques such as cell biology, analytical chemistry (e.g., LC-MS, NMR), or *in vitro* assays.
- Prior involvement in human nutrition studies, clinical research, or participant-facing work.
- Experience of clinical techniques, such as venepuncture or blood pressure measurement.
- Knowledge of cardiovascular physiology, nitric oxide biology, or nutritional biochemistry.
- Experience handling biological samples (e.g. blood, plasma, platelets).
- Understanding of Good Clinical Practice (GCP) or previous training in research ethics.

**Minimum requirements for all FoodBioSystems applicants:** An upper 2nd class degree (or equivalent) in a subject relevant to the project. Candidates with a lower class of degree, but merit or above at Master's level will also be considered. Demonstrable skills in problem-solving, team-working, communication and time management.

## Training

**Project specific training opportunities:** This PhD provides broad, hands-on training across nutrition, vascular biology, chemistry, and clinical research. You will learn laboratory techniques that mimic digestion, alongside advanced chemical analysis methods such as LC-MS and NMR, supported by specialist training from the University of Reading's Chemical Analysis Facility. You will also receive full clinical research training supported by the Hugh Sinclair Unit of Human Nutrition at the University of Reading, including how to run human studies, recruit participants, collect samples, monitor blood pressure, and work to good clinical practice (GCP) standards. You will also develop expertise in analysing platelet behaviour and integrating complex biological data. Throughout the PhD, you will build strong skills in statistics, experimental design, and scientific writing. This comprehensive training will equip you with valuable interdisciplinary experience and transferable skills for careers in bioscience, nutrition, and health research in either academia or industry.

**FoodBioSystems training opportunities:** Throughout their studentship, all FoodBioSystems doctoral researchers participate in cohort training that covers four key themes: food systems, big data (data analytics and modelling), business, and research fundamentals. All doctoral researchers complete a placement: either project-related with a non-academic (CASE) partner, or unrelated to the project and outside the academic environment (PIPS). Details of training are available on the DTP website: <https://research.reading.ac.uk/foodbiosystems/training/>.

## Project supervision style

The student will meet the lead supervisor weekly during the initial phase to establish strong foundations and receive close guidance, with meetings becoming less frequent as confidence and independence grow. Meetings will be tailored to project stages, with the student connecting more frequently with supervisors who have specific expertise relevant to the current objective, ensuring targeted support. Regular one-to-one meetings with the lead supervisor will occur at least biweekly after the initial period, supplemented by regular (3 monthly) full supervisory team meetings to review progress and provide interdisciplinary input. The student will also attend monthly lab group meetings to engage with peers and broaden scientific discussions. Supervisors commit to providing feedback on written work and data within two weeks to maintain momentum.

### Stipend (Salary)

FoodBioSystems DTP students receive an annual tax-free stipend (salary) that is paid in instalments throughout the year. For 2025/26 this is £20,780 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 who also meet academic eligibility criteria and the student profile essential for the project.

These are opt-in processes.

Our studentships can be offered to home students on a part-time basis, and studentship end date and stipend payments will be amended to reflect the part-time registration. The minimum registration for DTP funded part-time students is 0.5 FTE (studying an average of 20 hours per week over 8 years). We regret that part time registration is not available to international students due to complexities of visa restrictions.

### Funding note

We welcome applications from candidates with Home/ROI fees and international fees status. This studentship is funded by UKRI and covers stipend, fees at Home/ROI rate, and research costs.

Costs that must be found from other sources or met by the individual student include:

The difference between international and Home/ROI fees at University of Reading, visa fees, healthcare surcharge, relocation costs and guarantor services.

Information about fees is available at <https://www.reading.ac.uk/doctoral-researcher-college/funding/fees/fees-new-students>

**For up to date information on funding eligibility, studentship rates and part-time registration, please visit the [FoodBioSystems website](#).**