

frequency of serious, moderate, or other adverse events between the standard of care group and experimental group. No infant in either group had need for cardiopulmonary resuscitation or exploratory surgery within 48 hours following surgery nor did any infant experience any clinically appreciated adverse neurological events such as stroke or seizure. No infant in either group experienced clinically significant bradycardia of less than 100 beats per minute or sustained tachycardia of greater than 160 beats per minute. There was a trend toward lower heart rates in the experimental group. Junctional Ectopic tachycardia (JET) occurred in 2 patients in the experimental group and 1 in the standard of care group. The mean highest INR in both groups was 1.4 (range 1.2–1.6). The mean lowest recorded platelet level in the first 48 hours was 128.8 (range 87–160) in the standard of care group and 123.8 (range 49–229) in the experimental group. Infants in the experimental group had lower chest tube output overall than the standard of care infants. The mean days of intubation for standard of care infants was 5 days (range 1–15 days) and for experimental infants the mean was 3.7 days (range 0–16 d). The PICU length of stay was shorter for the experimental infants (6.9 vs. 12 d for standard of care). The total length of stay was also shorter for experimental infants (12.4 vs. 16.4 d for standard of care). Serum biomarkers of brain injury (s100b and Neuron specific enolase) were elevated in the immediate postoperative period for infants in the standard of care group compared with the experimental group but normalized more quickly for standard of care. **DISCUSSION/SIGNIFICANCE OF IMPACT:** This small pilot study suggests that mild hypothermia following congenital heart surgery in infants under the age of 12 months is safe as there was no increase in the rate of severe, moderate, or other adverse outcomes in infants who received the experimental treatment of delayed rewarming. This study provides evidence for the efficacy of the cooling blanket in regulating the temperature of infants after surgery. Trends toward lower chest tube output, shorter intubation and decreased length of stay are possibly the result of improved hemodynamic stability in the absence of postoperative fever. Future studies will need to assess the effect of mild hypothermia compared with a normothermic control group.

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### Association of chronic stress with alcohol seeking and health behaviors

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**OBJECTIVES/SPECIFIC AIMS:** The objective of this analysis was to characterize the impact of stress, both early life and chronic, on intravenous alcohol self-administration (IV-ASA) in healthy non-dependent drinkers using the Computer-Assisted Infusion System (CAIS). Personality measures also have shown to impact drinking behavior, particularly impulsivity. Few studies have assessed the impact of stress and impulsivity on drinking behaviors in a non-dependent population. **METHODS/STUDY POPULATION:** Healthy non-dependent drinkers ( $n=28$ ) completed a CAIS session, where they push a button ad lib to self-administer standardized IV alcohol infusions. Participants completed the Cumulative Chronic Stress interview and the Early Life Stress Questionnaire (ELSQ) for stress measures. The Cumulative Chronic Stress interview was broken up into 4 sections: major life events, life traumas, recent life events, and chronic stressors. The number of endorsed events was added up to create 4 separate scores. Subjective response and craving measures were collected serially using the Drug Effects Questionnaire (DEQ) and Alcohol Urge Questionnaire (AUQ). The Impaired Control Scale (ICS) assessed failed control over recent drinking in the past 6 months. Impulsivity was assessed using the NEO personality inventory, which included the N-impulsive sub-facet, as well as the UPPS-P Impulsive Behavior Scale. **RESULTS/ANTICIPATED RESULTS:** Results showed early life stress events (ELSQ) are related to more chronic stressors in the cumulative chronic stress interview ( $p=0.005$ ). Participants with higher chronic stress scores showed lower subjective effects, as measured by the DEQ, following the priming exposure ( $p=0.036$ ) but had more craving for alcohol as measured by the AUQ ( $p=0.009$ ). A regression analysis showed the number of chronic stressful events predicted ICS failed attempts to control drinking ( $p=0.034$ ), after covarying for sex. Participants with more chronic stressful events showed more impulsivity on the N-impulsivity measure ( $p=0.034$ ) and the UPPS-P positive urgency measure ( $p=0.005$ ). **DISCUSSION/SIGNIFICANCE OF IMPACT:** Non-dependent drinkers with more early life stress tend to have a higher number of chronic stressful events. More chronically stressful events were associated with feeling less effects of alcohol and higher craving for alcohol. Participants with more chronically stressful events also appear to have more failed attempts at controlling their drinking. Future analysis will assess for mediation and moderation of these factors. Chronically stressful events and impulsive behaviors could serve as important areas for intervention for better treatment outcomes for alcohol use disorders.

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### Ventriculo-arterial coupling and left ventricular mechanical work in systolic and diastolic heart failure

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**OBJECTIVES/SPECIFIC AIMS:** Our goal was to compare the ventriculo-arterial coupling and left ventricular mechanical work of patients with systolic and diastolic heart failure (SHF and DHF). **METHODS/STUDY POPULATION:** Patients with New York Heart Association Functional Class II-III HF symptoms were included. SHF was defined as left ventricular (LV) ejection fraction  $<50\%$  and DHF as  $>50\%$ . Analysis of the fingertip arterial blood pressure tracing captured with a finger plethysmography cuff according to device-specific algorithms provided brachial artery blood pressure and stroke volume. LV end-systolic volume was measured separately via transthoracic echocardiography. Arterial elastance ( $E_a$ ), a measure of pulsatile and nonpulsatile LV afterload, was calculated as LV end-systolic pressure (ESP)/end-diastolic volume. End-systolic elastance ( $E_{es}$ ), a measure of load-independent LV contractility, was calculated as LV ESP/end-systolic volume. Ventriculo-arterial coupling (VAC) ratio was defined as  $E_a/E_{es}$ . Stroke work (SWI) was calculated as stroke volume index  $\times$  LV end-systolic pressure  $\times 0.0136$  and potential energy index (PEI) as  $1/2 \times$  (LV end-systolic volume  $\times$  LV end-systolic pressure  $\times 0.0136$ ). Total work index (TWI) was the sum of SWI + PEI. **RESULTS/ANTICIPATED RESULTS:** Patients with SHF ( $n=52$ ) and DHF ( $n=29$ ) were evaluated. Median (IQR) age was 57 (51–64) years. There were 48 (58%) and 59 (71%) patients were male and African American, respectively. Cardiac index was 2.8 (2.2–3.2) L/minute and 3.0 (2.8–3.3) L/minute in SHF and DHF, respectively ( $p=0.12$ ). Self-reported activity levels (Duke Activity Status Index,  $p=0.48$ ) and heart failure symptoms (Minnesota Living with Heart Failure Questionnaire,  $p=0.55$ ) were not different between SHF and DHF.  $E_a$  was significantly lower in DHF compared with SHF patients [1.3 (1.2–1.6) vs. 1.7 (1.4–2.0) mmHg;  $p<0.001$ ] whereas  $E_{es}$  was higher in DHF vs. SHF [2.8 (2.1–3.1) vs. 0.9 (0.7–1.3) mmHg;  $p<0.001$ ]. VAC was 1.8 (1.3–2.8) in SHF versus 0.5 (0.4–0.7) in DHF ( $p<0.001$ ). Compared with SHF, DHF patients had higher SWI [71 (57–83) vs. 48 (39–68) gm  $\times$  m;  $p<0.001$ ] and lower PEI [19 (12–26) vs. 44 (36–57) gm  $\times$  m;  $p<0.001$ ]. TWI did not differ between SHF and DHF ( $p=0.14$ ). Work efficiency was higher in DHF than SHF [0.80 (0.74–0.84) vs. 0.53 (0.46–0.64);  $p<0.001$ ]. **DISCUSSION/SIGNIFICANCE OF IMPACT:** The results underscore the differences in pathophysiology between SHF and DHF patients with similar symptom burden and exercise capacity. These results highlight the difference in myocardial energy utilization between SHF and DHF.

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### Cardiac abnormalities drive exercise intolerance in patients with nonalcoholic fatty liver disease

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**OBJECTIVES/SPECIFIC AIMS:** Nonalcoholic fatty liver disease (NAFLD) affects 1 in 3 Americans and can exist in 2 histological subtypes: simple hepatic steatosis (SHS) and nonalcoholic steatohepatitis (NASH), a clinically aggressive variant. Fatigue is the most common complaint in patients with NAFLD but the etiology of fatigue is unknown. Thus, the goal of this study was to objectively evaluate fatigue via maximal cardiopulmonary exercise testing and identify determinants of exercise intolerance in NAFLD. **METHODS/STUDY POPULATION:** In total, 14 subjects with histologically confirmed NAFLD were prospectively enrolled. Subjects with cirrhosis or those with known history of heart failure (systolic or diastolic) were excluded. Fatigue was quantified via the Duke Activity Status Index (DASI) questionnaire. A symptom-limited treadmill cardiopulmonary exercise test was performed in all subjects to measure exercise time (ET) and peak oxygen consumption (peak  $\text{VO}_2$ ). Doppler-echocardiography was performed to measure systolic and diastolic function. **RESULTS/ANTICIPATED RESULTS:** The DASI score and ET was significantly reduced in patients with NASH ( $n=10$ ) when compared to those with SHS [40.2 (IQR = 24.2–50.7) vs. 58.2 (IQR = 50.7–58.2),  $p=0.04$ ]; [9.1 (IQR = 6.4–12.2) vs. 13.1 (IQR = 12.5–13.1) min,  $p=0.02$ , respectively] reflecting moderate fatigue and impaired overall exercise capacity. The ET was directly linked to peak  $\text{VO}_2$  ( $R = +0.79$ ,  $p<0.001$ ),  $\text{VO}_2$  at anaerobic threshold ( $R = +0.73$ ,  $p=0.003$ ), and inversely to ventilatory efficiency index ( $R = -0.785$ ,  $p=0.001$ ) suggesting impaired cardiorespiratory fitness in those with reduced ET. ET was also linked to several parameters of diastolic dysfunction