Scientific Meeting
AuPS | ASB
HOBART · 2022

Abstract: 160P

Characterising the opposing impact of obesity and exercise training on the cardiac phenotype in mice

Nimna Perera[1,2], Minh Deo[2], Oliver Fuller[1], Casey Egan[1], Miles De Blasio[2], Rebecca Ritchie[2], Mark Febbraio[1]

[1]Cellular and Molecular Metabolism Laboratory, Drug Discovery Biology, Monash Institute of Pharmaceutical Sciences, Parkville Melbourne, Australia [2]Heart Failure Pharmacology Laboratory, Drug Discovery Biology, Monash Institute of Pharmaceutical Sciences, Parkville Melbourne, Australia

Background: It is well-recognized that obesity is a significant contributor to cardiac mortality independent of its relationship with other cardiovascular risk factors. The detrimental consequences of obesity are due to both the associated cardiac structural and functional alterations. It is also well-recognized that physical activity can be cardio-protective and improve metabolic homeostasis in obesity. Accordingly, we investigated how the cardiac structure and function is altered in response to diet-induced obesity and long-term voluntary exercise.
Methods: At 6 weeks of age (wk), C57Bl6/J male mice commenced a chow or high fat diet (HFD; 59% energy from fat). At 10 wks, mice were dual-housed and randomised to either a locked or unlocked running wheel. Following 20 wks of exercise training, a cardiac puncture was performed for blood collection and left ventricle (LV) collected for analysis. Magnetic resonance imaging (EchoMRI) was performed monthly to examine body composition and echocardiography was performed at all three timepoints to assess LV function. Picrosirius red staining was undertaken to measure LV interstitial fibrosis and Coherent Anti-Strokes Raman Scattering Microscopy to examine LV lipids.
Results: In cohort 1 (n=4-7 per group), there were no differences in blood glucose levels measured at 6, 10 and 30 wk, and HbA1c% measured at study endpoint between the four groups. Body weight was not different between the four groups (**Figure 1A**). EchoMRI indicated that fat mass was increased ($p<0.05$) when comparing chow exercise with HFD exercise groups at the 5-month timepoint (**Figure 1B**). Endpoint Doppler flow echocardiography (Vevo 3100 ultrasound) in anaesthetised mice indicated a trend towards an increase in LV isovolumic contraction time (IVCT) as a result of HFD (**Figure 1C**). LV deceleration time was increased in HFD sedentary mice compared to sedentary chow mice and exercise intervention trended towards a decrease in deceleration time (**Figure 1D**). There were no significant differences between LV isovolumic relaxation time (IVRT; **Figure 1E**). Tissue Doppler indicated no significant differences in e' between the four groups (**Figure 1F**); a non-significant tendency towards a decrease in a' as a result of exercise treatment was seen (**Figure 1G**).
Conclusion: Cardiac structure and function are influenced by diet and exercise training. Further analysis with proteomics will be performed on LV to determine whether these changes correlate with modifications in the cardiac proteome.

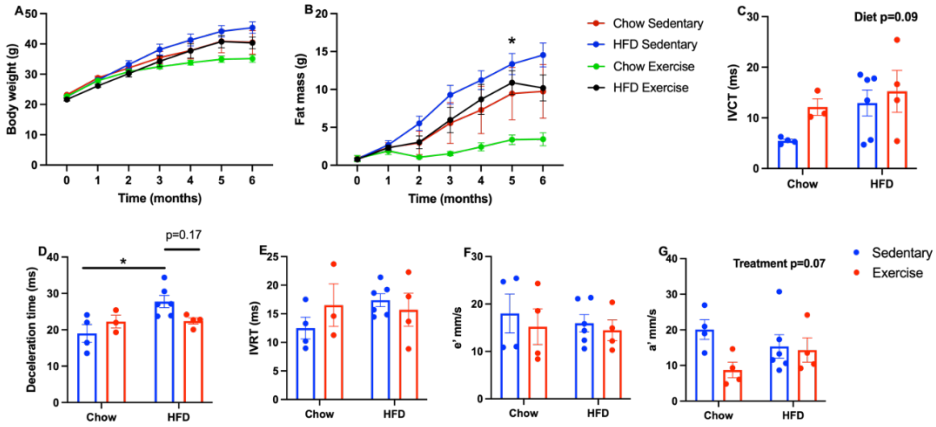

Figure 1: (A) Body weight and (B) fat mass of C57Bl6/J high fat diet fed exercise trained mice. Doppler flow echocardiography examined (C) IVCT, (D) deceleration time and (E) IVRT. Tissue Doppler echocardiography examined (F) e' and (G) a'. All data is presented as mean ± SEM and n=4-7 per group. Statistical significance is denoted by $p<0.05$ and data is analysed using a Two-way ANOVA with Tukey's *post hoc* test.