

Virtual Reality Feedback Cues for Improvement of Gait in Patients with Parkinson's Disease.

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The objective of this study was to study the effects of visual cues, provided through a portable visual-feedback, virtual reality (VR) apparatus, on the walking abilities of patients with Parkinson's disease (PD). In particular, we examined the on-line and residual effects on patients who were on their regular medication schedule. Positive effects of visual cues on gait in patients with movement disorders have been reported before^{1,2}. Early attempts to produce such cues artificially have resulted in open-loop systems, producing visual cues in constant motion, independent of the patient's own motion³. However, open-loop systems, subject to disturbances, are inherently unstable⁴. In contrast, an analytical study has shown that it is the closed-loop visual feedback effect, generated by the patient's own motion, which stabilizes and regulates gait⁵. Subsequently, a portable device, displaying a virtual tiled floor, which responds dynamically in closed-loop to the patient's own movement, has been developed⁶. A clinical study on un-medicated patients with PD has shown that, while open-loop visual cues have adverse effects, particularly dizziness, loss of balance, and even freezing of gait, visual feedback cues, responding to the patient's own movement in closed-loop, have a clear positive effect on gait⁷. Patients with multiple sclerosis (MS), who suffer from cerebellar ataxia, have also shown improvement in their gait when using the device⁸. The present study included 20 PD patients on their regular medication schedule. Putting the device on the patient with the display turned off showed a negligible "placebo" effect of about 1%, on average. Turning the display on, 50% of the patients improved either their walking speed or their stride length or both by over 20%. Taking the device off the patient, waiting for 15 minutes, and instructing the patients to walk again, 55% of the patients showed over 20% improvement in either walking speed or stride length or both. One week after participating in the first test (where the patient used the device for approximately 10 minutes), 36% showed over 20% improvement. Some of the patients reported that they still walk on the tiles in their minds. These residual effects suggest the examination of this approach in a comprehensive therapy program.

References

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