

Utilizing gut-microbiota as a tool for a priori stratification between responders and non-responders to prebiotic intervention

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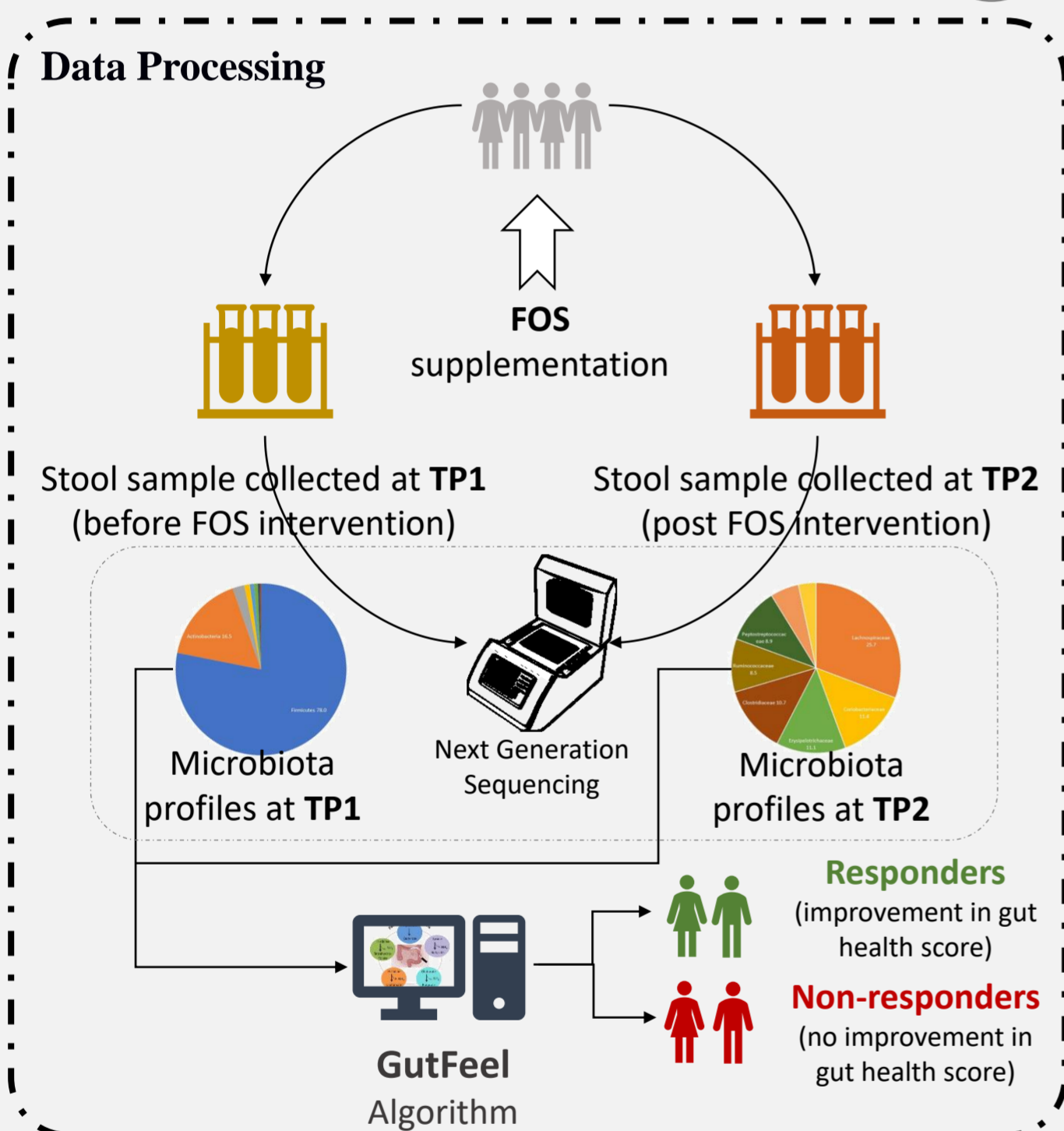
Background

- The gut microbiota, which is intricately linked to intestinal health, has also been shown to impact the functioning of host's immune system as well as several key organs like lungs, bones, brain, etc.
- Microbiome directed interventions, such as, prebiotics are expected to boost the proportion of beneficial bacteria in the gut thereby improving overall health and well being.

Objective

- To evaluate the role and association of existing gut microbiota to the outcomes of prebiotic (FOS: fructo-oligosaccharides) supplementation.
- Utilizing the knowledge to a priori stratify patients as potential responders and non-responders to a prebiotic for better treatment outcomes.

Method Workflow



Results

Datasets/ Tools used:

- Longitudinal stool samples from 69 participants who were provided prebiotic supplements (FOS).^[1]
- Samples were collected before the start of intervention (TP1) [Day 60 - basal phase] and at the end of dosage phase (TP2) [Day 150] were used in this study.^[1]
- Microbiota profiles were obtained through amplicon sequencing of the V3-V4 region of 16S rRNA gene.
- Improvement in gut microbial functions (gut health score) from TP1 to TP2 was computed using GutFeel.^[2]

Prediction accuracy:

In the 100-fold cross-validation experiment, which was performed to check the robustness of the ML-model, the mean training and test AUCs (area-under-the-ROC-curve) were observed to be 0.77 and 0.71 respectively.

Summary

- The benefits accrued through prebiotic supplementation is not universal and can vary among individuals receiving the intervention.
- The study provided preliminary evidence on the possibilities of using the gut microbiota composition as an indicator of the prospective benefits of prebiotic intervention in an individual.

Significance

- Outcome of a prebiotic intervention is dependent (at least in part) on the gut microbiome composition of the individual receiving supplementation.
- This opens up the scope to design personalized prebiotic regimen for improving treatment outcomes.

References

1. Tandon, D, et al. *Nature Reports* 9: 5473 (2019).
2. Anand, S. et al. *FEBS Letters* 595(13):1825-1843 (2021).



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