



Laboratory for Optimization and Computation in Orthopaedic Surgery

Department of Orthopaedic Surgery, University of Michigan

PEER-REVIEWED PUBLICATIONS AS OF 6/12/09

1. Hughes, R.E. and Powell, W.B. (1988) Mitigating end effects in the dynamic vehicle allocation model. *Management Science* 34(7): 859-879. PMC-ID 00251909.
2. Thompson, D.D., Chaffin, D.B., Hughes, R.E., and Evans, O. (1992) The relationship of isometric strength to peak dynamic hand forces during submaximal weight lifting. *International Journal of Industrial Ergonomics* 9(1): 15-23.
3. Lavender, S.A., Tsuang, Y.H., Hafezi, A., Andersson, G.B.J., Chaffin, D.B., and Hughes, R.E. (1992) Coactivation of the trunk musculature during asymmetric loading of the torso. *Human Factors* 34(2): 239-247. PMC-ID 1601434.
4. Redfern, M.S., Hughes, R.E., and Chaffin, D.B. (1993) High-pass filtering to remove electrocardiographic interference from torso EMG recordings. *Clinical Biomechanics* 8(1): 44-48.
5. Kerk, C.J., Chaffin, D.B., Page, G.B., and Hughes, R.E. (1994) A comprehensive biomechanical model using strength, stability, and COF constraints to predict hand force. *IIE Transactions* 26(3): 57-67.
6. Hughes, R.E., Chaffin, D.B., Lavender, S.A., and Andersson, G.B.J. (1994) Evaluating muscle force prediction models of the lumbar trunk using surface electromyography. *Journal of Orthopaedic Research* 12(5): 689-698. PMC-ID 7931786.
7. Hughes, R.E. and Chaffin, D.B. (1995) The effect of strict muscle stress limits on abdominal muscle force predictions for combined torsion and extension loadings. *Journal of Biomechanics* 28(5): 527-533. PMC-ID 7775489.
8. Hughes, R.E., Bean, J.C., and Chaffin, D.B. (1995) Evaluating the effect of co-contraction in optimization models. *Journal of Biomechanics* 28(7): 875-878. PMC-ID 7657686.
9. Hughes, R.E. (1995) Choice of optimization models for predicting spinal forces in a three-dimensional analysis of heavy work. *Ergonomics* 38(12): 2476-2484.
10. Silverstein, B.A. and Hughes, R.E. (1996) Epidemiology of upper extremity musculoskeletal disorders at a pulp and paper mill. *Applied Ergonomics* 27(3): 189-194. PMC-ID 15677059.

11. Hughes, R.E. and An, K-N (1996) Force analysis of rotator cuff muscles. *Clinical Orthopaedics and Related Research* 330: 75-83. PMC-ID 8804277.
12. Liu, J., Hughes, R.E., Smutz, P., Niebur, G., and An, K-N (1997) The roles of deltoid and rotator cuff muscles in shoulder elevation. *Clinical Biomechanics* 12(1): 32-38. PMC-ID 11415669.
13. Hughes, R.E., Silverstein, B.A., and Evanoff, B.A. (1997) Risk factors for work-related musculoskeletal disorders in an aluminum smelter. *American Journal of Industrial Medicine* 32: 66-75. PMC-ID 9131213.
14. Hughes, R.E. and Chaffin, D.B. (1997) Using principal components regression to stabilize EMG-muscle force parameter estimates of torso muscles. *IEEE Transactions on Biomedical Engineering* 44(7): 639-642. PMC-ID 9210824.
15. Hughes, R.E. and An, K-N. (1997) Monte Carlo simulation of a planar shoulder model. *Medical and Biological Engineering and Computing* 35: 544-548. PMC-ID 9374062.
16. Hughes, R.E., Schneeberger, A.G., An, K-N, Morrey, B.F., and O'Driscoll, S.W. (1997) Reduction of triceps muscle force after shortening of the distal humerus: A computational model. *Journal of Shoulder and Elbow Surgery* 6(5): 444-448. PMC-ID 9356933.
17. Hughes, R.E., Niebur, G., Liu, J., and An, K-N (1998) Comparison of two methods for computing abduction moment arms of the rotator cuff. *Journal of Biomechanics* 31: 157-160. PMC-ID 9593209.
18. Liu, J., Hughes, R.E., O'Driscoll, S.W., and An, K-N (1998) Biomechanical effect of medial advancement of the supraspinatus tendon. *Journal of Bone and Joint Surgery - American Volume* 80-A(6): 853-859. PMC-ID 9655103.
19. Smutz, W.P., Kongsayreepong, A., Hughes, R.E., Niebur, G., Cooney, W.P., and An, K-N (1998) Mechanical advantage of the thumb muscles. *Journal of Biomechanics* 31: 565-570. PMC-ID 9755041.
20. McMulkin, M.L., Woldstad, J.C., and Hughes, R.E. (1998) Torso loading via a harness method activates trunk muscles less than a hand loading method. *Journal of Biomechanics* 31(4): 391-395. PMC-ID 9672095.
21. Nakajima, T., Liu, J., Hughes, R.E., O'Driscoll, S.W., and An, K-N (1999) Abduction moment arm of transposed subscapularis tendon. *Clinical Biomechanics* 14: 265-270. PMC-ID 10619114.
22. Hughes, R.E., Rock, M.G., and An, K-N (1999) Identification of optimal strategies for increasing whole arm strength using Karush-Kuhn-Tucker multipliers. *Clinical Biomechanics* 14: 628-634. PMC-ID 10521646.

23. Hughes, R.E., Johnson, M.E., O'Driscoll, S.W., and An, K-N (1999) Age-related changes in normal isometric shoulder strength. *American Journal of Sports Medicine* 27: 651-657. PMC-ID10496585.
24. Hughes, R.E., Johnson, M.E., O'Driscoll, S.W., and An, K-N (1999) Normative values of agonist-antagonist shoulder strength ratios of adults aged 20 to 78. *Archives of Physical Medicine and Rehabilitation* 80: 1324-1326. PMC-ID 10527095.
25. Hughes, R.E. (2000) Effect of optimization criterion on spinal force estimates during asymmetric lifting. *Journal of Biomechanics* 33(2): 225-229. PMC-ID10653037.
26. Hughes, R.E., Johnson, M.E., Skow, A., An, K-N, and O'Driscoll, S.W. (2000) Reliability of a simple shoulder test. *Journal of Musculoskeletal Research* 3: 195-200.
27. Chang, Y-W, Hughes, R.E., Su, F-C, Itoi, E., and An, K-N (2000) Prediction of muscle force involved in shoulder internal rotation. *Journal of Shoulder and Elbow Surgery* 9(3): 188-195. PMC-ID 10888162.
28. Hughes, R.E., Bean, J.C., Chaffin, D.B. (2001) A method for classifying co-contraction of lumbar muscle activity. *Journal of Applied Biomechanics* 17(3): 253-258.
29. Giorelli, R.J., Hughes, R.E., Wassell, J.T., and Hsiao, H. (2001) The effect of wearing a back belt on spine kinematics during asymmetric lifting of large and small boxes. *Spine* 26(16): 1794-1798. PMC-ID 11493853.
30. Yian, E.H., Gallo, L., Hughes, R.E., and Kuhn, J.E. (2001) Relationship between Parson's tubercle and the insertion of the medial meniscus. *Arthroscopy* 17(7): 737-740. PMC-ID 11536093.
31. Wening, J.D., Hollis, R.F., Hughes, R.E., and Kuhn, J.E. (2002) The quantitative morphology of full thickness rotator cuff tears. *Clinical Anatomy* 15(1): 18-22. PMC-ID 11835539.
32. Spencer, E.E., Kuhn, J.E., Huston, L.J., Carpenter, J.E., and Hughes, R.E. (2002) Ligamentous restraints to anterior and posterior translation of the sternoclavicular joint. *Journal of Shoulder and Elbow Surgery* 11(1): 43-47. PMC-ID 11845148.
33. LaScalza, S., Gallo, L.N., Carpenter, J.E., and Hughes, R.E. (2002) A method for non-invasively measuring Euler angles and helical axis of upper arm motion. *Journal of Applied Biomechanics* 18(4): 374-383.
34. Myers, D.D., Linn, M.J., Hawley, A.E., Mell, A.G., Hughes, R.E., Philbrick, B.G., Knipp, B.S., Wroblewski, S.K., Chapman, A.M., Wakefield, T.W., and Schaub, R.G. (2002) The effects of P-selectin receptor antagonist rPSGL-Ig on wound healing in

- a rodent model. *Wounds: A Compendium of Clinical Research and Practice* 14(7): 244-251.
35. LaScalza, S., Arico, J., and Hughes, R. (2003) Effect of metal and sampling rate on accuracy of Flock of Birds electromagnetic tracking system. *Journal of Biomechanics* 36: 141-144. PMC-ID 12485650.
 36. Hughes, R.E., Bryant, C.R., Hall, J.M., Wening, J., Huston, L.J., Kuhn, J.E., Carpenter, J.E., and Blasier, R.B. (2003) Glenoid inclination is associated with full-thickness rotator cuff tears. *Clinical Orthopaedics and Related Research* 407: 86-91. PMC-ID 12567135.
 37. McMulkin, M., Woldstad, J., and Hughes, R.E. (2003) Optimization model estimates of trunk muscle forces do not correlate with EMG activity of females as well as males. *Journal of Applied Biomechanics* 19: 131-138.
 38. Nakajima, T., Hughes, R.E., and An, K-N. (2003) Validation of MRI-based measurements of supraspinatus morphology. *Journal of Musculoskeletal Research* 7(1): 15-23.
 39. Wong, A.S., Gallo, L., Kuhn, J.E., Carpenter, J.E. and Hughes, R.E. (2003) The effect of glenoid inclination on superior humeral head migration. *Journal of Shoulder and Elbow Surgery* 12(4): 360-364. PMC-ID 12934031.
 40. Giorcelli, R.J., Hughes, R.E., Current, R.S., and Myers, J.R. (2004) Accuracy of system for measuring three-dimensional torso kinematics during manual materials handling. *Journal of Applied Biomechanics* 20: 185-194.
 41. Nakajima, T., Hughes, R.E., and An, K-N (2004) Effects of glenohumeral rotations and translations on supraspinatus tendon morphology. *Clinical Biomechanics* 19: 579-585. PMC-ID 15234481.
 42. Langenderfer, J., Jerabek, S.A., Thangamani, V.B., Kuhn, J.E., and Hughes, R.E. (2004) Musculoskeletal parameters of muscles crossing the shoulder and elbow and the effect of sarcomere length sample size on estimation of optimal muscle length. *Clinical Biomechanics* 19(7):664-670. PMC-ID 15288451.
 43. Langenderfer, J., LaScalza, S., Mell, A., Carpenter, J.E., Kuhn, J.E., and Hughes, R.E. (2004) An EMG-driven model of the upper extremity and estimation of long head biceps force. *Computers in Biology and Medicine* 35: 25-39. PMC-ID 15567350.
 44. Carpenter, J.E., Wening, J.D., Mell, A.G., Hollis, R.F., Langenderfer, J., Kuhn, J.E., and Hughes, R.E. (2005) Changes in the long head of the biceps in rotator cuff tear shoulders. *Clinical Biomechanics* 20(2): 162-165. PMC-ID 15621320.
 45. Mell, A.G., LaScalza, S., Guffey, P., Ray, J., Maciejewski, M., Carpenter, J.E., and Hughes, R.E. (2005) Effect of rotator cuff pathology on shoulder rhythm. *Journal of Shoulder and Elbow Surgery* 14(1S): 58S-64S. PMC-ID 15726088.

46. Mell, A.G., Childress, B.L., and Hughes, R.E. (2005) The effect of wearing a wrist splint on shoulder kinematics during object manipulation. *Archives of Physical Medicine and Rehabilitation* 86(8): 1661-1664. PMC-ID 16084823.
47. Langenderfer, J., Hughes, R.E., and Carpenter, J.E. (2005) A stochastic model of elbow flexion strength for subjects with and without long head biceps tear. *Computer Methods in Biomechanics and Biomedical Engineering* 8(5): 315-322. PMC-ID 16298853.
48. Sommerich, C.M., and Hughes, R.E. (2006) Aetiology of work-related disorders of the rotator cuff tendons: Research and theory. *Theoretical Issues in Ergonomics Science* 7(1): 19-38.
49. Silver, A.E., Lungren, M.P., Johnson, M.E., O'Driscoll, S.W., An, K-N, and Hughes, R.E. (2006) Using support vector machines to optimally classify rotator cuff strength data and quantify post-operative strength in rotator cuff tear patients. *Journal of Biomechanics* 39: 973-979. PMC-ID 16488235.
50. Langenderfer, J.E., Carpenter, J.E., Johnson, M.E., An, K-N, and Hughes, R.E. (2006) A probabilistic model of glenohumeral external rotation strength for healthy normals and rotator cuff tear cases. *Annals of Biomedical Engineering* 34(3):465-476. PMC-ID 16474916.
51. Mell, A.G., Friedman, M.A., Hughes, R.E., and Carpenter, J.E. (2006) Shoulder muscle activity increases with wrist splint use during a simulated upper extremity work task. *American Journal of Occupational Therapy* 60(3):320-326. PMC-ID 16776399.
52. Langenderfer, J., Patthanacharoenphon, C., Carpenter, J., and Hughes, R. (2006) Variability in isometric force and moment generating capacity of glenohumeral external rotator muscles. *Clinical Biomechanics* 21(7):701-709. PMC-ID 16621210.
53. Swaringen, J.C., Mell, A.G., Langenderfer, J., LaScalza, S., Hughes, R.E., and Kuhn, J.E. (2006) Electromyographic analysis of physical examination tests for type II superior labrum anterior-posterior lesions. *Journal of Shoulder and Elbow Surgery* 15(5):576-579. PMC-ID 16979052.
54. Langenderfer, J.E., Patthanacharoenphon, C., Carpenter, J.E., and Hughes, R.E. (2006) Variation in external rotation moment arms among sub-regions of supraspinatus, infraspinatus, and teres minor muscles. *Journal of Orthopaedic Research* 24(8):1737-1744. PMC-ID 16779813.
55. Lungren, M.P., Smith, D., Carpenter, J.E., and Hughes, R.E. (2006) Fall-related rotator cuff tears. *Journal of Musculoskeletal Research* 10(2):75-82.

56. Gatti, C.J., Dickerson, C., Chadwick, E.K., Mell, A.G. and Hughes, R.E. (2007) Comparison of model-predicted and measured moment arms for the rotator cuff muscles. *Clinical Biomechanics* 22:639-644. PMC-ID 17395346.
57. Dickerson, C.D., Chaffin, D.B., and Hughes, R.E. (2007) A mathematical musculoskeletal shoulder model for proactive ergonomic analysis. *Computer Methods in Biomechanics and Biomedical Engineering* 10(6):389-400. PMC-ID 17891574.
58. Srinivasan, R.C., Lungren, M.P., Langenderfer, J.E., and Hughes, R.E. (2007) Fiber type composition and maximum shortening velocity of muscles crossing the human shoulder. *Clinical Anatomy* 20(2):144-149. PMC-ID 16795030.
59. Gatti, C.J., Doro, L.C., Langenderfer, J.E., Mell, A.G., Maratt, J.D., Carpenter, J.E., and Hughes, R.E. (2008) Evaluation of three methods for determining EMG-muscle force parameter estimates for the shoulder muscles. *Clinical Biomechanics* 23:166-174. PMC-ID 17945401.
60. Flieg, N.G., Gatti, C.J., Doro, L.C., Langenderfer, J.E., Carpenter, J.E., and Hughes, R.E. (2008) A stochastic analysis of glenoid inclination angle and superior migration of the humeral head. *Clinical Biomechanics* 23:554-561. PMC-ID 18280016.
61. Gatti, C.J., Scibek, J., Svintsitski, O., Carpenter, J.E., and Hughes, R.E. (2008) An integer programming models for optimizing shoulder rehabilitation. *Annals of Biomedical Engineering* 36(7):1242-53. PMC-ID 18398679.
62. Maratt, J.D., Peaks, Y-S, Doro, L.C., Karunakar, M.A., and Hughes, R.E. (2008) An integer programming model for distal humerus fracture fixation planning. *Computer Aided Surgery* 13(3): 139-47. PMC-ID 18432413.
63. Dickerson, C.R., Hughes, R.E., and Chaffin, D.B. (2008) Experimental evaluation of a computational shoulder musculoskeletal model. *Clinical Biomechanics* 23:886-894. PMC-ID 18502010.
64. Scibek, J.S., Mell, A.G., Downie, B.K., Carpenter, J.E., and Hughes, R.E. (2008) Shoulder kinematics in patients with full thickness rotator cuff tears following a subacromial injection. *Journal of Shoulder and Elbow Surgery* 17(1):172-81. PMC-ID 18036839.
65. Doro, L.C., Hughes, R.E., Miller, J.D., Schultz, K.F., Hallstrom, B.R., and Urquhart, A.G. (2008) The reliability of a kinematically-derived axis of the knee versus digitized anatomical landmarks using a knee navigation system. *The Open Biomedical Engineering Journal* 2: 52-56.
66. Doro, L.C., Hughes, R.E., and Urquhart, A.G. (2008) Enhancing a kinematically-derived axis of the knee using a knee navigation system. *Journal of Musculoskeletal Research* 11(3): 127-133.

67. Martus, J.E., Femino, J.E., Caird, M.S., Hughes, R.A., Browne, R.H., Farley, F.A. (2008) Accessory anterolateral facet of the pediatric talus: An anatomic study. *Journal of Bone and Joint Surgery – American Volume* 90(11): 2452-2459. PMC-ID 18978415.
68. Nelson, N.A. and Hughes, R.E. (2009) Quantifying relationships between selected work-related risk factors and back pain: A systematic review of objective biomechanical measures and cost-related health outcomes. *International Journal of Industrial Ergonomics* 39: 202-210.
69. Hughes, R.E. and Nelson, N.A. (2009) Estimating investment worthiness of an ergonomic intervention for preventing low back pain from a firm's perspective. *Applied Ergonomics* 40: 457-463. PMC-ID 19028380.
70. Gatti, C.J. and Hughes, R.E. (2009) Optimization of muscle wrapping objects using simulated annealing. *Annals of Biomedical Engineering* 37:1342-1347. PMC-ID: 19434495
71. Scibek, J.S., Carpenter, J.E., and Hughes, R.E. (2009) Rotator cuff tear pain and tear size and scapulohumeral rhythm. *Journal of Athletic Training* 44(2):148-159. PMC-ID: 19295959.