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Improving integration of multimodal omics data for precision metabolic health

Metabolic diseases such as obesity and type 2 diabetes (T2D) are intricately connected and contribute significantly to global mortality. However, considerable variability exists in disease presentation and pathogenesis, leading to different trajectories and outcomes from interventions, even among individuals with similar measurable characteristics. This variation reflects the complex relationship between key factors including nutrition, the gut microbiome, adipose tissue (AT), sex, as well as the host metabolome, all interacting through intertwined molecular mechanisms leading to a high heterogeneity. Notwithstanding, a full understanding of these bidirectional interactions and their role in disease heterogeneity remains elusive. To address these complexities, there is an urgent need to develop more sophisticated and more powerful frameworks incorporating data across various modalities and time points, including metagenomics, transcriptomics, epigenomics, metabolomics, and proteomics, combined with metadata on clinical and lifestyle characteristics. Our goal is to develop an integrated analytical approach to understand the individual and collective contributions of data spaces to disease heterogeneity, with a specific focus on metabolic health. In particular, beyond the existing tools, which are mainly designed for the investigation of malignant diseases, we intend to find a suitable mathematical formulation to develop statistical learning algorithms tailored to this task. For this, we will leverage large datasets of individuals with cardiometabolic diseases such as obesity and diabetes, including from individuals undergoing an intervention, which allows for the generation of frameworks equally suitable for other complex diseases or systems biology questions.

We are seeking a highly motivated and skilled Bioinformatician to join our interdisciplinary research team on a 75% TV-L (E13) fixed-term contract for three years. The successful candidate will contribute to the analysis, integration, and interpretation of large-scale biological data, supporting various genomics, transcriptomics, and epigenomics projects. Responsibilities include analysis of multimodal OMICs-data with existing state of the art applications (MixOmix, MOFA) as well as contributing to the development of new methodological approaches to integrate multiple large-scale datasets from patients with adiposity and metabolic disorders.

The ideal candidate holds a Master's degree in bioinformatics, computational biology, or a related field, with demonstrated experience in high-throughput data analysis and proficiency in programming languages such as Python, R, or similar. This position offers an excellent opportunity to work and collaborate in an international environment with multidisciplinary supervision and connection to large research consortia at the intersection of medicine, bioinformatics, and data science.

Sincerely yours,

Richard Golnik