SHORT TERM HYPERGLYCEMIA INCREASES LEFT VENTRICULAR CONTRACTILITY AND WALKING DISTANCE IN PATIENTS WITH TYPE 2 DIABETES AND HEART FAILURE

ACC Poster Contributions
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Background: We investigated the effects of short term modulation in circulating glucose levels on myocardial contractility and exercise performance in diabetic patients with (DM2-HF) and without heart failure (DM2-nonHF).

Methods: In a randomized, open label cross-over design insulin treated DM2-nonHF (N=8) (mean ± SD, EF 60 ± 3%) and DM2-HF (N=10) (NYHA 2-3 and mean EF 36±6%) underwent hyper- and euglycemia for 12 hours on two different occasions. Echocardiography, 6 minutes hall walk test, and treadmill exercise tests were performed after 12 hours during a fasting state in both study arms.

Results: Blood glucose levels differed significantly between study arms in DM2-nonHF (9,9 ± 2,1mM vs 5,7 ± 0,4mM, P<0.001) and in DM2-HF (14,1 ± 2,6mM vs 6,5 ± 0,8mM, p<0.001) whereas catecholamines and free fatty acids did not differ significantly. Insulin levels were lower in the DM2-nonHF but not in the DM2-HF group during hyperglycemia (P<0,01 and P=NS, respectively). During hyperglycemia global myocardial maximal systolic tissue velocity Vmax and longitudinal mitral annulus velocity Smax increased significantly (14%, P<0,05 and 10%, P<0,01, respectively in DM2-HF; 11%, P<0,05 and 11%, P<0,05, respectively in DM2-nonHF). In the total study population we found an increase in strain by 9% (P<0,05), increase in strain rate by 8% (P<0,05) and an increase in systolic longitudinal mitral annulus velocity by 7% post exercise (P<0,05). During hyperglycemia the DM2-HF group improved 6 minutes hall walk distance by 7% (P<0,05). Left ventricular ejection fraction, heart rate and resting blood pressure did not differ between study arms. Peak exercise blood pressure during treadmill exercise test was higher during hyperglycemia in the DM2-nonHF patients (P<0,05).

Conclusions: Short term hyperglycemia increases myocardial contractility in DM2-HF and DM2-nonHF patients and walking distance in DM2-HF patients. We suggest that our findings are explained by increased myocardial glucose uptake occurring independently of major changes in insulin levels due to a glucose mass effect.