

**PATHOKINESIOLOGY LABORATORY
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ABSTRACTS FROM PUBLISHED MANUSCRIPTS (2004 – 2005)

Effect of fore-aft seat position on shoulder demands during wheelchair propulsion: Part 1 – A kinetic analysis. Mulroy SJ, Newsam CJ, Gutierrez DD, Requejo P, Gronley JK, Lighthall Haubert L, Perry J. *J Spinal Cord Med* 2005;28:214-221.

Background/Objective – The highly repetitive and weight-bearing nature of wheelchair (WC) propulsion has been associated with shoulder pain among persons with spinal cord injury (SCI). Manipulation of WC seat position is believed to reduce the overall demand of WC propulsion. The objective of this investigation was to document the effect of fore-aft seat position on shoulder joint kinetics.

Methods – Thirteen men with complete motor paraplegia propelled a test WC in 2 fore-aft seat positions during free, fast, and graded conditions. The seat anterior position aligned the glenohumeral joint with the wheel axle and the seat posterior position moved the glenohumeral joint 8cm posteriorly. The right wheel of the test chair was instrumented to measure forces applied to the pushrim. An inverse dynamics algorithm was applied to calculate shoulder joint forces, external moments and powers.

Results – For all test conditions, the superior component of the shoulder joint resultant force was significantly lower in the seat posterior position. During graded propulsion, the posterior component of the shoulder joint force was significantly higher with the seat posterior. Peak shoulder joint moments and power were similar during free and fast propulsion. During graded propulsion, the seat posterior position displayed increased internal rotation moment, decreased sagittal plane power absorption, and increased transverse plane power generation.

Conclusions – This investigation provides objective support that a posterior seat position reduces the superior component of the shoulder joint resultant force. Consequently, this intervention potentially diminishes the risk for impingement of subacromial structures.

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