

## CURRICULUM VITAE

**NAME:** Gracie Vargas, Ph.D.

**PRESENT POSITION AND ADDRESS:**

Associate Professor  
Department of Neuroscience and Cell Biology  
University of Texas Medical Branch  
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**BIOGRAPHICAL**

Citizenship: United States  
Marital Status: Married, one child  
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**EDUCATION**

- 1994 B.A. Physics, Gustavus Adolphus College, St. Peter, MN
- 1997 M.S. Mechanical Engineering, University of Texas at Austin
- 2001 PhD Biomedical Engineering, University of Texas at Austin  
Dissertation title: *Reduction of Light Scattering in Biological Tissue: Implications for Optical Diagnostics and Therapeutics* (2001 Outstanding Dissertation Award-Honorable Mention)

**PROFESSIONAL AND TEACHING EXPERIENCE: (academic; non-academic)**

- 2001-2002: Postdoctoral Fellow, Biomedical Engineering Laser Laboratory, University of Texas at Austin, Austin TX
- 2002-2009: Assistant Professor, Department of Neuroscience & Cell Biology, University of Texas Medical Branch, Galveston, TX
- 2002-Present Scientist, Director for the Advanced Bio-Optics Imaging Laboratory, Center for Biomedical Engineering, University of Texas Medical Branch, Galveston, TX
- 2003-Present Graduate Faculty, Associate Member of the Cellular Physiology and Molecular Biophysics Graduate Program, University of Texas Medical Branch, Galveston, TX
- 2003-Present Graduate Faculty, Associate Member of the Cell Biology Graduate Program, University of Texas Medical Branch, Galveston, TX
- 2008-Present Co-Director, Optical Imaging Core, Galveston National Laboratory, Galveston, TX

**RESEARCH ACTIVITIES**

**Area of Research:**

My primary area of interest is in the integration of engineering principles with basic and translational research. Specifically, I am interested in applying my area of expertise in biophotonics/biomedical optics and imaging to better characterize and understand physiological and pathological processes toward the development of diagnostic and therapeutic solutions. To realize these efforts it is my aim to lead and participate in multidisciplinary teams. Examples of my current research include:

- 1) Development and evaluation of a noninvasive imaging approach using multiphoton autofluorescence microscopy and second harmonic generation microscopy for optical staging of epithelial precancerous lesions and early neoplasms. This research is an example of translational research in optical diagnostics. It involves the spatiotemporal study of epithelial neoplastic transformation *in vivo* in an animal model for oral cancer in order to better understand alterations in endogenous optical signals and to identify significant image-based parameters which may serve as markers of neoplastic progression. These findings will be used to develop and refine a noninvasive staging methodology by multiphoton microscopy to assist in guiding surgical resection and in surveillance of patients at risk for recurrence.
- 2) Enhanced *in vivo* optical sensing and molecular imaging through the use of exogenous agents to reduce tissue optical scattering. This research explores the use of chemical agents for reversibly reducing light attenuation in tissue to allow deeper light penetration for optical sensing and imaging applications. This research explores the mechanisms and dynamics of 'optical clearing' to better engineer practical approaches for utilizing the technique in sensing and imaging. The optical clearing technique developed during my graduate work has also made it to the clinical testing stage in which the method has been used to improve laser therapeutics for tattoo removal.
- 2) Integration of advanced optical imaging to studies in area of infectious diseases. This work is directed along several collaborative tracks. Along one track nonlinear optical microscopy approaches are being developed for highly sensitive detection of hepatitis C virus antigens in liver using targeted nanoparticles. I am also developing confocal reflectance and fluorescence imaging approaches for detecting the effects of topical microbicides on cervicovaginal epithelial integrity in both small and large animal models as well as in the clinic.
- 3) Nonlinear optical microscopy for the study of vascular inflammation. This research being pursued along a number of collaborative paths aims at using multiphoton microscopy and second harmonic generation for revealing pathological changes in vascular inflammation.

**Grant support**

**ACTIVE**

R01 CA127429-01 (PI:Vargas) 04/01/2008-03/30/2012 33% effort  
NIH/NCI

*Nonlinear Optical Staging of Epithelial Neoplasms*

The major goal of the project is the development and evaluation of a noninvasive imaging approach using multiphoton autofluorescence microscopy and second harmonic generation microscopy to stage early neoplastic lesions in oral mucosa.

Role: Principle Investigator

Co-Investigators: Dr. Vicente Resto and Dr. Susan McCammon, Dept. of Otolaryngology; Dr. Suimin Qiu, Dept. of Pathology

BES-0528986 (PI: Vargas) 09/01/2005-10/30/2009 10% effort  
National Science Foundation

*Tissue Clearing for Enhanced in vivo Optical Sensing and Monitoring*

The major goal of this project to investigate the use of chemical agents for enhanced light propagation in highly scattering tissue and enhanced optical sensing of molecular signals in vivo.

Role: Principle Investigator

1R21AI081058 – 01 (Lemon) 2009-2011 10% effort

NIH/NIAID

Imaging innate immune responses to HCV

Key Personnel: Lemon and Vargas

The major goal of this project is to develop advanced imaging approaches through nanoparticle targeting for imaging molecular biomarkers of immunity in Hepatitis C Virus.

Role: Co-Investigator. To provide expertise on nonlinear optical microscopy and imaging of targeted nanoparticles for highly sensitive and specific detection of molecular markers of immune responses in HCV, particularly in the liver – a traditionally difficult tissue to optically image.

N01-HD-5-3407 (Bourne) 09/30/2005-9/29/2008 10% effort  
NIH/NICHD

*Evaluation of Colposcopy for use in Vaginal Product Development*

The major goals of this project are to evaluate colposcopy for use in vaginal product assessment and development using small animal models as well as examine the relationship between detectable intravaginal epithelial lesions and susceptibility to sexually transmitted infections. Optical imaging plays a role in the assessment of epithelial injury.

Role: Co-Investigator, assist in optical evaluation of the effects of microbicides on cervicovaginal epithelium.

U19 AI60598 (Paull) 09/30/04-10/1/09 10% effort  
NIH/NIAID

*Development of Dendrimer and Combination Microbicides*

Major goals of the project are the development and testing of combinational microbicides. This project focuses on the preclinical and clinical development of dendrimer-based combination microbicides. Our project focuses on the development and use of new optical imaging systems to assess microbicide safety in non-human primates and women. A supplement project explores large animal models for assessing microbicide safety (Supplement PI: Motamedi).

Role: Co-investigator, Primary role is to provide the confocal imaging expertise and develop new *in vivo* imaging approaches as well as image processing algorithms for detecting differential effects of topical microbicides on large animal cervicovaginal epithelium.

R21 AI076062 (Motamedi) 6/1/2007 - 5/30/2012 15% effort

NIH/NIAID

*High-resolution optical assessment of microbicide toxicity*

The major goal of this project is to develop an endoscopic confocal imaging-based approach that can be used to assess the degree of injury induced by microbicides and correlate the results of imaging studies to susceptibility to genital infection in mice cervicovaginal tract and rectum caused by HSV-2.

Role: Co-investigator, Primary role is to develop/test new *in vivo* imaging approaches for detecting epithelial toxicity resulting from topical chemicals in mouse cervicovaginal epithelium. Primary expertise utilized is small animal imaging by confocal microscopy and optical coherence tomography.

5UC7AI070083 (Lemon) 03/1/2006-02/30/2011 10% effort

NIH/NIAID

Galveston National Laboratory

Role: Responsible for tasks related to integrating advanced imaging technologies and services into the Galveston National Laboratory, including the setup of two laboratories with confocal/multiphoton microscopy capabilities, one at BSL2 and another at BSL3, and initiating collaborations with investigators in the GNL.

**PENDING**

R01 (Pierangeli) 12/01/2009-11/30/2013

NIH

Antiphospholipid antibodies in lupus: new molecular targets for treatment,"

Co-Investigator at 5% effort

Role: My role will be to be the primary imaging investigator assisting in identification of quantum-dot targeted molecular markers for VCAM-1 and Tissue Factor-1

**COMPLETED**

PI, John Sealy Faculty Recruitment Award, "Optical Imaging for the Study of Disease Processes," 11/01/02-10/30/07. Faculty recruitment award to develop an advanced nonlinear optical imaging laboratory toward the study of disease.

Co-Investigator (PI: Motamedi) 10/01/2005-9/30/2008

NASA-Ames Research Center

Continuous and in situ based monitoring of biological systems for space exploration.

Role on Project: Nonlinear optical imaging of nanoparticle-targeted molecular markers.

Co-Investigator, 2R44AR046971-02 (PI:Nichols) 2006-6/30/2008

NIH

Optical Clearing of Skin for Cosmetic Laser Surgery

Role on project: Provide consultation on the tissue optical clearing method I developed during my graduate and postdoctoral work for the therapeutic application of tattoo removal by lasers.

Co-Investigator at UTMB, (PI: Motamedi) DARPA, U.S. Army Medical Research Acquisition Activity- "Tissue Constructs for Vaccine Testing," 12/29/04-12/28/05. My role in this project is to develop advanced optical imaging solutions for evaluating ex vivo immune constructs.

Co-Investigator, (PI: Motamedi) DARPA, U.S. Army Medical Research Acquisition Activity- Co-Investigator at UTMB, "3D Tissue Constructs by Sequential Layering for EX-Vivo Immune System", 10/01/02-09/30/04.

Co-Investigator, (PI: Leary) Nanoparticle Delivery of Repair Enzymes for Radiation Protection/DNA Damage, NASA, 12/21/01 9/29/04.

## **COMMITTEE RESPONSIBILITIES:**

### **University of Texas Medical Branch**

Graduate School of Biomedical Sciences:

Member of the Admissions Committee of the Cell Biology Graduate Program Admissions Committee, University of Texas Medical Branch

Member of several Cellular Physiology & Biophysics Qualifying Exam Committees (2003-2007)

### **Scientific Sessions Organized**

Lasers and Optics Session, 2005 Houston Society of Engineering in Medicine and Biology

Lasers and Optics Session, 2005 Houston Society of Engineering in Medicine and Biology

### **Scientific Sessions Chaired / Discussion Leader:**

2005 Lasers and Optics Session, Houston Society of Engineering in Medicine and Biology.

2007 Lasers and Optics Session, Biophotonic Applications of Nanoparticles, Houston Society of Engineering in Medicine and Biology.

## **TEACHING RESPONSIBILITIES**

### **A. TEACHING RESPONSIBILITIES AT UTMB:**

#### **a. Teaching:**

##### **School of Medicine (SOM):**

Facilitator, "Molecules, Cells, & Tissues," UTMB School of Medicine, Fall 2005

Facilitator (alternate), "Molecules, Cells, & Tissues," UTMB School of Medicine, Fall 2007

Facilitator (alternate), "Neuroscience and Human Behavior," UTMB School of Medicine, Spring 2008

Facilitator, "Molecules, Cells, & Tissues," UTMB School of Medicine, Fall 2008

Facilitator, "Neuroscience and Human Behavior," UTMB School of Medicine, Scheduled for Spring 2009

**Graduate School (GSBS):**

In collaboration with other faculty developed a new imaging course focused on imaging fundamentals and applications in biology:

Imaging in Biology.

2003. "Imaging in Biology" course (CPMB 6260)

2005 "Imaging in Biology" course (CPMB 6260)

2006 "Imaging in Biology" course (CPMB 6260)

2007 "Imaging in Biology" course (CPMB 6260)

2008 "Imaging in Biology" course (CPMB 6260)

**b. Students/Mentees/Advisees/Trainees:**

**Post-doctoral trainees:**

1) Ju Sun, Ph.D. (2003-2004); trained in nonlinear optical microscopy of neoplasia. Currently holds the position of Instructor Florida International Univ. since 2004.

2) Olga Chumakova, Ph.D. (2003-2004); trained in basic optical microscopy and autofluorescence detection of metabolic signals in cells and tissues toward disease diagnosis. Currently a postdoctoral researcher at UTMB in Dept. Infectious Diseases.

3) Jianwu Ding (2005); trained in nonlinear optical microscopy; Currently Principal Laser Scientist, Akamai Physics, Inc., Las Cruces, NM

4) Xudong Xiao (Jan 2006-Dec 2007, 2 years); trained in nonlinear optical microscopy and fiber-based delivery of femtosecond light for multiphoton microscopy; Awarded Cancer Center Multidisciplinary Fellowship. Currently a postdoctoral researcher at Texas A&M University.

**Medical Fellows:**

1) Ki-Hong Kevin Ho, M.D. (2006-present) Mentored in nonlinear optical microscopy for the imaging of epithelial neoplasia and in vivo assessment of cox-2 inhibitor therapeutic effects by multiphoton autofluorescence. The project is in collaboration with medical faculty Dr. Susan McCammon, Dept. of Otolaryngology. 1) *Evaluation of Celecoxib on Oral Carcinogenesis by in vivo Multiphoton Microscopy*, The 7th International Conference on Head and Neck Cancer, July 20, 2008, San Francisco, CA; 2) *Multiphoton autofluorescence for in vivo assessment of cox-2 inhibitor on oral neoplasia*, SPIE Photonics West BIOS, Jan 25, 2009;

**Ph.D. students:**

**Laboratory Rotations:**

1) Eghtedari Mohammed, PhD Candidate: 2003; Trained in nonlinear optical microscopy for deep tissue imaging and in tissue engineered samples.

2) Benjamin J. Blow, M.D./PhD Candidate: 2004; Trained in optical spectroscopy and nonlinear optical microscopy for visualization of amyloid protein aggregates.

3) Luke Koong, PhD Candidate Spring 2009; Trained in optical microscopy for live cell imaging and nanoparticle imaging

**Master's students:** None

**Undergraduate students:**

- 1) Gerardo Guerra, 2006; Summer Undergraduate Research Program. Training in optical microscopy of cells grown on nanoparticle scaffolds. Collaboration with Todd Pappas, PhD, UTMB.
- 2) Natalya Patrikeeva, Summer 2008 and Summer 2009. Undergraduate Research Assistant; Training in intravital nonlinear optical microscopy and image processing; Currently full-time student at Rice University.

**Additional Trainees in cooperation with collaborating faculty in efforts to integrate advanced optical imaging knowledge with respective biological / clinical fields (see also Professional Skills):**

- 1) Darci Smith Graduate student; briefly trained in multiphoton microscopy of GFP labeled VEE in thick mouse tissue sections, approximately 1 month in summer 2003 (mentor: Dr. Scott Weaver, UTMB)
- 2) Eghtedari Mohammed, Graduate student; 2004-2007; Trained in nonlinear optical microscopy extensively for deep tissue imaging and in tissue engineered samples (mentor: Dr. Massoud Motamedi)
- 3) Peter Brecht Graduate student. Advised on biomedical optics data analysis and interpretation 2003-2007 (mentor: Dr. Rinat Esinaliev, UTMB)
- 4) Adam Boretsky Graduate student; Training in biomedical optics and imaging. 2007-present; (mentor: Dr. Massoud Motamedi, UTMB).
- 5) Raiyan Zaman Graduate student; Trained in hamster dorsal skin flap preparation for optical imaging of in vivo skin microvasculature; training in optical clearing technique. 2005 (mentor: Dr. AJ Welch, Univ of Texas at Austin)
- 6) Piotr Rychahou, M.D. Medical Research Fellow in Cancer Center. Training in small animal in vivo molecular imaging by bioluminescence. 2006-2007 (mentor: Dr. Mark Evers)
- 7) Yuqiong Liang, PhD. Postdoctoral Trainee. Learning to image HCV antigens using targeted quantum dots in human liver sections using two-photon microscopy. 2006-present (mentor: Dr. Stanley Lemon)
- 8) Yongquan Jiang, PhD. (Jun 2007-present) extensive hands-on training in confocal microscopy and nonlinear optical microscopy (mentor: Massoud Motamedi)
- 9) Carla Kantara (2007-present) Graduate student; Training in optical microscopy for imaging of tumor cell migration in 3D tissue engineered scaffolds. (mentor: Dr. Vicente Resto)
- 10) Eddy Kuwana (Jun 2005-Jun 2006) extensive year-long training in fluorescence lifetime imaging microscopy using femtosecond laser excitation and combined with nonlinear optical microscopy; trained in organotypic brain slice imaging. Currently

a Scientist at an industrial laser company. (co-mentors Todd Pappas and Massoud Motamedi)

**c. Chair/Member of Ph.D. Supervisory Committee for:**

2003-2006 Member of the supervisory committee of Bryce Portier, Cell Biology Graduate Program UTMB Graduated Dec. 2006

2003-2007 Member of the supervisory committee of Hans-Peter Brecht Cellular Physiology and Molecular Biophysics UTMB Graduated Dec 2007

2003-2008 Member of the supervisory committee of Eghtedari Mohammed, Cellular Physiology and Molecular Biophysics

2003 Member of the PhD qualifying exam, Andrey Bednov, Cellular Physiology and Molecular Biophysics, UTMB

2004 Member of the PhD qualifying exam, Jesong Park, Cellular Physiology and Molecular Biophysics, UTMB

2004 Member of the PhD qualifying exam, Eghtedari Mohammed, Cellular Physiology and Molecular Biophysics, UTMB

2006 Member of the PhD qualifying exam, Amialohi Eschie, Cellular Physiology and Molecular Biophysics, UTMB

**B. TEACHING RESPONSIBILITIES AT OTHER UNIVERSITIES**

**a. Teaching**

2001 Teaching Assistant, "Laser-Tissue Interactions," Univ of Texas at Austin

2000 Teaching Assistant, "Laser-Tissue Interactions," Univ of Texas at Austin

1999 Teaching Assistant, "Laser-Tissue Interactions," Univ of Texas at Austin

1997 Teaching Assistant, "Introduction to Mechanical Engineering," Univ. of Texas at Austin, Austin, TX

1994 Laboratory Teaching Assistant, "Physics for Life Scientists," Gustavus Adolphus College, St. Peter, MN.

**b. Students/Mentees/Advisees/Trainees**

Medical Students:

1) Allison Readinger, medical student at UTMB; research project in morphological effects of hyperosmotic agents on vasculature imaged by low coherence optical technique, 2000

**MEMBERSHIP IN SCIENTIFIC SOCIETIES/PROFESSIONAL ORGANIZATIONS:**

SPIE (International Society for Optical Engineering)

**HONORS:**

- National Science Foundation Summer Research Fellowship, 1992.
- Professional Development Award, The University of Texas at Austin, 1998.
- National Science Foundation selected participant in the NSF Workshop for the Advancement and Retention of Underrepresented and Minority Engineering Educators (WEE '99), 1999.
- N.K. Wright Endowed Presidential Scholarship, 1999.
- University Continuing Fellowship, The University of Texas at Austin, 1999-2000.
- Clawson Endowed Graduate Fellowship, 2000-2001.
- AAUW Educational Foundation Engineering Dissertation Fellowship, 2000-2001.
- Outstanding Dissertation Award, Honorable Mention, Univ. of Texas, 2002.

**ADDITIONAL INFORMATION:**

**Journal Reviewer for**

Lasers in Surgery and Medicine  
Applied Optics  
Journal Biomedical Optics  
Optics Letters  
Physics in Medicine and Biology  
Journal of Photochemistry and Photobiology  
Lasers in Medical Science  
Journal of Biophotonics

**Grant Reviewer for National Funding Organizations:**

**1) National Institutes of Health**

**Study Sections:**

- 2003 Ad-Hoc reviewer for BMIT Diagnostic Medical Imaging study section, National Institutes of Health
- 2003 Ad-Hoc reviewer for Improvements in Imaging Methods and Technologies (ZRG1 SRB) study section, National Institutes of Health
- 2004 Ad-Hoc reviewer for BMIT Diagnostic Medical Imaging study section, National Institutes of Health
- 2005 Ad-Hoc reviewer for BMIT Diagnostic Medical Imaging study section, National Institutes of Health
- 2006 Mail reviewer, BMIT Diagnostic Medical Imaging study section, National Institutes of Health
- 2007 Ad-Hoc reviewer for Microscopic Imaging study section, National Institutes of Health
- 2008 Mail / Telephone reviewer for BMIT Diagnostic Medical Imaging study section, National Institutes of Health

**Site Visits:**

- 2007 Member of Special Review Panel for P41 research resource, NIH-Biomedical Imaging, Technology Nov. 5-7
- 2008 Special Review Panel for P41 research resource, NIH-Biomedical Imaging, Sept 25, 2008

**2) National Science Foundation**

- 2008 Mail Review, National Science Foundation, Pan-American Advanced Studies Institutes Program (PASI)

**Professional Skills** (i.e. Faculty mentor, professional development endeavors)

- 1) *Advancement of emerging optical technology and integration of bioengineering and imaging with biological and clinical fields through collaborative endeavors:*

I have established a successful advanced optical imaging laboratory (Advanced Bio-Optics Imaging Laboratory) which has served as a resource for transferring of knowledge from biomedical engineering and optical imaging to established basic and clinical investigators. This effort has proven to be highly successful and fruitful in that it has impacted the research activity of individual investigators as well as collectively enhanced the knowledge-base of advanced imaging. The effort has included hands-on teaching of trainees in the areas of confocal microscopy, nonlinear optical microscopy, and optical coherence tomography (individually listed above under trainees section).

*2) Facilitating the integration of basic and preclinical studies into clinical arena*

Through my research in biomedical engineering have assisted in the translation of basic studies into potential clinical applications. Three such examples include:

- 1) Noninvasive optical assessment of topical microbicides on cervicovaginal epithelium. Over the past four years have worked as part of an international multidisciplinary team to develop and test noninvasive optical imaging for detecting microbicide-induced toxicity on cervicovaginal epithelium. A clinical trial is planned for Spring of 2009 to assess one of these techniques.
- 2) Laser tattoo removal facilitated by tissue optical clearing. The technique of optical clearing patented by myself and collaborators at UT-Austin has made it to the clinic at UTMB and tested in human patients for laser tattoo removal. Results are being compiled.
- 3) Epithelial cancer screening and detection. Am working collaboratively with members of the Center for Cancers of the Head and Neck at UTMB to develop a method based on multiphoton microscopy for noninvasive imaging of epithelial neoplasms.

**PATENTS**

Vargas, Gracie (Galveston, TX); Barton; Jennifer K. (Tucson, AZ); Chan; Eric K. (Lexington, MA); Milner; Thomas E. (Austin, TX); Welch; Ashley J. (Austin, TX); United States Patent 6,942,663: Laser treatment of cutaneous vascular lesions, September 13, 2005.

**PUBLISHED:**

**A. ARTICLES IN PEER-REVIEWED JOURNALS:**

1. Vargas G, Chan EK, Barton JK, Rylander III HG, Welch AJ, "Use of an agent to reduce scattering in skin," *Lasers in Surgery and Medicine*, 24(2): 133-141, 1999.
2. Barton JK, Vargas G, Pfefer TJ, Welch AJ, "Laser fluence for permanent damage of cutaneous blood vessels", *Photochemistry & Photobiology*, 70(6): 916-920, 1999.
3. Pfefer TJ, Choi B, Vargas G, McNally KM, Welch AJ: Pulsed laser-induced thermal damage in whole blood. *Journal of Biomechanical Engineering Transactions of the ASME*, 2000; 122:196-202.
4. Chan KF, Lee H, Kamerer A, McGuff H.S., Vargas G, Teichman JMH, Welch AJ, "Erbium:YAG laser lithotripsy mechanism," *Journal of Urology*, 2002;168(2):436-41.
6. Chan KF, Choi B, Vargas G, Hammer DX, Sorg B, Pfefer JT, Teichman JMH, Welch AJ, and Jansen ED, "Free electron laser ablation of urinary calculi: an

- experimental study,” *IEEE Journal on Selected Topics in Quantum Electronics*, 2001; 7(6):1022-1033.
7. Vargas G, Chan KF, Thomsen SL, Welch AJ, “The use of osmotically active agents to alter the optical properties of tissue: effects on the fluorescence signal detected through skin,” *Lasers in Surgery and Medicine*, 2001; 29:213-220.
  8. Telekov S, Vargas G, Nelson JS, Milner TE, Coherent thermal wave imaging of subsurface chromophores in biological materials, *Physics in Medicine & Biology*, 2002; 47:657-671.
  9. Choi B, Kim J, Milner TE, Vargas G, Aguilar G, Rylander CG, Nelson JS, Use of optical coherence tomography to monitor biological tissue freezing during cryosurgery., *Journal of Biomedical Optics*, 2004; 9(2):282-6.
  10. Vargas G, Readinger A, Dozier SS, Welch AJ, Morphological changes associated with increased visualization of subdermal blood vessels by tissue optical clearing – measured using Doppler optical coherence tomography, *Photochemistry & Photobiology*, 2003; 77(5): 541-549.
  11. Kotov NA, Liu Y, Wang S, Cumming C, Eghtedari M, Vargas G, Motamedi M, Nichols J, Cortiella J, Inverted colloidal crystals as three-dimensional cell scaffolds, *Langmuir*, 2004; 20(19):7887-7892.
  12. Sun J, Shilagard T, Bell B, Motamedi M, Vargas G, In vivo multimodal nonlinear optical imaging of mucosal tissue, *Optics Express*, 2004; 12(11):2478-86; <http://www.opticsexpress.org/abstract.cfm?URI=OPEX-12-11-2478>.
  13. Youn JI, Vargas G, Wong BF, Milner TE, Depth-resolved phase retardation measurements for laser-assisted non-ablative cartilage reshaping, *Physics in Medicine & Biology*, 2005; 50:1937-1950.
  14. Liu Y, Wang S, Krouse J, Kotov NA, Eghtedari M, Vargas G, Motamedi M, Rapid aqueous photo-polymerization route to polymer and polymer-composite hydrogel 3D inverted colloidal crystal scaffolds, *J Biomaterials Res:A*, 2007 Mar. 2.
  15. Gong B., Sun J., Vargas G, Xu Y, Chang Q, Srivastava D, Boor PJ, Nonlinear Imaging Study of Extracellular Matrix in Chemical-induced, Developmental Dissecting Aortic Aneurysm: Evidence for Defective Collagen Type III, *Birth Defects Research Part A: Clinical and Molecular Teratology*, 2008; 82(1); 16-24.
  16. Vargas G., Barton JK, Welch AJ, Use of hyperosmotic chemical agent to improve the laser treatment of cutaneous vascular lesions, *Journal of Biomedical Optics*, 2008; 13(2):021114.
  17. Vincent K, Bourne N, Bell BA, Vargas G, Tan A, Cowan D, Stanberry L, Rosenthal SL, Motamedi M, High resolution imaging of epithelial injury in the sheep cervicovaginal tract, *Sexually Transmitted Diseases* 2009; 36(12):1-7.
  18. Ioannou Y, Romay-Penabad Z, Pericleous C, Giles I, Papalardo E, Vargas G, Shilagard T, Latchman DS, Isenberg DA, Rahman A, Pierangeli S. In vivo inhibition of antiphospholipid antibody-induced vascular thrombosis through the use of the antigenic target peptide domain I of  $\beta$ 2-glycoprotein I. *Journal of Thrombosis and Haemostasis* 2009 May;7(5):833-42
  19. Vargas G., Tuya Shilagard, Rebecca Johnston, Brent Bell, Rachael Stegal, Kathleen Vincent, Lawrence Stanberry, Massoud Motamedi, Nigel Bourne, High resolution confocal imaging of vaginal epithelial microstructure as a means of detecting microbicide toxicity , *Journal Infectious Diseases* 2009; 199(10):1546-52.
  20. Zaman RT, Parthasarathy AB, Chen B, Vargas G, Dunn AK, Rylander HG, Welch AJ, Perfusion in Skin Treated with Glycerol, *Lasers in Surgery and Medicine*, 2009 Sep;41(7):492-503

21. Pennock JW, Stegall R, Bell B, Vargas G, Milligan G, Bourne N, Estradiol improves genital herpes vaccine efficacy in mice, *Vaccine*. 2009 Aug 3. [Epub ahead of print]
22. Liang Y, Shilagard T, Lau D, Xiao SY, Snyder N, Cicalese L, Vargas G, Lemon S, Visualizing hepatitis C virus infections in human liver by two-photon microscopy, *Gastroenterology* 2009 Oct 1 [Epub ahead of print].

## **B. OTHER:**

### **Thesis/Dissertation**

Vargas, Gracie, Reduction of Light Scattering in Biological Tissue: Implications for Optical Diagnostics and Therapeutics, UT-Austin Department of Biomedical Engineering, 2001. Awarded University of Texas at Austin Outstanding Dissertation Award, 2<sup>nd</sup> place

### **Proceedings and Symposia**

1. Vargas G, Barton JK, Choi B, Izatt JA, Welch AJ, "Assessing vessel damage with color Doppler optical coherence tomography following irradiations with cooling," *Proceedings SPIE*, 3598, 1999.
2. Vargas G, Chan KF, Thomsen SL, Welch AJ, "Enhanced penetration depth of light in skin by application of several osmotically active agents," *Proceedings SPIE*, 3907, 2000.
3. Vargas G, Ducros M, Dozier S, Welch AJ, "Selective photocoagulation of cutaneous blood vessels: evaluation of vessel damage by color Doppler optical coherence tomography," *Proceedings SPIE*, 3907, 2000.
4. Youn J, Vargas G, Ducros M, Telenkov SA, Wong BJJ, Milner TE, "Thermally induced birefringence changes in cartilage using polarization sensitive optical coherence tomography," *Proceedings SPIE*, 4257, 2001.
5. Vargas G, Readinger A, Dozier S, Welch AJ, "Chemical agents for the reduction of light scattering in tissue: implications for light therapeutic applications," *Proceedings SPIE*, 4609, 2002.
6. Vargas G, Shilagard T, Sun J, Motamedi M, In vivo multiphoton and second harmonic generation microscopy of epithelial carcinogenesis, *Proc. SPIE Vol. 6091*, p. 58-65; 2006
7. Kuwana E, Vargas G, T. C. Pappas, A. Liopo, M. Motamedi, Quantitative intracellular calcium sensing with two-photon fluorescence lifetime imaging microscopy, *Proc SPIE Vol 6424*, 2007.
8. Xiao X, Shilagard T, Vargas G, In vivo mucosal tissue imaging using fiber-based two-photon approach, *SPIE Vol 6442-71*.

## **C. ABSTRACTS:**

1. Vargas G, Chan KF, Barton JK, Rylander HG, Welch AJ, "The use of an osmotically active index matching fluid to reduce skin turbidity," *American Society for Lasers in Surgery and Medicine*, 1998.
  2. Barton JK, Vargas G, Pfefer TJ, Choi B, Kulkarni MD, Izatt JA, van Leeuwen TG, Welch AJ, "Optical modeling of cutaneous blood vessels imaged by in

- vivo color Doppler optical coherence tomography,” Gordon Research Conference: Lasers in Medicine and Biology, 1998.
3. Vargas G, Chan KF, Barton JK, Rylander HG, Welch AJ, “The use of an osmotically active index matching fluid to reduce skin turbidity,” Gordon Research Conference: Lasers in Medicine and Biology, 1998.
  4. Vargas G, Chan KF, Thomsen SL, Welch AJ, “Enhanced penetration depth of light in skin by application of several osmotically active agents,” Proceedings SPIE, 3907, 2000.
  5. Vargas G, Welch AJ, “Optical clearing agents: effect on a focused beam within tissue,” Gordon Research Conference: Lasers in Medicine and Biology, 2000.
  6. Vargas G, Readinger A, Welch AJ, “The use of chemical agents for altering the optical properties of tissue: implications for light diagnostic and therapeutic applications,” American Society for Lasers in Surgery and Medicine, 2001.
  7. Vargas G, Barton JK, Allison Readinger, Susan S. Dozier, A.J. Welch, Tissue Optical Clearing for Improved Blood Vessel Coagulation, American Society for Lasers in Surgery and Medicine, 2002.
  8. Ju Sun, Tuya Shilagard, Brent Bell, Massoud Motamedi, Gracie Vargas, Imaging Oral Carcinogenesis Using Two-Photon Fluorescence and Second Harmonic Generation Microscopy, CBST (Center for Biophotonics Science & Technology) San Antonio Biophotonics Symposium, Feb 26-27, 2004.
  9. Ju Sun, Tuya Shilagard, Brent Bell, Massoud Motamedi, Gracie Vargas, Imaging Oral Carcinogenesis Using Two-Photon Fluorescence and Second Harmonic Generation Microscopy, Houston Society for Engineering in Medicine and Biology, Feb. 2004
  10. Shilagard T, Bell B, Motamedi M, Vargas G, In vivo multiphoton and second harmonic generation microscopy of epithelial carcinogenesis, Houston Society for Engineering in Medicine and Biology, 2006
  11. Gong B, Wang L, Sun J, Vargas G, Boor PJ, Quantitative Morphologic Assessment of Extracellular Matrix in Chemical-induced Developmental Dissecting Aortic Aneurysm using Multiphoton Fluorescence and Second Harmonic Generation Microscopy, Weinstein Cardiovascular Development Conference, 2006.
  12. Vargas G, Shilagard T, Bell B, Castro C, Motamedi M, Stanberry L, Bourne N, High-resolution optical evaluation of cervicovaginal epithelial microstructure in small animal model following application of N-9 containing microbicide, Microbicides 2006
  13. Xiao X, Shilagard T, Vargas G, In vivo mucosal tissue imaging using fiber-based two-photon approach, SPIE Vol 6442-71.
  14. Vargas G, A. Recinos III, T. Shilagard, C. Lee, H. Sun, A. Brasier, Multiphoton microscopy and second-harmonic generation for evaluating extracellular changes in aortic aneurysm, SPIE Vol 6442-43, 2007.
  15. Vargas G, T. Shilagard, B. A. Bell, M. Motamedi, L. Stanberry, N. Bourne, Three-dimensional microscopic evaluation of cervicovaginal epithelial microstructure change due to topical microbicides, SPIE 6441-03, 2007
  16. Boor PJ, Gong B, Xu Y, Oberhauser AF; Vargas G, An in vivo Model of Dissecting Aortic Aneurysm: Possible Role of Collagen Type III in Development of Media, Vascular Matrix Biology & Bioengineering Workshop, Mar 15-18, 2007, Whistler Village, BC Canada.

17. Vargas G, A. Recinos III, T. Shilagard, C. Lee, H. Sun, A. Brasier, Multiphoton microscopy and second-harmonic generation imaging of aortic aneurysm, The Houston Society for Engineering in Medicine and Biology, Feb. 7, 2008.
18. Domanski MC, Vargas G, Shilagard T, Resto VA, Differential Interactions between tumor cells and lymph nodes correlate with survival in an orthotopic model of HNSCC, P533, The 7<sup>th</sup> International Conference on Head and Neck Cancer, July 20, 2008, San Francisco, CA.
19. Shilagard T, J.Sun, C.Castro, V.Resto, S.McCammon, M.Motamedi, Vargas G, In vivo multiphoton and second harmonic generation microscopy of oral epithelial carcinogenesis, P214, The 7<sup>th</sup> International Conference on Head and Neck Cancer, July 20, 2008, San Francisco, CA
20. Ho KK, Shilagard T, Newlands SD, Motamedi M, Qiu S, McCammon S, Vargas G, P642, Evaluation of Celecoxib on Oral Carcinogenesis by in vivo Multiphoton Microscopy, The 7<sup>th</sup> International Conference on Head and Neck Cancer, July 20, 2008, San Francisco, CA
21. Kholodnykh AK, Shilagard T, Motamedi M, Vargas G, In vivo OCT study of optical clearing and its recovery dynamics: implications for molecular imaging, SPIE Photonics West: BIOS, Jan 27, 2009.
22. Ho KK, Shilagard T, Newlands SD, Motamedi M, Qiu S, McCammon S, Vargas G, Multiphoton autofluorescence for evaluating effects of a cox-2 inhibitor in vivo in oral carcinogenesis, SPIE Photonics West: BIOS, Jan 25, 2009.

#### **PUBLICATIONS - IN PRESS:**

#### **PUBLICATIONS - SUBMITTED:**

1. Romay-Penabad R, Montiel-Manzano MG, Shilagard T, Papalardo E, Vargas G, Wang M, Hajjar K, Pierangeli SS, Annexin A2 is involved in antiphospholipid antibody-mediated pathogenic effects in vitro and in vivo., accepted to *Blood*

#### **MANUSCRIPTS IN PREPARATION:**

2. Vargas G, Shilagard T, Sun J, Motamedi M, In vivo multiphoton and second harmonic generation microscopy of epithelial carcinogenesis, in preparation for submission to *Neoplasia*
3. Vargas G, Patrikeev I, Johnston R, Bell B, Vincent K, Bourne N, Motamedi M, Detection of microbicide induced damage in the ovine vaginal epithelium using surface confocal microendoscopy, In preparation for *Journal Infectious Diseases*
4. Kholodnykh AK, Shilagard T, Motamedi M, Vargas G, In vivo OCT study of optical clearing and its recovery dynamics: implications for molecular imaging, SPIE Photonics West: BIOS, Jan 27, 2009 – in prep for *Journal of Biomedical Optics*
5. Ho KK, Shilagard T, Newlands SD, Motamedi M, Qiu S, McCammon S, Vargas G, Multiphoton autofluorescence for evaluating effects of a cox-2 inhibitor in vivo in oral carcinogenesis, in prep for *Laryngoscopy*

#### **PAPERS AND CONTINUING EDUCATION PROGRAMS PRESENTED:**

#### **INVITED LECTURES AT SYMPOSIA AND CONFERENCES:**

Invited talk: Optical Imaging, Microscopy, and Infrared Imaging Session at the 31<sup>st</sup> Annual International Conference on IEEE Engineering in Medicine and Biology Society, Sept 2009

**INVITED LECTURES - OFF CAMPUS:**

2002 Invited seminar: "Tissue Optical Clearing for Improved Blood Vessel Coagulation," Beckman Laser Institute / Laser Microbeam and Medical Program (LAMMP) Lecture, University of California, Irvine, June 2002.

2002 Invited seminar: "Tissue Optical Clearing," Biomedical Engineering, University of Texas at Austin, November 11, 2002.

2003 Invited lecture, "Techniques for Deep Optical Imaging," Department of Biomedical Engineering Seminar Series, Texas A&M University, December 1, 2003

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