

Weight Loss Associated With Time Restricted Eating Is Not Reflected in Changes in the Human Gut Microbiome

Anne Bantle, Alison Alvear, Dan Knights, Lisa Chow, and Abigail Johnson

University of Minnesota

Objectives: Time-restricted eating (TRE) is a novel approach to obesity treatment that recently received attention. Very limited data exist regarding gut microbiome changes during TRE interventions in humans. Our objective was to characterize the gut microbiome of human participants before and after a 12-week TRE intervention.

Methods: In a randomized controlled trial of an 8-hour TRE intervention in human participants over 12 weeks, Chow, *et al.* demonstrated reduction in weight, lean mass, and visceral fat with TRE compared to control. Stool samples were collected before and after the intervention by study participants using home kits, placed in RNAlater Stabilization Solution (Ambion), and kept < at room temperature for < 7 days before storage in a -80°C freezer. Samples were submitted as a batch to the University of Minnesota Genomics Center for DNA extraction, amplification, and shotgun metagenomic DNA sequencing (Illumina HiSeq platform). Quality-controlled sequences were aligned to the GTDB Genome Taxonomy Database (<https://gtdb.ecogenomic.org>).

Results: Sixteen study participants provided stool samples which were used in this analysis (8 TRE and 8 control). Participants undergoing the TRE intervention successfully restricted their eating window (mean \pm SD 15.3 ± 0.8 hours at baseline to 9.3 ± 1.7 hours during intervention, $p < 0.001$). The control group's eating window remained unchanged. Weight loss, visceral fat loss, and BMI reduction were significantly greater for the TRE group. There was no significant effect of the TRE intervention on alpha diversity (Shannon index, Simpson index, and number of taxa, linear mixed models), beta diversity (Bray-curtis, PERMANOVA), or overall microbiome composition controlling for weight change and visceral fat change.

Conclusions: Our analyses did not show any difference in gut microbiome composition or diversity indices in participants completing a TRE intervention as compared to control, but are limited by small sample size, short study duration, and stool-sampling at only two study timepoints.

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