Gut microbiota composition and arterial hypertension improvement post-Roux-en-Y Gastric Bypass: GATEWAY Trial sub-analysis after 5 years

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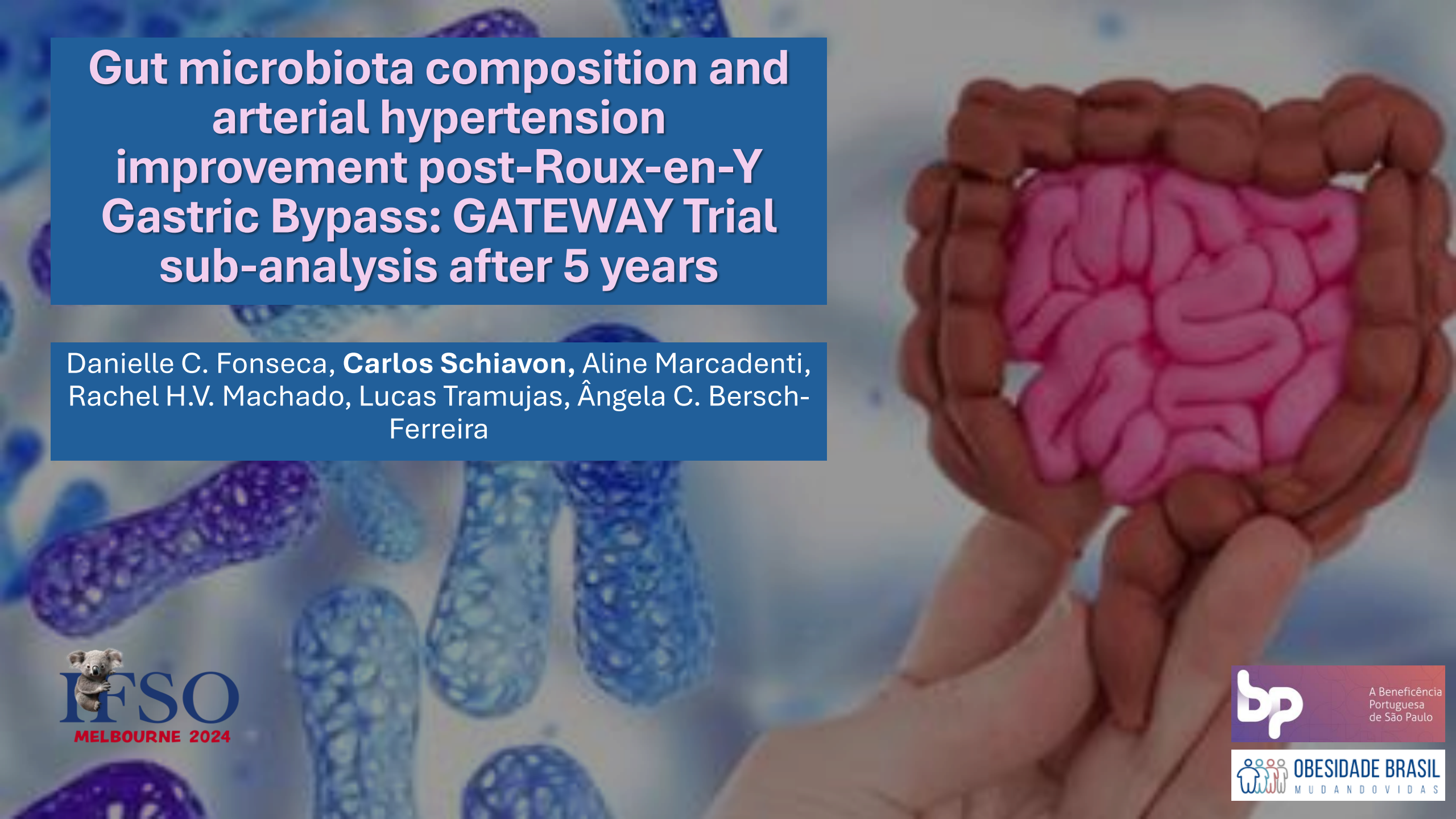

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Disclosures

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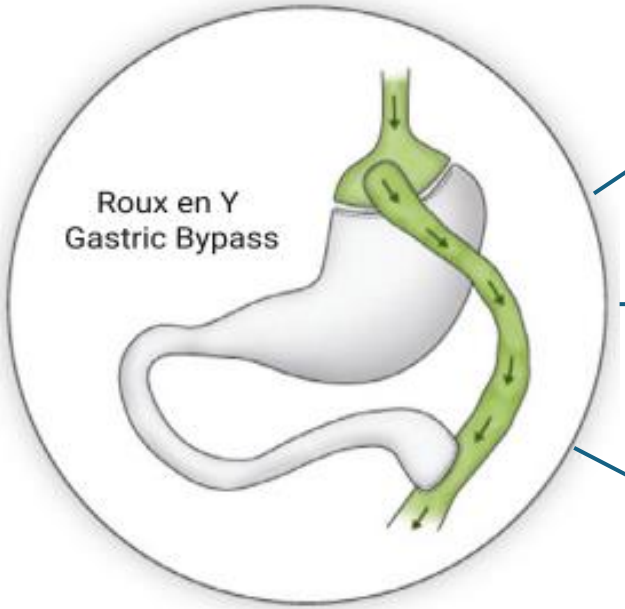
  - **Biome**Hub

Bariatric and metabolic surgery – gut microbiota (GM)



↑ Proteobacteria
↑ Gemella
↑ Streptococcus

Frequently related to human diseases

↑ Veillonella
↑ Akkermansia

Frequently related to human health

↓ Blautia
↓ Bifidobacterium

Frequently related to human health

↓ SCFAs (Short-chain fatty acid)
↓ BCAAs (Branched chain amino acids)

Frequently related to human health

↑BCFAs (Branched chain fatty acids)
↑ Tryptophan-derived metabolites
↑ TMAO (Trimethylamine N-oxide)

Frequently related to human diseases

↑ Secundary bile acids

Frequently related to human health

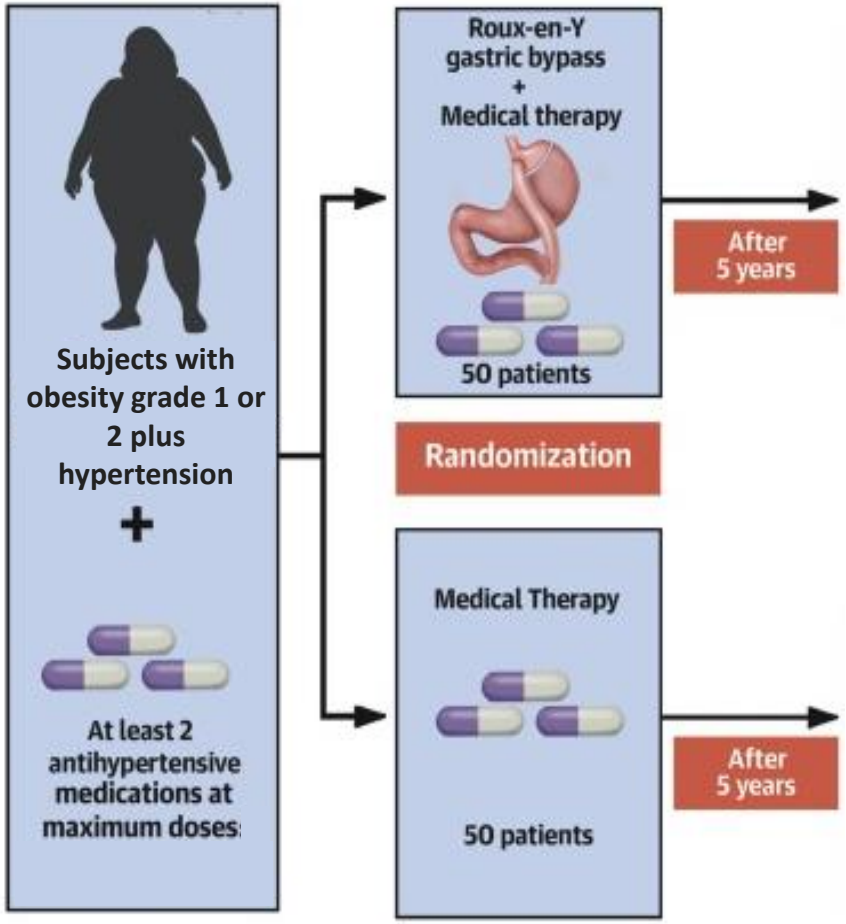
Rizzatti G, Lopetuso LR, Gibiino G, et al. Biomed Res Int. 2017:9351507 (2017).
Gutiérrez-Repiso, C., Moreno-Indias, I. & Tinahones, F.J. *Rev Endocr Metab Disord* 22, 1137–1156 (2021).
Roshanravan, Neda, Sepideh Bastani, Helda Tutunchi, et al. Archives of Physiology and Biochemistry 129 (3): 741–51 (2023).

Aim

Our aim was to describe and evaluate the GM composition according to the type of response to RYGB compared to Medical Therapy after five years or more years of follow-up at the GATEWAY Trial.

Methods

This is a sub-analysis of the GATEWAY RCT (NCT01784848) that included individuals with obesity and hypertension after at least five years follow-up.



Roux-en-Y gastric bypass + Medical therapy

50 patients

After 5 years

Randomization

Medical Therapy

50 patients

After 5 years

Group 1) RYGB **with remission** of hypertension (n=12)

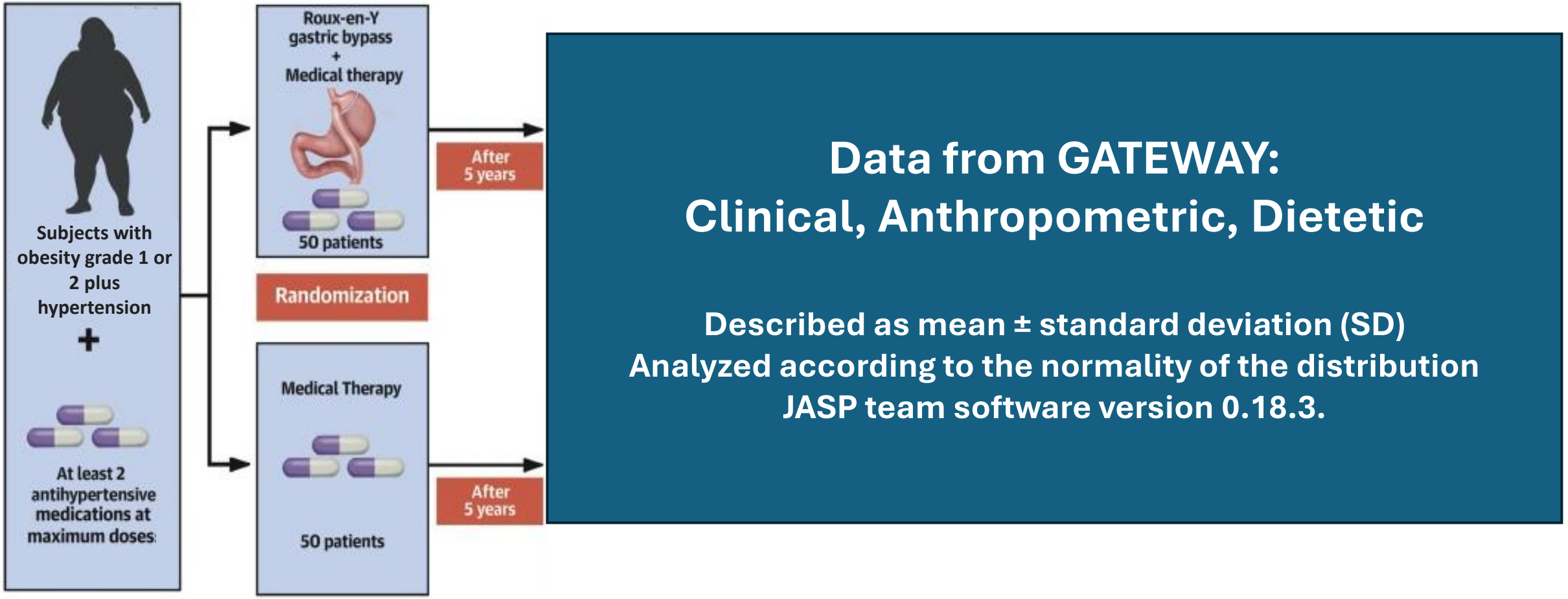
Group 2) RYGB **without remission** of hypertension (n=12)

Group 3) **Medical Therapy** - MT (n=15)

Schiavon CA, Cavalcanti AB, Oliveira JD, Machado RHV, Santucci EV, Santos RN, et al. Randomized Trial of Effect of Bariatric Surgery on Blood Pressure After 5 Years. J Am Coll Cardiol. 2024 Feb 13;83(6):637-648.

Methods

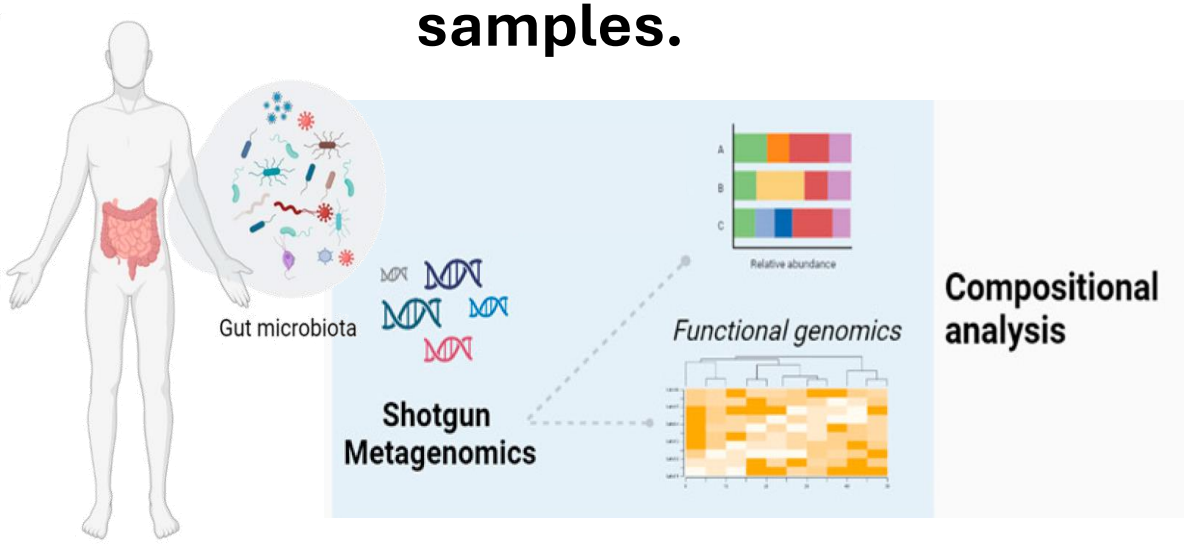
This is a sub-analysis of the GATEWAY RCT (NCT01784848) that included individuals with obesity and hypertension after at least five years follow-up (cross-sectional analysis).



Schiavon CA, Cavalcanti AB, Oliveira JD, Machado RHV, Santucci EV, Santos RN, et al. Randomized Trial of Effect of Bariatric Surgery on Blood Pressure After 5 Years. J Am Coll Cardiol. 2024 Feb 13;83(6):637-648.

Methods

GM was assessed by shotgun metagenomic sequencing of fecal samples.



Descriptives

- Relative abundance (GM profile): Percentual of Phyla and Genera

Descriptives:

- **Richness:** the **number** of species present in a system
- **Alfa-diversity (Simpson and Shannon):** the ecological diversity of a single sample, taking into account the number of different bacteria and their relative abundances (**distribution**)

Considered measures of gut microbiota health

Analyses were performed:

- LinDA in MicrobiomeStat R package version 1.1
- Correlation among GM and clinical data in JASP team software version 0.18.3.

Results

Population Characteristics After 5-years follow-up:

Variable	Group1 (n=12)	Group2 (n=12)	Group3 (n=15)	P-value
Age (years)	47.7 ± 8.3	55.8 ± 9.4	55.3 ± 8.2	0.044
BMI (kg/m^2)	27.6 ± 2.0	28.7 ± 5.2	37.4 ± 4.2	$p<0.001$
SBP (mmHg)	119.4 ± 14.3	130.7 ± 12.4	127.7 ± 17.3	0.544
DBP (mmHg)	78.6 ± 12.0	83.4 ± 11.6	80.9 ± 8.3	0.173

Anova

Results

GM profile:

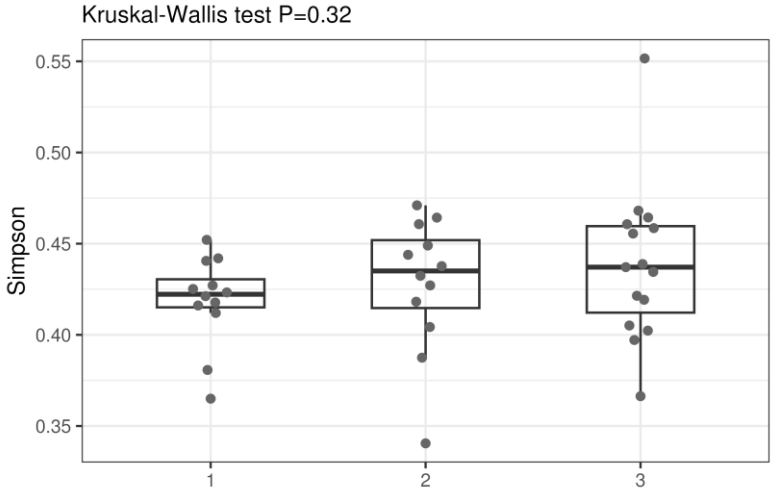
- **Phyla (p>0.05): Similar among groups**

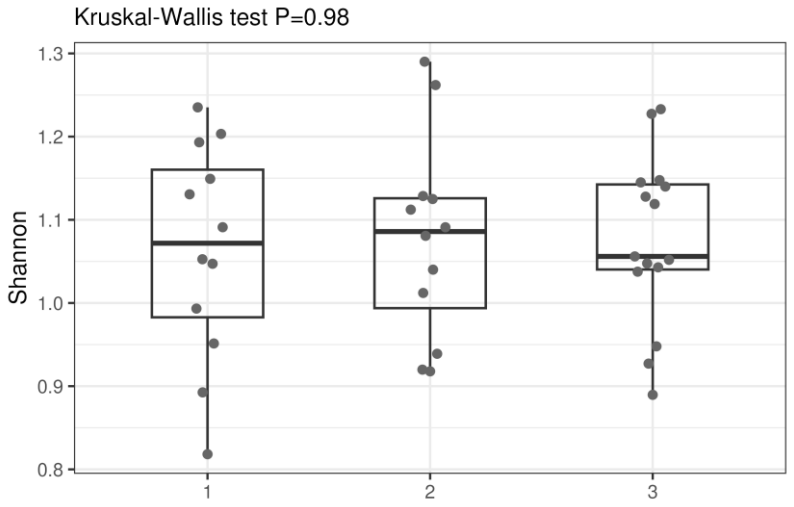
Firmicutes, Bacteroidetes, Proteobacteria and Actinobacteria → The dominant gut microbial of human

- **Top five genera (p>0.05): Similar among groups**

Prevotella (24.5%); Faecalibacterium (6.2%); Blautia (4.3%); Escherichia (3.8%); Phocaeicola (3.8%)

- **Alfa-diversity measures (p>0.05): Similar among groups**

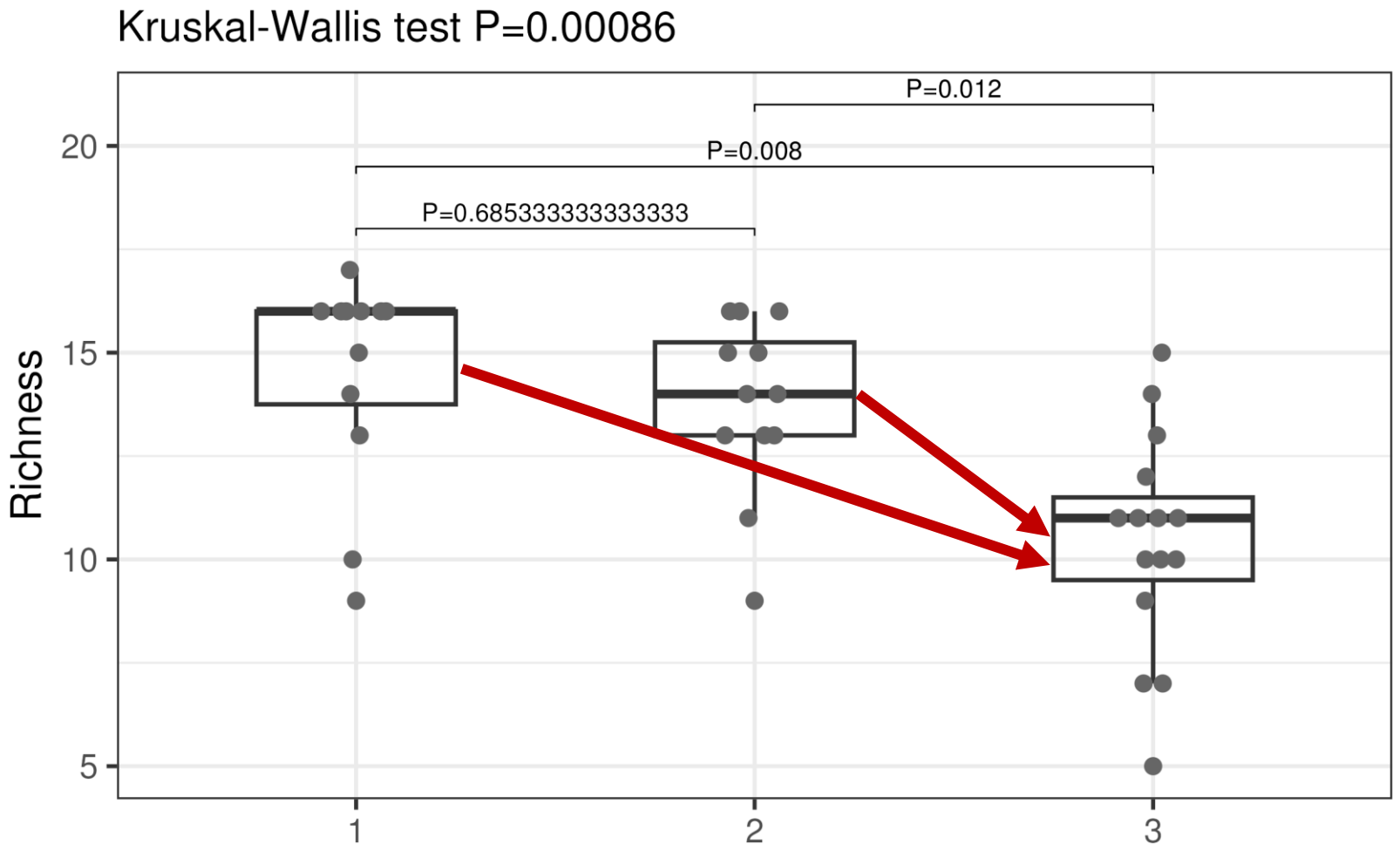




Regarding the compositional aspect, no differences were identified between the GM of the groups

Results

Microbial richness was notably different between BS groups (1 and 2) comparing MT



Pairwise comparisons used Wilcoxon rank sum tests with Holm correction for multiple comparisons.

Literature suggests that: low richness of GM is characterized by more adiposity, insulin resistance and a more pronounced inflammatory phenotype when compared with high GM richness individuals.

Le Chatelier E, Nielsen T, Qin J, et al. Nature. 2013 Aug 29;500(7464):541-6.
Balmant BD, Fonseca DC, Rocha IM, et al. Nutrients. 2023 Oct 5;15(19):4261.

Conclusion

- This comprehensive analysis unveiled no disparities in the taxonomic composition of the GM when comparing groups.

- Nevertheless, it did identify higher richness in the GM of participants undergoing RYGB compared to those who remained on drug treatment throughout the study's follow-up period.

- The increased GM richness has previously been observed after short-term bariatric surgery. Studies with follow-up of more than five years are scarce, especially in patients with hypertension. **The findings of this subanalysis provide opportunities to explore GM characteristics in patients with and without hypertension remission after RYGB.**

Thank you for your attention!

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