

TITLE

Aerobic Exercise Restores Most of the Left Ventricular Hemodynamic Parameters in Zucker Diabetic Fatty Rats, a Model of Type 2 Diabetes

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Diabetic heart disease involves diastolic and systolic dysfunction. Aerobic exercise attenuates the cardiac dysfunction in diabetes. We aimed to characterize left ventricular hemodynamics in the Zucker Diabetic Fatty (ZDF) rat, a model of type 2 diabetes with complications seen in humans, and evaluate changes induced by exercise training.

Male ZDF and Zucker lean (control) rats were assigned to 4 groups: sedentary (SD) and exercised (ED) diabetic, and sedentary (SC) and exercised (EC) control. Exercise training consisted of 8 weeks of running on a treadmill. Hemodynamic changes were determined using left ventricular catheterization and pressure volume analysis.

Of the 24 hemodynamic parameters tested, 15 were negatively affected by diabetes. The debility of diabetic heart disease was evident in the diastolic filling, isovolumic contraction, ejection, and isovolumic relaxation phases. Specifically, ventricular filling was impaired in SD rats with a 23% loss in end diastolic volume. dp/dt_{max} , an indicator of contractility, showed a 40% reduction while the ejection fraction was 8% lower in SD rats. In addition to compromised ventricular contraction, impaired relaxation was present in SD rats with dp/dt_{min} levels at 59% of those in controls. Importantly, exercise training restored 13 of the 15 hemodynamic parameters affected by diabetes. We concluded that diastolic and systolic dysfunction was present in the ZDF rat model and exercise had a definite cardioprotective effect on left ventricular hemodynamics in the diabetic rats.

Biography

Irina V. Smirnova has earned her PhD degree in protein chemistry from the Institute of Bioorganic Chemistry of the Ukrainian Academy of Sciences in Kyiv, Ukraine. She is a principal investigator in the Diabetes Research Laboratory at the University of Kansas Medical Center. Her research interests include diabetic heart disease and benefits of exercise. She has published over 40 papers in peer-reviewed scientific journals.