

Harvard Medical School Curriculum Vitae

Date Prepared: August 11, 2014
Name: Quan Zhang
Office Address: Neural Systems Group, MGH, 13th St, Building 149, Rm 2651, Charlestown, MA 02129
Home Address: 453 Washington St, Winchester, MA 01890
Work Phone: (617) 7249608
Work Email: qzhang@nmr.mgh.harvard.edu
Work FAX: (617) 7264078
Place of Birth: Luoyang, China

Education

1989-1993	BS	Biomedical Engineering (Advisor: Prof. Mingxi Wan)	Xi'an Jiaotong University
1998	PhD	Biomedical Engineering (Advisor: Prof. Chongxun Zheng)	Xi'an Jiaotong University

Postdoctoral Training

1998-1999	Postdoctoral Research Fellow	Medical Imaging (Lab PI: Prof. Britton Chance)	University of Pennsylvania
1999-2004	Postdoctoral Research Fellow	Medical Imaging (Lab PI: Dr. David Boas)	Massachusetts General Hospital/Harvard Medical School

Faculty Academic Appointments

2004-present	Instructor	Department of Psychiatry	Harvard Medical School
2013-present	Affiliated faculty	Center for Space Medicine	Baylor college of Medicine

Appointments at Hospitals/Affiliated Institutions

11/2004-present	Assistant in Research	Department of Psychiatry	Massachusetts General Hospital
09/2006-present	Research Associate	Center for Engineering in Medicine, Department of Surgery	Massachusetts General Hospital
01/2007-	Assistant in	Department of Neurology	Massachusetts General

present 09/2006- 08/2008	Neuroscience Research Associate	Hospital Shriners Hospital
--------------------------------	------------------------------------	-------------------------------

Other Professional Positions

2011~2012	Consultant in patient monitoring technologies	Mindray, Inc, Shenzhen, China
2004	Consultant in medical imaging	Intelligent Medical Devices, LLC, Cambridge, MA
2002	Consultant in medical imaging	Advanced Research Technologies Inc, Montreal, Canada

Major Administrative Leadership Positions

Local

2006- present	Director, Biomedical Engineering Lab	Neural Systems Group, Dept of Psychiatry, Massachusetts General Hospital
2006- present	Group leader, Biomedical Optics Group	Center for Engineering in Medicine, Massachusetts General Hospital

Committee Service

Local

2013	“Towards Unobtrusive and Wearable Blood Pressure Measurements” symposia	IFMBE International Conference on Health Informatics
2006-2010	Research Operations Committee	Center for Engineering in Medicine, Massachusetts General Hospital

Professional Societies

1999-2004	International Society for Optical Engineering (SPIE)	Member
1999-2004	Optical Society of America(OSA)	Member
2002-2006	Academy of Molecular Imaging (AMI)	Member
2005-2006	IEEE Engineering in Medicine and Biology Society (EMBS)	Member
2008-2009	The Association for Research in Vision and Ophthalmology (ARVO)	Member

Editorial Activities

Academic Radiology, Journal of Biomedical Optics, Optics Letters, IEEE Trans. Bio. Med. Eng., IEEE Trans. Medical Imaging, Journal of Selected Topics in Quantum Electronics, Journal of Electronic Imaging, Physics in Medicine and Biology, and Applied Optics.

Honors and Prizes

1998	Excellent Science and Technology Award	Xian Jiaotong University, Xi'an, China	Development of long term ambulatory monitoring
------	--	---	--

technology for the diagnosis of
acid reflux and non-cardiac
chest pain

Report of Funded and Unfunded Projects

Funding Information

Past

“Neuroimaging of acute mountain sickness”	DM102287(PI: G. Strangman) DOD – DMRDP Role: Co-Investigator Goals: The goal of this research is to identify any cerebral mechanisms leading to or underlying the behavioral symptoms of acute mountain sickness, including investigation of the role of exercise and hypobaria.	12/01/10 - 11/30/13
"Distributed System for Spaceflight Biomedical Support"	NASA Cooperative Agreement NCC 9-58 (PI: Strangman) National Space Biomedical Research Institute (NSBRI) Role: Investigator Goals: The goal of this research is to develop a combined software and hardware platform for integration of biomedical detection, monitoring and countermeasure devices.	06/01/10 - 05/31/14
“Selective Targeting of the Retinal Pigment Epithelium for the Treatment of Macular Degeneration”	Industrial Grant (PI: Martin Yarmush & Mark A. Latina) Lumenis Ltd. Role: Co-Investigator Goals: The goals of this project are to advance the currently experimental “selective targeting of RPE” technology, e.g. by incorporating Optical Coherence Tomography, and to improve the understanding of the therapeutic and biological effects of low dose laser exposure on RPE.	01/01/06-6/31/10
“Diffuse Optical Imaging of Intracranial Pressure Changes”	R21-EB02416-02 (PI: G. Strangman) NIH/NIBIB Role: Co-Investigator Goals: This project aims to evaluate the feasibility of using diffuse optical imaging to provide non-invasive, continuous monitoring of ICP changes in neurointensive care patients.	09/30/03 – 08/31/07
“Non-invasive Fast Optical Imaging of Visual and Motor Processing”	R01-EB006589 (PI: Andrei Medvedev) NIH/NIBIB Role: Co-Investigator Goals: This project aims to demonstrate the ability of NIRS to non-invasively monitor neural activity using methods that may be suitable for functional brain imaging in populations with developmental disorders.	09/30/06 – 8/31/09
“DOT and fMRI Studies	R21-MH068610 (PI: G. Ganis)	07/01/04 – 06/30/07

of Visual Perception and Imagery”	NIH/NIMH Role: Co-Investigator Goals: This project aims to conduct a systematic validation of the true potential and limitations of DOT as a cognitive neuroscience tool in adults by recording simultaneously DOT and fMRI data during established visual stimulation paradigms.	
“Hallucination Monitoring using Near-infrared Spectroscopy”	New Concept 2006 (PI: A. Weiss) CIMIT Role: Co-Investigator Goals: This project aims to evaluate if we can detect the hemodynamic contrast of auditory hallucination using optical methods.	10/01/05 – 10/01/07
“Diffuse Optical Brain Imaging for Stroke Rehabilitation”	1K25-NS046554-01(PI: G. Strangman) NIH/NIBIB Role: Co-Investigator Goals: This project aims to evaluate the feasibility of using simultaneous diffuse optical imaging and functional MRI to detect learning-related changes in healthy and stroke rehabilitation populations, and to apply this technology in the stroke rehabilitation environment.	4/1/03 – 3/31/08
“Neuroimaging Acupuncture Effects on Human Brain Activity”	5P01AT002048-03 (PI: Bruce Rosen) NIH/NCCAM Role: Collaborator Goals: The central goal of this "Center of Excellence for Research on Complementary and Alternative Medicine" is to investigate the neurobiology of acupuncture.	09/26/03-05/31/06
“3D Optical Imaging and Digital X-ray of Breast Lesions”	R01-CA97305 (PI: D. A. Boas) NIH/NCI Role: Co-Investigator Goals: to advance the clinical utility of tomographic optical breast imaging by synergistically fusing the diffuse optical technology with state-of-the-art digital X-Ray mammographic 3D tomography (known as Tomosynthesis), thus producing a multi-modal imaging method that integrates structural and functional information relevant to the screening and diagnosis of breast cancer.	07/01/02-06/30/08
“Continuous Wave and Frequency Domain Optical Mammography”	Industrial grant (PI: David A. Boas) Advanced Research Technologies, Inc Role: Co-Investigator Goals: to advance the clinical utility of tomographic optical breast imaging by synergistically fusing the diffuse optical technology with state-of-the-art digital X-Ray mammographic 3D tomography (known as Tomosynthesis), thus producing a multi-modality imaging method that integrates structural and functional information relevant to the screening and diagnosis of breast cancer.	8/01/99-07/31/02
“Breast Cancer Multi-dimensional Diffuse	5U54CA105480-03 (PI: Bruce J. Tromberg) NIH/NCI Network for Translational Research of Optical Imaging grant	09/29/03-08/31/08

Optical Imaging”
 Role: Co-Investigator
 Goals: The broad goal is to advance new technology, Multi-Dimensional Diffuse Optical Imaging (MDDOI), that will dramatically improve breast cancer detection, clinical management, and quality of life for breast cancer patients.

Current

"Multi-use near-infrared spectroscopy device for spaceflight"
 NASA Cooperative Agreement NCC 9-58 (PI: Strangman) 10/1/12-9/30/15
 Role: Co-Investigator
 Goals: This project seeks to develop a single, modular device that can be used for (1) brain, muscle or other tissue imaging, (2) tissue oxygenation and blood volume measurement, (3) pulse oximetry, and (4) auxiliary sensor recordings (e.g., EMG, accelerometry, EKG) for use in spaceflight medical management.

“Biomedical Signal Acquisition and Processing”
 Biomedical Engineering Lab Sundry Fund, supported by Mindray Inc
 Role: PI
 Goals: The goal of this project is to explore novel methods for biomedical signal acquisition and processing.

Current Unfunded Projects

2010-present PI / Development of Ambulatory Neuroimaging Based Biomarker for Relaxation and Stress reduction
 The goal is to find an ambulatory neuroimaging (wearable brain imaging during daily activities) based biomarker and further explain how the body reacts to relaxation, especially in the context of the treatment of diseases such as depression, sleep disorders, headache and others.

2007-present PI / Functional Imaging Based Assessment of Cadaveric Livers for Transplantation
 I am applying for funding and collecting preliminary data to use functional imaging in marginal liver transplantation.

2005-present PI / Simultaneous EEG and Diffuse Optical Imaging to Improve Noninvasive Localization of Epilepsy
 This unfunded project has already led to a publication in Epilepsy & Behavior. I am currently applying for funding and collecting preliminary data to start human subject tests.

2008-present Co-PI / Laser Assisted Therapeutic Agent Delivery Into Retina and Subretinal Space.
 We have reported the pilot results from this unfunded project at ARVO 2009. I am currently applying for funding and collecting more animal experiment data.

Report of Local Teaching and Training

Laboratory and Other Research Supervisory and Training Responsibilities

2013	Mentoring of a visiting scholar, Prof Tianmin Zhu from Chengdu University of Chinese Medicine, China, on the studies of neuroimaging and relaxation response; mentoring Dr. Gang Hu and Zhi Li on the aNIRS technology development.	About 10%
2011-2012	Mentoring of a visiting scholar, Prof Jumei Wu from Chengdu University of Chinese Medicine, China, on the studies of neuroimaging and relaxation response.	About 3%
2011-present	Training of our research assistant, Zhi Li, on diffuse optical imaging /NIRS and functional neuroimaging data analysis.	About 3%

Formally Supervised Trainees

2013~2014	Training of visiting scholar Prof Tianmin Zhu from Chengdu University of Chinese Medicine, China, on the studies of neuroimaging and relaxation response
2008-2010	Training of collaborators at Prof. Le Zhang' lab at Michigan Technological University on medical imaging
2006~2011	Teaching and training of students at Prof Yan's lab at Xian Jiaotong University on medical imaging, two of the students have acquired their MS degree.
2006-2009	Basak Uygun, PhD / Research Associate at CEM, MGH I trained Dr. Uygun on biomedical lasers and Optical Coherent Tomography.
2009	Neil Parikh, BS / graduate school, MIT In a project supported by NASA's National Space Biomedical Research Institute (NSBRI), I advised Neil on adaptive filtering algorithm.
2005-2006	Margaret Duff, MS / PhD candidate, Arizona State University I trained Margaret on Near Infrared Spectroscopy and Diffuse Optical Imaging algorithms and data analysis methods.
1999-2004	Ang Li, PhD / Postdoctoral Fellow, Beckman Laser Institute, University of California, Irvine I advised Dr. Li on Diffuse Optical Imaging algorithms and experiments.

Local Invited Presentations

2007	"Ambulatory Near Infrared Spectroscopy and Ambulatory Diffuse Optical Imaging" at the Center for Engineering in Medicine, MGH
2006	"aNIRS: towards ambulatory monitoring of cerebral vascular diseases" at Beth Israel Deaconess Medical Center.

Report of Regional, National and International Invited Teaching and Presentations

Invited Presentations and Courses

International

2013 “Towards Multi-modality Unobtrusive Blood Pressure Measurement and Monitoring” at IFMBE International Conference on Health Informatics (ICHI2013), Vilamoura, Portugal, where I chaired the novel blood pressure measurement symposium.

Regional

2004 “Diffuse Optical Tomography: Can It Help the Drug Development?” at Pfizer, Inc, Cambridge, MA

Report of Technological and Other Scientific Innovations

System and method for non-invasive, intracranial brain motion monitoring

US Patent Application, PCT/US14/44056, filed June 25, 2014. Inventors: **Zhang Q**, Strangman G.

This invention will make it possible, for the first time, to non-invasively and even unobtrusively (using our wearable technology) monitor the direction and amplitude of brain movement inside the skull, before, during or after the traumatic brain injury (TBI) events. This capability will help provide a much more objective and quantitative understanding of how and when TBI patients sustain head injuries, and hence provide improved guidance on how to reduce or eliminate such injuries.

System and method for measuring and monitoring blood pressure

US Patent Application, MGH case #22490, filed November 2014; Inventors: **Zhang Q**, Yuanting Zhang.

This invention will be the first technology to enable noninvasive, unobtrusive, cuffless, continuous beat-to-beat Ambulatory Blood Pressure Monitoring (ABPM). These innovations will provide a revolutionary step forward from the current 100-year-old BP measurement standard, and will enable major improvements in health management (e.g. prevention, home monitoring) for people who suffer from symptoms and risks of cerebral vascular diseases (CVD).

Electro-optical system, apparatus, and method for ambulatory monitoring

US Patent Application, 11/ 995352, filed January 12, 2006. Inventors: **Zhang Q**, Strangman G.
www.uspto.gov

As an Instructor at the Neural Systems Group, MGH, I invented the OpticHolter, a portable, long-term ambulatory neuroimaging system that has the potential of monitoring brain functions continuously for days without affecting a person’s normal daily activity. The National Space Biomedical Research Institute

(NSBRI) is currently funding a project related to this work that aims to improve the performance and test the use of this device for the monitoring of astronauts during spaceflight.

Systems and method for generating an image

United States Patent No. 7333647; **European patent** No. 1495466. Inventors: Boas DA, **Zhang Q**, Li A.
www.uspto.gov

As a postdoctoral Research Fellow at the Athinoula A Martinos Center for Biomedical Imaging, MGH, I have developed Tomographic Optical Breast Imaging system, the only imaging system that has the capability to perform strictly co-registered three dimensional X-ray and functional optical breast imaging. The novel algorithm for multi-modality imaging, based on my innovative solution to the mathematical inverse problem in image reconstruction, was awarded a United States patent and a European patent Based on the results from these initial results, NIH has awarded MGH two NIH R01s to extend the study of combined optical and X-ray breast imaging. These developments have led to several publications in top journals in the field such as Optics Letters and Journal of Biomedical Optics.

Multi-channel pH Probe with Internal Reference for long term GI monitoring

People's Republic of China Patent No.97 2 08372.3, Inventors: **Zhang Q**, Zheng CX, Zhang S.
<http://www.cnpat.com.cn/>

As a PhD candidate at Xi'an Jiaotong University, I invented and developed several miniature pH sensors used for the diagnosis of acid reflux disease and non-cardiac chest pain. This work enabled objective evaluation of acid reflux, led to several publications, and was awarded the "Excellent Science and Technology Award"

Multi-channel pH Probe with External Reference for long term GI monitoring

People's Republic of China Patent No.97 2 08374.X, Inventors: **Zhang Q**, Zheng CX, Zhang S.
<http://www.cnpat.com.cn/>

As a PhD candidate at Xi'an Jiaotong University, I invented and developed several miniature pH sensors used for the diagnosis of acid reflux disease and non-cardiac chest pain. This work enabled objective evaluation of acid reflux, led to several publications, and was awarded the "Excellent Science and Technology Award".

Report of Scholarship

Publications

Peer reviewed publications in print or other media

1. **Zhang Q**; Ivkovic V; Hu G; Strangman GE, Twenty-four-hour ambulatory recording of cerebral

- hemodynamics, systemic hemodynamics, electrocardiography, and actigraphy during people's daily activities, *J. Biomed. Opt.* 19 (4), 047003 (April 28, 2014); doi: 10.1117/1.JBO.19.4.047003
2. Strangman GE, **Zhang Q**, Li Z, Scalp and skull influence on near infrared photon propagation in the Colin27 brain template, **NeuroImage**, 2014(85), 136-149; DOI: 10.1016/j.neuroimage.2013.04.090
 3. Strangman GE, Li Z, **Zhang Q**, Depth sensitivity and source-detector separations for near infrared spectroscopy based on the Colin27 brain template, **PLOS ONE**, 2013(8), Issue: 8, e66319, DOI:10.1371/journal.pone.0066319
 4. **Zhang Q**, Yan X, Strangman GE, Development of motion resistant instrumentation for ambulatory Near-Infrared spectroscopy, **J Biomedical Optics**, 2011(16), Issue: 8, Page: 087008
 5. **Zhang Q**, Strangman GE, Ganis G, Adaptive filtering to reduce global interference in NIRS-measured brain activation: How well and when does it work? **NeuroImage**, 2009; 45(3):788-794
 6. Strangman G, **Zhang Q**, Zeffiro T, Near-Infrared Neuroimaging with NinPy, **Frontiers in Neuroinformatics**, 2009; 3(article 12): 1-13
 7. **Zhang Q**, Cole AJ, Cash SS, Medvedev AV, Strangman GE, Simultaneous EEG and diffuse optical imaging to improve noninvasive localization of epilepsy, in Schachter SC, Gutttag J, Schiff S, Schomer DL, Summit Contributors, Advances in the Application of Technology to Epilepsy: The CIMIT/NIO Epilepsy Innovation Summit, **Epilepsy & Behavior**, 2009(16), 22-23
 8. Song Q, Uygun B, Banerjee I, Nahmias Y, **Zhang Q**, Berthiaume F, Latina M, Yarmush ML, Low power laser irradiation stimulates the proliferation of adult human Retinal Pigment Epithelial cells in culture, **Cellular and Molecular Bioengineering**, 2009; 2(1): 87-103
 9. Fang Q, Carp SA, Selb J, Boverman G, **Zhang Q**, Kopans DB, Moore RH, Miller EL, Brooks DH, Boas DA. Combined optical imaging and mammography of the healthy breast: optical contrast derived from breast structure and compression, **IEEE Trans Medical Imaging**, 2009; 28(1):30-42
 10. **Zhang Q**, Brown EN, Strangman GE. Adaptive filtering for global interference cancellation and real time recovery of evoked brain activity: a Monte Carlo simulation study. **J Biomedical Optics**, 2007; 12: 044014.
 11. **Zhang Q**, Brown EN, Strangman GE. Adaptive filtering to reduce global interference in evoked brain activity detection: a human subject case study. **J Biomedical Optics**, 2007; 12: 064009.
 12. **Zhang Q**, Brukilacchio TJ, Li A, Stott JJ, Chaves T, Wu T, Moore RH, Kopans DB, Boas DA. Co-registered Tomographic X-ray and Optical Breast Imaging. **J Biomedical Optics**, 2005; 10: 024033.
 13. Boverman G, Miller EL, Li A, **Zhang Q**, Chaves T, Brooks DH and Boas DA. Quantitative spectroscopic diffuse optical tomography of the breast guided by imperfect *a priori* structural information. **Phys Med Biol**; 2005; 50: 3941–3956.
 14. Li A, Boverman G, Zhang Y, Brooks D, Miller EL, Kilmer ME, **Zhang Q**, Hillman E, Boas DA. An optimal linear inverse solution given multiple priors in diffuse optical tomography, **Applied Optics**, 2005; 44: 1948-1956.
 15. Li A, **Zhang Q**, Culver JP, Miller EL, D.A. Boas, Reconstructing chromophore concentration images directly by continuous-wave diffuse optical tomography, **Optics Letters**, 2004; 29: 256-258.
 16. Li A, Miller EL, Kilmer ME, Brukilacchio TJ, Chaves T, Stott J, **Zhang Q**, Chorlton M, Moore RH, Kopans DB, Boas DA. Tomographic Optical Breast Imaging Guided by 3-D Mammography, **Applied Optics**, 2003; 42: 5181-5190.
 17. Milstein AB, Oh S, Webb KJ, Bouman CA, **Zhang Q**, Boas DA, Millane RP. Fluorescence Optical Diffusion Tomography, **Applied Optics**, 2003; 42: 3081- 3094.

18. Boas DA, Brooks DH, Miller EL, DiMarzio CA, Kilmer M, Gaudette RJ, **Zhang Q**. "Imaging the body with diffuse optical tomography." **IEEE Signal Processing**, 2001; 18: 57-75.
19. Hueber DM, Franceschini MA, Ma HY, **Zhang Q**, Ballesteros JR, Fantini S, Wallace D, Ntziachristos V, Chance B. Non-invasive and quantitative near-infrared haemoglobin spectrometry in the piglet brain during hypoxic stress, using a frequency-domain multi-distance instrument, **Phys Med Biol** 2001; 46: 41-62.
20. **Zhang Q**, Ma HY, Nioka S, Chance B. Study of near infrared technology for intracranial hematoma detection, **J Biomedical Optics**, 2000; 5: 206-213.
21. Guo S, Wang L. **Zhang Q**, Study of the upper GI dynamics, **Beijing Biomedical Engineering**, 1998, 2
22. **Zhang Q**, Zheng C, Guo S, Gong J, Luo J. Study on the ambulatory multi-parameter monitoring and data analysis for disorders in upper gastrointestinal tract. **Journal of Xi'an Jiaotong University**, 1997; 31 (9)
23. **Zhang Q**, Zhang S, Zheng C. Research on a microtransducer for ambulatory multi-location pH monitoring in the upper gastrointestinal tract. **J Biomedical Engineering**, 1997; 15 (2)
24. **Zhang Q**, Zhang S, et al. A new type of reference electrode tube for ambulatory monitoring of the pH in the gastrointestinal tract. **Chinese Journal of Medical Instrumentation**, 1997; 25 (4)
25. Zheng C, **Zhang Q**, et al. Diagnosis and ambulatory monitoring for functional disorders in the upper GI tract. **International Medical Devices**, 1997; 3: 20-26
26. Guo S, **Zhang Q**, Zheng C. The development of a long-term dynamic multi-parameter monitoring and analyzing system for the upper digestive tract, **Chinese Journal of Medical Instrumentation**, 1997, 25(3)
27. Gong J, Luo J, Zheng C, **Zhang Q**, et al. Clinical application of gastroesophageal pH and electrocardiograph monitoring synchronously. *China National Journal of Gastroenterology*, 1996; 2: (suppl.1), 111-112
28. Gong J, Zheng C, **Zhang Q**, et al. The clinical application of simultaneous 24 hour monitoring of esophageal acidity stomach acidity and ECG. *Shaanxi Medical Journal*, 1996; 25: suppl, 9-10.

[Non-peer reviewed scientific or medical publications/materials in print or other media](#)

1. Chen YL, **Zhang Q** and Zhu Q, Optical Coherence Tomography in Dentistry, Selected Topics in Optical Coherence Tomography, edited by Gangjun Liu, ISBN: 978-953-51-0034-8, DOI: 10.5772/33281, InTech, 2012
2. **Zhang Q.**, Michaud N., Bennett S., Uygun B., Yarmush M.L., and Latina M.A., Pilot Study of Laser Assisted Therapeutic Agent Delivery Into Retina and Subretinal Space, ARVO Proc. Reducing disparities in Eye Disease and Treatment, Fort Lauderdale, FL, 2009
3. **Zhang Q**, Stott JJ, Brukilacchio TJ, Li A, Chaves T, Boverman G, Wu T, Chorlton M, Rafferty E, Moore RH, Kopans DB, Boas DA, Preliminary Study of the Breast's Bulk Optical Properties Using A Co-registered Tomographic X-ray and Optical Breast Imaging System, **OSA Biomedical Topical Meetings and Tabletop Exhibit**, Miami, 2004
4. **Zhang Q**, Brukilacchio TJ, Stott JJ, Li A, Chaves T, Boas DA, Wu T, Moore RH, Kopans DB, Co-registered DOT and 3D X-ray Breast Imaging with Spectroscopic Difference Tomography, in Biomedical Topical Meetings, **OSA Technical Digest** (Optical Society of America, Washington DC, 2002), pp 638 - 640
5. **Zhang Q**, Brukilacchio TJ, Gaudett T, Wang L, Li A, Boas DA, Experimental comparison of using continuous-wave and frequency-domain diffuse optical imaging systems to detect heterogeneities,

- Proceedings of SPIE**, 2001, Vol. 4250 , 4250-34
6. Kumar AT, Stott JJ, **Zhang Q**, Kim YR, Boas DA, Dunn AK, MRI guided fluorescence optical tomography for small animal imaging, **OSA Biomedical Topical Meetings and Tabletop Exhibit**, Miami, 2004
 7. Milstein AB, **Zhang Q**, Oh S, Webb KJ, Bouman CA, Millane RP, Boas DA, Fluorescence Imaging in Optical Diffusion Tomography, **2002 IEEE International Symposium on Biomedical imaging: Macro to Nano**, Washington DC, 2002.
 8. Brukilacchio TJ, **Zhang Q**, Stott J, Li A, Wu T, Boas DA, Instrumentation For Imaging of Breast Lesions Based on Co-Registered Diffuse Optical and X-Ray Tomography, in Biomedical Topical Meetings, **OSA Technical Digest** (Optical Society of America, Washington DC, 2002), pp178 –180
 9. Li A, **Zhang Q**, Brukilacchio TJ, Boas DA, Exploiting Prior 2 Dimensional or 3 Dimensional Spatial Information for Diffuse Optical Imaging, in Biomedical Topical Meetings, **OSA Technical Digest** (Optical Society of America, Washington DC, 2002), pp106 – 108
 10. Millane RP, Milstein AM, **Zhang Q** , Oh S, Webb KJ, Bouman CA and Boas DA, Imaging Fluorescence Parameters by Bayesian Optical Diffusion Tomography, "Image reconstruction from incomplete data II," P.J. Boney, M.A. Fiddy and R.P. Millane (Eds), **Proc. SPIE**, 4792, 9-18 (2002).

Professional educational materials or reports, in print or other media

1. Strangman G, **Zhang Q**, Zeffiro T, Near-Infrared Neuroimaging with NinPy, **Frontiers in Neuroinformatics**, 2009; 3(article 12): 1-13
This is an introductory article about NinPy, a Python based software we developed to assist researchers performing Near-Infrared Neuroimaging.
2. **Zhang Q**, Adaptive Filtering Tools. <http://www.nmr.mgh.harvard.edu/~qzhang/adaptiveFilter/>;
On this website we provide a brief description and the C++ and Matlab source code the novel global noise cancellation algorithm we developed for peers who are interested in using them in their studies.

Thesis

Zhang Q, Long term ambulatory GI monitoring for the diagnosis of acid reflux and non-cardiac chest pain, PhD thesis, Xi'an Jiaotong University, 1997

Abstracts, Poster Presentations and Exhibits Presented at Professional Meetings

1. **Quan Zhang**, Lee H Schwamm, Gary E. Strangman, Noninvasive Intracranial Pressure(ICP) Monitoring Using Near Infrared Neuromonitoring (NIN), Human Research Program Investigators' Workshop, Houston, 2013
2. Gang Hu, **Quan Zhang**, Gary Strangman, Ninscan M: Multi-Use Near-Infrared Imaging For Spaceflight Health Monitoring, Human Research Program Investigators' Workshop, Houston, 2013
3. Vladimir Ivkovic, Gary E. Strangman, **Quan Zhang**, Near Infrared Neuromonitoring for Inflight Assessment of Cerebral Autoregulation and Intracranial Pressure, Human Research Program Investigators' Workshop, Houston, 2013
4. Michael L. Lee, **Quan Zhang**, Gary E. Strangman, Elizabeth B. Klerman, Assessing the Impact of Chronic Sleep Restriction on Sleep and Performance-Associated Regional Brain Activation Using

- Near Infrared Spectroscopy, Human Research Program Investigators' Workshop, Houston, 2013
5. Strangman GE, **Zhang Q**, NINscan TD: Toward Imaging Brain Function in Spaceflight, NASA Human Research Program Investigators' Workshop, Houston, 2012
 6. **Zhang Q**, Parikh N, Strangman GE, Filtering Physiological and Motion Artifacts for Mobile Neuroimaging, 18th IAA Humans in Space symposium, Houston, 2011
 7. Strangman GE, **Zhang Q**, Developing Neuroimaging Capabilities for Spaceflight, 18th IAA Humans in Space symposium, Houston, 2011
 8. **Zhang Q**, Supelana C, Strangman GE, Towards Long-term Ambulatory Neuromonitoring, Methods in Bioengineering, Boston, 2007

Narrative Report (limit to 500 words)

With extensive training and experience in biomedical engineering, I am particularly interested in wearable multi-modality monitoring, functional imaging and their applications such as the prevention, diagnosis and management of cerebrovascular and cardiovascular diseases. I am also interested in the study of relaxation response and stress reduction.

Currently my research focuses on 1) the development of a novel wearable functional neuro-imaging technology, which aims to perform long term brain function monitoring and imaging during peoples' daily activities; and 2) the development of novel unobtrusive blood pressure monitoring technologies for the prevention, diagnosis and management of cerebral vascular diseases. I have devoted approximately 90% of my effort towards research activities, and 10% toward teaching and mentoring activities. My career objective is to establish myself as a leader in biomedical research, and an innovator who applies latest technologies to answering important questions of healthcare.

I have developed the prototype of BP-Glass, where blood pressure sensors are integrated within a pair of glasses to enable unobtrusive blood pressure monitoring. I have developed several generations of the NINscan devices, and performed the first 24 hour ambulatory multimodality neuro-monitoring during people's daily activity. I have made several exciting discoveries and invented novel ways to measure intracranial brain motion, which has significant potential in the diagnosis of TBI and others. We have successfully collected initial ambulatory neuroimaging dataset from zero-g parabolic flight, as well as from extreme conditions such as from above 15,000 foot altitude on Kilimanjaro. Our research has led to several publications in top journals in the medical imaging field, as well as several patent applications. Currently we are further developing this technology, with the goal of functional brain imaging for astronauts during spaceflight. Besides technology development, we are actively searching for important applications of this technology, including epilepsy care, sleep studies, and stress reduction. For this purpose, we have setup collaboration with a wide range of labs and researchers.

In my research career, I have also made several other contributions in the field of Biomedical Engineering. I established the idea of using functional imaging for liver viability evaluation and transplantation, and tested our novel method of laser assisted drug delivery and made progress on low level laser therapy for the treatment of retinal disease. I developed the Tomographic Optical Breast Imaging system at MGH, at that time the only imaging system that has the capability of performing strictly co-registered three dimensional X-ray and optical breast imaging. I am the second inventor of a novel multi-modality imaging algorithm, which was awarded US and European patents. My PhD work led to the invention of several novel sensors for the objective diagnosis of gastroesophageal acid reflux.

Currently I am the director of the Biomedical Engineering lab at the Neural Systems Group at MGH. My contributions to the field are internationally recognized; in 2013 I was invited to give a talk and chair one of the symposiums at the IFMBE International Conference on Health Informatics. My teaching and education effort includes training and mentoring of lab members, research assistants and visiting scholars. Besides research, I am active in giving introductory seminars about medical imaging at universities and companies, and I also serve as a reviewer for many journals in biomedical optics and neuroimaging.