Contact:

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Master thesis

On the subject: „Microbiome-host interactions in healthy obesity and metabolic disease: a multi-omics based approach “

The gut microbiome is a well-defined key regulator of metabolism alongside several other factors including genetics and lifestyle habits. In this aspect, shifts in taxonomic and functional composition of the gut microbiome and several bacterial metabolites have been linked to metabolic complications of obesity such as type 2 Diabetes and cardiovascular disease.

That being said, inter-individual variability is prevalent in the metabolic response to obesity itself: certain individuals with obesity seem to be protected against its deleterious metabolic effects, constituting a new subgroup of patients with what is described as metabolically healthy obesity (MHO). To this specific end, it is unclear whether MHO is a clear clinical entity with its own microbiome and metabolome signature. Similarly, the microbiome has been shown to mediate genomic reprograming and contribute to epigenetic modification. While evidence for a crosstalk between microbial metabolites and adipose tissue (AT) exists, and adipose tissue specific methylation patterns have been shown to associate with parameters of fat distribution and glucose metabolism, it is unclear whether the microbiome is related to the AT-specific epigenetic signature. If so, it may influence AT effects on metabolic sequalae of obesity as a metabolically active endocrine organ. Therefore, we hypothesize that epigenetic modifications of AT and microbiome are associated and that metabolic healthy obesity is characterized by a specific bacterial signature. The aim of this work is to establish pipelines incorporating data from multi-omics (metabolome, microbiome and methylome) and test the presented hypotheses. This work will be a shared co-mentorship between the medical faculty, Bioinformatics Department of the University of Leipzig, and iDiv - German Centre for Integrative Biodiversity Research. A doctoral thesis based on a background in microbial ecology to further validate targets *in vitro* can be offered depending on project outcome (Funding by SFB 1052).

Your tasks:

* Researching the literature relevant to the topic
* Conducting integrative -omics statistical analyses
* Reporting and interpreting the results

Your profile:

* You should be enrolled at a University program in bioinformatics, ecology, environmental science, data science, statistics, or similar
* Experience in data analysis and statistics is a prerequisite
* Knowledge of R, Python, or Matlab is a prerequisite
* Keen interest in data analysis and computer-based science
* You should be motivated to learn new data analysis methods
* Sufficiently good communication skills in English
* Motivation, curiosity, team spirit

We offer:

* Close and good support in a dynamic group with people who support a healthy research culture
* The chance to participate with your own ideas and to give new impulses from the beginning
* Exciting insights into the collaborative work on the interface of medicine and bioinformatics
* Excellent technical equipment
* Opportunities for close collaboration and work with leading scientists in the microbiome field

Supervisors: Dr. Rima Chakaroun; Dr. Anna Heintz-Buschart; Dr. Stephanie Kehr

Supervising PIs: Prof. Peter Stadler; Prof. Peter Kovacs

To apply, please submit your application via Email with your CV and motivation letter (1-page maximum). For additional questions regarding the offer, please contact Rima Chakaroun (rima.chakaroun@medizin.uni-leipzig.de).