CB2050 Project in Molecular Life Science

Preliminary project title: Analysis of new Olink proteomics data from S3WP: toward multi-omics integration

Summary

The Swedish SciLifeLab SCAPIS Wellness Profiling (S3WP) started in 2018 as a longitudinal study based on the larger SCAPIS cohort (1). The study initially followed 101 healthy individuals over two years, collecting omics data at six time points to track changes related to wellness and health (2). The data includes proteomics, transcriptomics, genomics and other omics platforms. With recent advancements in Olink's Proximity Extension Assay technology, the proteomics data from S3WP has been upgraded to detect more than 5000 plasma protein levels. Hence, such valuable data requires a new analysis, aiming toward multi-omics integration. The goal of this project is to extract significant information from the updated proteomics data set, compare it to the findings from earlier proteomics platforms and explore the potential for higher-level analysis through integration with other omics data from the S3WP project.

Analysis method

- Analyze the plasma proteomics data from the Olink HT including: quality control, differential expression, multivariate analyses, protein correlation across longitudinal samples, pathway enrichment
- Assess the potential of multi-omics integration, exploring methods like Multi-Omics Factor Analysis (MOFA) or alternative ML models

Expected output

- Main expected output: comprehensive longitudinal proteomics profiles based on more than 5000 protein levels
- Secondary output: multi-omics associations between selected omics methods, if time allows

Time plan: October 28th - January 13th (week 44 – week 2)

- Week 44: literature search, hypothesis formation
- Week 45: data access, quality control and pre-processing
- Week 46 – 50: longitudinal plasma proteomics analyses
- Week 51 – 52: report writing, with potential multi-omics integration
- Week 1 – 2: report completion, preparation of presentation and opposition

Reference

(1) Bergström G, Berglund G, Blomberg A, Brandberg J, Engström G, Engvall J, et al. The Swedish CArdioPulmonary BioImage Study: objectives and design. Journal of Internal Medicine [Internet]. 2015 Jun 19;278(6):645–59. Available from: https://doi.org/10.1111/joim.12384

(2) Tebani A, Gummesson A, Zhong W, Koistinen IS, Lakshmikanth T, Olsson LM, et al. Integration of molecular profiles in a longitudinal wellness profiling cohort. Nature Communications [Internet]. 2020 Sep 8;11(1). Available from: https://doi.org/10.1038/s41467-020-18148-7