

# Impact of Parental Obesogenic Diets on Cardiac Health in Adult Rat Offspring

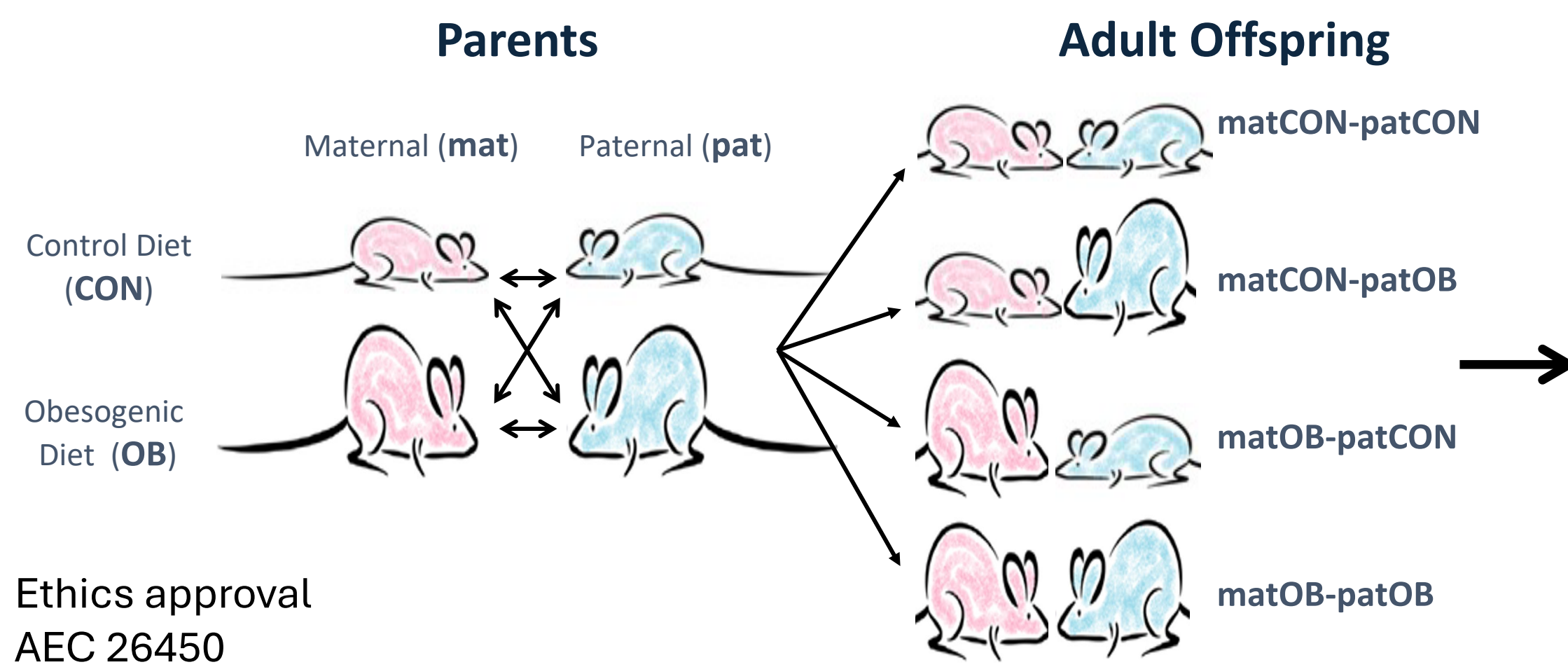
Ponnampalam AP<sup>1,3</sup>, Toor K<sup>2</sup>, Annandale M<sup>3</sup>, Vickers MH<sup>2</sup>, Firth E<sup>2</sup>, Musson D<sup>4</sup>, Albert BB<sup>2,5</sup>

<sup>1</sup>Pūtahi Manawa-Healthy Hearts for Aotearoa New Zealand, <sup>2</sup>The Liggins Institute, <sup>3</sup>Department of Physiology, <sup>4</sup>Department of Nutrition, Faculty of Medical and Health Sciences, The University of Auckland, Starship Children's Health, Te Whatu Ora, Te Toka Tumai Auckland, New Zealand

## BACKGROUND

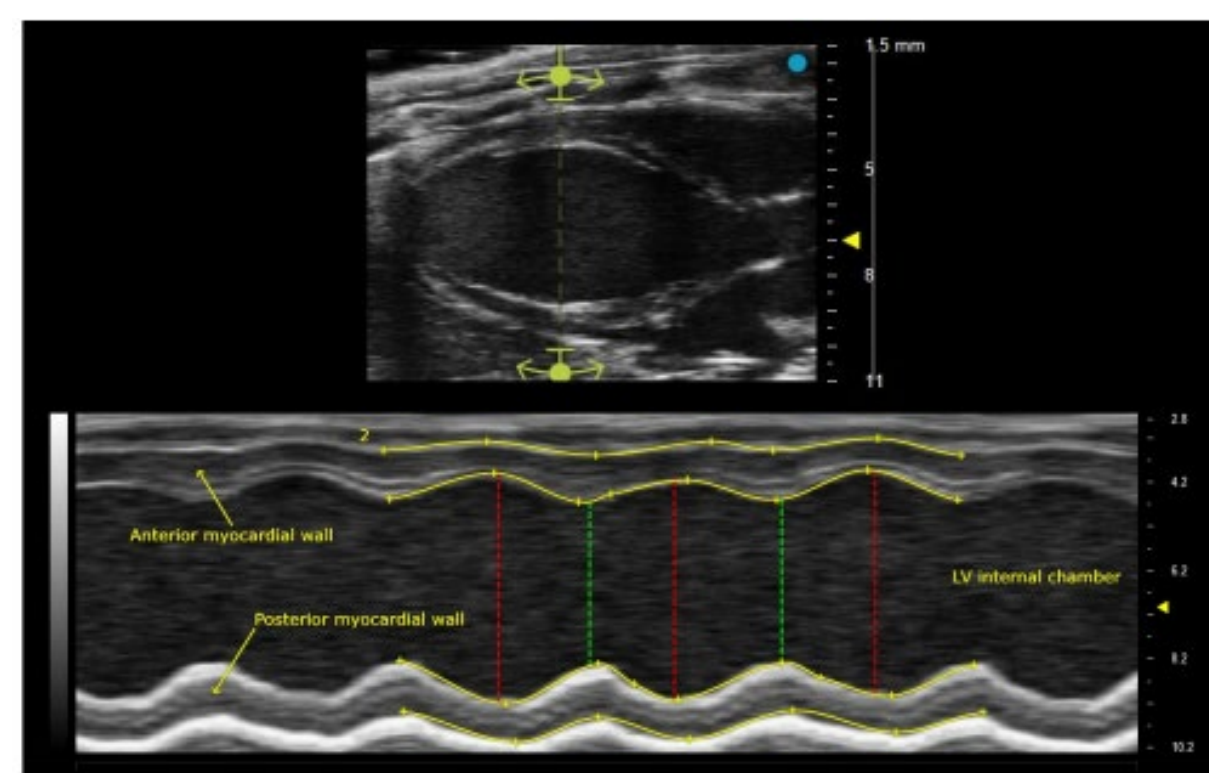
- Cardiovascular disease (CVD) is the leading cause of death worldwide
- Alterations in the early life nutritional environment result in cardiovascular adaptations in offspring that predispose to CVD and other chronic diseases in later life. CVD disease manifestation and symptoms are sex-specific, with women often overlooked in research, misdiagnosed, and undertreated.
- Although there is growing recognition of the father's role in shaping offspring health outcomes, most research to date on early-life influences and later disease has focused on the mother.
- This study aimed to determine the relative and combined impact of a maternal and paternal high-fat:high-sugar obesogenic (OB) diet on long-term cardiac outcomes in adult rat offspring.

## METHODS



Ethics approval AEC 26450

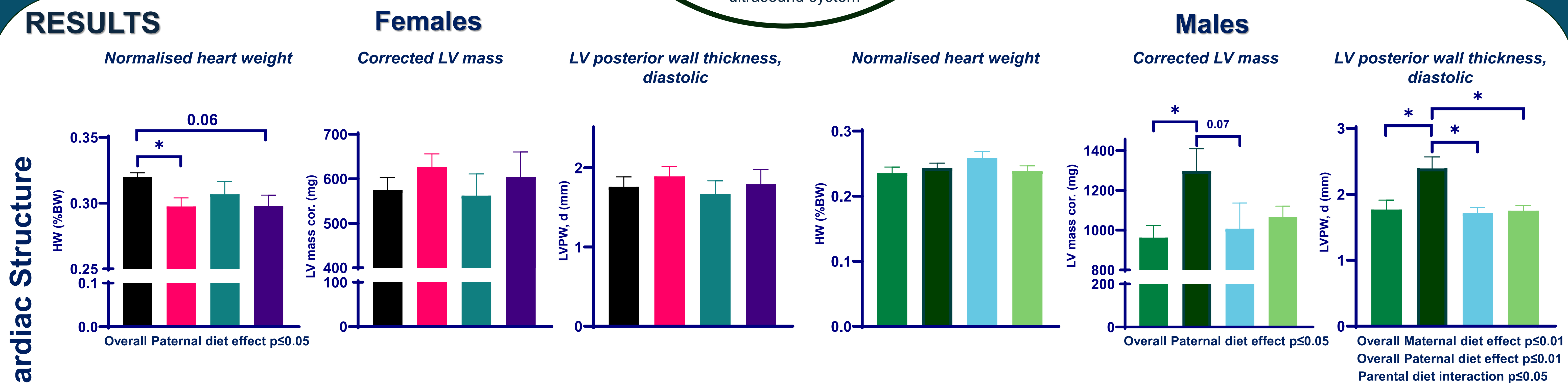
### Echocardiography to assess cardiac function



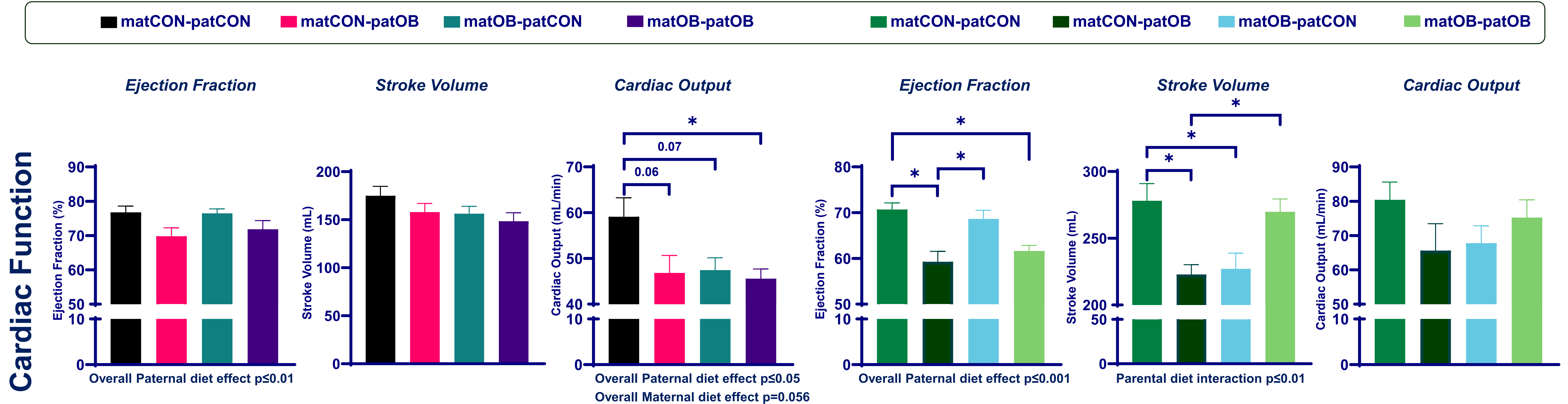
Example of M-mode long axis analysis on a Fuji Vevo 3100 ultrasound system

- Male and female Sprague-Dawley rats were fed a control (CON) or OB diet for five-weeks pre-mating. Females continued their diets throughout gestation and lactation.
- Four offspring groups (n=10-12/group per sex) were established and fed a standard chow diet post-weaning. Echocardiography was undertaken at postnatal day 160 and hearts were collected.
- Data were analysed using two-way ANOVA, correcting for multiple comparisons using Tukey's correction. Data are mean + standard error, \* denotes p<0.05

## RESULTS



- Paternal obesogenic diet led to a reduction in relative heart weight (normalised to body weight) in females.
- Paternal obesogenic diet led to an increase in left ventricular mass (LVM) and an increase in posterior wall thickness (LVPW) with a parental diet interaction in males.



- Paternal obesogenic diet led to a reduction in ejection fraction in male and female offspring.
- Parental obesogenic diets independently led to a reduction in stroke volume (SV) with a parental diet interaction in males.
- Obesogenic diet in both parents led to a reduction in cardiac output (CO) in females.
- There were no effects of parental diets on offspring heart rates (data not shown).

## CONCLUSIONS

- A paternal obesogenic diet resulted in adverse sex-specific effects on cardiac structure and function in adult offspring with greater impacts in combination with maternal obesogenic diet for some parameters.
- These findings highlight the influence of parental nutrition on offspring cardiac health and underscores the importance of considering both parental contributions in strategies aimed at preventing intergenerational transmission of cardiometabolic risk.