

# The Effect of Fructose Containing Sugars on Lipids, Blood Pressure and Uric Acid When Consumed at up to the 90<sup>th</sup> Percentile Population Consumption levels

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## Introduction

•The American Heart Association (AHA) recommended that women and men not consume more than 100 or 150 kcal/day, respectively, from added sugars. Sucrose and high fructose corn syrup (HFCS) have been singled out for particular concern because of their fructose content, which has been specifically implicated for its atherogenic potential and possible role in elevating blood pressure through uric acid mediated endothelial dysfunction. Few data exist on longer term effects when these sugars are consumed at typical population levels.

## Methods

- Participants in this ten-week study (n=352) were overweight or obese, aged 20-60 (mean age 39.1 years), normotensive and normoglycemic.
- The energy intake for weight maintenance was estimated using the Mifflin St Joer equation with an activity factor determined from self-reported physical activity questionnaires.
- Participants were required to consume 1% fat milk sweetened with either HFCS or Sucrose in amounts such that the added sugar contributed 8%, 18% or 30% of the calories required for weight maintenance
  - 25<sup>th</sup>, 50<sup>th</sup>, and 90<sup>th</sup> percentile of the population consumption levels for fructose respectively.
- Subjects and research staff were blinded to which sugar was consumed.
- A subset of participants (n=101) underwent a one-night stay in the metabolic unit, while consuming a calorie and macronutrient controlled diet containing sugars in the amount described above. Uric acid was measured every two hours for 24 hours and Area Under the Curve (AUC) calculated.

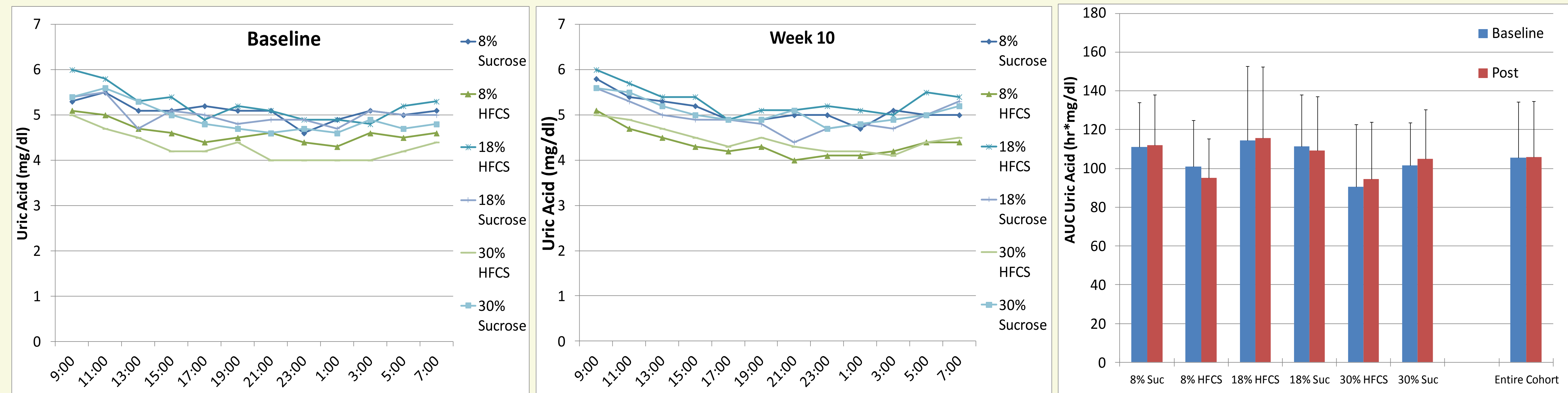
## Results

### Fasting Measures

		8% HFCS	8% Sucrose	18% HFCS	18% Sucrose	30% HFCS	30% Sucrose	Entire Cohort
Body Mass (lbs)	Baseline	168.6 ± 31.2	175.6 ± 32.9	168.4 ± 30.4	165.8 ± 30.5	172.7 ± 27.6	163.9 ± 30.5	169.1 ± 30.6
	Week 10	170.5 ± 32.5	178.0 ± 34.1	169.9 ± 30.6	168.2 ± 32.7	175.8 ± 28.8	168.2 ± 31.4	171.6 ± 31.8***
	Interaction	p=0.055						
Systolic Blood pressure (mmHg)	Baseline	107.4 ± 10.8	111.0 ± 11.2	108.2 ± 9.5	107.6 ± 11.1	112.4 ± 11.3	110.4 ± 11.0	109.4 ± 10.9
	Week 10	108.7 ± 10.6	107.0 ± 11.1	107.7 ± 9.2	106.3 ± 11.0	109.4 ± 12.3	111.3 ± 11.1	108.3 ± 10.9
	Interaction	p=0.078						
Diastolic Blood Pressure (mmHg)	Baseline	71.5 ± 6.7	72.0 ± 8.0	72.0 ± 7.8	70.7 ± 8.9	74.7 ± 8.2	72.5 ± 8.1	72.1 ± 8.0
	Week 10	71.0 ± 8.0	70.6 ± 8.7	70.3 ± 7.6	71.1 ± 8.0	73.1 ± 7.4	71.8 ± 8.3	71.3 ± 8.0
	Interaction	p=0.787						
Total Cholesterol (mg/dl)	Baseline	181.2 ± 39.2	178.2 ± 36.8	184.3 ± 40.1	188.5 ± 30.7	185.1 ± 35.8	183.5 ± 42.8	183.5 ± 37.5
	Week 10	179.6 ± 38.0	176.0 ± 37.0	185.2 ± 45.7	190.9 ± 35.5	187.9 ± 41.6	187.9 ± 47.2	184.4 ± 40.8
	Interaction	p=0.732						
Triglycerides (mg/dl)	Baseline	97.9 ± 43.4	110.3 ± 56.6	111.1 ± 55.3	97.3 ± 46.5	101.3 ± 48.5	108.5 ± 60.7	104.1 ± 51.8
	Week 10	110.8 ± 58.7	111.9 ± 56.5	109.0 ± 54.2	109.3 ± 60.3	119.3 ± 75.8	126.9 ± 83.1	114.1 ± 64.7***
	Interaction	p=0.150						
HDL (mg/dl)	Baseline	53.1 ± 13.9	50.8 ± 14.9	51.0 ± 13.0	54.2 ± 16.5	51.8 ± 13.3	52.9 ± 12.2	52.4 ± 14.1
	Week 10	52.1 ± 12.3	50.1 ± 13.9	50.8 ± 13.5	54.3 ± 15.3	49.8 ± 12.2	52.0 ± 13.9	51.6 ± 13.6*
	Interaction	p=0.714						
LDL (mg/dl)	Baseline	108.4 ± 33.3	105.6 ± 33.8	111.0 ± 33.1	114.8 ± 25.4	113.0 ± 31.0	108.9 ± 35.8	110.3 ± 32.0
	Week 10	105.2 ± 31.3	103.6 ± 30.5	112.6 ± 39.3	114.7 ± 28.5	114.5 ± 36.0	110.5 ± 38.9	110.0 ± 34.1
	Interaction	p=0.812						

Different than baseline, p<0.05 \*, Different than baseline, p<0.001 \*\*\*

### Metabolic Unit – Uric Acid



## Discussion & Conclusion

- These data suggest that when consumed as part of normal diet, common fructose containing sugars do not raise blood pressure even when consumed at the 90<sup>th</sup> percentile population consumption level for fructose (5 times the level recommended by the AHA). Furthermore, changes in lipid profile were mixed, but modest,
- There were no differences between sucrose and HFCS in these parameters at typical levels of sweetener consumption.



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