

# OBJECTIVE CIRCLE METRICS TO QUANTIFY ARM FUNCTION FOLLOWING STROKE

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## BACKGROUND

- Impaired arm function after stroke
- Synergistic movement patterns
- Arm function often assessed with subjective clinical scales

## AIM

Examine whether circle drawing metrics are suitable outcome measures to objectively quantify arm function after stroke.

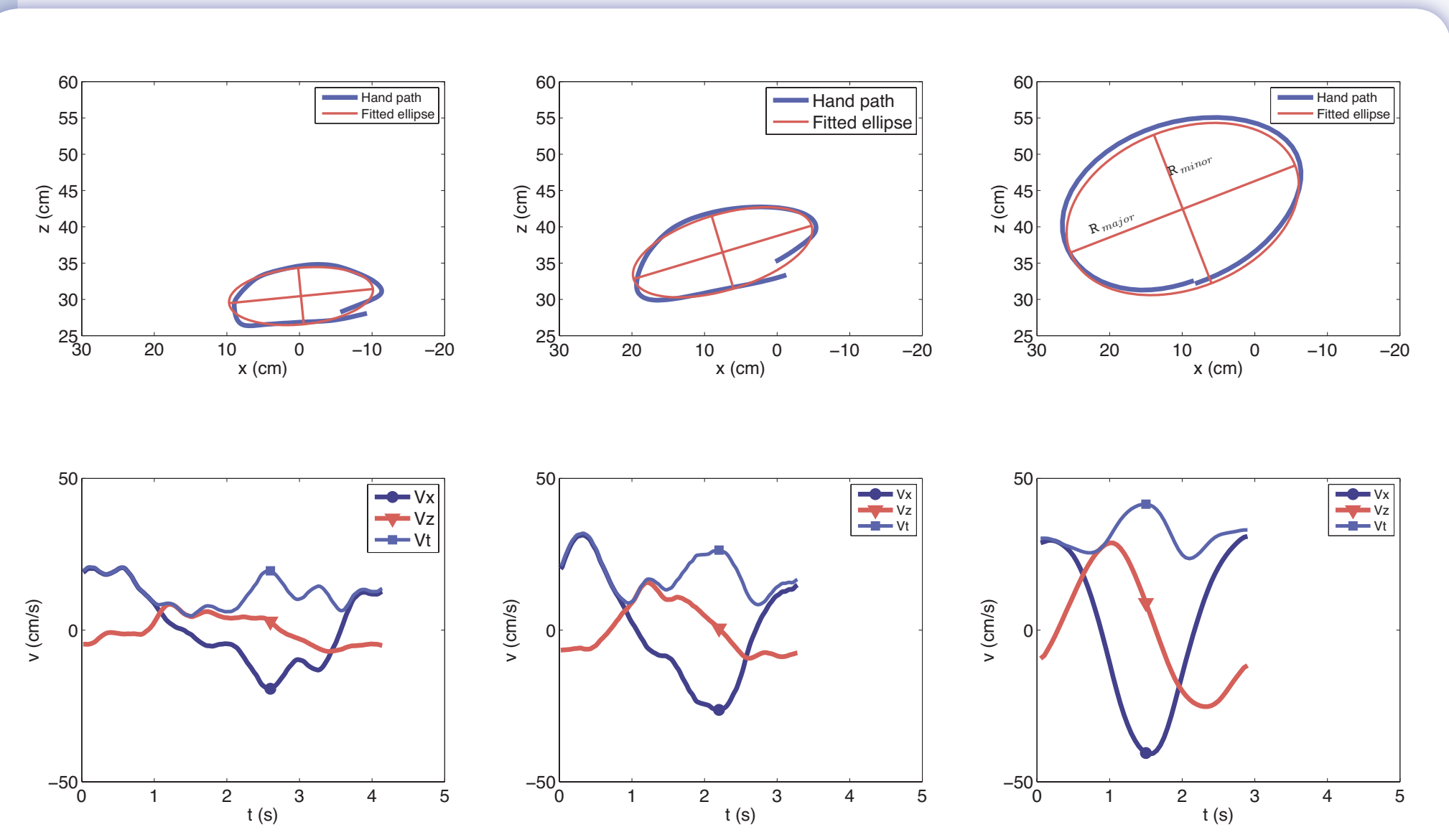


Figure 2 Typical examples of a severely affected, mildly affected and healthy subject. Corresponding speed profiles are shown in the lower three subplots.

## METHODS

- 20 healthy subjects and 16 stroke survivors
- FM assessment stroke survivors
- Circle drawing task for evaluation of arm function
- Calculation of circle area and roundness
- Synergistic movement patterns based on simultaneous shoulder ab-/adduction and elbow flexion/extension.

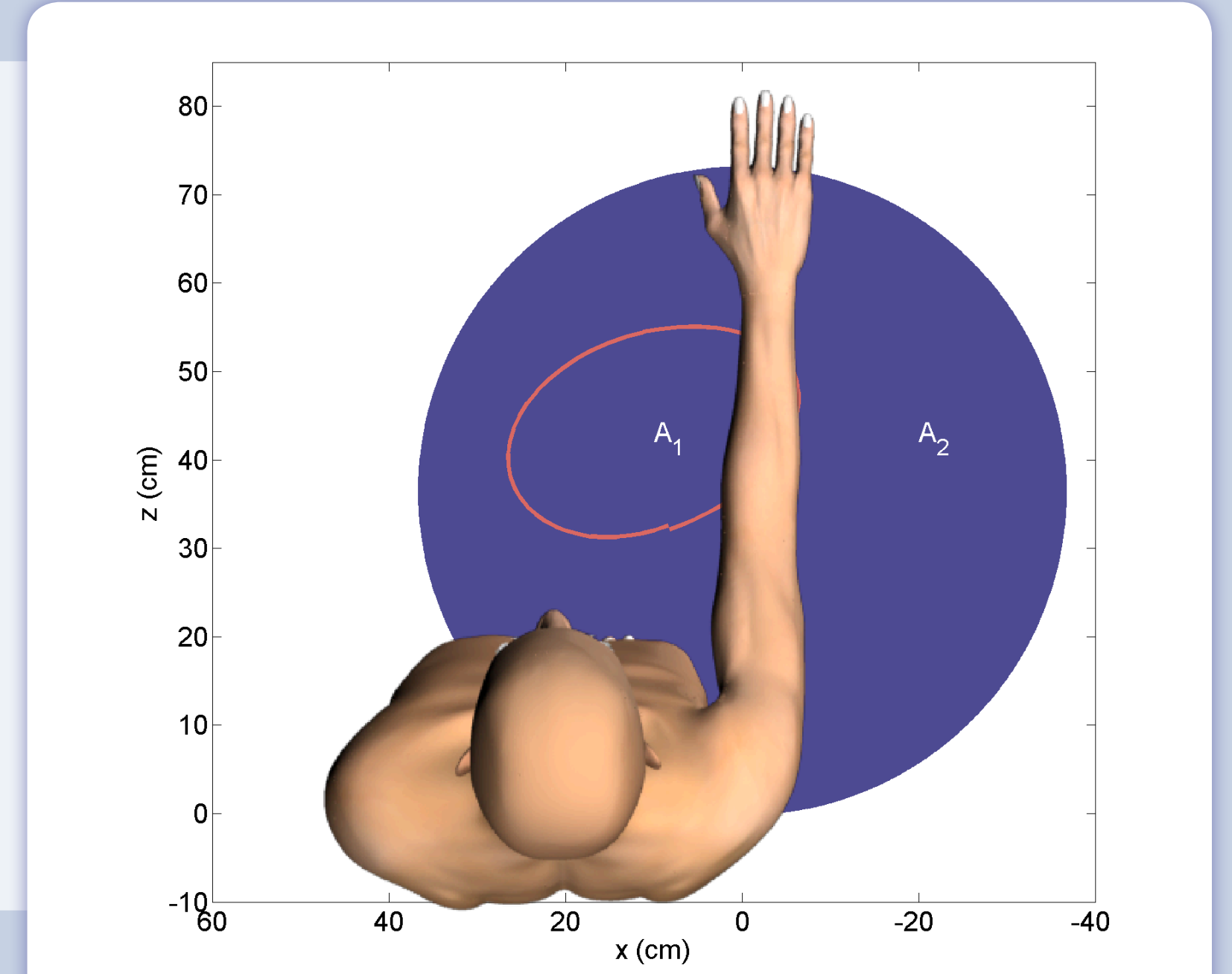


Figure 1 Normalized circle area is calculated as  $A_1$  divided by  $A_2$ .

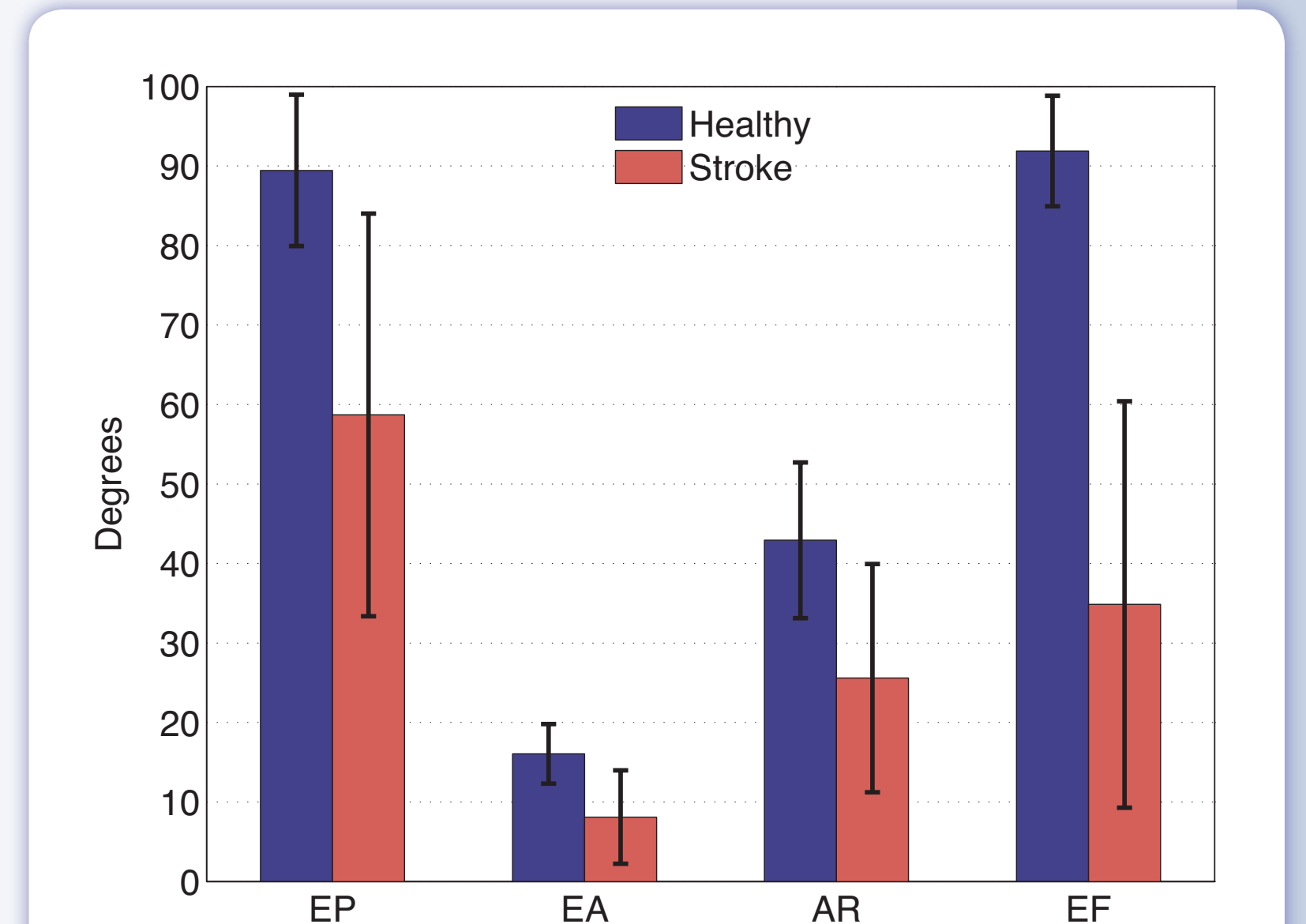


Figure 3 Joint excursions of healthy and stroke subjects during circle drawing.

## RESULTS

- Significant differences in circle area, roundness and synergistic movement patterns between groups
- Strong correlations between objective circle metrics.
- FM scale, concerning movement within/out of pathological synergies

## IMPLICATIONS

- Objective outcome measures
- Circle metrics differ significantly between healthy and stroke subjects
- Can be quickly administered

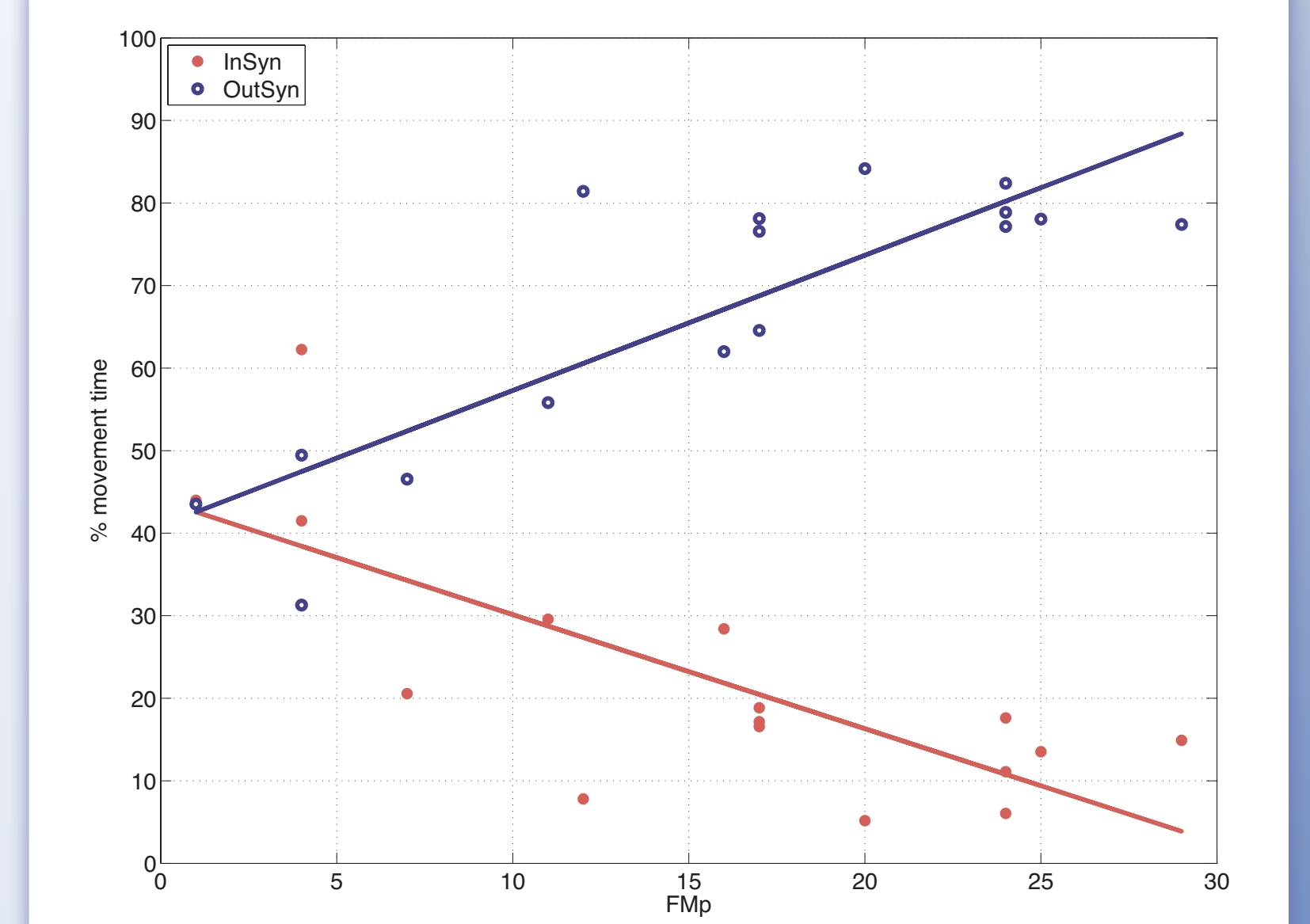
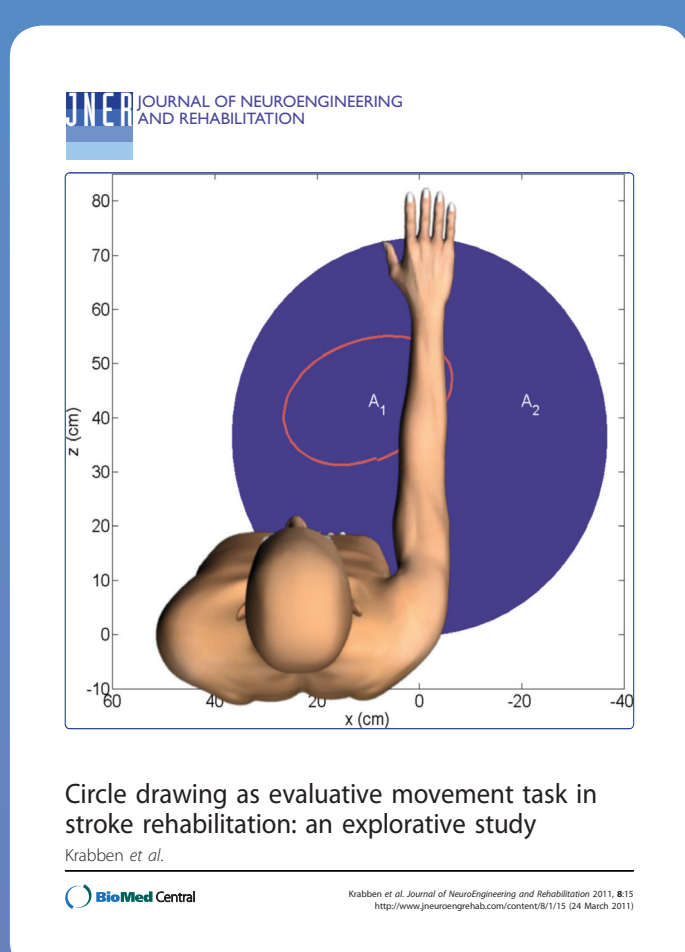


Figure 4 Strong correlations can be seen between the occurrence of synergistic movement patterns and a subset of the FM scale.



## SEE ALSO

Krabben et al., Journal of NeuroEngineering and Rehabilitation 2011, 8:15



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