Whole Body Periodic Acceleration (WBPA) Improves Muscle Function in Diabetic Mice

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BACKGROUND: According to the International Diabetes Foundation, there are over 415 million people worldwide diagnosed with diabetes [1]. In the United States alone, there are 29.1 million people with diabetes mellitus, and an additional 8.1 million undiagnosed [1]. Diabetic patients suffer from muscle weakness and fatigability. Whole body periodic acceleration (WBPA) is the passive sinusoidal motion of the supine body back and forth, which produces pulsatile shear stress and is shown to increase the expression of endothelial-derived nitric oxide synthase [2]. It was hypothesized that WBPA performed on type 1 diabetic (T1D) patients may improve muscle functions. METHODS: Forelimb muscle strength and resistance to fatigue was measured in control C57BL/6J mice of both sexes, and in mice pretreated with streptozotocin (40mg/Kg) to develop T1D (glucose> 250mg/dl). Control and diabetic mice were treated with WBPA for 8 consecutive days (480 rpm, 1 hr daily). Force was measured using a grip strength meter (Columbus Instruments, USA). Muscle fatigue was quantified using the hanging wire tests. The test is based on the latency of a mouse to fall off a metal wire upon exhaustion. RESULTS: Diabetic mice showed a significant decrease in force generation compared to age-matched control mice. Furthermore, T1D mice showed a high susceptibility to fatigue when compared to non-diabetic mice. WBPA improved force and increased resistance to muscle fatigue in T1D mice CONCLUSIONS: This study is the first to directly test the ability of WBPA to ameliorate established muscle dysfunction in diabetic mice.

Awards Won: