ACUTE HYPERGLYCEMIA IN NONDIABETIC WOMEN REDUCES CORONARY FLOW RESERVE: NOVEL OBSERVATIONS DURING NONINVASIVE ASSESSMENT OF MYOCARDIAL PERFUSION USING RAPID-ACQUISITION BEDSIDE CONTRAST ECHOCARDIOGRAPHY

ACC Poster Contributions
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Background: Dysglycemia and insulin resistance (IR) are risk factors for cardiovascular disease. Hyperglycemia, with or without diabetes mellitus, has been linked to adverse cardiac outcomes in patients with acute coronary syndromes. However, the effect of acute hyperglycemia on coronary perfusion in humans has been poorly studied. We sought to evaluate the effects of hyperglycemia on coronary flow reserve (CFR) in healthy volunteers, without a history of diabetes, obesity, smoking or hyperlipidemia.

Methods: 9 women (mean ± SD, age: 46 ± 4 years, BMI: 24.1 ± 2.1 kg/m2) with normal fasting blood sugar (BS) (88 ± 5.2 mg/dl), HbA1C (5.4 ± 0.3 %), and lipids were studied after an overnight fast in the presence of a two step pancreatic clamp containing somatostatin, replacement glucagon and growth hormone. Insulin was infused at 0.75 mU/KgTBW/min and glucose was infused for 3-4 hrs to maintain euglycemia (BS ~100 mg/dl for 1-2 hrs) followed by hyperglycemia (BS ~225mg/dl for 1-2 hrs). Myocardial contrast echocardiography (MCE) was performed during the final 30 minutes of each glycemic step (during steady state) using a continuous infusion of Definity (1.3 ml diluted in 60 cc 0.9% saline at 200 ml/hr; Lantheus Medical Imaging) at rest and during stress-induced vasodilation with Regadenoson (Lexiscan 5 ml (400 ug) IV bolus; Astellas Pharma Global Inc.) to quantify myocardial blood flow (MBF) and determine CFR [stress MBF/rest MBF]. Degree of IR was assessed from glucose infusion rates (GIR) at euglycemia.

Results: CFR during euglycemia (BS: 94.5 ± 4.7 mg/dl) vs. hyperglycemia (BS: 234 ± 24mg/dl) was 3.4±1.8 vs. 2.2 ±1.4 (p=0.009). Mean ± SD of GIR at euglycemia was 5.1 ± 3.1mg/kg/min. Subjects were classified by GIR at euglycemia: < 5 or > 5; in those (n=6) with GIR< 5, the BMI was greater [25.1 ± 1.4 vs. 22.0 ± 1.7 (p=0.02)] and there was a trend towards decreased CFR levels [2.89 ± 1.24 vs. 4.56 ± 2.44, (P= 0.2)]. There were no significant adverse effects noted from either MCE or Regadenoson administration.

Conclusion: CFR, as determined noninvasively by MCE, using a rapid bedside acquisition technique, is decreased during acute hyperglycemia in nondiabetic, healthy women and may be associated with variations in IR and BMI.