**Quantitative Analysis and Recovery Process of a Patient with
Ataxic Upper Limb Using a Robotic Device**

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Purpose: The purpose of the present study is to investigate the kinematic change in a patient with upper limb ataxia, quantitatively using a robotic device.

Methods: One septuagenarian man with upper limb ataxia due to midbrain infarction participated in this study. The kinematic assessment was performed at baseline (BL) and 2 and 4 weeks after baseline (2W, 4W) during his rehabilitation at the hospital. The subject made use of visually guided tracking movement in the horizontal plane with his affected arm using a robotic device. The six kinematic parameters (coordinate error, velocity error, moving range of the X-axis and Y-axis, total length of trajectory, and Jerk Index) were calculated. Clinical findings such as the finger-nose test and the hand pronation supination test were also obtained.

Results: Coordinate error gradually decreased, but the other 5 parameters increased at 2W and decreased at 4W. The finger-nose test and the hand pronation supination test were positive at both BL and 4W.

Conclusion: The kinematic change of the upper limb tracking movement may not simply reflect the change of ataxic symptom but also an adaptive motor strategy. The present results indicate that the kinematic assessment using this robotic device is useful for detecting chronological change of the ataxic arm movement quantitatively.