Position Description – Research Affiliate (Physiologist), GS-0413-11

Research Associate, GS-11/12

Factor I - Research Assignment

A. Assigned Responsibility:

The incumbent serves as a Research Physiologist in the Obesity and Metabolism Research Unit (OMRU) at the Western Human Nutrition Research Center (WHNRC). The WHNRC, located on the campus of the University of California, Davis, investigates the benefits of food and nutrition interventions on prevention of disease and promotion of health. The mission of the OMRU is to determine how diet, dietary components, genetic, and environmental factors interact to affect physiology and behavior to influence body weight, weight gain, and metabolic health that can lead to metabolic dysregulation and associated adverse health effects. The Center and the Unit focus on human studies to conduct their research but also use animal and cellular models to address mechanistic research questions when appropriate to the mission. The incumbent will participate in human nutrition research efforts to characterize physiological responses to dietary interventions. The assignment is to use mass spectrometry-based metabolomic approaches to: 1) study the phenotypic responses to dietary interventions using targeted and untargeted metabolomics approaches; 2) apply statistical analysis and modeling to identify postprandial metabolic phenotypes associated with the nutritional challenge test responses; 3) explore dietary determinants of phenotypic responses. Future work may include additional human studies or mechanistic studies using appropriate model systems. The incumbent’s research supports ARS National Program 107-Human Nutrition.

B. Research Objectives and Methodology:

The primary objective of this position is to develop a computational approach to integrate nutritional, clinical, gut microbial, and metabolic phenotyping data to define an individual’s position in the “landscape” of nutritionally sensitive phenotypic responses, and identify basal measures that influence and predict that position. A secondary objective will be to identify phenotypic response variants to dietary challenges and associate these with measurable factors including diet and metabolic data.

Methods to accomplish these objective will include: 1) analytical data generation using complex validated liquid and gas chromatography techniques with mass spectrometry detection and quantification; 2) assemblage of metabolomic, metabolic, physical, clinical, dietary, and possibly genetic information into comprehensive datasets for statistical analysis and model building; 3) computational multivariate statistical analyses and modeling identified by the incumbent that will likely include, but not be limited to, principle components analysis, partial least squares discriminate analysis, hierarchical cluster analysis, pathway enrichment analysis, partial correlation analysis in open source and commercial statistical analysis packages; 4) as needed and as part of a team, develop novel analytical methods to expand the ability to phenotypically characterize study participants.

C. Expected Results:
This research will develop a computational approach to integrate and analyze habitual diet, physical activity and clinical parameters with metabolic responses to a mixed-macronutrient challenge test. Dietary intervention associated improvements in risk factors of cardiometabolic disease (e.g. insulin resistance, metabolic flexibility) will be mapped onto the “nutritional response landscape” to yield a prototype map of the nutrition/activity x disease risk landscape. Once complete, this will provide a new tool for medical professionals, policy makers, and the general public to support choices regarding lifestyle modifications with respect to potential reductions in health risk.

D. Knowledge Required:

This position requires a Ph.D. in biology, biochemistry, physiology, or a related field. Knowledge of human/animal physiology as it relates to energy metabolism and storage, quantitative and semi-quantitative mass spectrometry-based analytical chemistry, and biostatistics are highly desirable.

E. Supervisory Responsibilities:

The incumbent may provide intermittent technical guidance to visiting scholars, graduate students and technical support staff.

Factor 2 - Supervisory Control

A. Assigned Authority:

The research problems are determined by the supervisor and discussed with the incumbent. The incumbent is expected to plan and conduct experiments; analyze, evaluate and interpret the results; and prepare reports of the results in the form of manuscripts for publication in peer-reviewed journals and presentations at scientific meetings. Controversial information or findings will be directed to the supervisor’s attention for direction.

B. Technical Guidance Received:

Guidance will be provided by the supervisor and will consist primarily of defining research problems, guidance in planning experiments, and review and discussion of results within the context of team research goals, and to provide assistance on situations that have no clear precedents. Colleagues and collaborators will be consulted as needed.

C. Review of Results:

Results and manuscripts will be reviewed by the supervisor. In addition, appropriate colleagues will be chosen with whom to review and discuss results and manuscripts. Manuscripts will be submitted to the Research Leader for administrative review and approval.

D. General Supervision:
The incumbent is supervised by the principal investigator but is expected to display independence in management of agreed-upon research activities. The supervisor provides administrative guidance and technical support, but the incumbent is expected to contribute creative initiative to the research. Regular no less than weekly discussions will be held with the incumbent regarding progress, results, and adjustments needed in approach, methodologies, budget/personnel and equipment needs, and future plans.

**Factor 3 - Guidelines and Originality**

**A. Available Literature:**

There is an extensive bodies of literature on diet pattern analyses, the physiology of obesity, and multivariate analysis and bio-statistical model building, and a limited but growing body of literature on metabolomic-based nutritional phenotyping. However, few have attempted to integrate non-omics data such as dietary and physiological responsiveness into such analyses for the purpose of discriminant model development to provide a broader nutritional phenotyping and visualization tools.

**B. Originality Required:**

The assignment requires a working knowledge of human physiology associated with energy metabolism, targeted and untargeted metabolomics analyses of human cohorts, and complex multivariate statistical models using disparate data types. The incumbent must be able to apply this knowledge to the system described, and use judgement, initiative and resourcefulness to modify/adapt existing approaches and/or deviate from established methods as needed to accomplish the research goals.

**OTHER CONSIDERATIONS (Check if applicable)**

- [ ] Supervisory Responsibilities (EEO Statement)
- [ ] Training Activities - Career Intern, Student Career Experience Program
- [ ] Motor Vehicle or Commercial Driver’s License Required
- [ ] Pesticide Applicators License Required
- [ ] Safety/Radiological Safety Collateral Duties
- [ ] EEO Collateral Duties
- [ ] Drug Test Required
- [ ] Vaccine(s) Required
- [ ] Financial Disclosure Required
- [ ] Special Physical Requirements/Demands
- [ ] Duties require unrestricted access to BSL-3 containment facilities; work with CFR- listed agents or toxins; or unrestricted access to the exclusion areas of high security facilities (such as the vaults of major gene banks).
[] Other: