



University of Colorado
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Children's Hospital Colorado

Evaluation of Racial and Ethnic Differences in Glucose and Lipid Metabolism and impact on Neonatal Growth Outcomes among Women with Gestational Diabetes

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Hypothesis

Asian women and Hispanic women diagnosed with gestational diabetes (GDM) that adhered to the higher complex-carbohydrate diet (CHOICE Diet) will exhibit higher percent of infant fat development versus Non-Hispanic White women that adhered to the CHOICE Diet through the use of the PeaPod machine.

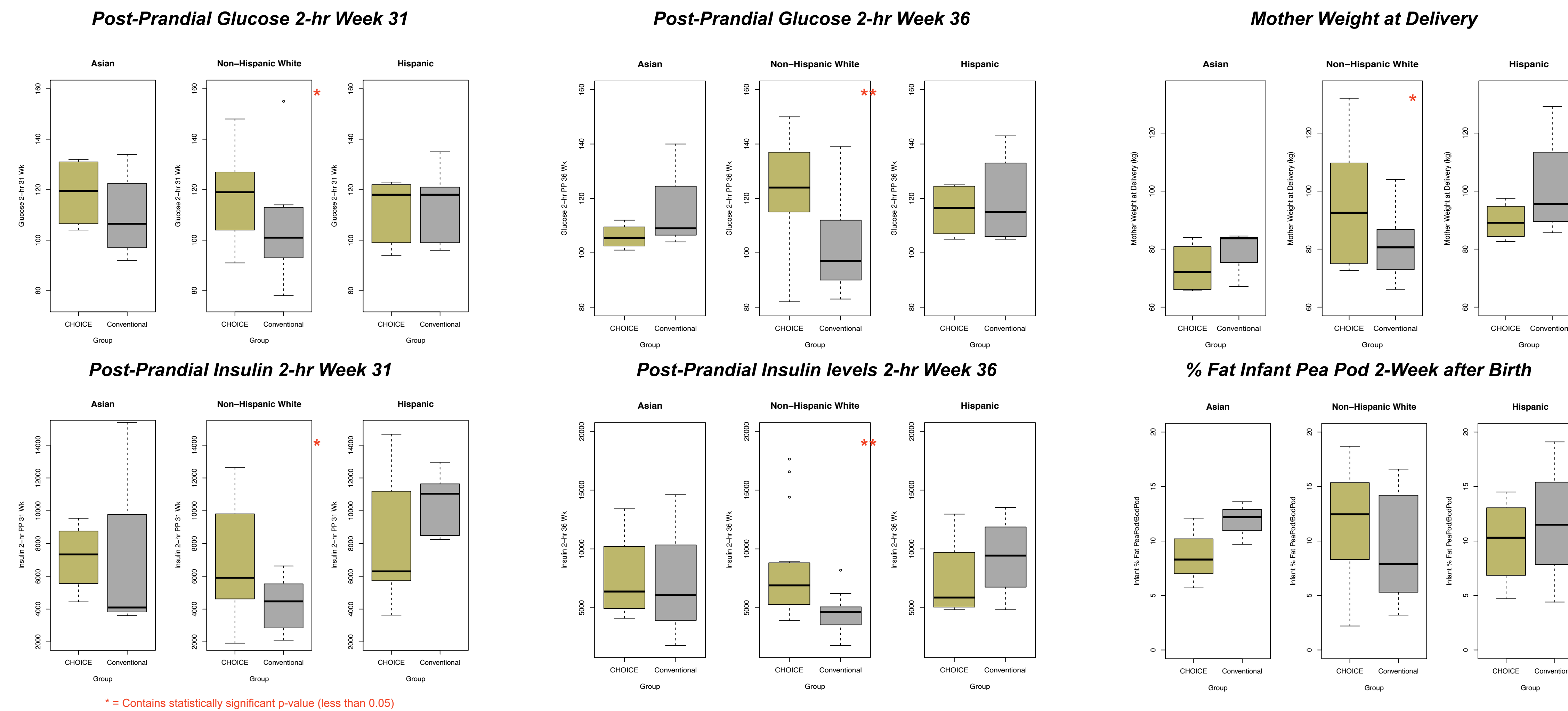
Hypothesis

The rising prevalence of gestational diabetes mellitus (GDM) could soon impact 1 in 5 pregnant women. For some women, GDM is temporary but for others, however, GDM evolves to chronic illnesses with a long-term burden, such as Type 2 diabetes and cardiovascular disease. GDM develops due to a combination of physiologic factors, including pre-pregnancy insulin resistance or beta cell defect and maternal obesity, all superimposed by the physiologic adaptations of pregnancy orchestrated by various hormones produced by the placenta. The hallmark of GDM, which is diagnosed late in the 2nd trimester, is hyperglycemia, known to drive fetal overgrowth patterns. Offspring of women with GDM are at high risk for childhood obesity and later metabolic disease, particularly if born with excess adiposity. Effective treatment with nutrition therapy during the pregnancy allows for improved perinatal outcomes for mother and offspring without incurring the costs of medications.

Background

The 56 women diagnosed with gestational diabetes mellitus (GDM) included in this study were placed in a randomized study to analyze the outcome of fetal adiposity development. The CHOICE Diet (60% CHO, 25% Fat, 15% PRO) and the Conventional Diet (40% CHO, 45% FAT, 15% PRO) were randomly assigned to each of the women within this study which resulted in 28 women admitted into the CHOICE Diet and 28 admitted into the Conventional Diet. The women included in this study adhered to the diet from Week 31-36 of pregnancy. At Week 31 & 36, an Oral Glucose Tolerance Test (OGTT) was conducted, in various lipid, glucose and insulin levels were recorded before and after the meal. A breakfast meal observation was also performed during week 31 & 36, in which various lipid glucose and insulin levels were recorded before and after the meal. The primary analysis is to compare neonatal adiposity among the two diet groups.

Results



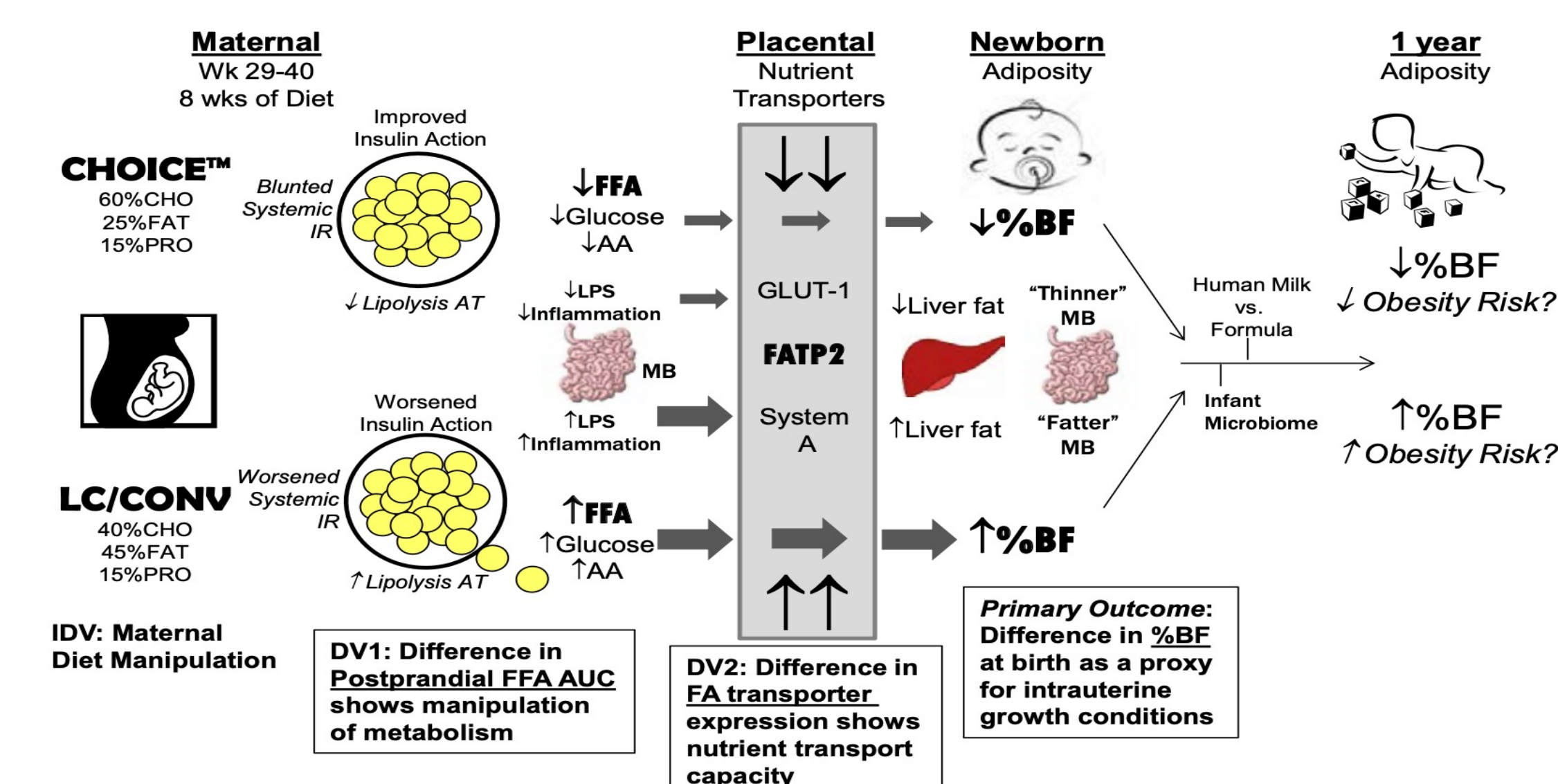
	T-Test p-value comparing CHOICE vs Conventional Diet for each Race/Ethnicity		
Variable	Asian (n = 8)	Non-Hispanic White (n = 38)	Hispanic (n = 10)
Insulin 2-hr wk 31	0.908	0.009*	0.355
Insulin 2-hr wk 36	0.985	0.004**	0.489
Glucose 2-hr wk 31	0.463	0.0316*	0.791
Glucose 2-hr wk 36	0.288	0.0007**	0.726
Mother Weight at Delivery	0.514	0.031*	0.284
% Fat Infant PeaPod/BodPod	0.224	0.277	0.663

	Mean and Standard Deviation CHOICE vs Conventional Diet for each Race/Ethnicity (Mean ± SD)		
Variable	Asian (n = 8)	Non-Hispanic White (n = 38)	Hispanic (n = 10)
Insulin 2-hr wk 31	110.875 ± 67.5	85.696 ± 67.0	123.500 ± 49.1
Insulin 2-hr wk 36	110.714 ± 83.4	100.931 ± 84.6	110.125 ± 47.8
Glucose 2-hr wk 31	114.250 ± 15.8	110.706 ± 17.4	112.5 ± 14.2
Glucose 2-hr wk 36	111.0 ± 13.3	113.103 ± 20.3	117.625 ± 113.5
Mother weight at Delivery (kg)	75.598 ± 8.9	87.610 ± 16.5	95.513 ± 14.7
% Fat Infant Pea Pod/Bod Pod	10.267 ± 2.9	10.424 ± 4.9	10.788 ± 4.9

Newborn Body Composition by PEAPOD



Study Design



Methods

56 women diagnosed with gestational diabetes at Week 29 of pregnancy were enrolled through were randomized to either conventional (N = 28) or CHOICE (N = 28) diet groups and were followed for ? weeks while adhering to their specified diet. Various lipid, glucose, insulin and blunt post-prandial measurements were taken at week 31 & 26 during pregnancy. Primary analyses (not reported) evaluated the effects of diet on these outcomes. In this secondary analysis, we tested whether the effect of diet on these outcomes differed by the mother's race/ethnicity. To do so, we modeled each continuous outcome in a linear regression with an interaction between diet group and race/ethnicity. All models were adjusted for baseline triglycerides, a potential confounder that differed between diet groups at baseline. (can also add in something about p value cut-off for significance/trend level, if of interest and if you have room).

Discussion

- There was a total sample size of 56 women ((Asian(N = 8), Non-Hispanic White (N = 38), Hispanic (N = 10)) diagnosed with gestational diabetes within this study and did not initially provide power to the race/ethnicity secondary analysis. An even distribution among each race/ethnicity would benefit future randomized analyses for rate of fetal adiposity growth and differing diets
- The sample size of Non-Hispanic White women was much larger compared to Asian and Hispanic women
- A larger sample size of various races/ethnicities included in the CHOICE and Conventional Diet would provide a better powered study of lipid and glucose metabolism and overall outcome of rate of fetal adiposity growth
- According to the statistical calculations , Non-Hispanic White women within the CHOICE Diet exhibited higher levels of glucose and insulin levels than Non-Hispanic white women in the Conventional Diet
- Non-Hispanic White women within the CHOICE Diet may have gained more weight compared to Non-Hispanic White women in the Conventional Diet
- The comparison among the 3 races/ethnicities within this secondary analysis and the development of % Fat of the infant 2 week after delivery did not exhibit a significant interaction to the overall outcome, difference fetal adiposity development.

Acknowledgements

--To my grandfather, David Carlos Arellano, who passed away on January 12th, 2021 due to complications relating to Type II Diabetes and onset Diabetes ketoacidosis.
--Thank you to the EURECA Program for funding this secondary analysis and my participation with the Colorado School of Public Health.