PPODS

Pregnancy & Postpartum Observational Dietary Study

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UMASS.

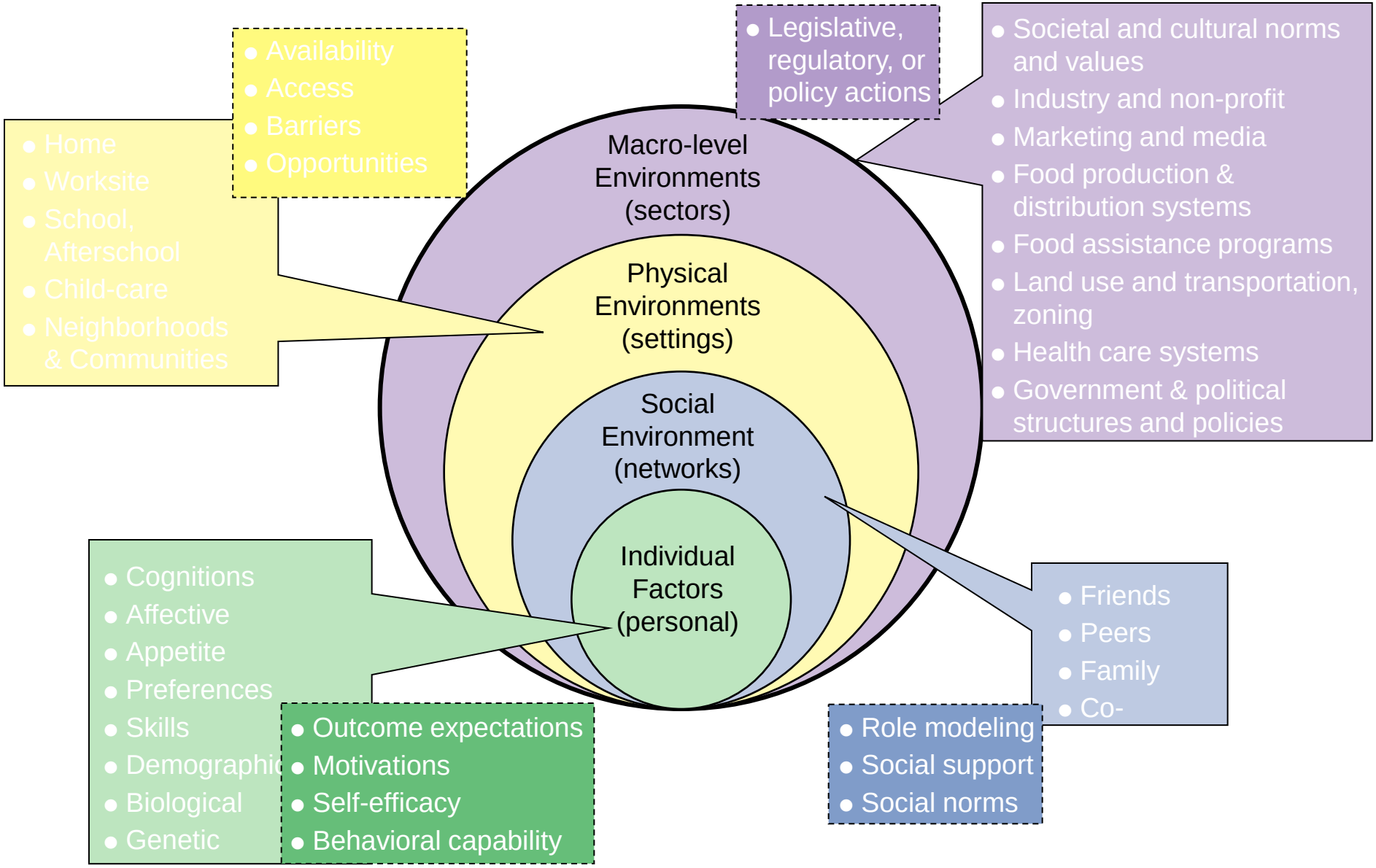
UMassMemorial

- **Principal Investigators**:
  - Milagros Rosal, PhD – Preventive & Behavioral Med
  - Tiffany A. Moore Simas, MD, MPH, MEd –Ob/Gyn
  - Silvia Corvera, MD – Molecular Medicine
- **Co-Investigators**:
  - Mary Lee, MD – Pediatrics
  - Bruce Barton, PhD – Quantitative Health Sciences
  - Sarwat Hussain, MD – Radiology
  - Barbara Olendzki, RD, MPH – Prev & Behavioral Med
- **Funding**:
  - UMCCTS PPP

DISCLOSURE

I have no actual or potential conflict of interest in relation to this program or presentation.

An Ecological Framework : Multiple Influences on Physical Activity and Eating Behaviors



Background

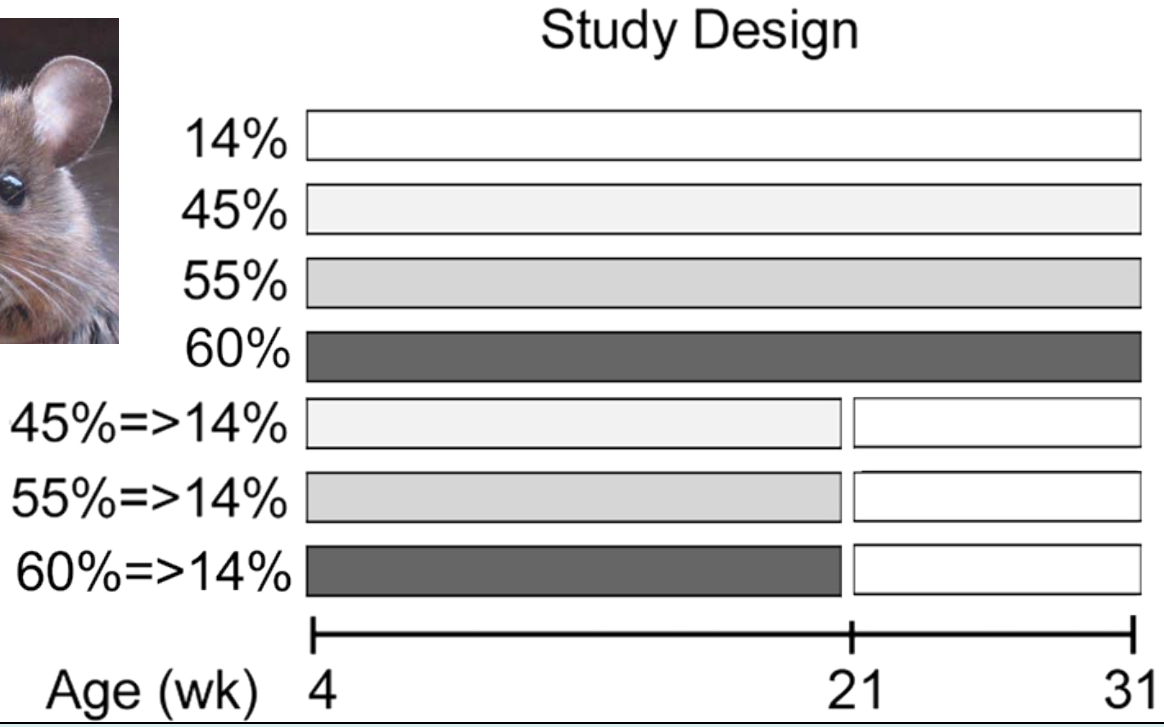
- Weight gain in young adults ↑s risks for cardio-metabolic & other health conditions thru adulthood, and weight loss ↓s these risks.
- Gestational weight gain (GWG) and Post-Partum Weight Retention (PPWR) contribute to ↑ BMI among women of childbearing age.
  - On average, women retain ~3 kg/preg @ 10 years
  - Failure to lose pregnancy weight within 6mos pp predicts long-term obesity
  - Thus, Post-Partum Weight Loss (PPWL) is key to women's long-term health.

Background

- Interventions to promote PPWL have been minimally effective.
- An underlying assumption in these studies is that excess adipose tissue responds to weight loss strategies independent of the manner in which the weight was accrued.
  - Recent studies from our group (Corvera laboratory) question this assumption.

Dr. Corvera Lab - Design

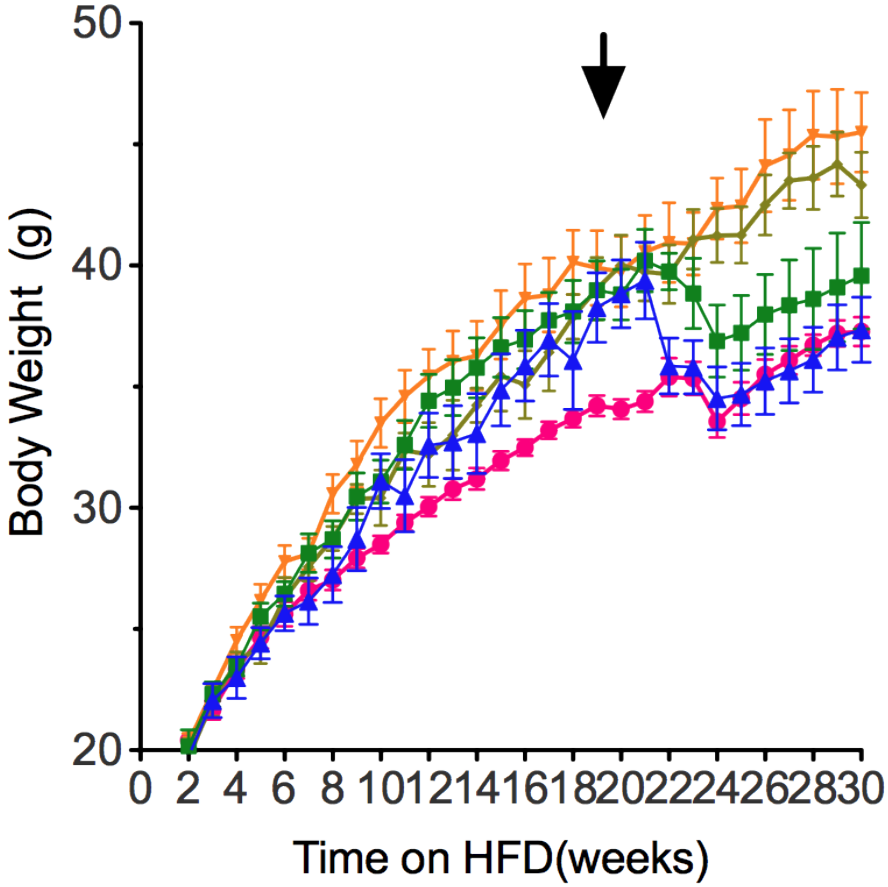
- C57BL/6J mice placed on frequently used high fat diets with normal chow comparison group



% refers to calories derived from total fat. Diets varied in with relation to specific dietary components (e.g. saturated fat). Diets were isocaloric. Mice fed *ad libitum.*

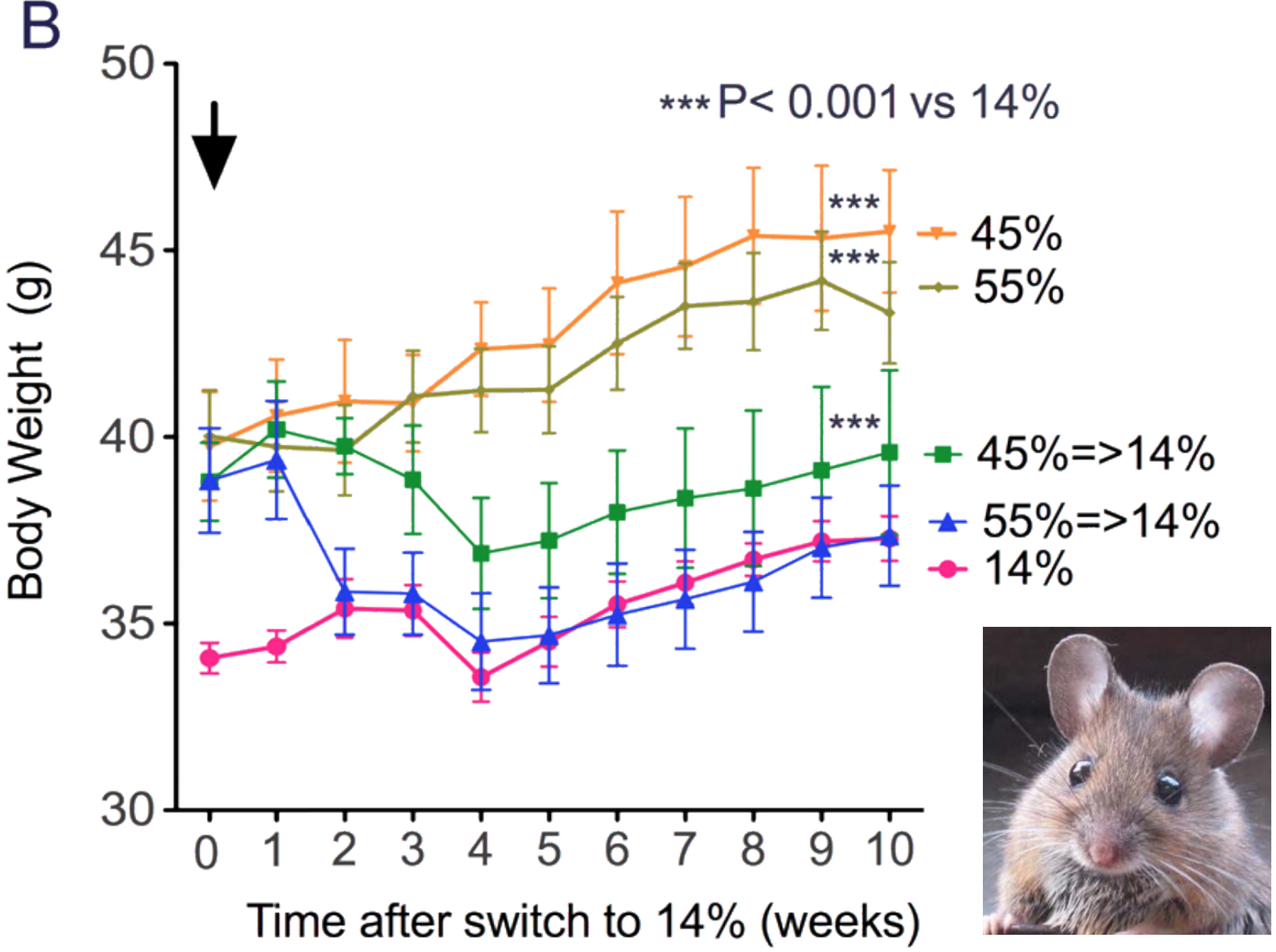
Chouinard et al. Submitted (Corvera Lab)

Dr. Corvera Lab - Results



Different obesogenic diets induced very similar degrees of weight accumulation in mice, the rate and extent of weight loss varied significantly following transition to normal (non-obesogenic) rodent diet.

Chouinard et al. Submitted (Corvera Lab)



When mice placed on standard chow after 21 wks of HFD, those rendered obese with 55% fat diet returned to weight of age-matched controls within 10 weeks, but animals on 45% and 60% HFD did not.

Dr. Corvera Lab - Results

- Differences in where fat deposited
  - 55% more epididymal deposition
  - 45% and 60% more SQ deposition
- Upon withdrawal of obesogenic diets, differences correlated with. . .
  - Differences in energy expenditure
  - Differences in adipocytokine profiles

Chouinard et al. Submitted (Corvera Lab)

Dr. Corvera Lab - Results

- Results show that the composition of the diet that led to the accumulation of excess adipose tissue has an important effect on subsequent weight loss.

- While the diets used in these studies varied in several parameters, only the **percent saturated fat** correlated with the preferential increase in SQ adiposity, decreased energy expenditure and persistence of fat mass/weight.

Chouinard et al. Submitted (Corvera Lab)

Overall Goal of PPODS

- Evaluate whether associations among consumption of saturated fat, fat deposition and weight loss observed in mice can be observed in human subjects during pregnancy and the postpartum period.

Sp Aims PPODS - Maternal

- Investigate whether dietary composition during pregnancy, specifically percent saturated fat content, is associated with:

1. Early (i.e., 6 mos) PPWL.
2. Differential SQ:visceral fat deposition during GWG.
3. Hypertrophic vs hyperplastic SQ & visceral adipose tissue growth and alterations in vascular architecture.

Sp Aims PPODS – Maternal & Neonatal

- Investigate whether dietary composition during pregnancy, specifically percent saturated fat content, and GWG, is associated with:
  - differences in epigenetic profiles of metabolic pathway genes in neonatal and maternal tissues.

PPODS Methods

- Observational Study

- 100 subjects recruited in preg
- 80 subjects w/ complete data @ 6mos pp

Inclusion Criteria

- English-speaking
- Singleton gestations
- Age 20-39
- Negative routine GDM screen
  - performed ~28 weeks with 50g glucola
- PNC from faculty/resident practice

Exclusion Criteria

(1) Age <20 or ≥ 40 years
(2) Multiple gestations
(3) Non-English speaking
(4) DM1, DM2 or GDM
(5) E/o PSA
- tob (w/l 1 yr)
- ETOH and/or illicit drugs

(6) Prescriptions in preg for meds affecting weight
  - anti-hypertensives
  - hypoglycemics
  - steroids
  - anti-depressants
  - second-generation anti-psychotics
  - nicotine replacement products
  - anti-epileptics
  - thyroid-related pharmaceuticals

(7) HIV
(8) Hepatitis
(9) Autoimmune disease
  - Lupus
  - Sjorgen's
  - Rheumatoid arthritis

(10) Gastric bypass history
(11) Eating d/o hx
(12) initiated prenatal care after 13 wks GA

Table of Measurements/Outcomes

	Screening/ Baseline (~28 wks) (outpt)	Delivery (inpt)	Postpartum				
			0-4d (inpt)	6 wks (outpt)	3 mos (outpt)	6 mos (outpt)	1 year (outpt)
Sign Informed Consent	X						
Interview	X		X	X	X	X	
Best Estimate of Gest. Age	X						
Confirm Inclusion/Exclusion	X						
Subject No. Assigned	X						
Demographics & Pertinent Medical History	X						
Psychosocial surveys (Mailed & completed before appoint. or given at appoint. if not brought in)**	X		X	X	X	X	
Weight measurement	X (& Height)		X	X	X	X	
Blood pressure	X		X	X	X	X	
Skin fold thickness	X		X	X	X	X	
Blood Sample	X		X	X	X	X	
Mouthwash Buccal DNA sample	X						
Placenta, umbilical cord, & umbilical cord blood		X					
24h diet & exercise recall 3 phone calls at each time point	X				X		
Breastfeeding survey			X	X	X	X	
SQ & Visceral adipose tissue biopsy (n=30, who undergo Cesarean section for obstetric indications)		X					
MRI Performed on subset of subjects only (n=30)			X*				
Evaluation or Admission Data		X					
Labor & Delivery info		X					
Neonatal & Maternal Outcomes		X					
Baby weight and length		X			X	X	X
Compensation	$40	--	$20 (*$20)	$20	$40	$50	

PPODS Results

- Primary Exposure → Primary Outcome

  Diet in Preg PPWL

- Regression models that control for potential confounders will be used to evaluate each of the study aims

Innovation & Significance

- **Test the hypothesis that, controlling for total number calories consumed and energy expenditure, dietary composition during pregnancy will significantly influence weight loss postpartum.**

- **Intervening for PPWL in pregnancy would take advantage of pregnancy as a unique window of opportunity when women are highly motivated to engage in behavioral change for promotion of healthy lifestyle habits, to benefit themselves and their unborn children**.

Future

Should the study hypotheses be confirmed, findings will warrant:

(1) return to animal models for elucidation of underlying mechanisms

(2) development of human clinical interventions to optimize dietary intake, GWG & metabolic outcomes of pregnancy that will likely benefit mother and offspring.

Thank you

- **Funding**:
  - UMCCTS PPP Grant