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Perceived Stress, Cortisol, Breath Hydrogen, and Gastrointestinal Symptoms After Consumption of Gluten and Inulin in Adults With and Without Irritable Bowel Syndrome

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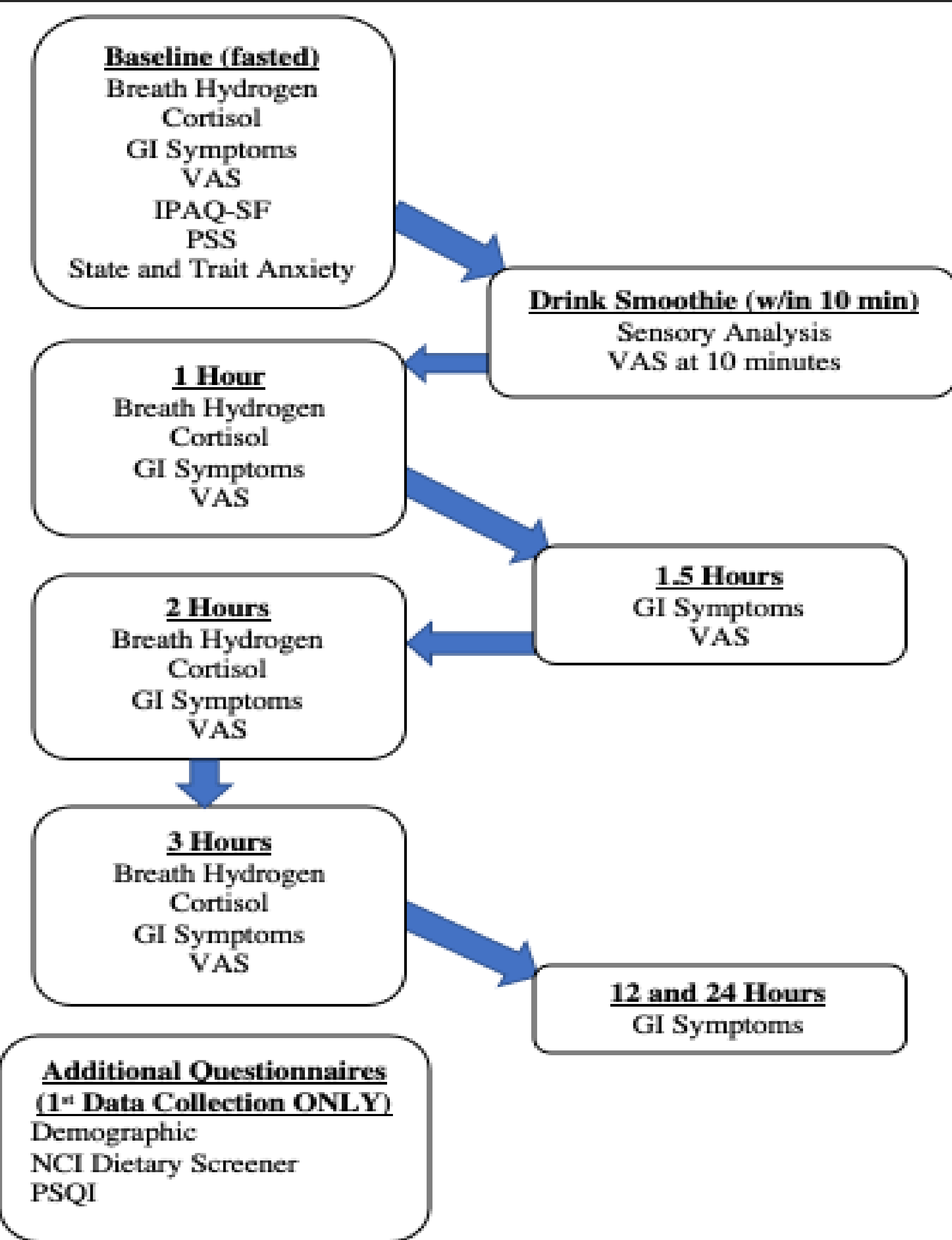
Introduction

- Stress is often thought to play a role in breath hydrogen and GI symptoms.

Objective

- Investigate stress, breath hydrogen, and GI symptoms after consumption of gluten and inulin in those with and without IBS.

Methods



- Salimetrics ELISA assays were used to determine cortisol values.
- Variables were analyzed by Area Under the Curve, Spearman rho, Repeated Measures ANOVA, and Simple Effect Tests with $p < 0.05$.

Figure 1. Cortisol in Non-IBS Participants Based on Treatment (n=24)

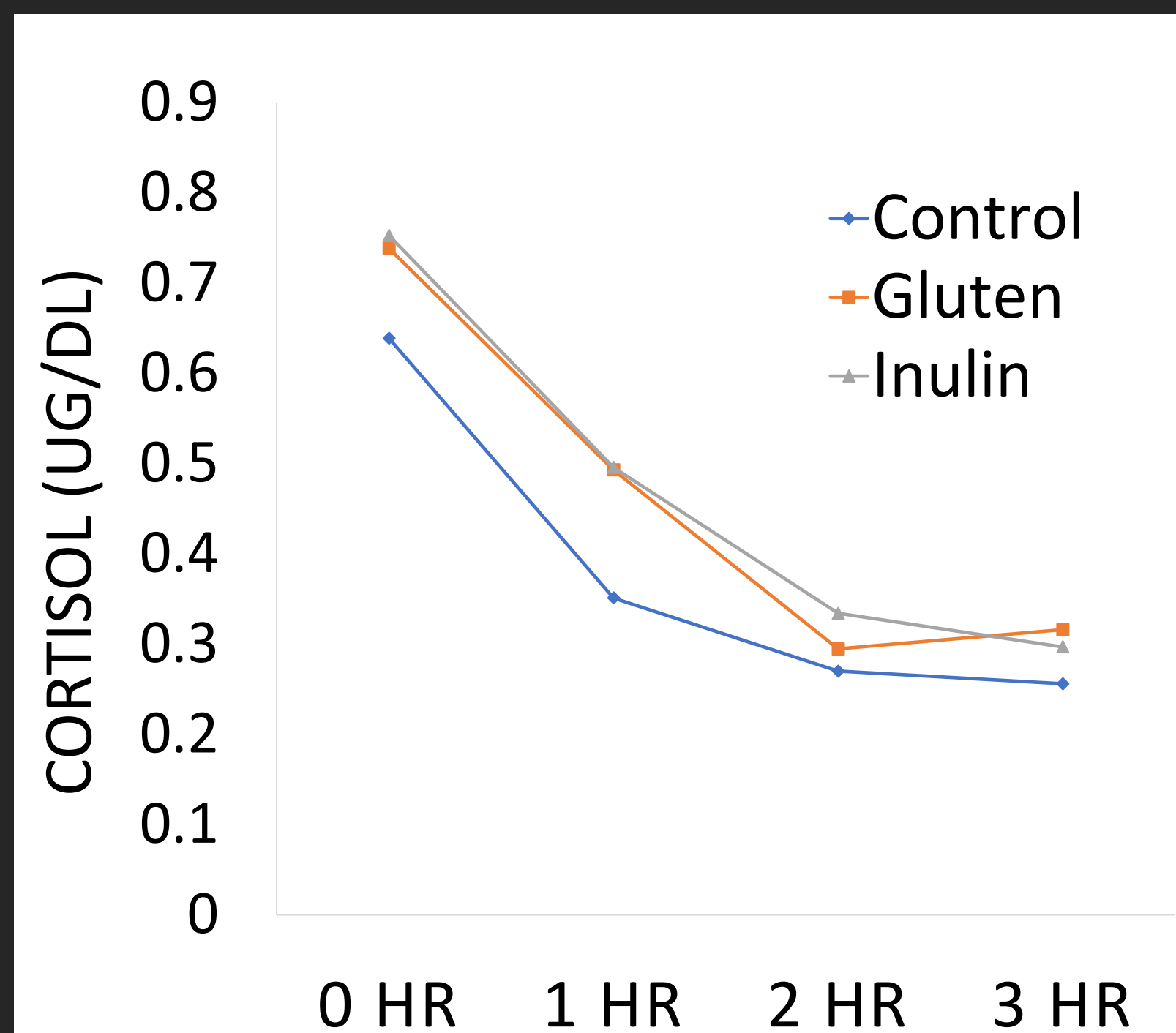


Figure 2. Cortisol in IBS Participants Based on Treatment (n=14)

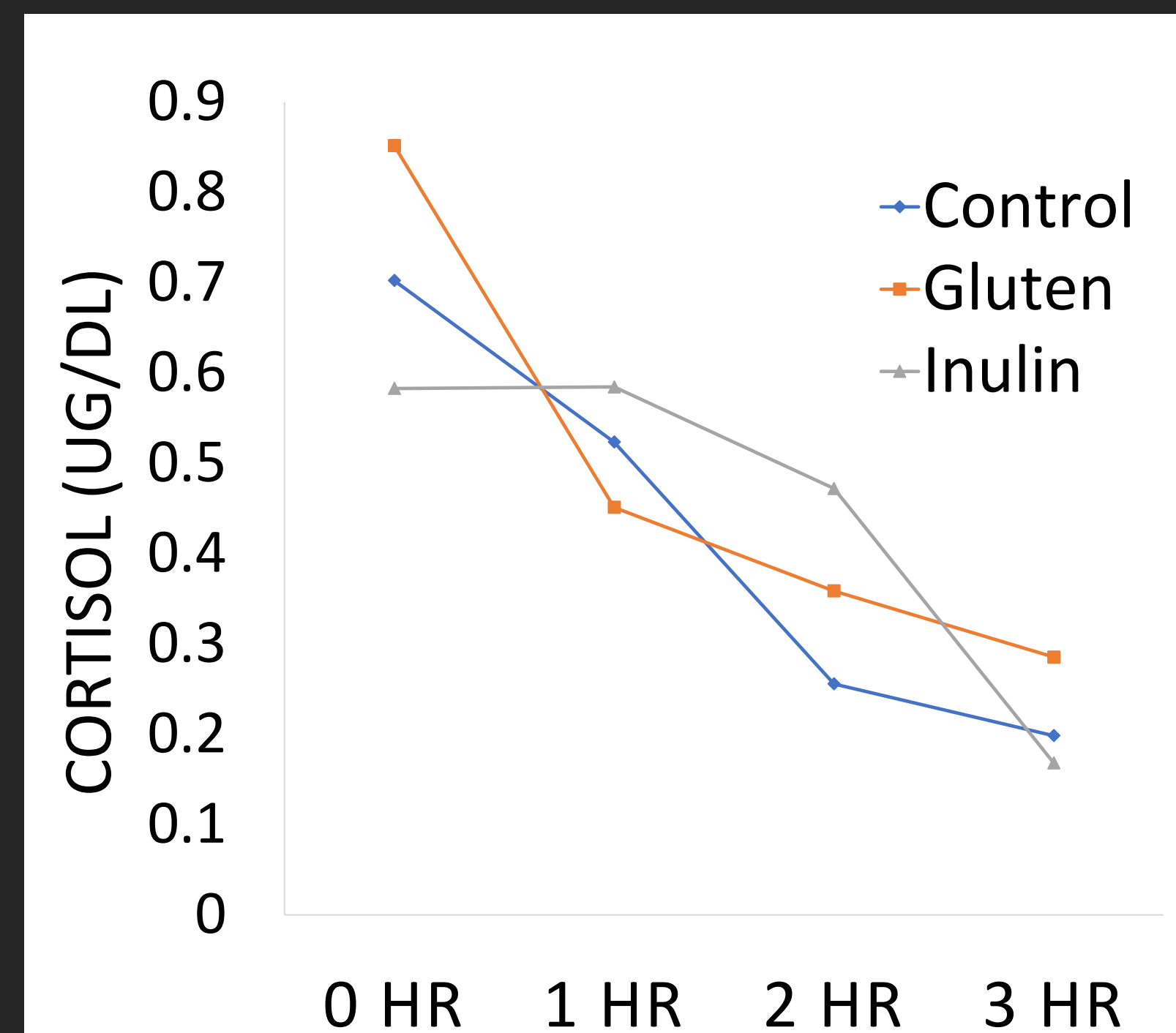
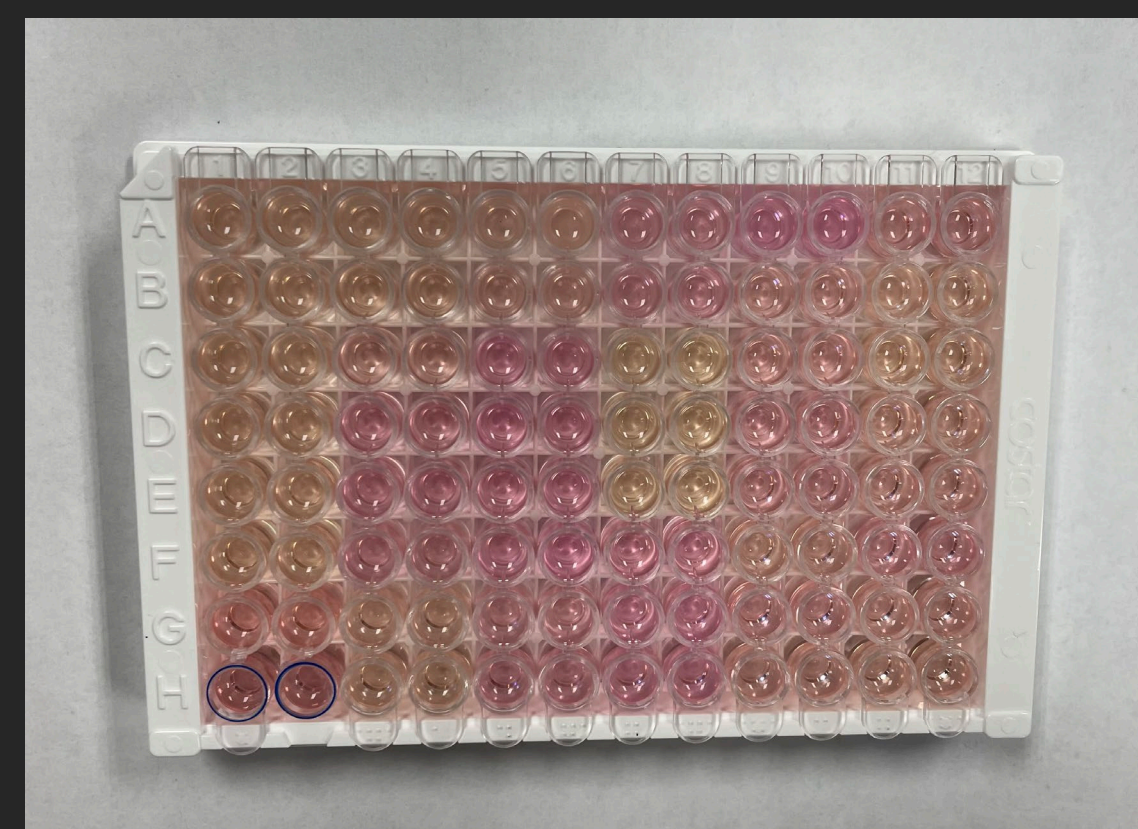
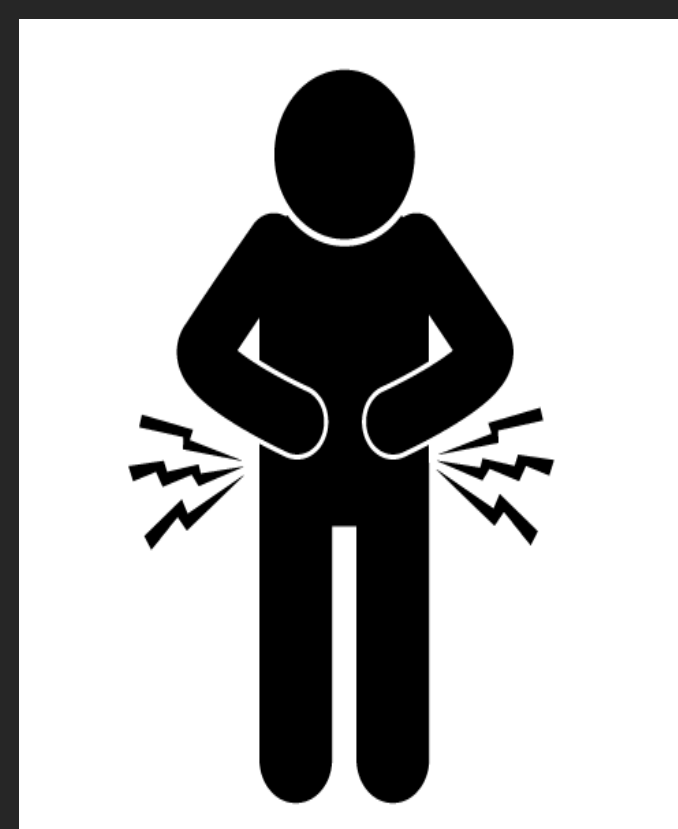


Table 1. Differences between Non-IBS and IBS in Perceived Stress Scores, Cortisol, Breath Hydrogen, Total GI Symptoms

Variable	Treatment	Non-IBS (n=24)	IBS (n=14)	F	p	η^2
Perceived Stress Score	Control	18.46 ± 5.78	16.57 ± 6.05	0.91	0.35	0.03
	Gluten	17.018 ± 6.18	16.14 ± 5.90	0.21	0.65	0.01
	Inulin	15.96 ± 6.42	16.93 ± 4.53	0.25	0.62	0.08
Cortisol (µg/dL)	Control	1.06 ± 0.38	1.15 ± 0.35	0.58	0.45	0.02
	Gluten	1.32 ± 0.47	1.31 ± 0.68	0.00	0.99	0.00
	Inulin	1.36 ± 0.67	1.07 ± 0.33	2.07	0.16	0.06
Breath Hydrogen (ppm)	Control	3.96 ± 3.42	3.75 ± 4.48	0.00	0.97	0.00
	Gluten	12.31 ± 6.04	-2.661 ± 7.91	2.26	0.14	0.06
	Inulin	11.81 ± 5.19	-1.00 ± 6.79	2.25	0.14	0.06
Total GI Symptoms	Control	35.91 ± 37.38	109.13 ± 92.89	11.83	0.001	0.25
	Gluten	20.00 ± 30.31	74.57 ± 62.63	13.14	0.001	0.25
	Inulin	37.45 ± 47.62	93.79 ± 107.44	5.00	0.032	0.12



Thank you to Dr. McIntee in the Chemistry Department for his assistance in performing cortisol ELISA assays.

Results

- Cortisol differed in the non-IBS group between control vs gluten treatments (MD=-0.313; $p=0.004$) and control vs inulin treatments (MD=-0.150; $p=0.031$), with control having lower cortisol concentrations.
- Perceived stress did not differ between treatments or IBS groups ($p > 0.05$).
- GI symptoms differed between gluten and inulin treatments in non-IBS group, with gluten producing fewer GI symptoms (MD=-4.362; $p=0.013$).
- Total GI symptoms differed between the IBS and non-IBS groups for control ($p=0.001$), gluten ($p=0.001$), and inulin ($p=0.032$) treatments.
- IBS group had more total GI symptoms than non-IBS group for control (MD=73.219; $p=0.001$), gluten (MD=54.571; $p < 0.001$), and inulin (MD=56.338; $p=0.032$) treatments.
- There were no differences in breath hydrogen between treatments or groups ($p > 0.05$).

Conclusion

- In this sample of participants, the restriction of gluten and inulin in the diet (at 5 grams) is not warranted for those with and without IBS, as neither treatment produced a significant increase in breath hydrogen or total GI symptoms.
- In those with IBS, there were increased GI symptoms to start with – indicating more GI distress but not related to the consumption of gluten or inulin at the 5-gram level.
- While perceived stress did not differ between non-IBS and IBS groups, physiological stress (cortisol) was higher with gluten consumption in non-IBS participants.
- More research is needed, as the relationship between cortisol, breath hydrogen, and GI symptoms is still unclear.