Title	Leveraging network information to understand the role of lipids on child growth
Group	Systems and Synthetic Biology ; Nutrition, Metabolism and Genomics
Project type	Thesis
Credits	36
Supervisor(s)	Dr. Edoardo Saccenti (SSB); Dr. Bryan Gonzales (NMG)
Examiner(s)	
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Begin date	

Used skills: Network inference, data analysis and multivariate statistics; programming; relating results to existing or novel biological knowledge.

Requirements: Ability to program in R, basic statistics and biological knowledge are highly desired skills.

Description: Growth faltering in children in low and middle-income countries remain to be serious public health problem. However, why children fail to grow at their optimal capacity remains unknown. We performed lipidomics analysis on a cohort of children in the Gambia, where plasma lipidome composition was longitudinally investigated from 3 months until 2 years of age.

In this project, we will use network analysis to understand molecular mechanisms influencing growth faltering. A network is a graphical representation of different biological entities (nodes) and their relationships (edges): the meaning of the nodes and edges used in a network representation depends on the type of data used to build the network. We specifically aim to understand how interactions among lipids change over time, and how these influence poor growth of children in low-resource countries.

At the end of the project you will have gained ample experience in network analysis, network topology, statistics and modelling complex information, applied to understanding nutritional problems in children.

References

Gonzales et al (2021). “Plasma lipids and growth faltering: a longitudinal cohort study in rural Gambian children”. medRxiv. doi: 10.1101/2021.03.25.21253967

Alm, E. and A. P. Arkin (2003). "Biological networks." Current opinion in structural biology **13**(2): 193-202.

Embar, V., A. Handen and M. K. Ganapathiraju (2016). "Is the average shortest path length of gene set a reflection of their biological relatedness?" Journal of bioinformatics and computational biology **14**(06): 1660002.
Glass, L. (1975). "Classification of biological networks by their qualitative dynamics." Journal of Theoretical Biology **54**(1): 85-107.
van Tilborg, D. and E. Saccenti (2021). "Cancers in Agreement? Exploring the Cross-Talk of Cancer Metabolomic and Transcriptomic Landscapes Using Publicly Available Data." Cancers **13**(3): 393.