Introduction
For patients with ALS, the preservation of independent movement in one's environment is important to quality of life. Use of a wheelchair with eye-gaze controls would be a significant advancement preserving independence and quality of life for patients with this disease.

Objectives
Our objective was to conduct a small pilot study to demonstrate the feasibility, safety, and responsiveness of an eye-gaze directed power wheelchair (PWC) for patients with ALS.

Materials and Methods
We conducted an uncontrolled pilot study in 12 subjects with ALS, over 18 years of age. Subjects were excluded if they had prior use of eye-gaze technology, significant respiratory compromise (FVC < 50%), frontotemporal dementia, or other cognitive impairments. An eye-gaze controlled system that allowed the subject to direct their movements was mounted on the power wheelchair (Figure 1). The wheelchair moves in the direction the subject gazes on the screen using transparent arrows to indicate direction and a central red square to stop the chair (Figure 2). The subjects were also able to see their environment ahead on the screen. The subjects drove the eye-gaze controlled wheelchair around a standard course completing three trials (Figure 3). On the course, various tasks were measured: overall time to complete the course; stop on command; start on command; turning 90, 135, and 180 degrees; and time to back up in reverse over a short and long distance. The primary outcome measure was to assess the feasibility and safety of an eye-gaze-controlled power wheelchair in patients with ALS. The secondary outcome measure was to assess user satisfaction of the eye-gaze control system with regards to the performance of the wheelchair.

Results
14 subjects were screened, and 12 subjects completed the trial. All of the subjects were able to complete three runs around the course and the associated maneuvers safely. The mean time for all of the subjects to complete the course got faster with each successive run (Table 1 and Figure 4). The subjects were able to safely perform the runs and avoid obstacles. Overall, the runs were completed with very little variability in times to complete the course and to perform the various maneuvers (Table 1 and 2). The subjects rated the system’s ability to complete each task very highly and the overall responsiveness of the system as excellent (Table 3).

Conclusions
This small pilot study suggests that the hands-free or eye-gaze controlled power wheelchair is a feasible and safe system for power mobility. The user experience was very favorable. This system has tremendous potential to improve the quality of life and independence of patients with ALS.