RESEARCH GROUP: Northern Ireland Centre for Food and Health (NICHE)

Project Title: The role of maternal vitamin D status in child development

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Level: PhD

Background to the project:
The Seychelles Child Development Study (SCDS) is a prospective observational study investigating the risk-benefits of fish consumption during pregnancy on child development. We have consistently reported that beneficial effects of maternal nutritional status (long chain polyunsaturated fatty acid status) from high fish consumption outweigh any adverse effects of prenatal methylmercury exposure on neurodevelopment\(^1\)\(^-\)\(^2\). Fish is also a rich source of vitamin D and together with high UV exposure, which endogenously synthesises vitamin D, places the SCDS in a unique position to investigate effects of maternal vitamin D status on neurodevelopment. Preliminary findings from the SCDS Nutrition Cohort 1 (NC1) show that vitamin D status is indeed higher than that observed in more northern latitudes\(^3\)\(^-\)\(^4\). Research has shown that maternal vitamin D status modulates foetal programming and influences long-term health of the child\(^3\). More recently, studies have reported that maternal\(^5\) and cord\(^6\)\(^-\)\(^7\) 25(OH)D concentrations are positively associated with neurodevelopment in early and later childhood. Furthermore, vitamin D is an immunomodulator\(^10\) and may potentially further modify any adverse effects of methylmercury on developmental outcomes. Further research is needed to elucidate the role of maternal and early-life vitamin D status on child neurodevelopment.

Objectives of the research project:
The overall objective of this study is to assess the role of vitamin D in child development.

STUDY 1: To conduct a systematic review investigating the role of vitamin D in neurodevelopment

STUDY 2: To assess the effects of maternal and cord vitamin D status on child neurodevelopment in a high-fish eating equatorial population
STUDY 3: To investigate the impact of maternal and cord vitamin D status on child outcomes in a high-fish eating equatorial population

STUDY 4: To investigate the potential modifying effects of vitamin D status on associations between methylmercury and neurodevelopment in a high-fish eating equatorial population

Methods to be used:

STUDY 1: Literature will be systematically reviewed to assess the role of vitamin D in child development and meta-analysis carried out where appropriate.

STUDY 2: Vitamin D status will be quantified by measuring 25(OH)D concentrations (using LC-MS/MS) from maternal and cord samples already collected from the Seychelles Child Development Study, Nutrition Cohort 2 (n=1200 mother-child pairs). Statistical analysis will be conducted to assess the relationship between maternal and cord vitamin D status. Predictors of maternal vitamin D status including fish consumption (collected from fish use questionnaires), dietary patterns (from food frequency questionnaires) and UV exposure (from publically available meteorological archive databases) will also be considered.

STUDY 3: Statistical analysis will be conducted using vitamin D status data collected from Study 2 and a range of neurodevelopmental endpoints assessed at 20 months and 5 years of age as part of SCDS NC2 to assess the impact of maternal and cord vitamin D status on child neurodevelopment.

STUDY 4: Statistical analysis will be conducted using maternal vitamin D status data collected from Study 2 and data on a range of inflammatory markers previously measured in this cohort to assess the associations between vitamin D status and immune markers in pregnancy. The potential modifying effects of vitamin D on associations between methylmercury and neurodevelopment will be statistically assessed under the guidance of Biostatisticians from the University of Rochester.

Skills required of applicant:

The applicant will be required to have the following:

- BSc or higher degree in relevant area
- Sound knowledge of nutrition, biochemistry epidemiology or related discipline
- Excellent team working skills
- Laboratory experience and willingness to acquire new laboratory skills
- High quality level of record keeping
- Able to use his/her initiative and work under pressure
- Ability to deal effectively with administrative tasks
- Excellent transferable skills, including interpersonal, oral and written communication

References


