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Heart Failure

A DIET HIGH IN LONG CHAIN FATTY ACIDS WORSENS SYSTOLIC FUNCTION IN TYPE II DIABETIC PATIENTS, BUT A DIET RICH IN MEDIUM CHAIN FATTY ACIDS DOES NOT: A RANDOMIZED, DOUBLE-BLIND STUDY

Poster Contributions
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Background: Excessive uptake and storage of long chain fatty acids (LCFAs) in the heart is associated with dysfunction in patients with type 2 diabetes (T2DM). Medium chain fatty acids (MCFAs) are not stored but rather are oxidized. We hypothesized that a diet rich in MCFAs would result in less steatosis and hence better cardiac function compared to a LCFA-rich diet.

Methods: Sixteen patients with T2DM were randomized to receive 2 weeks of foods (eucaloric diet: 38% fat; 16% protein; 46% carbohydrate) rich in MCFAs or LCFAs (each 28% of total calories). Before and after the diets, patients underwent a phlebotomy, resting echo, and magnetic resonance spectroscopy (MRS). Dieticians monitored diet compliance.

Results: (See Table). High-density lipoprotein dropped and total cholesterol trended lower in patients on the MCFA diet. However, neither diet lowered cardiac or hepatic fat deposition. Despite this, the LCFA diet induced a decrease in stroke volume, (derived from the left ventricular outflow tract time-velocity integral [LVOT TVI] and the LVOT diameter) and cardiac output. The MCFA diet did not.

Conclusion: After only a 2-week diet high in LCFAs, patients with T2DM had decreased systolic function, whereas T2DM patients on a similar MCFA diet did not. In addition, neither group showed a change in cardiac steatosis. These findings suggest that steatosis itself does not cause cardiac dysfunction. Moreover, they suggest that not all fatty acids are detrimental to heart function.

Table: Data shown as mean ± SE; *p<0.05 baseline differences between groups

	Pre-LCFA	Post-LCFA	P value (paired t-test)	Pre-MCFA	Post-MCFA	P value (paired t-test)
Total Cholesterol (mg/dL)	164 ± 13	150 ± 13	0.11	187 ± 7	174 ± 10	0.09
High density lipoprotein (mg/dL)	46 ± 6	46 ± 6	0.96	50 ± 5	46 ± 5	0.008
Low density lipoprotein (mg/dL)	85 ± 15	75 ± 10	0.19	105 ± 8	94 ± 10	0.14
Plasma triglycerides (mg/dL)	165 ± 39	166 ± 51	0.96	158 ± 41	199 ± 59	0.10
Cardiac lipid (per MRS)	0.015 ± 0.003	0.016 ± 0.007	0.85	0.016 ± 0.004	0.014 ± 0.002	0.53
Hepatic lipid (per MRS)	0.197 ± 0.039	0.187 ± 0.038	0.30	0.241 ± 0.124	0.240 ± 0.101	0.93
LVOT TVI (cm)	22 ± 1*	20 ± 1	0.008	19 ± 1	17 ± 1	0.27
Stroke volume (mL)	78 ± 5*	69 ± 5	0.01	63 ± 5	56 ± 4	0.18
Mean arterial pressure (mmHg)	97 ± 2	91 ± 5	0.296	93 ± 4	86 ± 2	0.159
Heart Rate (bpm)	68 ± 3	66 ± 2	0.427	75 ± 3	77 ± 3	0.34
Cardiac output (L/min)	5.4 ± 0.5	4.5 ± 0.3	0.008	4.7 ± 0.4	4.3 ± 0.3	0.20