Committee on Energy and Commerce
U.S. House of Representatives

Witness Disclosure Requirement - "Truth in Testimony"
Required by House Rule XI, Clause 2(g)(5)

1. Your Name: William S. Marras		
2. Your Title: Professor and Executive Director & Scientific Director		
3. The Entity(ies) You are Representing: **The Ohio State University, Spine Research Institute**		
4. Are you testifying on behalf of the Federal, or a State or local government entity? state	**Yes** X	**No**
5. Please list any Federal grants or contracts, or contracts or payments originating with a foreign government, that you or the entity(ies) you represent have received on or after January 1, 2015. Only grants, contracts, or payments related to the subject matter of the hearing must be listed.		
6. Please attach your curriculum vitae to your completed disclosure form.		

Signature:_ 

_____Date:_June 7, 2017_____

WILLIAM S. MARRAS

CONTACT

SPINE RESEARCH INSTITUE
The Ohio State University
1971 Neil Avenue
Columbus, Ohio 43210

[redacted]

EDUCATION

Ph.D.	Major: Bioengineering and Ergonomics July 1982 Wayne State University Detroit, Michigan
M.S.I.E.	Industrial Engineering Major: Human Factors Engineering June 1978 Wayne State University Detroit, Michigan
B.S.	Systems Engineering - Human Factors Engineering June 1976 Wright State University Dayton, Ohio

HONORARY DEGREES

Dr. Sci. (honoris causa)	University of Waterloo October 23, 2004 Waterloo, Ontario Canada

LICENSURE

CPE	Board Certified Ergonomist (Certified Professional Ergonomist) Certification Number 153
F. Erg. S.	(Professional Ergonomics Registration) The Ergonomics Society United Kingdom

ACADEMIC POSITIONS

2014 – 2017	Visiting Eminent Professor College of Engineering Texas A&M University
2014 to present	Professor (Adjunct) Department of Neurosurgery The Ohio State University
2012 to present	Executive Director and Scientific Director Spine Research Institute The Ohio State University
2007 to present	Director Center for Occupational Health in Automotive Manufacturing (COHAM) The Ohio State University
2005 to present	Professor (Adjunct) Department of Orthopaedic Surgery College of Medicine The Ohio State University
1998 to present	Honda Chair Professor (endowed chair) College of Engineering The Ohio State University
1992 to present	Professor Department of Integrated Systems Engineering The Ohio State University
	Director Biodynamics Laboratory The Ohio State University

Executive Director
Institute for Ergonomics
The Ohio State University

Professor (Adjunct)
Department of Physical Medicine
The Ohio State University

Professor (Adjunct)
Department of Biomedical Engineering
The Ohio State University

1987 to 1992 Associate Professor
Department of Industrial and Systems Engineering
The Ohio State University

Director
Biodynamics Laboratory
The Ohio State University

Associate Professor
Department of Physical Medicine
The Ohio State University

Associate Professor
Biomedical Engineering Center
The Ohio State University

1982 to 1987 Assistant Professor
Department of Industrial and Systems Engineering
The Ohio State University

Director
Biodynamics Laboratory
The Ohio State University

Assistant Professor
Department of Physical Medicine
The Ohio State University

1981 to 1982 Research Associate (Principal Investigator)
Wayne State University
Directing research on the biomechanics of back motion for the Rehabilitation Institute Foundation

1978 to 1981	Instructor Wayne State University Taught probabilistic and statistical methods for engineers, Human Factors Engineering and Work Measurement Research Associate Investigations of the Static Muscle Strength Control System (Sponsored by the U.S. Air Force) Principal Investigator Strength Testing of Aging Effects (Sponsored by the Institute of Gerontology) Co-Investigator Investigation of Dynamic Testing of Human Lifting Strength (National Institute of Occupational Safety and Health)
Military	Ohio Air National Guard, 1971-1977 251st Headquarters Communication Group Rank: Sergeant, Honorable Discharge December 1977

PROFESSIONAL SOCIETY MEMBERSHIPS

American Society of Biomechanics (ASB)
American Industrial Hygiene Association (AIHA)
Ergonomics Society
Human Factors and Ergonomics Society (HFES)
International Society of Biomechanics (ISB)
Institute of Industrial Engineers (IIE)
International Ergonomics Association (IEA)
International Foundation for Industrial Ergonomics and Safety Research (IFIESR)
International Society for the Study of the Lumbar Spine (ISSLS)
Orthopaedic Research Society (ORS)
International Commission on Occupational Health (ICOH)
North American Spine Society (NASS)
New York Academy of Sciences
National Academy of Engineering (NAE)
American Association for the Advancement of Science (AAAS)

PROFESSIONAL SERVICE

Society Service

Delegate to NATO Symposium on Anthropometry and Biomechanics (1980)
Chairman, Ergonomics Committee, Ohio Safety and Health Congress (1985-1987)

Chairman, Ergonomics Division, Institute of Industrial Engineers, Fall Conference (1986)
Chairman of Z-94 ANSI Subcommittee on Industrial Engineering Terminology for Anthropometry, Biomechanics and Human Factors (1985-1991)
Research Officer, IIE Human Factors Technical Group (1987-1989)
Ergonomics Committee, American Industrial Hygiene Association (1984-present)
Assistant Program Chairman, American Industrial Hygiene Association (1989-1990)
Board of Directors, Mid Central Ergonomics/Human Factors Conf. (1983-1987)
Industrial Ergonomics Technical Group, Human Factors Society (1982-present)
Chairman, Industrial Ergonomics Technical Group, Human Factors Society, (1989-1990)
Program Chairman, Ergonomics Committee, American Industrial Hygiene Association (1989-1990)
Chairman, Ergonomics Committee, American Industrial Hygiene Association (1990-1991)
Technical Program Chair, International Ergonomics Association World Conference '93 on Ergonomics of Materials Handling, June 14-17, 1993
Food Marketing Institute Ergonomics Task Force, (1989-1994)
Technical Program Chair, Human Factors and Ergonomics Society, Industrial Ergonomics Technical Group (1996-1997)
Executive Committee, Midwestern United States Representative, International Society for the Study of the Lumbar Spine (ISSLS) (2001-2004)
Research Needs Committee co-chair (occupational issues) American Association of Orthopaedic Surgeons (2001-2003)
Outcomes Compendium Task Force, North American Spine Society (2003-2006)
International Society for the Study of the Lumbar Spine (ISSLS) Surgical Course Committee Co-Chair (2006-2012)
HFES Delegate to IEA (chairman) 2006-2009
Executive Committee, Scientific Research Chair, International Society for the Study of the Lumbar Spine (ISSLS) (2004-2012)
Secretary-Treasurer, Human Factors and Ergonomics Society, 2007
Executive Council, Human Factors and Ergonomics Society, 2006-2008
President Elect, Human Factors and Ergonomics Society, 2014-2015
President, Human Factors and Ergonomics Society, 2015-2016
Past President, Human Factors and Ergonomics Society, 2016-2017

Editorial Board Service

Editorial Board, *Human Factors*, 1986 - 1993, 1995 - present
Editorial Board, *International Journal of Industrial Ergonomics*, 1985 - 1993
Editorial Board (Advisory Editorial Board), *Spine*, 1993 - 2004
Medical Advisory Board, *Healthwise*, 2002-present
Editorial Board (Associate Editorial Board), *Spine*, 2004 – 2005
Deputy Editor, *Spine,* 2006 – present
Editorial Board, *Clinical Biomechanics*, 1995-present
Editorial Board, *Occupational Ergonomics*, 1996-present
Editorial Board, *Journal of Electromyography and Kinesiology*, 1998-present

Advisory Board, *Journal of Electromyography and Kinesiology*, 1999-present
Editorial Board, *The Spine Journal*, 2000-present
Editorial Board, *European Spine Journal*, 2007-present
Editorial Board, *Human Factors and Ergonomics in Manufacturing,* 1997-present
Department Editor (Ergonomics and Human Factors), *IIE Transactions,* 1992-1996
Consulting Editor, *Ergonomics*, 1998-2007
Senior Editor, *Theoretical Issues in Ergonomics Science*, 2000-present
Associate Editor, *Human Factors,* 2001-2009
Editor-in-Chief, *Human Factors,* 2010 – 2013
Track Editor, *Human Factors,* 2014 – present

Government/National Service

Integrated Ergonomic Modeling Committee, National Academy of Sciences (1985-1986)
NIOSH-SOH Study Section, Proposal Reviewer (1991- 1998)
National Academies (National Research Council) Steering Committee on Work-Related Musculoskeletal Disorders (1998-1999)
Member, National Academies (National Research Council) Committee on Human Factors (1999-2012)
Member, National Academies (National Research Council/Institute of Medicine) Musculoskeletal Disorders Committee, (1999-2001)
Chair, National Academies (National Research Council) Committee on Human Factors (2006-2008)
Member, National Academies (National Research Council) Recruitment of Youth in the Military Committee (2004-2006)
Member, NIOSH–North American Research Agenda (NORA) Musculoskeletal Committee (1997-2003)
Chair, National Academies (National Research Council) Committee on Human-Systems Integration (2009-2010)
NIOSH–North American Research Agenda (NORA II) Manufacturing Sector Committee (2010 - 2011)
Chair, National Academies (National Research Council) Board on Human-Systems Integration (2010-2011)
Member, The National Academies (National Academy of Engineering) Soldier Systems Panel (2009-present)
Member, The National Academies, (National Research Council) Advisory Committee Division of Behavioral and Social Sciences and Education (DBASSE) (2012-2017)
Member, National Academies (National Academy of Engineering) peer review committee (2011-2014)
Chair, National Academies, (National Research Council) Essential Components of Self-Escape in Mining Committee (2011- 2013)
Member, National Academies Panel on Ballistics Science and Engineering at the Army Research Laboratory (2013-present)
Member, The National Academies of Sciences, Engineering, and Medicine, Gulf Research Program Advisory Board (October 1, 2015- September 30, 2018)
Member, NIOSH–North American Research Agenda (NORA III) Musculoskeletal Health (MUS) Council (2016 - present)

University Service

Biomedical Engineering Center Coordinating Committee, The Ohio State University (1982-1988)
Graduate Faculty (Category III), The Ohio State University, 1983
College of Engineering's Intellectual Property Council (2003-present)
College of Engineering Research Committee (2000-present)
University College of Engineering Dean Search Committee (2003)
Search Committee for Chair of Orthopaedic Surgery Department (2006)
Faculty Advisory Committee, Center for Automotive Research (CAR) 2007-2010
College of Engineering Promotion and Tenure Committee (2007-2009)
College of Engineering Dean Search Committee (2009-2011)
College Center Directors Committee (2011-2013)
College Research Committee (2013-present)
University Senate (2015-2017)
University Senate Research Committee (2017-2020)

HONORS

Fellow

Fellow, Human Factors and Ergonomics Society, Santa Monica, CA (1995)
Fellow, Ergonomics Society, Loughborough, UK (1999)
Fellow, American Institute for Medical and Biological Engineering (1999)
Fellow, International Ergonomics Association (IEA), (2007)
Fellow, American Industrial Hygiene Association (AIHA), (2010)
Fellow, American Association for the Advancement of Science (AAAS) (2013)
Fellow and Eminent Scholar, Texas Institute for Advanced Study (TIAS) (2015)

International Awards

1993 Volvo Award for Low Back Pain Research: Bioengineering, Gotenborg, Sweden
1993 Vienna Award for Physical Medicine, Vienna, Austria
Best Paper Award (2000), The International Society for the Study of the Lumbar Spine, Adelaide, Australia
2002 Volvo Award for Low Back Pain Research in Biomechanics, Gotenborg, Sweden
2002 Outstanding Poster Award, North American Spine Society, Montreal, Canada
2003 Best Poster Award, International Society for the Study of the Lumbar Spine Annual Meeting, Vancouver, Canada
2003 Liberty Mutual Prize in Occupational Safety and Ergonomics, International Ergonomics Association, Seoul, Korea
2004 Honorary Doctor of Science Degree, Waterloo University, Ontario Canada
2013 Liberty Mutual Award (best paper published in *Ergonomics* in 2012) “A strategy for human factors/ergonomics: developing the discipline and profession.” Jan Dul, Ralph Bruder, Peter Buckle, Pascale Carayon, Pierre Falzon, William S. Marras,

John R. Wilson & Bas van der Doelen

National Awards

1992 Dr. David F. Baker Distinguished Research Award, Institute of Industrial Engineers, Atlanta GA
Jack A. Kraft Innovator Award (1999), The Human Factors and Ergonomics Society, Houston, TX
2003 Alice Hamilton Science Award, (Outstanding Scientific Publication) National Institute for Occupational Safety and Health (NIOSH), Washington, D.C.
2003 Distinguished Engineering Alumni Achievement Award, Wayne State University, Detroit,MI
Wayne State University College of Engineering Hall of Fame (inducted 2003)
2004 Bernice Owen Award for Research, Orlando, FL
National Academy of Engineering (elected 2009)
2009 Paul M. Fitts Education Award, Human Factors and Ergonomics Society, Santa Monica, CA
2010 Wright State University Outstanding Alumni Award

Ohio State University Awards

1987 College of Engineering Research Award
Battelle Professor (1986-1987)
1992 College of Engineering Lumley Research Award
1996 College of Engineering Lumley Research Award
Designated Chair of the Biodynamics Laboratory sponsored by NCR Corporation, Atlanta GA (1993-1996)
Honda Endowed Chair in Transportation (Ergonomics) (1998-present)
2004 College of Engineering Lumley Research Award
The Clara M. and Peter L. Scott Award for Outstanding Academic Achievement (2009)
2017 Distinguished Scholar Award

PATENTS

Apparatus for Monitoring Motion Components of the Spine
Patent No. 5,012,819

Apparatus for Monitoring the Motion of the Lumbar Spine
Patent No. 5,094,249

Apparatus for Monitoring the Motion Components of the Spine
Patent No. 5,143,088

CONSULTING (selected)

FORD Motor Company, Dearborn, MI
National Beef Packing Company, Liberal, KS
Occupational Safety and Health Administration (OSHA), Washington D.C.
U. S. Department of Labor, Philadelphia, PA
Industrial Commission of Ohio, Columbus, OH
Institute for Behavioral Medicine, Providence, RI
National Institute for Occupational Safety and Health, Cincinnati, OH
RCA Corporation, Columbus OH
PPG Industries, Delaware OH
Food Marketing Institute (FMI), Washington D.C.
Ross Laboratories, Columbus, OH
Ametek Electric, Cambridge & Kent, OH, Racine WI, Grahm NC, Woostock NY
Big Bear Food Warehouse, Columbus, OH
National Association of Chain Drug Stores, Washington D.C.
Hanaford Brothers Food Distribution, Portland ME
Steelcase, Grand Rapids, MI (Scientific Advisory Board)
Biomec, Cleveland, OH (Scientific Advisory Board)
Creative Ergonomic Solutions, Detroit, MI, (Board of Directors)
Honda of America, Marysville, OH
Liberty Pacific Medical Imaging, Seattle, WA, (Scientific Advisory Board)
The Limited (Columbus, OH)
Target Inc. (Minneapolis, MN)
Sears, Inc. (San Francisco, CA)
Safeway, Inc. (San Francisco, CA)
Costco, Inc. (San Francisco, CA)
Healthwise (Medical Reviewer) (Boise, ID)

PUBLICATIONS

Refereed Journals (as of February 2017)

ISI h-index: 43; over 6,400 citations
Google h-index: 68; over 15,600 citations

1. Marras, W. S., and K. H. E. Kroemer, (1980), "A Method to Evaluate Human Factors/Ergonomics Design Variables of Distress Signals," *Human Factors*, 22(4), 389-400.

2. Kroemer, K. H. E. and W. S. Marras, (1980), "Ergonomics of Visual Emergency Signals," *Journal of Applied Ergonomics*, 11(3), 137-144.

3. Kroemer, K. H. E. and W. S. Marras, (1980), "Towards an Objective Assessment of the Maximal Voluntary Contraction Component in Routine Muscle Strength Measurements," *European Journal of Applied Physiology*, 45, 1-9.

4. Kroemer, K. H. E., and W. S. Marras, (1981), "Evaluation of Maximal and Sub-Maximal Static Muscle Exertions," *Human Factors*, 23(6), 643-654.

5. Marras, W. S., King, A. I., and R. L. Joynt, (1984), "Measurements of Loads on the Lumbar Spine Under Isometric and Isokinetic Conditions," *Spine*, 9(2), 176-188.

6. Marras, W. S., Joynt, R. L., and A. I. King, (1985), "The Force Velocity Relation and Intra-abdominal Pressure During Lifting Activities," *Ergonomics*, 23(3), 603-613.

7. Marras, W. S., and T. H. Rockwell, (1986), "An Experimental Evaluation of Method and Tool Effects in Spike Maul Use," *Human Factors*, 28(3), 267-281.

8. Rockwell, T. H., and W. S. Marras, (1986), "An Evaluation of Tool Design and Method of Use of Railroad Leverage Tools on Back Stress and Tool Performance," *Human Factors*, 28(3) 303-315.

9. Marras, W. S., and P. E. Wongsam, (1986), "Flexibility and Velocity of the Normal and Impaired Lumbar Spine," *Archives of Physical Medicine and Rehabilitation*, 67, 213-217.

10. Marras, W. S., Wongsam, P. E., and S. L. Rangarajulu, (1986), "Trunk Motion During Lifting: The Relative Cost," *International Journal of Industrial Ergonomics*, 1(2), 103-113.

11. Marras, W. S., Rangarajulu, S. L., and P. E. Wongsam, (1987), "Trunk Force Development During Static and Dynamic Lifts," *Human Factors*, 29(1), 19-29.

12. Marras, W. S., (1987), "Trunk Motion During Lifting: Temporal Relations Among Loading Factors," *International Journal of Industrial Ergonomics*, 1(3), 159-167.

13. Marras, W. S., Rangarajulu, S. L. and S. A. Lavender, (1987), "Trunk Loading and Expectation," *Ergonomics*, 30(3), 551-562.

14. Kim, J. Y. and W. S. Marras, (1987), "Quantitative Trunk Muscle Electromyography During Lifting at Different Speeds," *International Journal of Industrial Ergonomics*, 1(3), 219-229.

15. Treaster, D., and W. S. Marras, (1987), "Measurement of Seat and Back Pressure Distributions," *Human Factors*, 29(5), 563-575.

16. Marras, W. S., Bobick, T. G., Lavender, S. A., Rockwell, T. H., and R. L. Lundquist, (1988), "Risks of Hand Tool Injury in U.S. Underground Mining from 1978 through 1983, Part I: Coal Mining," *Journal of Safety Research*, 19, 71-85.

17. Marras, W. S., Lavender, S. A., Bobick, T. G., Rockwell, T. H., and R. L. Lundquist, (1988), "Risks of Hand Tool Injury in U.S. Underground Mining from 1978 through 1983, Part II: Metal-Non Metal Mining," *Journal of Safety Research*, 19, 115-124.

18. Marras, W. S., and C. H. Reilly, (1988), "Networks of Internal Trunk Loading Activities Under Controlled Trunk Motion Conditions," *Spine*, 13(6), 661-667.

19. Marras, W. S., (1988), "Predictions of Forces Acting Upon the Lumbar Spine Under Isometric and Isokinetic Conditions: A Model-Experiment Comparison," *International Journal of Industrial Ergonomics*, 3(1), 19-27.

20. Gallagher, S., Marras, W. S., and T. G. Bobick, (1988), "Lifting in Stooped and Kneeling Postures: Effects on Lifting Capacity, Metabolic Costs and Electromyography of Eight Trunk Muscles," *International Journal of Industrial Ergonomics*, 3(1), 65-76.

21. Reilly, C. H., and W. S. Marras, (1989), "SIMULIFT: A Simulation Model of Human Trunk Motion During Lifting," *Spine*, 14(1), 5-11.

22. Lavender, S. A., Mirka, G. A., Schoenmarklin, R. W., Sommerich, C. M., Sudhaker, L. R., and W. S. Marras, (1989), "An Investigation into the Effects of Preview and Symmetry on Trunk Loading," *Human Factors*, 31(1) 101-115.

23. Schoenmarklin, R. W. and W. S. Marras, (1989), "Effects of Angle and Work Orientation on Hammering: I. Wrist Motion and Hammering Performance," *Human Factors*, 31(4), 397-411.

24. Schoenmarklin, R. W. and W. S. Marras, (1989), "Effects of Angle and Work Orientation on Hammering: II. Muscle Fatigue and Subjective Ratings of Body Discomfort," *Human Factors*, 31(4), 413-420.

25. Gray, B. A., and W. S. Marras, (1989), "An Experimental Analysis of Railroad Spike Maul Methods," *Human Factors*, 31(3), 335-344.

26. Marras, W. S. and G. A. Mirka, (1989), "Trunk Strength During Asymmetric Trunk Motion," *Human Factors*, 31(6), 667-677.

27. Mirka, G. A. and W. S. Marras, (1990), "Lumbar Motion Response to a Constant Load Velocity Lift," *Human Factors*, 32(4), 493-501.

28. Marras, W. S. and G. A. Mirka, (1990), " Trunk Responses to Asymmetric Acceleration," *Journal of Orthopaedic Research*, 8(6), 824-832.

29. Lavender, S. A. and W. S. Marras, (1990), "An Electromyographic Analysis of an Ergonomic Intervention with the Jack Leg Drill," *Applied Ergonomics*, 21(2), 90-100.

30. Marras, W.S., (1990), "A Guide to Industrial Applications of Electromyography," *International Journal of Industrial Ergonomics*, 6, 89-93.

31. Kroemer, K. H. E., Marras, W. S., McGlothlin, J. D., McIntyre, D. R., and M. Nordin, (1990), "On the Measurement of Human Strength," *International Journal of Industrial Ergonomics*, 6, 199-210.

32. Ahern, D. K., Follick, M. J., Lucas, P., Parziale, J., Marras, W. S., Wilkin D. and Wolf, S., (1990), "Interdisciplinary perspectives on mechanisms and management of low back pain," *Rhode Island Medical Journal*, January, 21-31.

33. Marras, W. S. and Ferguson, S. A. and Simon S. R. (1990), "Three dimensional dynamic motor performance of the normal trunk," *International Journal of Industrial Ergonomics*, 6, 211-224.

34. Marras, W. S. and S. A. Lavender, (1991), "The Effects of Method of Use, Tool Design, and Roof Height on Trunk Muscle Activities During Underground Scaling Bar Use," *Ergonomics*, 34(2), 221-232.

35. Marras, W. S. and Sommerich, C. M., (1991), "A Three Dimensional Motion Model Of Loads On The Lumbar Spine, Part I: Model Structure," *Human Factors*, 33(2), 123-137.

36. Marras, W. S. and Sommerich, C. M., (1991), "A Three Dimensional Motion Model Of Loads On The Lumbar Spine, Part II: Model Validation," *Human Factors*, 33(2), 139-149.

37. Marras, W. S. (1991), "A Model for the Objective Assessment of Automobile Restraint Systems," *International Journal of Industrial Ergonomics,* 8(1), 59-65.

38. Marras, W. S. and G. A. Mirka, (1992), "A Comprehensive Evaluation of Asymmetric Trunk Motions," *Spine* 17(3), 318-326.

39. Marras, W.S. Fathallah, F., Miller R.J., Davis S.W. and G.A. Mirka (1992), "Accuracy of a Three Dimensional Lumbar Motion Monitor for Recording Dynamic Trunk Motion Characteristics," *International Journal of Industrial Ergonomics*, 9(1), 75-87.

40. Sommerich, C.M. and W.S. Marras (1992), "Temporal Patterns of Trunk Muscle Activity Throughout a Dynamic, Asymmetric Lifting Motion," *Human Factors*, 34(2), 215-230.

41. Ferguson S.A., W.S. Marras and T.R. Waters (1992), "Quantification of Back Motion During Asymmetric Lifting," *Ergonomics*, 35(7/8), 845-859.

42. Ferguson, S.A., and Marras W.S. (1992), “Quantification of Velocity Coupling During Asymmetric Lifting,” *International Journal of Industrial Ergonomics*, 10, 207-215.

43. Lavender, S.A., Marras, W.S., and R.A. Miller (1993), "The Development of Preparatory Response Strategies in Anticipation of Sudden Loading to the Torso," *Spine*, 18(14), 2097-2105.

44. Sommerich, C.M., McGlothlin, J.D., and W.S. Marras (1993), "Occupational Risk Factors Associated with Soft Tissue Disorders of the Shoulder: A review of Recent Investigations in the Literature," *Ergonomics*, 36(6), 697-717.

45. Marras, W. S., McGlothlin, J. D., McIntyre, D. R., Nordin, M., and Kroemer, K. H. E., (1993), "Dynamic Measures of Low Back Performance," *American Industrial Hygiene Association Ergonomics Guide*, ISBN 0-932627-52-8, Stock No. 174-ER-93.

46. Marras, W.S. and Schoenmarklin, R.W., (1993), "Wrist Motion in Industry," *Ergonomics*, 36(4), 341-351.

47. Schoenmarklin, R.W. and Marras, W.S., (1993), "Dynamic Capabilities of the Wrist Joint in Industrial Workers," *International Journal of Industrial Ergonomics*, 11(3), 207-224.

48. Marras, W.S., Lavender, S.A, Leurgans, S., Rajulu, S., Allread, W.G., Fathallah F. and Ferguson, S.A., (1993), "The Role of Dynamic Three Dimensional Trunk Motion in Occupationally-Related Low Back Disorders: The Effects of Workplace Factors, Trunk Position and Trunk Motion Characteristics on Injury," *Spine,* 18(5), 617-628.

49. Granata, K.P. and W.S. Marras, (1993), "An EMG-Assisted Model of Loads on the Lumbar Spine During Asymmetric Trunk Extensions," *Journal of Biomechanics*, 26(12), 1429-1438.

50. Marras, W.S. and Kim, J. Y. (1993), "Anthropometry of Industrial Populations," *Ergonomics*, 36(4), 371-378.

51. Marras, W.S. and G.A. Mirka, (1993), "Electromyographic Studies of the Lumbar Trunk Musculature During the Generation of Low Level Trunk Acceleration," *Journal of Orthopaedic Research*, 11(6), 811-817.

52. Mirka G.A., and Marras, W.S. (1993), "A Stochastic Model of Trunk Muscle Activities During Trunk Bending," *Spine*, **Volvo Award for Low Back Pain Research**, 18(11), 1396-1409.

53. Lavender, S.A, and Marras, W.S. (1993),"The Use of Turnover Rate as a Passive Surveillance Indicator For Potential Low Back Disorders," *Ergonomics,* 37(6), 971-978.

54. Marras. W.S., Parnianpour, M., Ferguson, S.A., Kim, J.Y., Crowell, R.R., and Simon, S.R. (1993), "Quantification and Classification of Low Back Disorders Based on Trunk Motion," *European Journal of Physical Medicine*; **Vienna Physical Medicine Award 1993**, 3(6), 218-235.

55. Gallagher, S., Hamrick, C. A., Love, A. C. and Marras, W. S., (1994), "Dynamic Biomechanical Modeling of Symmetric and Asymmetric Lifting Tasks in Restricted Postures," *Ergonomics*, 37(8), 1289-1310.

56. Kim, J.Y., Stuart-Buttle, C., and Marras W.S. (1994), "The Effects of Mats on Back and Leg Fatigue," *Applied Ergonomics*, 25(1), 29-34.

57. Schoenmarklin, R.W., Marras, W.S., and Leurgans S.E. (1994), "Industrial Wrist Motions and Risk of Cumulative Trauma Disorders in Industry," *Ergonomics*, 37(9), 1449-1459.

58. Marras, W.S., Parnianpour, M. Kim, J.Y., Ferguson, S.A., Crowell, R.R, and Simon, S.R. (1994) "A Normal Database of Dynamic Trunk Motion Characteristics During Repetitive Trunk Flexion and Extension as A Function of Task Asymmetry, Age and Gender," *IEEE Transactions,* 2(3), 137-146.

59. Marras, W.S., Lavender, S.A, Leurgans, S., Fathallah F., Allread, W.G., Ferguson, S.A., and Rajulu, S. (1995), "Biomechanical Risk Factors for Occupationally Related Low Back Disorder Risk," *Ergonomics*, 38(2), 377-410.

60. Lavender, S.A., and Marras W.S. (1995), "The Effects of Temporal Warning Stimulus on the Biomechanical Preparations for Sudden Loading," *Journal of Electromyography and Kinesiology*, 5(1) 45-56.

61. Marras, W.S., Schoenmarklin, R.W., Greenspan, G. J., and K.R. Lehman (1995), "Quantification of Wrist Motions During Scanning," *Human Factors*, 37(2) 412-423.

62. Parnianpour, M., Kaushik, G., Barin, K., and Marras, W.S. (1995) "Quantification of Trunk Motion in Response to Complex Platform Perturbations While Holding Weights in an Upright Posture," *IEEE Transactions,* (in review).

63. Marras, W.S., Parnianpour, M., Ferguson, S.A., Kim, J.Y., Crowell, R.R, Bose, S and Simon, S.R. (1995), "The Classification of Anatomic and Symptom Based Low Back Disorders Using Motion Measure Models," *Spine,* 20(23), 2531-2546.

64. Marras, W.S. and Granata, K.P. (1995), "A Biomechanical Assessment and Model of Axial Twisting in the Thoraco-Lumbar Spine," *Spine,* 20(13), 1440-1451.

65. Granata, K.P. and Marras, W.S. (1995), "An EMG-Assisted Model of Trunk Loading during Free-Dynamic Lifting," *J. Biomechanics,* 28(11), 1309-1317.

66. Granata, K.P., and Marras, W.S. (1995), "The Influence of Trunk Muscle Coactivity Upon Dynamic Spinal Loads," *Spine*, 20(8), 913-919.

67. Fathallah, F., Marras, W.S., and Wright, L.P. (1995), "Diurnal Changes in Trunk Motion Throughout the Day," *J. Spinal Disorders*, 8(1), 20-25.

68. Marras, W.S. and Mirka G.A. (1996), "Intraabdominal Pressure During Extension Motions," *Clinical Biomechanics*, 11(5), 267-274.

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