• Maternal HF and sucrose diets program exaggerated cardiovascular responses to psychological stress
  (Eg: Rudyk O. et al (2011), PLoS ONE 6(10): e25250.)

• Oxidative stress in brain increasingly implicated in primary hypertension.

**Hypothesis**

High fat-high sucrose (HFS) programmed offspring may have enhanced responses to psychological stress. This may be due to increased oxidative stress within the brainstem.
Aims

• Investigate the impact of a maternal HFS diet on offspring:
  • Resting cardiovascular function
  • Cardiovascular responses to mild and moderate psychological stress
  • Brainstem oxidative stress levels
Sprague-Dawley Maternal Diet

High Fat-High Sucrose (HFS) (21% fat, 34% sucrose) until weaning

Control chow (4.8% fat, 0% sucrose)

Methods

Radio Telemetry
- Blood pressure (BP) and heart rate (HR)
- Autonomic indices (BPV) and (HRV)

Cardiovascular Data

Psychological Stressors
Air Jet Stress
- Puffs of air (~300kPa)

Restraint Stress

n=7
Methods

- Oxidative Stress marker Protein Carbonyl (PC) Assay
- Glutathione (GSH) antioxidant Assay

Sprague-Dawley Maternal Diet

Control chow (4.8% fat, 0% sucrose)

High Fat-High Sucrose (HFS) (21% fat, 34% sucrose) until weaning

Oxidative Stress

RV Medulla

Midbrain PAG

Dorsomedial hypothalamus

n=7
Offspring body composition and baseline cardiovascular data

Greater retroperitoneal adiposity

24-hour cardiovascular and autonomic data – HFS offspring have higher BP at rest

**RP ADIPOSITY** (% body weight)

**MEAN BP (mmHg)**

**BPV (LF)** (mmHg^2)

**HEART RATE (bpm)**

**HRV (LF:HF)**

Body weight ns p=0.3

Control

HFS
HFS Offspring Display Enhanced Blood Pressure Responses to Stress

AIR JET STRESS

**

RESTRAINT STRESS

**

△SBP (mmHg)

BPV (LF) (mmHg^2)

△SBP (mmHg)

BPV (LF) (mmHg^2)
Heart Rate responses to Psychological Stress

**AIR JET STRESS**

- **HR (bpm)**
- **HRV (LF:HF)**

- **Stress**

**RESTRAINT STRESS**

- **HR (bpm)**
- **HRV (LF:HF)**

- **Stress**
Increased Oxidative Stress in hypothalamic defense area

OXIDATIVE STRESS MARKER - PCs

ANTIOXIDANT - GSH

![Graphs showing concentration changes in different brain areas under control and HFS conditions.](image-url)
Summary

- Offspring have greater RP adiposity
- Offspring are hypertensive at rest
- Offspring have greater hypothalamic oxidative stress
- Exaggerated CV responses to psychological stress

Maternal HFS
Thank you!

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