Zero Calories, Zero Problems? An Analysis of Sucralose and Its Effect on GLP-1 Release in Healthy Humans

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INTRODUCTION

As individuals with high body fat attempt to lose weight, low sugar or zero calorie food options appear to be ideal because of the minor calorie contribution. This is accomplished through using artificial sweeteners, also known as non-nutritive sweeteners (NNS)[1]

A type of endocrine cell in the small intestine, called an L-cell, responds to the sugar and/or NNS by releasing a hormone called glucagon-like peptide 1 (GLP−1)[2,3].

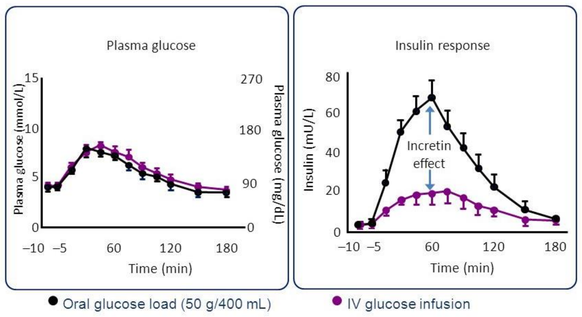


Figure 1: Incretins augment insulin release after an oral glucose load. I.V. glucose does not interact with incretin-releasing cells[3].

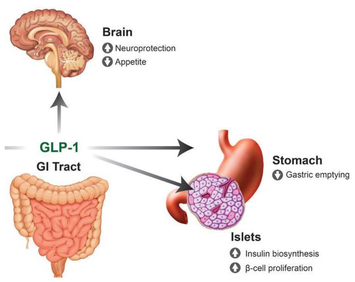


Figure 2: Summary of GLP-1 effects on the brain, stomach, and pancreatic islets[4]

QUESTION

Does the release of GLP-1 differ between sucralose and glucose?

METHODS

- 96 publications were found using keywords “sucralose AND GLP-1” without restriction on the year or language of the publication.
- Searched PubMed, Web of Science, Cochrane Library, and the California State University, Long Beach Academic Search Complete.
- Subject exclusion criteria: Animals, children subjects, diabetic or “unhealthy” subjects, cell cultures. Intragastric sweetener infusion methods were excluded.
- 10 articles were identified, reporting 11 studies that fit our criteria.
- 8 of the 11 provided total area under the curve (AUC) data from oral glucose tolerance tests which were used to calculate the mean and standard deviation across studies.

RESULTS

Figure 3: Summary table of the 11 studies. Conclusion is effect of sucralose on GLP-1 release compared to the control.

= increase
= no change
= decrease

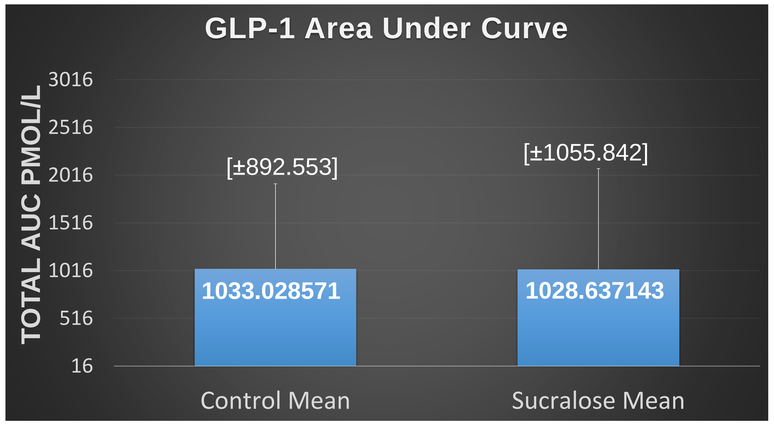
Studies that did not report mean data have the “Year” text in red.

***** Indicates appetite was reported and did not change

Year	Authors	Subject N=	Conclusion
2009	Brown, Rother	22	↑
2011*	Ford, Bloom	8	=
2011*	Wu, Rayner	10	=
2013	Wu, Rayner	10	=
2014	Temizkan, Yavuz	8	=
2016*	Sylvetsky, Rother	30	=
2016*	Sylvetsky, Rother	31	↑
2017	Young, Horowitz	14	↓
2018*	Lertrit, Sriphrapradang	15	↑
2018	Young, Rogers	14	↓
2019	Ahmad, MacKay	17	=

Figure 4: Calculated means of control versus sucralose GLP-1 release with standard deviations.

8 studies that reported mean values in both categories were used.



CONCLUSION

- Based on limited data, sucralose does not appear to impact appetite or GLP-1 efflux in healthy humans.
- High standard deviation due to different subjects, sucralose dosage and administration, and outcomes per study.

FUTURE WORK

- Future work should focus on dietary factors that affect tissue sensitivity to incretins.
- Study the incretin/sucralose relationship, before and after a low carbohydrate diet in healthy humans.

REFERENCES

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4. Deborah Hinnen, Glucagon-Like Peptide 1 Receptor Agonists for Type 2 Diabetes. Diabetes Spectrum Aug 2017, 30 (3) 202-210.

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