

PhD Project Advertisement

Project title: Interaction between Iron Status and Vitamin D Health in Ethnic Groups - Implications for Immune Function

Project No: FBS2023-32-Lanham-New-sr

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Project description:

Good nutrition is key to health. Over the last decade, there has been a growing recognition in the field of nutritional sciences that being low on iron intake and not having enough iron in your blood is not good for health. Indeed iron deficiency/insufficiency is a major public health issue in ethnic groups – both in women of child-bearing age and older men and children from Black and South Asian populations. It has also been clearly identified that having a low intake of vitamin D and not enough vitamin D circulating in your body is also not good for health; and indeed vitamin D deficiency is becoming increasingly common in the UK, EU and worldwide. There are also data to show that there is a synergistic effect between vitamin D status and iron status but this has not been studied effectively in Ethnic Groups and there are few too data to make any firm conclusions.

In this project, we will investigate to see if there is a link between iron deficiency/insufficiency and markers of immune health in ethnic groups using; 1) population-based/'big data' approaches and 2) data from human nutrition trials and a specific intervention study using both nutrients. For the 1) population-based/'big data' approach, we will undertake: (i) systematic review/meta-analysis of globally available data on iron intake and iron status; the interaction between iron and vitamin D status and upper/lower respiratory tract infections; (ii) analysis of iron intake, iron status and the interaction with vitamin D status and its concomitant effect on markers of immune health in the UK Biobank and the USA NHANES datasets, specifically focusing on South Asian, Black African-Caribbean and Black African American men and women; For the 2) human nutrition trials – (i) we will use stored samples to examine the relationship between iron intake, iron status and vitamin D status on specific markers of immune function in different Ethnic Groups with existing samples available; (ii) an iron/vitamin D supplementation randomized controlled trial (RCT) on markers of immune function in ethnic groups.

We will undertake this project over 48 months and we have five specific aims and objectives:

1. Conduct a systematic review to examine the extent of low dietary intake and low nutritional status of iron (as measured by serum ferritin) and the interaction with low vitamin D status (as measured serum 25 hydroxyvitamin [25OHD] in ethnic groups from different countries;
2. Screen relevant and suitable publications from the systematic review (Step 1) to perform a meta-analysis dietary iron intake, serum ferritin status serum 25OHD status and immune markers and upper/lower respiratory tract infection in white Caucasian and all ethnic groups (Step 2).;
3. Explore the associations between iron intake, iron status, vitamin D intake, vitamin D status and immune markers via analysis of the UK Biobank cohort (total n = 500,000 subjects including all ethnic groups) and the USA NHANES cohorts (n= 25, 000);
4. Investigate the association between iron intake & status, vitamin D status and markers of immune function (including but not limited to C-reactive protein [CRP] and interleukin 6 & 8 [IL6/IL8] and cytokines) from stored samples in: White European, South Asian, Black Afro-Caribbean, Arabic and Indian Sikh populations from key previously funded HM Government research grants previously funded;
5. Design and deliver a supplementation RCT to determine whether increasing iron status and vitamin D status in parallel will positively impact markers of immune function in white European, UK South Asian and UK Black Afro-Caribbean subjects.

The project will provide key scientific data for the field as well as giving the student an exceptionally well-rounded experience in nutritional sciences and the broader fields of clinical trials, big data and global public health. Overall, the current project will therefore address an urgent gap in the field of iron nutrition, vitamin D and immune function, and specifically according to ethnicity. The evidence and conclusions we draw from the current project will be of great importance to the general public, the scientific field, and to key Government bodies such as the Scientific Advisory Committee on Nutrition (SACN) and the European Food Safety Authority (EFSA).

Training opportunities:

A broad yet specialised training programme, aligned to the project aims, will be provided by Surrey's expertise in nutritional epidemiology (including systematic review & meta-analysis and analysis of big data) and Reading's expertise in designing and conducting human nutrition studies together with our Policy and Industry Partners. The student will learn key research skills in human intervention studies, biochemical sample analysis and nutritional epidemiology. Specific courses include: University of Surrey: 1) Training in systematic review and meta-analysis and use of big data including UK Biobank & NHANES as well as training in research methods; 2) Modules on immune function and research methods from our MSc, Nutritional Medicine. University of Reading: 1) Training on design and conduct of human intervention studies including Good Clinical Practice and ethics applications; 2) Training on clinical analysis and data management.

The work placements in the Nutrition Supplement Industry and Food Industry (Viridian and ADM Milling) and in using the NHANES dataset as well as providing experience for the student in the relevancy of their work to the wider nutritional sciences field. In addition, collaboration with the Institute of Naval Medicine, MoD will provide the student with examples of how scientific research is translated into changing Government policy.

Student profile:

We are looking for a passionate, enthusiastic and dedicated student to work on this key public health nutrition project. This project would be suitable for students with a degree in nutrition, epidemiology, food science or a closely related subject. We would be requesting a minimum of BSc (2.1) degree qualification. The ability to work with volunteers and knowledge in the nutritional science area is essential; as is a willingness to learn new skills.

Stipend (Salary):

FoodBioSystems DTP students receive an annual tax free stipend (salary) that is paid in instalments throughout the year. For 2022/23 this will be £17,668 and this will increase slightly each year at rate set by UKRI.

Equality Diversity and Inclusion:

The FoodBioSystems DTP is committed to equality, 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](#).

In accordance with UKRI guidelines, 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.

References:

1. Lanham-New, S.A., Buttriss, J.L., Gibson-Moore, H., et al. Vitamin D – a multi-disciplinary approach to: (1) elucidate its role in human health; (2) develop strategies to improve vitamin D status in the UK population. Nutrition Bulletin 2022 In press
2. Köhrle, J., Rauner, M., Lanham-New, S.A. 100 YEARS OF VITAMIN D Light and health: a century after the therapeutic use of UV light and vitamin D, hormones advanced medical care (2022) Endocrine Connections, 11(1):e210609. doi: 10.1530/EC-21-0609
3. Vearing, R.M., Hart, K.H., ... Lanham-New, S.A. Global Perspective of the Vitamin D Status of African-Caribbean Populations: A Systematic Review and Meta-analysis (2022) European Journal of Clinical Nutrition, 76 (4), pp. 516-526.
4. Vearing, R.M., Hart, K.H., ...Lanham-New, S.A., et al. Vitamin D status of the British African-Caribbean residents: Analysis of the UK Biobank cohort (2021) Nutrients, 13 (11):4104. doi:10.3390/nu13114104.
5. Vearing RM., Hart.K., Darling AL., Probst Y., Olayinka AS., Mendis J., Ribiera H., Thakur S., Mendes M., Charlton K., Lanham-New SA. Global Perspective of Vitamin D Status of African-Caribbean Populations: A Systematic Review & Meta-analysis. Eur J Clin Nutr 2021.

6. Darling AL, Blackbourn DJ, Ahmadi KR, Lanham-New SA. Very high prevalence of 25-hydroxyvitamin D deficiency in 6433 UK South Asian adults: analysis of the UK Biobank Cohort. *British Journal of Nutrition* (2021), 125, 448–459.
7. Lanham-New SA, Webb AR, Cashman KD et al. Vitamin D and SARS-CoV-2 virus/ COVID-19 disease *BMJ Nutrition, Prevention & Health* 2020;0. doi:10.1136/ bmjnph-2020-000089.
8. Darling AL, Blackbourn DJ, Ahmadi KR, Lanham-New SA. Vitamin D supplement use and associated demographic, dietary and lifestyle factors in 8024 South Asians aged 40-69 years: analysis of the UK Biobank cohort. *Public Health Nutr.* 2018 Oct;21(14):2678-2688.

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