

The Use of Post-prandial Breath Hydrogen to Monitor Antibiotic-induced Changes in the Activity of the Gut Microbiome

Barahona, Guillermo¹; Moran, Áine²; Mc Bride, Barry²; Harrison, Kedrick²; Villatoro, Luisa¹; Burns, Robert¹; Konings, Bo¹; Bulat, Robert¹; McKnight, Megan¹; Shortt, Claire²; Pasricha, Pankaj J¹.
Johns Hopkins Center for Neurogastroenterology, Baltimore, MD, United States¹. FoodMarble Digestive Health, Dublin, Ireland²

Introduction

- Small intestinal bacterial overgrowth (SIBO) is a common condition that is associated with a range of non-specific GI symptoms.
- Patients are often prescribed an empirical trial of antibiotics, however response to treatment can vary.
- Due to the heterogeneous nature of symptoms, post-prandial breath hydrogen (PPH₂) may assist in identifying beneficial changes in gut microbiome in those with a dysbiotic phenotype.

Aims

- To compare daily PPH₂ in suspected SIBO patients and healthy controls following their habitual diet.
- To evaluate daily PPH₂ in suspected SIBO patients before, during and after antibiotic treatment.

Methods

- 24 suspected SIBO patients and 10 healthy controls measured their PPH₂ using an at-home, app-connected breath analyzer (AIRE[®], FoodMarble).
- Readings were taken at 0, 30, 60 and 90 min after morning and evening meals for 7 days pre- and post-treatment.
- 14/24 suspected SIBO patients recorded PPH₂ during antibiotic treatment.
- PPH₂ of suspected SIBO patients before, during and after treatment was compared with that of healthy controls.

Results

Suspected SIBO patients produce significantly more post-prandial hydrogen than healthy controls ($p < 0.001$)

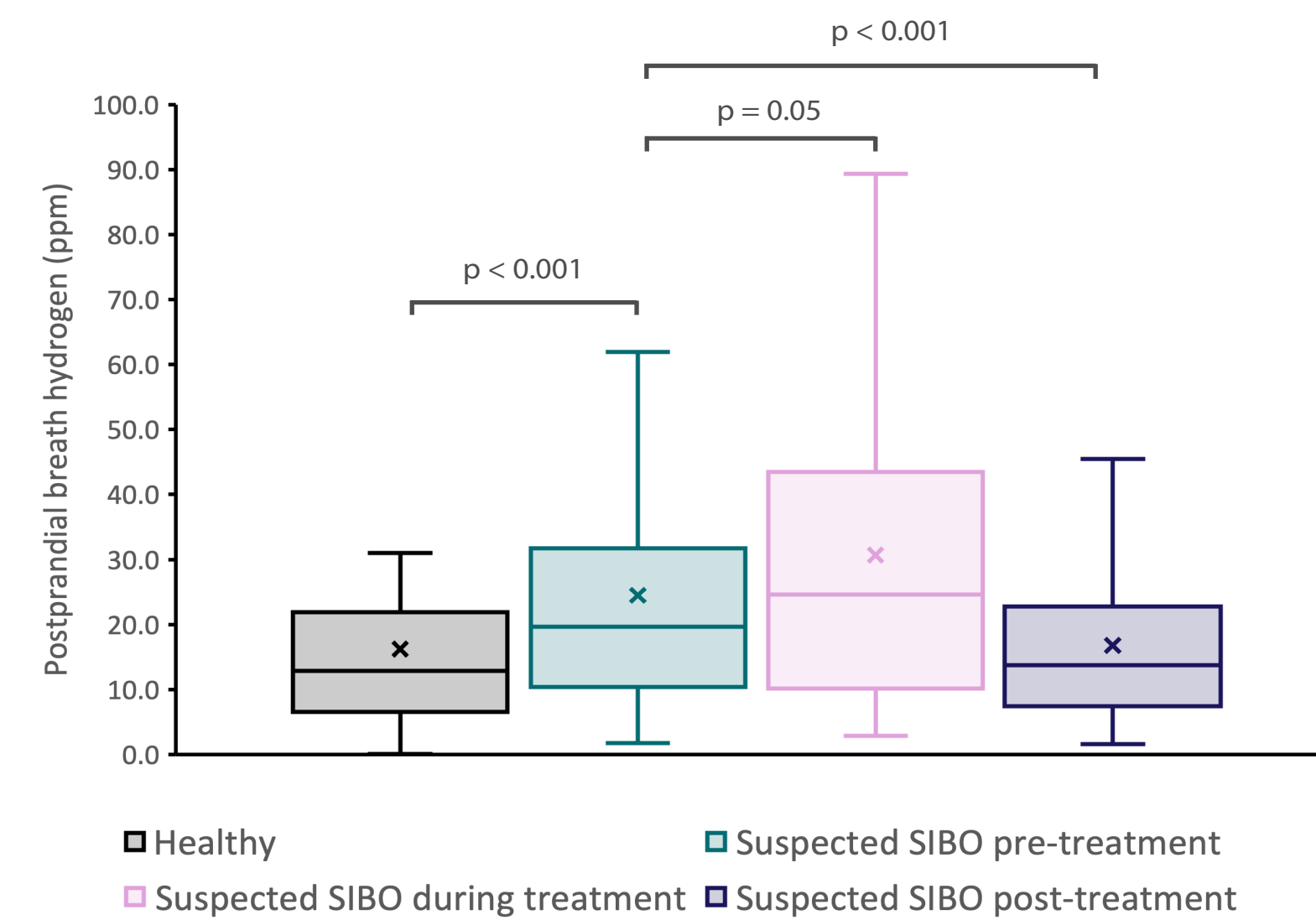


Fig. 1 A comparison of post-prandial hydrogen from suspected SIBO patients pre-treatment (n = 24), during treatment (n = 14) and post-treatment (n = 24) to healthy volunteers (n = 10).

	PPH ₂ ppm (mean ± SD)
Healthy (n = 10)	16.2 ± 15.8
Suspected SIBO pre-treatment (n = 24)	24.5 ± 19.3
Suspected SIBO during treatment (n = 14)	30.7 ± 25.7
Suspected SIBO post-treatment (n = 24)	16.8 ± 12.6

Table 1. Summary of mean PPH₂ (mean ± SD) for suspected SIBO patients vs. healthy controls.

Real-time microbiome changes in response to antibiotic treatment can be tracked using post-prandial breath measurements

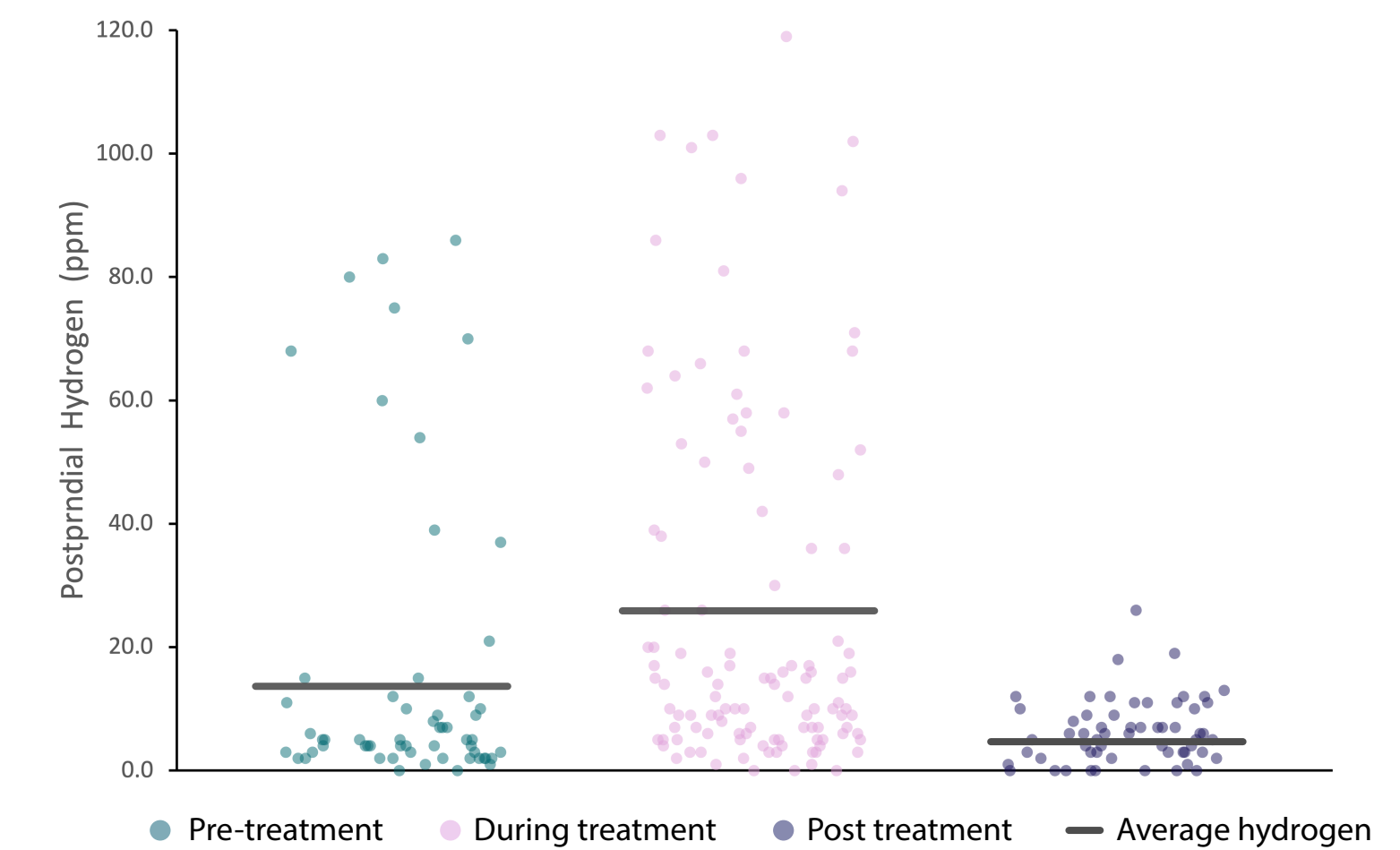


Fig. 2 Scatter plot of post-prandial breath hydrogen readings for a patient before, during and post treatment.

Summary & Key Observations

- Suspected SIBO patients had significantly greater PPH₂ ($p < 0.001$) than healthy controls indicating that PPH₂ may be able to differentiate between a healthy and dysbiotic microbiome.
- The mean PPH₂ of patients increased significantly ($p = 0.05$) during treatment and was driven by 5/14 (35%) of patients. This change suggests a possible dynamic rearrangement of specific microbial population in response to antibiotics.
- PPH₂ of patients reduced significantly ($p < 0.001$) after treatment. However, the response to antibiotics varied across patients and our preliminary data suggests that many would benefit from an additional or alternative treatment.
- PPH₂ data may identify those who produce elevated gas levels due to a dysbiosis and provide objective data to help guide antibiotic treatment protocols.