

Glycemic Response to Two Doses of Resistant Starch Type 4: A Randomized Controlled Crossover Trial

Introduction

- Resistant starch has been shown to beneficially affect glycemic and insulinemic responses in the post-prandial period^{1,3}.
- Additionally, different types of resistant starches have shown different glycemic responses².
- Standard testing protocols require 50g of available carbohydrate for a treatment to be acceptable for nutrient content claims⁴.
- Consumption of resistant starch type 4 (RS4) has not been investigated, leaving a gap in the literature regarding the effects of RS4 consumption on potential health benefits.

Study Goals:

- Investigate the postprandial effects of resistant starch type 4
- Compare glycemic and insulinemic response between two doses of resistant starch type 4

Methods

Participants: 15 apparently healthy college aged participants

Design: Randomized controlled crossover trial

- Participants consumed the same meal prior to each visit with a minimum 72hr washout period between visits
- Glucose and insulin collected via indwelling catheter in a forearm vein

Table 1. Available carbohydrate and dietary fiber amounts by condition.

Condition	Available carbohydrate (g)	Amount of food by weight	Dietary fiber (g)	Dietary fiber (%)
50DEX	50.00	~296mL	0.00	0.00
50PWB	50.00	91.7g	12.0	13.1
50RS4	50.00	106.4g	29.7	27.9
30DEX	30.00	~178mL	0.00	0.00
30PWB	30.00	55.00g	7.2	13.1
30RS4	30.00	63.80g	17.8	27.9

Oral Glucose Tolerance Test:

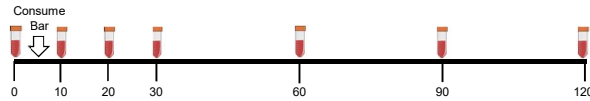


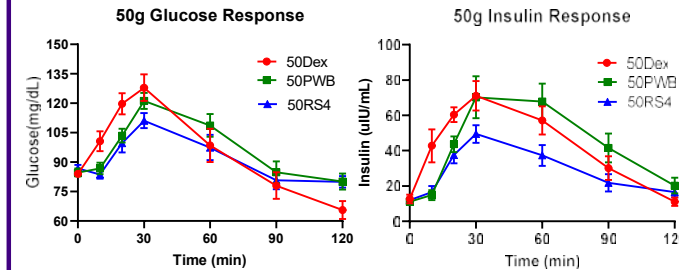
Table 2. Subject characteristics (Mean ± SD)

	All Participants (n=14)
Age (yr)	26.1 ± 4.6
Height (cm)	174.0 ± 8.8
Weight (kg)	76.1 ± 16.8
BMI (kg/m ²)	24.9 ± 4.0

Results

Table 3. Means ± SD and p-value for testing parameters.

Parameter	50g Conditions	30g Conditions	p-value
Glucose iAUC (mg/dL x 2hr)	50Dex: 2112 ± 1567 50PWB: 2030 ± 1373 50RS4: 1229 ± 1142	30Dex: 1781 ± 1624 30PWB: 828.6 ± 594.1 30RS4: 630.2 ± 687.9	50CHO: 0.0541 30CHO: 0.0018*
Insulin iAUC (µIU/mL x 2hr)	50Dex: 3339 ± 2020 50PWB: 3968 ± 2454 50RS4: 2046 ± 928.7	30Dex: 2400 ± 1689 30PWB: 1855 ± 665.7 30RS4: 1115 ± 832.2	50CHO: 0.0339* 30CHO: 0.0005*
Peak Glucose (mg/dL)	50Dex: 134.5 ± 21.58 50PWB: 125.9 ± 14.00 50RS4: 113.5 ± 14.91	30Dex: 132.0 ± 25.04 30PWB: 114.9 ± 18.33 30RS4: 104.0 ± 13.85	50CHO: 0.0056* 30CHO: 0.0003*
Peak Insulin (µIU/mL)	50Dex: 73.64 ± 35.87 50PWB: 80.81 ± 42.52 50RS4: 53.89 ± 20.05	30Dex: 68.00 ± 39.70 30PWB: 59.39 ± 25.75 30RS4: 44.18 ± 20.83	50CHO: 0.0105* 30CHO: 0.0139*



Figures 1 & 2. No significant differences were observed between 50g available carbohydrate conditions ($p>0.05$). No differences were observed between 30g available carbohydrate conditions ($p>0.05$).

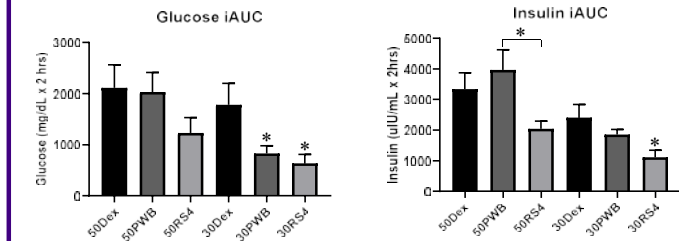
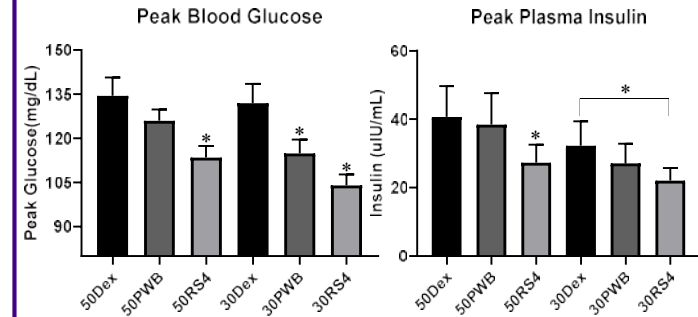


Figure 3. No significant differences were observed between 50g available carbohydrate conditions ($p=0.054$). Both 30g available carbohydrate bars had a lower glucose iAUC compared to the 30g dextrose control ($p<0.05$). However, no differences were observed between the 30g bars ($p>0.05$).
Figure 4. 50RS4 resulted in a lower insulin iAUC compared to 50PWB ($p<0.05$) with no additional differences observed between 50g conditions ($ps>0.05$). 30RS4 had a lower insulin iAUC compared to both 30PWB and 30Dex ($ps<0.05$). No differences were observed between 30g conditions ($p>0.05$).

Results



Figures 5 & 6. Peak blood glucose was significantly lower for 50RS4 compared to 50Dex and 50PWB ($ps<0.05$). Both 30g bars were significantly lower than the carbohydrate matched control ($ps<0.05$), however no differences were observed between the 30g bars ($p>0.05$). Peak plasma insulin was significantly lower for 50RS4 compared to 50Dex and 50PWB ($ps<0.05$). 30RS4 had lower peak plasma insulin compared to 30Dex, however no other differences were observed between groups ($ps>0.05$).

Discussion

- Resistant starch type 4 consumption resulted in lowered glucose iAUC at the 30g available carbohydrate level and lowered insulin iAUC at both the 50g and 30g available carbohydrate doses compared to a carbohydrate matched dextrose beverage and puffed wheat nutrition bar.
- Additionally, resistant starch type 4 resulted in lowered peak blood glucose compared to a dextrose control beverage and a puffed wheat nutrition bar at the 50g and 30g available carbohydrate doses.
- Insulin decreased by ~25% or more for iAUC and peak insulin following RS4 consumption compared to dextrose and puffed wheat among all doses, suggesting an increased efficiency dealing with similar glucose responses.
- The effects of RS4 consumption on insulin needs to be investigated further to fully elucidate the potential health benefits of RS4 consumption.

Acknowledgements

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References

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