JINGZHI LIU

CURRICULUM VITAE

PRESENT POSITIONS:

Project Staff	Dept. of Biomedical Engineering, Lerner Research Institute Cleveland Clinic Foundation
Adjunct Assistant Professor	Dept. of Physics, Case Western Reserve University
Instructor	Cleveland Clinic Lerner College of Medicine-CWRU
Faculty member	Joint Applied Biomedical Engineering Program, CCF/CSU
University Graduate Faculty	Depts. of Chemical Engineering/Physics, Cleveland State University

PERSONAL INFORMATION:

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DOB: 02/06/1970 **Visa:** Permanent Resident of USA

EDUCATION:

- Case Western Reserve University, Dept of Physics **Ph.D.**, (Biomedical) Physics 9/1995-5/2000
  Cleveland Clinic Foundation, Dept of Biomedical Engineering
  Cleveland, OH, USA
- The Chinese Academy of Sciences **M.S.**, Physics 9/1992-7/1995
  Institute of Theoretical Physics, Beijing, China
- University of Science and Technology of China **B.S.**, Physics 9/1987-7/1992
  Dept of Modern Physics, Hefei, China

PROFESSIONAL EXPERIENCE:

- Cleveland Clinic Foundation Project Staff 2000-Date
  Lerner Research Institute
  Dept. of Biomedical Engineering
- Case Western Reserve University Adjunct Assistant Professor 2000-Date
  Dept. of Physics
- Cleveland Clinic Lerner College of Medicine Instructor 2004-Date
  - Case Western Reserve University
- CCF/CSU
  Joint Applied Biomedical Engineering Program Faculty member 2001-Date
- Cleveland State University
  Depts. of Chemical Engineering/physics University Graduate Faculty 2001-Date

• Cleveland Clinic Foundation Dept. of Biomedical Engineering	Research Engineer	1998-2000
• Cleveland Clinic Foundation Dept. of Biomedical Engineering	Research/Teaching Assistant	1997-2000
• Marconi Medical System, Inc. (Picker Int'l) MEG/EEG Division	Research Assistant	1996-1997
• Case Western Reserve University Dept. of Physics	Research/Teaching Assistant	1995-2000
• The Chinese Academy of Sciences Institute of Theoretical Physics	Research/Teaching Assistant	1992-1995
• Univ. of Science & Technology of China Dept. of Modern Physics	Research Assistant	1991-1992

RESEARCH INTERESTS:

- Neuroimaging (fMRI/MRI, EEG, MEG)
- Biophysics of the neuromuscular system
- Development of new techniques/methods for studying the neuromuscular system

MEMBERSHIP OF PROFESSIONAL ORGANIZATIONS:

- Biophysical Society
- American Physical Society
- Society for Neuroscience
- Biomedical Engineering Society
- International Society for Magnetic Resonance in Medicine
- American Association for the Advancement of Science
- American Physiological Society
- International Brain Research Organization

PROFESSIONAL SERVICES:

- Guest reviewer for journals: *Journal of Neurophysiology, Muscle & Nerve, Brain Research families, etc.*
- Member of International Reviewers Panel for *Medical Science Monitor.*
- Member of the Review Panel for the *International Society for Magnetic Resonance in Medicine* (ISMRM) Annual Meetings: 2003, Toronto, Ontario, Canada; 2004, Kyoto, Japan; 2005, Miami, USA;
- Member of the *International Program Committee* for the International Conference on Biomechanics (BioMECH), International Association of Science and Technology for Development (IASTED): 2003, Rhodes, Greece; 2004, Honolulu, Hawaii, USA; 2005, Benidorm, Spain;

- Member of the organizing committee for the joint Fall meeting of the Ohio section of the *American Physical Society* and the Ohio section of the American Association of Physics Teachers at Case Western Reserve University, Cleveland, Ohio, USA, October 17-18, 2003.
- Member in the advisory committees for graduate and undergraduate students.

HONORS & AWARDS:

- 1987 Kang Youwei Prize, for outstanding high-school graduates (only 20 awardees), Qingdao, Shandong Province, & Nanhai, Guangdong Province, China
- 1987-1992 Excellent student scholarship, University of Science and Technology of China, Hefei, China
- 1992 Zhang Zhongzhi Prize, for outstanding graduates, University of Science and Technology of China, Hefei, China
- 1992-1995 Graduate student scholarship, Institute of Theoretical Physics, The Chinese Academy of Sciences, Beijing, China
- 1995-2000 Graduate student scholarship, Department of Physics, Case Western Reserve University, Cleveland, Ohio
- 2004 SCBA award, 10th SCBA International Symposium

GRANTS:

As Principal Investigator:

1) **1 R01 AG025799-01, NIH/NIA (National Institute on Aging)** (Liu)
   Title of Grant: Aging effects on cortical and neuromuscular couplings
   Major Goal: To investigate aging effects on cortical and neuromuscular coupling using fMRI and EEG, and EMG
   Funding Period: pending

2) **1 R01 NS048165-01, NIH/National Institute of Neurological Disorders and Stroke** (Liu)
   Title of Grant: Brain command quantification and muscle force modeling
   Major Goal: To study the time-dependency of the brain command during prolonged MVC motor tasks and to develop a muscle force model that can determine muscle parameters quantitatively and non-invasively
   Funding Period: pending

3) **1 R01 NS049182-01, NIH/NIBIB (National Institute of Biomedical Imaging and Bioengineering)** (Liu)
   Title of Grant: Brain structure identification using fuzzy logic
   Major Goal: To develop a fully automated method to identify and segment brain structures in MR images based on fuzzy-logic-encoded brain anatomical knowledge, and study age and gender effects on brain volume changes in the brain and brain structures
   Funding Period: pending

As Co-investigator:

4) **R01 NS 37400-01, NIH/NINDS** (Yue)

Title of Grant: Central nervous system and muscle fatigue
Major Goal: To determine the effects of muscle fatigue on human bran activation
Funding Period: 12/1/98 – 11/30/01 Total Cost: $650k
Role: major co-investigator, responsible for design of fMRI and EEG experiments, data acquisition and analysis, result report, conclusion drawing, and manuscript preparation

5) **R01 NS 35130-01, NIH** (Yue)
Title of Grant: Effects of mental training on voluntary muscle strength
Major Goal: To investigate neural mechanisms underlying mental training-induced voluntary muscle strength improvement
Funding Period: 2/1/97 – 1/31/01 Total Cost: $770k
Role: major co-investigator

6) **R01 HD 36725-01, NIH** (Yue)
Title of Grant: Mental-effort effect on large muscle strengthening
Major Goal: To determine the effects of mental effort during training on voluntary muscle strength improvement
Funding Period: 9/1/99 – 8/31/04 Total Cost: $1.14 M
Role: major co-investigator

7) **DAMD17-01-1-0665-02, Department of Defense (DoD)** (Yue)
Title: Neural mechanisms of chronic fatigue syndrome
Major Goal: to investigate neural mechanisms underlying chronic fatigue syndrome in military veterans and civilian patients
Funding Period: 4/1/02 – 3/31/05 Total Cost: $1.53 M
Role: major co-investigator

8) **B3388R, Department of Veterans Affairs** (Daly)
Title of Grant: CNS plasticity induced by motor learning technologies following stroke
Major Goal: To identify the nature of the therapy after stroke required to optimally facilitate CNS plasticity that can drive motor control most closely approximating normal
Funding Period: 1/1/2005 – 12/31/2009 Total Cost: $5M
Role: major co-investigator

TEACHING EXPERIENCE:

- **1995-date, Case Western Reserve University, Dept. of Physics (CWRU/PHYS)**

  - Physics 431/EBME 431: Physics of Imaging
    Magnetic Resonance Imaging (MRI): Physical Principles and Sequence Design
    (For graduate students in physics, engineering and medicine)
  - Special Topics:
    - Functional Magnetic Resonance Imaging (fMRI):
      Principle, Method and Application
  - Physics 113: Introductory Physics Laboratory
  - Physics 301: Advanced Laboratory Physics
  - Electromagnetism

- Quantum Mechanics
- Classical Mechanics

- **1998-date, Cleveland Clinic Foundation, Dept. of Biomedical Engineering (CCF/BME)**
  For graduate and undergraduate students from: Case Western Reserve University, Cleveland Clinic Foundation, and Cleveland State University (CSU)

  - Imaging Laboratory
    - Magnetic Resonance Imaging (MRI):
      Principle, method, and application in studies of human brain and muscles
    - Functional Magnetic Resonance Imaging (fMRI):
      Principle, method, and application in studies of human brain function
    - fMRI Experiments: protocol design, sequence design and accomplishment, machine functioning, data collection and management, data analysis, result evaluation and report
    - Software packages for fMRI data analysis (MEDx, FSL, BrainVoyager, etc)

  - EEG (Electroencephalography) Laboratory
    - Principle, method, and application in studies of human brain function
    - EEG Experiments: protocol design, equipment setup, data collection and management, data analysis, result evaluation and report
    - Software packages for EEG data analysis (CURRY, BESA, etc)
    - Inverse problem for source modeling and locating

- **2000-date, Faculty Member in the Joint Applied Biomedical Engineering Program**
  between CCF/BME and Cleveland State University/Dept. of Chemical Engineering
  Website: http://www.csuohio.edu/ccfabm/faculty.htm

- **2004-date,** Cleveland Clinic Lerner College of Medicine - Case Western Reserve University
  For the medical doctorial students in the joint MD degree program of CCF/CWRU to educate medical scientists

  - Research topics in neuromuscular system behavior, motor control and neuroscience using fMRI, MRI, EEG, and EMG

- **2000-date, Student Advisory:**

  Students in Doctor or Master programs:
  - Beth Lewandowski, M.S., 2000-2002
    Dept. of Biomedical Engineering, Case Western Reserve University
  - Zuyao Shan, D. Eng., 1999-2003
    Dept. of Chemical Engineering, Cleveland State University
    /Cleveland Clinic Foundation Joint Applied Biomedical Engineering Program
  - Luduan Zhang, Ph.D. candidate, 2000-
    Dept. of Biomedical Engineering, Case Western Reserve University
  - Bing Yao, Ph.D. candidate, 2000-
    Dept. of Physics, Case Western Reserve University
  - Haibin Huang, D. Eng. candidate, 2002-

Dept. of Chemical Engineering, Cleveland State University
/Cleveland Clinic Foundation Joint Applied Biomedical Engineering Program

- Tina Yang, D. Eng. candidate, 2004-
  Dept. of Chemical Engineering, Cleveland State University
  /Cleveland Clinic Foundation Joint Applied Biomedical Engineering Program

Undergraduate students:

- Sona Mehandru, B.A./B.S., senior project on fMRI and EEG
  Dept. of Physics, Case Western Reserve University, 2002-2003

Summer internship students:

- Yasuaki Harasaki, B.S. student, University of New York, 2000
- Kristen Salzberger, B.S. student, Dept. of Bioengineering, University of Toledo, 2001
- Jing Xu, M.S. student, Dept Computer/Information Science, Cleveland State University, 2002
- Chris Karakasis, B.S. student, Northwest University, 2003

MEETINGS/PRESENTATIONS:

Presentations at International Congresses

International Society for MR in Medicine	Sydney, Australia	1998
	Glasgow, UK	2001
	Honolulu, Hawaii	2002
	Kyoto, Japan	2004
International Conference on Functional Mapping of the Human Brain	Montreal, Canada	1998
	Dusseldorf, Germany	1999
Congress of SIROT/CSOS	Shanghai-Beijing, China	2000
XIII Congress of International Society of Electrophysiology and Kinesiology	Sapporo, Japan	2000
Congress of ICNA/AOCNA	Beijing, China	2002
10^{th} SCBA symposium	Beijing, China	2004

Presentations at Annual Meetings of National Societies

Society for Neuroscience	Los Angeles, CA	1998
	Miami Beach, FL	1999
	New Orleans, LA	2000
	San Diego, CA	2001
	Orlando, FL	2002
	New Orleans, LA	2003

Biomedical Engineering Society	Cleveland, OH	1998
American Congress of Physical Medicine and Rehabilitation	Seattle, Washington	1998
American Physical Society	Kent, OH Cleveland, OH	2001 2003

WORKSHOPS:

BrainMap'97 International Meeting	San Antonio, TX	1997
Clinical Functional MRI 2000	Harvard Medical School Cambridge, MA	2000
MRI Hardware Workshop	Cleveland, OH	2001

SEMINARS:

Imaging Seminar	Case Western Reserve University Dept. of Physics	1997-Date
Biomechanics Seminar Interdisciplinary Seminar Series	Cleveland Clinic Foundation Dept. of Biomedical Engineering	1997-Date
Biomedical Engineering Departmental Seminar	Cleveland Clinic Foundation Dept. of Biomedical Engineering	1999-Date
Dept of Rehab & Phys Med Departmental Seminar	Cleveland Clinic Foundation Dept of Rehab & Phys Med	1999-Date
Image Registration Seminar	Case Western Reserve University Dept of Biomedical Engineering	2000-Date
Epilepsy Grand Round	Cleveland Clinic Foundation Dept of Neurology	2001-Date

PATENTS:

1) US Patent Application file No. 01534, CCF-6006PV: Method and Apparatus for Brain Segmentation and Brain Volume Measurement.

PUBLICATIONS:

In Peer-Reviewed Journals

1) G. H. Yue, V. K. Ranganathan, V. Siemionow, **J. Z. Liu**, V. Sahgal: Older adults exhibit a reduced ability to fully activate their biceps brachii muscle. *Journal of Gerontology: Medical Sciences*, 54A (5): 249-253, 1999.

2) **J. Z. Liu,** T. H. Dai, T. Elster, V. Sahgal, R. W. Brown, G. H. Yue: Simultaneous measurement of human joint force, surface electromyograms, and functional MRI-measured brain activation. *Journal of Neuroscience Methods*, 101: 49-57, 2000.

3) G. H. Yue, **J. Z. Liu,** V. Siemionow, V. K. Ranganathan, T. C. Ng, V. Sahgal: Brain activation during human finger extension and flexion movements. *Brain Research*, 856: 291-300, 2000.

4) V. Siemionow, G. H. Yue, V. K. Ranganathan, **J. Z. Liu**, V. Sahgal: Relationship between motor activity-related cortical potential and voluntary muscle activation. *Experimental Brain Research*, 133(3): 303-311, 2000. DOI: 10.1007/s002210000382.

5) G. H. Yue, V. K. Ranganathan, V. Siemionow, **J. Z. Liu**, V. Sahgal: Evidence of inability to fully activate human limb muscle. *Muscle & Nerve*, 23: 376-384, 2000.

6) T. H. Dai, **J. Z. Liu,** V. Sahgal, R. W. Brown, G. H. Yue: Relationship between muscle output and functional MRI-measured brain activation. *Experimental Brain Research*, 140: 290-300, 2001. DOI: 10.1007/s002210100815.

7) V. K. Ranganathan, V. Siemionow, V. Sahgal, **J. Z. Liu**, G. H. Yue: Skilled finger movement exercise improves hand function. *Journal of Gerontology: Medical Sciences*, 56A (8): 518-522, 2001.

8) T. Fukuhara, M. G. Luciano, **J. Z. Liu**, G. H. Yue: Functional magnetic resonance imaging before and after ventriculoperitoneal shunting for hydrocephalus--case report. *Neurologia Medico-Chirurgica (Tokyo)*, 41(12): 626-630, 2001.

9) **J. Z. Liu**, R. W. Brown, G. H. Yue: A dynamical model of muscle activation, fatigue, and recovery. *Biophysical J.*, 82(5): 2344-2359, 2002.

10) **J. Z. Liu,** T. H. Dai, V. Sahgal, R. W. Brown, G. H. Yue: Nonlinear cortical modulation of muscle fatigue: a functional MRI study. *Brain Research*, 957: 320-329, 2002. (erratum: *Brain Research* 973: 307, 2003)

11) **J. Z. Liu,** L. D. Zhang, B. Yao, G. H. Yue: Accessory hardware for neuromuscular measurements during functional MRI experiments. *Magnetic Resonance Materials in Biology, Physics and Medicine*, 13: 164-171, 2002.

12) Z. Y. Shan, G. H. Yue, **J. Z. Liu**: Automated histogram-based brain segmentation in T1-weighted three-dimensional magnetic resonance head images. *NeuroImage* 17: 1587-1598, 2002. DOI: 10.1006/nimg.2002.1287.

13) **J. Z. Liu,** Z. Y. Shan, L. D. Zhang, V. Sahgal, R. W. Brown, G. H. Yue: Human brain activation during sustained and intermittent submaximal fatigue muscle contractions: an fMRI study. *Journal of Neurophysiology*, 90: 300 - 312, 2003.

14) **J. Z. Liu**, L. D. Zhang, G. H. Yue: Fractal dimension in human cerebellum measured by magnetic resonance imaging. *Biophysical Journal*, 85: 4041-4046, 2003.

15) **J. Z. Liu**, L. D. Zhang, R. W. Brown, G. H. Yue: Reproducibility of fMRI at 1.5 T in a strictly controlled motor task. *Magnetic Resonance in Medicine*, 52: 751-760, 2004.

16) V. K. Ranganathan, V. Siemionow, **J. Z. Liu**, V. Sahgal, G. H. Yue: From mental power to muscle power: Gaining strength by using the mind. *Neuropsychologia*, 42: 944-956, 2004.

17) Z. Y. Shan, **J. Z. Liu**, G. H. Yue: Automated human frontal lobe identification in MR images based on fuzzy-logic encoded expert anatomic knowledge. *Magnetic Resonance Imaging*, 22: 607-617, 2004.

18) **J. Z. Liu,** L. D. Zhang, B. Yao, V. Sahgal, G. H. Yue: Fatigue induced by intermittent maximal voluntary contractions is associated with significant losses in muscle output but limited reductions in functional MRI-measured brain activation level. *Brain Research*, in press, 2004.

19) Z. Y. Shan, **J. Z. Liu**, V. Sahgal, B. Wang, G. H. Yue: Selective atrophy of left hemisphere and frontal lobe of the brain in old men. *Journal of Gerontology: Biological Sciences*, in press, 2004.

20) **J. Z. Liu**, B. Yao, V. Siemionow, V. Sahgal, X. Wang, J. Sun, G. H. Yue: Minimal changes in initial cortical command but substantial declines in muscular output during severe muscle fatigue. *Journal of Neurophysiology*, in review, 2004.

21) **J. Z. Liu**, Q. Yang, B. Yao, G. H. Yue: Linear correlation between fractal dimension of EEG signal and handgrip force. *Biophysical Journal*, in review, 2004.

22) **J. Z. Liu**, B. Lewandowski, C. Karakasis, B. Yao, V. Sahgal, G. H. Yue: Fatigue-induced rotation of cortical activation center: an EEG inverse problem study. *Journal of Neuroscience*, in review, 2004.

23) B. Yao, G. H. Yue, R. W. Brown, S. Salenius, R. Hari, **J. Z. Liu**: Rectification versus non-rectification: EMG signal processing in terms of coherence with EEG and MEG signals. *Journal of Neurophysiology*, in review, 2004.

24) S. Peltier, S. M. LaConte, D. Niyazov, **J. Z. Liu**, V. Sahgal, G. H. Yue, X. Hu: Reductions in interhemispheric motor cortex functional connectivity after muscle fatigue. *Journal of Neuroscience*, in review, 2004.

25) Z. Y. Shan, **J. Z. Liu**, J. O. Glass, A. Gajjar, W. E. Reddick: Analysis of white matter fractal features in medulloblastoma survivors. *NeuroImage*, in review, 2004.

26) V. Siemionow, J. Boros, Y. Fang, V. K. Ranganathan, B. Yao, **J. Z. Liu**, V. Sahgal, G. H. Yue: Linear potential and frequency modulation of EEG signals during voluntary activation of human lower extremity muscles. *Experimental Brain Research*, in review, 2004.

27) **J. Z. Liu**, Q. Yang, B. Yao, G. H. Yue: Changes in fractal dimension of EEG signals during muscle fatigue. *Biophysical Journal*, in preparation.

28) **J. Z. Liu**, B. Yao, R. W. Brown, V. Sahgal, G. H. Yue: Cortical and neuromuscular coherence during muscle fatigue. *Journal of Neuroscience*, in preparation.

29) L. D. Zhang, G. H. Yue, **J. Z. Liu**: Automatic cerebellum skeleton extraction in human MR brain images. *IEEE Transactions on Medical Imaging,* in preparation.

30) L. D. Zhang, G. H. Yue, V. Sahgal, **J. Z. Liu**: Aging effect on fractal dimension of human brain white matter structures. *Cerebral Cortex,* in preparation.

31) **J. Z. Liu**, S. Peltier, V. Sahgal, X. Hu, G. H. Yue: Changes in cortical functional connectivity along muscle fatigue. *Journal of Neuroscience*, in preparation.

32) **J. Z. Liu,** Y. Harasaki, G. H. Yue: Brain activation during precision versus casual handgrip and finger pinch tasks. *Brain Research,* in preparation.

33) **J. Z. Liu**, G. H. Yue, P. A. Hardy: Visualization of human muscle activation based on T2-weighted MRI. *Journal of Applied Physiology*, in preparation.

By Editorial Invitation

34) **J. Z. Liu**: Strong prefrontal activity during simple hand movements in hemiplegic patients: *Society for Neuroscience Press Book*, 24: 215-216, 1998.

35) G. H. Yue, **J. Z. Liu**, V. Sahgal: Relationship between brain activation and muscle output. In: *Electrophysiology and Kinesiology,* pp43-48, Litosei-Rastignano-Bologna (Italy), 2000.

Abstracts

36) **J. Z. Liu,** V. Siemionow, T. C. Ng, G. H. Yue: Strong prefrontal activity during simple hand movements in hemiplegic patients. *Soc. Neurosci. Abstr*., 24: 1665, 1998.

37) G. H. Yue, **J. Z. Liu,** V. Siemionow, V. K. Ranganathan, T. C. Ng, V. Sahgal: Differential cortical control of extension and flexion movements of the thumb. 6th Scientific Meeting and Exhibition of International Society for MR in Medicine, Sydney, Australia, April 1998.

38) V. Siemionow, G. H. Yue, V. K. Ranganathan, **J. Z. Liu,** V. Sahgal: Relationship between movement-related cortical potential and voluntary muscle activation. *NeuroImage*, 7: S934, 1998.

39) A. Shah, V. K. Ranganathan, V. Siemionow, **J. Z. Liu,** G. H. Yue, V. Sahgal: Extrapolating true maximal muscle force. *Annals of Biomedical Engineering*, 26, S1: 100, 1998.

40) V. Siemionow, G. H. Yue, V. K. Ranganathan, **J. Z. Liu,** V. Sahgal: Motor activity-related cortical potential during isometric elbow extension and flexion contractions. *NeuroImage*, 9: S458, 1999.

41) **J. Z. Liu**, T. H. Dai, V. Siemionow, V. Sahgal, G. H. Yue: Brain activation during muscle fatigue. *Soc. Neurosci. Abstr*., 25: 1145, 1999.

42) G. H. Yue, V. K. Ranganathan, V. Siemionow, **J. Z. Liu**, V. Sahgal: Mental-effort effect on human muscle strengthening. *Soc. Neurosci. Abstr*., 25: 1913, 1999.

43) **J. Z. Liu**, Z. Y. Shan, V. Sahgal, G. H. Yue: Brain activation during muscle fatigue induced by repetitive handgrip contractions. *Soc. Neurosci. Abstr*., 26: 463, 2000.

44) G. H. Yue, V. Siemionow, **J. Z. Liu**, V. Sahgal: Visualization of human muscle activation using magnetic resonance T2. *2000 Congress of SIROT/CSOS (Societe Internationale DE Recherche Orthopedique et de Traumatologie / Chinese Speaking Orthopaedic Society) abstract Book*, p93, Beijing-Shanghai, China, 2000.

45) **J. Z. Liu,** Y. Harasaki, G. H. Yue: Brain activation during precision versus casual handgrip tasks. *Proc. Intl. Soc. Mag. Reson. Med.* 9: 1241, 2001.

46) **J. Z. Liu,** G. H. Yue, R. W. Brown: A dynamical model of muscle activation, fatigue and recovery. *Bulletin of the American Physical Society.* American Physical Society Spring Meeting (Ohio Section), Kent, Ohio, April, 2001.

47) **J. Z. Liu**, B. Yao, L. D. Zhang, V. Siemionow, V. Sahgal, G. H. Yue: Motor activity-related cortical potential during muscle fatigue. *Soc. Neurosci. Abstr*., 27: 401.6, 2001.

48) **J. Z. Liu**, Z. Y. Shan, G. H. Yue: Automated histogram-based brain segmentation and volume measurement in T1-weighted 3-D MR head images. *Brain & Development* 24(6): 584, 2002. *The 9th International Child Neurology Congress & The 7th Asian and Oceanian Congress of Child Neurology*, Beijing, China, 2002.

49) **J. Z. Liu,** L. D. Zhang, G. H. Yue: fMRI reproducibility at 1.5 T in strictly controlled motor tasks. *Proc. Intl. Soc. Mag. Reson. Med.* 10: 1449, 2002.

50) **J. Z. Liu**, B. Yao, G. H. Yue: Coherence and correlation analysis of EEG data during muscle fatigue. *Soc. Neurosci. Abstr*., 28: 459.10, 2002.

51) B. Yao, G. H. Yue, **J. Z. Liu**: Time-frequency analysis of EEG data during muscle fatigue. *Soc. Neurosci. Abstr*., 28: 459.9, 2002.

52) L. D. Zhang, G. H. Yue, **J. Z. Liu**: Fractal structure in human cerebellum measured by MRI. *Soc. Neurosci. Abstr*., 28: 506.13, 2002.

53) Z. Y. Shan, **J. Z. Liu**, G. H. Yue: Automated extraction and identification of human brain longitudinal fissure medial surface from T1-weighted MRI data. *Soc. Neurosci. Abstr*., 28: 404.1, 2002.

54) B. Lewandowski, **J. Z. Liu**, V. Siemionow, B. Yao, E. P. Pioro, G. H. Yue: Source reconstruction of EEG signals during muscle fatigue. *Soc. Neurosci. Abstr*., 28: 459.11, 2002.

55) **J. Z. Liu,** G. H. Yue, R. W. Brown: Muscle fatigue and the brain: functional neural imaging and EEG. *Bulletin of the American Physical Society*, Vol. 48 (11): C5-4; P23; P24; P25. American Physical Society Fall Meeting (Ohio Section), Cleveland, Ohio, October, 2003.

56) B. Yao, G. H. Yue, **J. Z. Liu**: Phase and time lag in EEG and EMG signals during muscle fatigue. *Soc. Neurosci. Abstr*., 29: 921.10, 2003.

57) H. B. Huang, B. Yao, G. H. Yue, **J. Z. Liu**: Fractal dimension in EEG signals during muscle fatigue. *Soc. Neurosci. Abstr*., 29: 921.6, 2003.

58) Z. Y. Shan, **J. Z. Liu**, V. Sahgal, G. H. Yue: Age-related human brain volume changes: an MRI volumetric study. *Soc. Neurosci. Abstr*., 29: 735.6, 2003.

59) V. Siemionow, J. Boros, Y. Fang, B. Yao, **J. Z. Liu**, V. Sahgal, G. H. Yue: linear frequency modulation of EEG signals during voluntary activation of human lower extremity muscles. *Soc. Neurosci. Abstr*., 29: 708.4, 2003.

60) **J. Z. Liu**, Z. Y. Shan, V. Sahgal, G. H. Yue: Selective local atrophy in human brain along aging. *Society of Chinese Bioscientists in America*, *proceedings of 10th Int'l symposium*, p. xxx. Beijing, China, 2004.

61) **J. Z. Liu,** L. D. Zhang, G. H. Yue: Automatic cerebellum skeleton extraction in human MR brain images. *Proc. Intl. Soc. Mag. Reson. Med.* 12: 755, 2004.

62) B. Yao, G. H. Yue, R. W. Brown, **J. Z. Liu**: Rectification of surface EMG alters power spectrum but does not significantly change its coherence with EEG signals. *Soc. Neurosci. Abstr*., 30: 241.10, 2004.

63) L. D. Zhang, **J. Z. Liu**, D. Dean, V. Sahgal, G. H. Yue: Fractal analysis of white matter structural changes due to normal aging as measured by MRI. *Soc. Neurosci. Abstr*., 30: 450.18, 2004.

64) V. K. Ranganathan, V. Siemionow, D. Codney, B. Yao, **J. Z. Liu**, V. Sahgal and G. H. Yue: Mental training induced changes in EEG amplitude, power and coherence. *Soc. Neurosci. Abstr*., 30: 873.7, 2004.

65) **J. Z. Liu,** H. B. Huang, V. Shagal, X. P. Hu, G. H. Yue: Deterioration of cortical functional connectivity due to muscle fatigue. *Proc. Intl. Soc. Mag. Reson. Med.* 13: 000, 2005.

66) Z. Y. Shan, **J. Z. Liu**, J. O. Glass, A. Gajjar, W. E. Reddick: White matter fractal dimensions in medulloblastoma survivors. *Proc. Intl. Soc. Mag. Reson. Med.* 13: 000, 2005.

References:

Main ones:

Robert W. Brown, Ph.D.
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