Background
• Diabetes is a leading cause of adult disability in the United States.1
• Diabetic neuropathy (DN) is a complication of Type 1 and Type 2 diabetes in over 50% of people who have had the disease for 20 years.2
• The most common form of DN is a symmetrical distal degeneration of peripheral nerves combined with impaired nerve regeneration leading to impaired balance, altered gait patterns, and increased risk of falling.3 Increased susceptibility to injury, gangrene, and amputation.2
• Several studies have demonstrated improved glycemic control following aerobic and resistance exercise in people with diabetes, yet participation in regular physical activity remains an underutilized therapy.4
• Because of complications associated with regular exercise, including foot ulceration, few studies have looked at the effectiveness of exercise in people with diabetic neuropathy.6

Summary of Preliminary Studies
• Our preliminary work evaluated ankle proprioception and cutaneous innervation in people with Type 2 Diabetes.
• Our lab reported the following proprioceptive baseline measures on a sample of 26 participants (n=9 healthy subjects; n=9 diabetic with neuropathy and n=8 diabetic with no neuropathy). Table 1 illustrates the error on proprioceptive testing at 2 different ankle positions. We found a significant difference between nondiabetic and diabetic without neuropathy (one-way ANOVA).

Outcome Measures
• Nerve function will be characterized at baseline and following the intervention by Quantitative sensory testing (QST), and nerve conduction studies (NCS) of the sural, peroneal, and tibial nerves.
• Quantitative proprioception testing measure passive joint position sense on the dominant ankle joint using an isokinetic dynamometer (Biodex Medical Systems Inc, Shirley, NY).
• Total dermal and epidermal innervation will be quantified with a punch skin biopsy from distal lateral ankle and the proximal lateral thigh using a 3 mm disposable circular punch (Miltex, York, PA).
• The tissue will be sectioned at 50 µm and processed for immunohistochemistry using rabbit anti-PGP9.5 primary antibody (1:3000; Chemicon, Temecula, CA). In addition, sections will be coded in order to carry out the analysis in a blinded fashion and to determine the error on proprioceptive testing at 2 different ankle positions. We found a significant difference between nondiabetic and diabetic without neuropathy (one-way ANOVA).

Methods
• A pre-test post-test design has been used for this pilot study, with all subjects participating in the intervention.
• Clinical neurological examination performed by Dr. Pasnoor
• Quantitative sensory testing (TSA-II NeuroSensory Analyzer, Advanced Medical Systems)
• Nerve conduction velocity studies
• Proprioceptive control by measuring passive joint position sense on the dominant ankle joint using an isokinetic dynamometer (Pic 1,2).

Subjects
• Thirty participants with diabetic neuropathy (age 40-70), will be recruited for this study through flyers posted in the community (e.g. at the local ADA chapter offices, at diabetes support group meetings, in the Cray Diabetes Center, in Wyandotte County safety net clinics, and in other physician offices).
• To date, 6 subjects have been recruited and began the intervention. Their baseline measurements are found in Table 3.