Befera N, A Rivard, D Gatlin, S Black, J Zhang, JE Foker. Ribose treatment helps preserve function of the remote myocardium after myocardial infarction. ***J Surg Res*** **2007;137(2):156.**

Introduction: The myocardium, stressed from a variety of causes including pressure or volume overload, may develop increasing dysfunction and go on to apoptosis and remodeling. This progression produces the increasingly common problem of chronic cardiac failure (CCF). The progression has been well characterized, but what controls it is unknown. We hypothesized that the progression begins by increased cardiac load producing an unfavorable myocardial energy supply/demand ratio which leads to depressed myocardial energy levels. We have begun to study this progression in a myocardial infarction (MI) model. Following an MI, the uninvolved, remote myocardium (RM) must assume the entire workload of the ventricle, and this additional strain on the RM has been shown to lead to apoptosis and remodeling. The hypothesis that a fall in RM energy levels leads to decreased function was tested by infusing ribose in a rat MI model. We have shown in a global ischemia and reperfusion model that ribose infusion will greatly enhance return of myocardial ATP levels and function. Because ribose is the rate-limiting precursor to adenine nucleotide synthesis and is not itself a fuel source, increased AMP synthesis must be the reason for the enhanced recovery. **Methods**: Male Lewis rats received continuous venous infusion of 0.9% NaCl solution with or without 2.5% D-ribose (N=6 for each group) via implanted osmotic mini-pump (Durect, Inc.) for 14 days. Animals underwent ligation of the left anterior descending coronary artery to produce an anterior wall MI, 1-2 days after pump placement. Echocardiographic analysis was performed preoperatively and at 2 and 4 weeks post-MI to assess changes in function by ejection indices, chamber dimensions, and wall thickness. Results: By all three indices, the function of the RM was better maintained with ribose treatment following an anterior MI. Contractility (EF, SF) and wall thickness were increased, and less ventricular dilation occurred. These data show that ribose infusion reduces the impairment of RM function that follows an MI. Conclusion: These data show (1) the RM shows a significant decrease in function four weeks following an MI, and (2) ribose infusion prevents, to a significant degree, the dysfunction. The benefit of ribose suggests the increased workload on the RM produces an unfavorable energy supply/demand ratio which results in lower myocardial energy levels. Studies are underway to determine the changes in energy metabolism and apoptotic pathways which occur. These data show that raising myocardial energy levels clearly improves function and we propose it may also delay chronic changes, including apoptosis, in a variety of surgically treatable CCF conditions.

Echo Indices	Treatment	Pre-MI	4 weeks after MI
LV diastolic diameter (cm)	Ribose	0.64 ± 0.04	0.76 ± 0.07*
	Control	0.68 ± 0.03	0.94 ± 0.07
LV systolic diameter (cm)	Ribose	0.39 ± 0.06	0.64 ± 0.09*
	Control	0.40 ± 0.03	0.95 ± 0.07
Septal diastolic thickness (cm)	Ribose	0.13 ± 0.02	0.12 ± 0.02
	Control	0.12 ± 0.01	0.10 ± 0.01
Posterior wall diastolic thickness (cm)	Ribose	0.13 ± 0.02	0.13 ± 0.03*
	Control	0.13 ± 0.03	0.10 ± 0.01
Ejection fraction (EF) (cm)	Ribose	76.4 ± 5.9	49.1 ± 9.4*
	Control	76.3 ± 2.3	31.2 ± 4.8
Shortening fraction (SF) %	Ribose	38.6 ± 5.3	19.9 ± 6.1*
	Control	38.9 ± 2.1	10.7 ± 1.1

* P < 0.05 vs. control.