

## CURRICULUM VITAE

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**Date Prepared:** March 30, 2017

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**Place of Birth:** Pratapgarh, India

### Education

1966	B.S.	Chemistry	University of Karachi, Pakistan
1968	M.S.	Organic Chemistry	University of Karachi, Pakistan
1970	M. Phil.	Physical Chemistry	University of Islamabad, Pakistan
1980	Ph.D.	Physical Organic Chemistry	University of Arkansas

### Postdoctoral Training

1980-1982 Research Fellow, Department of Chemistry, University of Pennsylvania

### Faculty Academic Appointments

1982-1987	Research Associate, Department of Dermatology, Harvard Medical School
1987-1991	Assistant Professor of Dermatology (Biochemistry), Harvard Medical School
1990-1991	Assistant Professor of Health Sciences and Technology, Harvard-MIT HST Division
1991-2000	Associate Professor of Dermatology (Biochemistry), Harvard Medical School
1991-2000	Associate Professor of Health Sciences and Technology, Harvard-MIT HST Division
2000-	Professor of Dermatology (Biochemistry), Harvard Medical School
2005	Member of the Affiliated Faculty, Harvard-MIT Division of Health Sciences and Technology
2009-	Professor of Health Sciences and Technology, Harvard-MIT HST Division

### Appointments at Hospitals/Affiliated Institutions

1982-1989 Assistant Biochemist, Department of Dermatology, Massachusetts General Hospital

1989-1994	Associate Biochemist, Department of Dermatology, Massachusetts General Hospital
1994-2005-	Biochemist, Department of Dermatology, Massachusetts General Hospital Member, Affiliated Faculty, Harvard-MIT Division of Health Sciences and Technology (HST)
2005-2011	Founding Director, Office of Research Career Development, Massachusetts General Hospital

### **Other Professional Positions**

1990	Visiting Professor, University Clinic Ulm, Ulm, Germany
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### **Major Administrative Leadership Positions**

1988-1998	Team Leader, Wellman Laboratories of Photomedicine, Massachusetts General Hospital
1991-93	Chair, Wellman Laboratories Team Leaders, Massachusetts General Hospital
1997-98	Chair, Strategic Planning Committee, Wellman Laboratories of Photomedicine, Massachusetts General Hospital
1999-2004	Associate Director, Wellman Center for Photomedicine, Massachusetts General Hospital
1999-2004	Executive Council, Wellman Laboratories of Photomedicine, Massachusetts General Hospital
1999-2004	Faculty Council, Wellman Laboratories of Photomedicine, Massachusetts General Hospital
2002-2003	Chair, Joint Committee on the Status of Women, Harvard Medical School
2004-	Committee of Professors, Wellman Center for Photomedicine, Massachusetts General Hospital
2004-	Faculty Executive Council, Wellman Center for Photomedicine, Massachusetts General Hospital
2004-2005	Member, Committee on New Criteria for Promotions at Harvard Medical School
2005-2011	Director, Office of Research Career Development, Massachusetts General Hospital
2005-	Committee of Professors, Harvard Medical School
2008- 2013	Member, Standing Committee on Promotions, Reappointments and Appointments (P&R), Harvard Medical School
2009-	President-Elect, American Society for Photobiology
2009-2014	Treasurer, International Photodynamic Association
2010-2012	President, American Society for Photobiology
2013	Vice President of Science, 1st Scientific Meeting of the PanAmerican Photodynamic Association (PAPDT)
2014-	President, International Photodynamic Association

### **Committee Service**

Years of Membership	Name of Committee and Institution/Organization
<i>Local:</i>	
1986-1988	Co-Chair, Education Committee, Wellman Laboratories, Massachusetts General Hospital and Harrison Spectroscopy Laboratories, MIT

1989-1990 Member, Committee on Research, Massachusetts General Hospital

1990-1998 Member, Subcommittee on Research Animal Care, Massachusetts General Hospital

1992-1998 Member, Subcommittee on Review of Research Proposals (SRRP), Massachusetts General Hospital

1992-1993-1994 Member, Research Council, Massachusetts General Hospital  
Member, Steering Committee, Wellman Laboratories of Photomedicine, Massachusetts General Hospital

1994-1998 Member, Applications Committee, Wellman Laboratories of Photomedicine, Massachusetts General Hospital

1994-1998 Member, Basic Science Committee, Wellman Laboratories of Photomedicine, Massachusetts General Hospital

1996-2005 Member, Affirmative Action Committee, Massachusetts General Hospital

1997 Member, Cancer Center Search Committee, Massachusetts General Hospital/Massachusetts Eye & Ear Infirmary

1997- Member, Fellowship Selection Committee in Gynecology-Oncology, Massachusetts General Hospital

1997-1998 Chair, Executive Director Search Committee, Wellman Laboratories of Photomedicine, Massachusetts General Hospital

1998-2002 Member, Harvard Skin Disease Research Center, Harvard Institutes of Medicine, Brigham and Women's Hospital

1998-1998 Member, Joint Committee on the Status of Women at Harvard Medical School  
Member, Research Operations Improvement Committee on Faculty Development, Massachusetts General Hospital

1998 Member, Strategic Planning Committee, Subcommittee on Review of Research Proposals (SRRP), Massachusetts General Hospital

1999- Chair, Appointments and Promotion Committee, Wellman Center for Photomedicine, Massachusetts General Hospital

1999-2004 Member, Executive Committee, Wellman Laboratories of Photomedicine, Massachusetts General Hospital

2000-2001 Chair, Executive Committee, Wellman Laboratories of Photomedicine, Massachusetts General Hospital

2000-2001 Chair, Faculty Council, Wellman Laboratories of Photomedicine, Massachusetts General Hospital

2001-2002 Vice-Chair, Joint Committee on the Status of Women, Harvard Medical School

2002-2003 Chair, Joint Committee on the Status of Women, Harvard Medical School

2002-2005 Member, Women in Academic Medicine Leadership Committee, Harvard Medical School

2002-2005 Standing Deans Committee on Promotion, Reappointments, and Appointments, Member, Harvard Medical School

2003-2005 Member, ECOR Career Development Office Task Force, Massachusetts General Hospital

2003-2005 Chair, Dean's Award Committee, Joint Committee on the Status of Women, Harvard Medical School

2004- Member, Space Committee, Wellman Center for Photomedicine, Massachusetts General Hospital

2005-2008 Member, Subcommittee of Professors, Harvard Medical School

2005-2008 Member, Faculty Council, Harvard Medical School

2005- Member, Standing Search Committee, Harvard-MIT Division of Health Sciences and Technology (HST)

2005- Member, Career Conference Committee, Harvard Medical School

2005- Member, Executive Committee on Research (ECOR), Massachusetts General Hospital

2005- Research Administration Management Project (RAMP), Massachusetts General Hospital

2006- Member, Partners Research Council

2007- Member, Personnel Committee, Harvard-MIT Division of Health Sciences and Technology (HST)

2008- Member, Standing Committee on Promotions, Reappointments and Appointments (P&R), Harvard Medical School

2008- Voting Member, Harvard Medical School Promotion and Review Board (PRB)

2008- Member, Milton Committee, Harvard Medical School

2008- Member, Authorship Dispute, Brigham & Women's Hospital, Harvard Medical School

2008- Member, Student Review Board, Harvard Medical School

2008- Member, MGH Dermatology Promotions Committee

2008- Advisor, Biomedical Science Careers Student Conference sponsored by Biomedical Science Careers Program, Diversity Inclusion and Community Partnership (DCP), Harvard Medical School (Saturdays)

2009 Member, Ad Hoc Committee to Search for a Professor of Surgery, Full Time, to Serve as Director of the Center for Quality and Safety and Associate Director of the Codman Center for Clinical Effectiveness in Surgery at Massachusetts General Hospital, Harvard Medical School

2009- Member, Council of Mentors, HMS Office for Diversity and Community Partnership

2009- Member of the HMS/HSDM (Harvard School of Dental Medicine) Excellence in Mentoring Awards Selection Committee

2009- Member, Task Force on Research Activities in the Department of Anesthesia and Critical Care, Massachusetts General Hospital

2009- Member, Finance Committee, Wellman Center for Photomedicine, Massachusetts General Hospital

2009 Member, Search Committee for Young Investigators, Harvard-MIT HST & MIT EECS (Electrical Engineering and Computer Science)

2010 Member, Partners Responsible Conduct of Research Program, Massachusetts General Hospital

2010 Member, Shore Fellowship Fundraising Committee, Eleanor and Miles Shore 50th Anniversary Scholars Awards, Harvard Medical School

2010 Member, Mentoring Committee for Melissa Suter, Wellman Center for Photomedicine, Massachusetts General Hospital

2010- Member, Strategic Space Planning Committee, Wellman Center for Photomedicine, Massachusetts General Hospital

2011 Member, Visiting Committee, Harvard-MIT Division of Health Sciences and Technology (HST)

2011- Member, Partners Biorepository Implementation Committee

2012- Chair, Affirmative Action Committee, Wellman Center for Photomedicine, Massachusetts General Hospital

- 2012- Member, Ad hoc Administration Task Force Committee, Wellman Center for Photomedicine, Massachusetts General Hospital
- 2012- Member, Review Committee on Student Misconduct, Harvard School of Dental Medicine
- 2014 Member, Ad hoc Evaluation Committee, Office for Faculty Affairs, Harvard Medical School
- 2014 Member, Ad hoc Evaluation Committee, Department of Medicine/BWH and Professorial Promotions Committee
- 2014 Member, Search Committee, Instructor/Assistant Professor in the Division of Biomedical Engineering at Brigham & Women's Hospital
- 2014 Panelist, Career Pathways Panel Discussion: The Academic Job Search, Office for Research Career Development, Massachusetts General Hospital
- 2015 Co-leader, New Investigator Advancement Initiative (NAI), "expanding your research program through collaborations", Office for Research Career Development, Massachusetts General Hospital
- 2015 Member, Shore Fellowship Selection Committee, Office for Faculty Affairs Harvard Medical School
- 2015 Panelist, Academic Jobs Panel, Office for Research Career Development, Massachusetts General Hospital
- 2016 Member, Ad hoc Committee to evaluate Dr. F. Stephen Hodi, for appointment as Professor of Medicine to serve at the Dana-Farber Cancer Institute
- 2017 Member, Ad hoc Committee to evaluate Dr. Seok Hyun Yun, Ph.D. for appointment as Professor of Dermatology, Harvard Medical School

*National:*

- 1979- Member, Miscellaneous committees (Search, space committees)
- 1991- 2004 Member, Scientific Advisory Committee, Case Western Reserve University, Photodynamic Therapy Program, Cleveland, OH
- 1993- Member, Organizing Committee, 1998 SPIE Conference, San Jose, CA
- 1994-1996 Member, Scientific Advisory Board, MediSpectra Inc., Cambridge, MA
- 1996-2002 Member, Technical Advisory Board, OPOTEK Inc., Carlsbad, CA
- 1997-1998 Member, Scientific Advisory Board, Light Medicine, Inc., Leverett, MA
- 1998-2002 Consultant, Miravant Medical Technologies, Santa Barbara, CA
- 1997-2000 Consultant, Peridontix, Inc., Watertown, MA
- 1998 Member, Organizing Committee, 1998 Therapeutic Laser Applications Conference, Optical Society of America, Orlando, FL
- 1999 Member, Publications Committee, American Society for Laser Medicine and Surgery, Inc., Wausau, WI
- 1988 Chair, Advances in Photochemotherapy, Society for Photoinstrumentation and Electronics (SPIE), Boston, MA
- 1990 Co-Chair, Fundamentals of Photodynamic Therapy, Society for Photoinstrumentation and Electronics (SPIE), Los Angeles, CA
- 1990 Co-Chair, Photochemical Effects in Laser-Tissue Interactions, Society for Photoinstrumentation and Electronics (SPIE), Los Angeles
- 1990 Chair, International Photodynamic Association, Buffalo, NY
- 1991 Chair, Photochemical Effected Laser-Tissue Interactions, Society for Photoinstrumentation and Electronics (SPIE), Los Angeles
- 1991 Chair, Future Directions in Photodynamic Therapy, Engineering Foundation Conference on Lasers in Medicine, Palm Coast, FL

1992 Chair, Photochemical Effects in Laser-Tissue Interactions, Society for  
Photoinstrumentation and Electronics (SPIE), Los Angeles

1993 Laser-Tissue Interactions, Chair, Society for Photoinstrumentation and  
Electronics (SPIE), Los Angeles, CA

1994 Chair, Laser-Tissue Interactions, Society for Photoinstrumentation and  
Electronics (SPIE), Los Angeles, CA

1995 Chair, Laser-Tissue Interactions, Society for Photoinstrumentation and  
Electronics (SPIE), Los Angeles, CA

1996 Chair, Laser-Tissue Interactions, Society for Photoinstrumentation and  
Electronics (SPIE), San Jose, CA

1996 Co-Chair, Cardiovascular Photobiology and Photomedicine, American Society for  
Photobiology, Atlanta, GA

1997 Co-Chair, Laser-Tissue Interactions, Society for Photoinstrumentation and  
Electronics (SPIE), San Jose, CA

1998 Co-Chair, Laser-Tissue Interactions, Society for Photoinstrumentation and  
Electronics (SPIE), San Jose, CA

1998 Co-Chair, Therapeutic Laser Applications, Optical Society of America, Orlando,  
FL

1998 Co-Chair, Photodynamic Therapy Session, Gordon Research Conference, Laser  
Tissue Interactions, Meriden, NH

1999 Co-Chair, Optical Techniques for Treatment of Tumors, Society for  
Photoinstrumentation and Electronics (SPIE), San Jose, CA

1999 Co-Chair, Advances in Optics for Biotechnology, Medicine and Surgery  
Conference, Kona, HI

1999-2001 Board Member, League of Women Voters

1999- Member, League of Women Voters

2003- Member, Scientific Advisory Board, Rasiris Technologies, Bozeman, MT

2004- Consultant, Medtronic Vascular, Santa Rosa, CA

2004-2009 Co-Chair, Optical Methods for Tumor Treatment and Detection, SPIE  
Conference, San Jose, CA

2009 Member, Coordinating and Governance Committee (CGC), National Cancer  
Institute, Bethesda, MD

2009 Co-Chair, International Photodynamic Association, Seattle, WA

2009- Member, National Initiative on Gender, Culture and Leadership in Medicine: C -  
Change, Brandeis University, Women's Studies Research Center, Brandeis  
University, Stoneham, MA

2009 Member, Network for Translational Research (NTR): Optical Imaging in  
Multimodal Platforms (NTR U54) Advisory Committee, St. Louis, MO

2010 Member, National Institute of Biomedical Imaging and Bioengineering (NIBIB)  
Scientific Advisory Board through an initiative by the Center for Molecular  
Imaging and Innovation Technology (CMIIT) of the Society for Nuclear Imaging,  
St. Louis, MO

2010- Member, Scientific Advisory Board, Department of Biomedical Engineering,  
Tufts University, Medford, MA

2011- Member, External Scientific Advisory Committee for the Dartmouth Center for  
Cancer Nanotechnology Excellence (DCCNE), Dartmouth, NH

2012 Mentor, AACR Science Education Committee, AACR Special Program for High  
School Students: The Conquest of Cancer and the Next Generation of Cancer  
Researchers (AACR), Chicago, IL

- 2012 Discussion Leader-Molecular Probes, Gordon Research Conferences-Lasers in Medicine and Biology, Holderness, NH
- 2013 Session Chair, Optical Methods for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy XXII (SPIE), San Francisco, CA
- 2013 Member, Molecular Imaging Program's Scientific Advisory Board, National Institutes of Health
- 2013 Co-Chair, 1st Scientific Meeting of the PanAmerican Photodynamic Association (PAPDT), Boston, MA
- 2014 Member, Scientific Advisory Board-Molecular Imaging Program, Washington, DC
- 2014 Co-Chair, Optical Methods for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy XXIII (SPIE), San Francisco, CA
- 2014 Conference Chair, Photonic Therapeutics and Diagnostics (SPIE), San Francisco, CA
- 2014 Member, A BIOS Student Networking Event, (SPIE), San Francisco, CA
- 2014 Co-Chair, PanAmerican Photodynamic Association (PAPDT), Phoenix, AZ
- 2014 Conference Chair, American Society for Photobiology, San Diego, CA
- 2016 Session Chair, Photodynamic Therapy II (SPIE), San Francisco, CA
- 2016 Inaugural Member, External Advisory Committee, Center for Multiple Myeloma Nanotherapy (CMMN) at Washington University School of Medicine, St. Louis, MO
- 2016- Member, External Advisory Board for the developing Siteman Cancer Center/ Washington University School of Medicine (WUSM) Breast Cancer Specialized Program of Research Excellence (SPORE) Program
- 2016 Member, PDT Pancreatic Cancer Advisory Board, Pinnacle Biologics, Inc., Denver, CO
- 2016 Member, Photofrin® Virtual Advisory Board, Pinnacle Biologics, Inc.

*International:*

- 1992 National Cancer Institute, Radiation Medicine Study Section, Toronto, Canada
- 1993 Medical Research Council of Canada
- 1993 Chair, Laser Society of Japan, Tokyo
- 1993 Chair, Multiphoton Photochemistry in Biological Systems, Vancouver, Canada
- 1994 Medical Research Council of Canada
- 1996 Chair, 6th Biennial Meeting of the International Photodynamic Association, Melbourne, Australia
- 1996 Co-Chair, Photodynamic Sensitization in the Treatment of Non-Tumor Diseases, International Congress on Photobiology, Vienna, Austria
- 1996 Co-Chair, Biomedical Applications of Lasers, Society for Photoinstrumentation and Electronics (SPIE), Beijing, China
- 1998 Co-Chair, 7th Biennial Congress of the International Photodynamic Association, Nantes, France
- 1998 Austrian National Research Council
- 1999- Swiss National Research Foundation
- 2003 National Medical Research Council, Singapore
- 2003 VolkswagenStiftung, Hannover, Germany
- 2004 VolkswagenStiftung, Hannover, Germany
- 2004 U.S. Civilian Research and Development Foundation (CRDF), Cooperative Grants Program for scientists and engineers in the former Soviet Union

2004-2007	Scientific Advisory Board, QLT Inc, Vancouver, BC
2005	Medical Research Council Grant, United Kingdom
2005-11	Director, International Photodynamic Association
2006-09	Co-Chair; International Photodynamic Association
2008	Cancer campaign, Medical Research Council, UK
2009	Member, Advisory Board to Planning Committee, ESP
2009-2014	Treasurer, International Photodynamic Association
2009-	Member, Search Committee, Translational Health Science and Technology Institute, India (THSTI)
2012	Mentor, Biophotonics and Imaging Graduate Summer School, Galway, Ireland
2013	Chair, Fundamental Research (combination Treatment), The 14 <sup>th</sup> World Congress of International Photodynamic Association, Seoul, Korea
	Chair, Plenary 12-Targeting the tumor micro-environment to improve PDT effectiveness, The 14 <sup>th</sup> World Congress of International Photodynamic Association, Seoul, Korea
2013	Chair, IV International Symposium, Topical Problems of Biophotonics, Nizhny Novgorod - the Volga River, Russia
2016	Chair, Photodynamic Therapy and Photodiagnosis update Conference (Other Aspects of PDT), Nancy France
2017	Member, Program Project Grant Competition Review, March 28, Toronto, Canada

### Professional Societies

Year of Membership	Society Name
1976-	American Chemical Society
1982-	American Society for Photobiology
1988-	European Society for Photobiology
1990-	American Association for Cancer Research
1990-	International Photodynamic Association
2000-	American Society for Lasers in Surgery and Medicine
2014-	American Society for Microbiology

### Grant Review Activities

Years of Membership	Name of Committee and Organization
<i>National:</i>	
1993	Whitaker Foundation, Rosslyn, VA
1993	National Institutes of Health, Special Study Section on Technology, Bethesda, MD
1993	National Institutes of Health, Radiation Medicine Study Section, Bethesda, MD
1994	Air Force Office of Scientific Research, Bolling AFB, D.C.
1994	American Cancer Society
1994	National Science Foundation
1995	National Institutes of Health, Special Study Section on Technology, Bethesda, MD
1995	National Institutes of Health, Radiation Oncology Study Section, Bethesda, MD
1996	National Institutes of Health, Diagnostic and Imaging Study Section, Bethesda, MD



1996-2000 National Institutes of Health, Radiation Medicine Study Section, Bethesda, MD

2002 National Institutes of Health, Special Study Section on Small Business: Radiation Biology and Medical Physics, Bethesda, MD

2002 National Institutes of Health, Roswell Park Cancer Institute, Site visit for the Program Project, PDT Mechanisms and Strategies of Optimization Study Section, Buffalo, NY

2003 Department of Defense, Breast Cancer Research Program, Reston, VA

2004 National Institutes of Health, Center for Scientific Review, Medical Imaging Technologies Study Section, Bethesda, MD

2004 National Institutes of Health, Center for Scientific Review, Bethesda, MD, National Institute of Arthritis and Musculoskeletal and Skin Diseases

2004 Department of Defense, Reston, VA, Breast Cancer Research Program

2005 Department of Defense, Breast Cancer Research Program, Reston, VA

2005 Department of Defense, Ovarian Cancer Research Program, Reston, VA

2006 National Institutes of Health, Radiation Therapeutics and Biology Study Section, Bethesda, MD

2007 National Institutes of Health, Radiation Therapeutics and Biology Study Section, Bethesda, MD

2008 National Institutes of Health, Radiation Oncology Study Section, Bethesda, MD

2008 National Institutes of Health, Special Emphasis Panel on Small Business Innovation Research (SBIR), Bethesda, MD

2009 National Institutes of Health, Challenge Grant Study Section Meeting

2009 National Institutes of Health, Review Panel to Review the New ARRA R15 Academic Research Enhancement Award (AREA), Bethesda, MD

2010 National Cancer Institute, Centers of Cancer Nanotechnology Excellence (CCNE) Review, Gaithersburg, Maryland

2010 National Cancer Institute Workshop: Image-Guided and Tumor Targeted Delivery in Cancer, Bethesda, MD

2011 Member Conflict: Bioengineering Sciences and Technologies, Review

2011 Nanotechnology Study Section Meeting, Seattle, WA

2011 CDMRP BCRP TRN-CET Panel Scientist Reviewer Invitation-Teleconference; Breast Cancer Research Program (BCRP) for the Department of Defense Congressionally Directed Medical Research Programs (CDMRP)

2012- Member, National Institutes of Health Federal Advisory Committee, Bioengineering Sciences and Technology Sciences Integrated Review Group, Nanotechnology Study Section (NANO), Bethesda, MD

2012- Member, NANO panel, Nanotechnology Study Section, NIH-Center for Scientific Review, Bethesda, MD

2013 Special Emphasis Panel/Scientific Review Group 2013/05 NANO meeting, San Francisco, CA

2016 NIH Radiation Therapeutic Member Conflict Special Emphasis Panel - Telephone Review, Bethesda, MD

## Editorial Activities

- Ad hoc Reviewer
  - *List of Journals Since 1987 (selected listing):*
  - American Journal of Obstetrics and Gynecology
  - BBA - Biomembranes

- Bioconjugate Chemistry
- Biomedical Optics
- Biomedical Central Microbiology (BMC)
- British Journal of Cancer
- Clinical Cancer Research
- Cancer Research
- Chemical-Biological Interactions
- Circulation
- Experimental Dermatology
- Gastroenterology
- Gynecology Oncology
- International Journal of Cancer
- Journal of the American Chemical Society
- Journal of Biological Chemistry
- Journal of Biomedical Optics
- Journal of Clinical Oncology
- Journal of Medicinal Chemistry
- Journal of the National Cancer Institute
- Journal of Photochemistry and Photobiology (European)
- International Journal of Cancer
- Lasers in Surgery and Medicine
- Nature
- Nature Biotechnology
- Nature Medicine
- Nature Protocols
- Oncogene
- Photochemistry & Photobiology
- The Journal of the North American Menopause Society
- The Lancet
- An many others

● Other Editorial Roles

<i>Year</i>	<i>Role</i>	<i>Journal Name</i>
1991-2001	Editorial Board	Lasers in Surgery and Medicine
1997-2001	Associate Editor	Journal of Photochemistry and Photobiology (European)
2001-2002	Associate Editor	Photochemical and Photobiological Sciences
2008-	Editorial Board	International Journal of Green Nanotechnology
2008-	Associate Editor	Journal of Cancer Nanotechnology: Basic, Translational & Clinical Research
2012-	Editorial Board	Nanomedicine, Nanotechnology, Biology, and Medicine (Elsevier)
2013-	Editorial Board	Austin Journal of Nanomedicine & Nanotechnology

**Honors and Prizes**

<i>Year</i>	<i>Name of Honor/Prize</i>	<i>Awarding Organization</i>
1964-1966	National Merit Scholarship	Punjab Board of Education, Pakistan
1966-1968	National Merit Scholarship	Punjab University, Pakistan
1968-1970	National Merit Fellowship	University of Islamabad

2001	Partners in Excellence Award	Partners HealthCare System, Inc.
2007	Partners in Excellence Award	Partners HealthCare System, Inc.
2009	William Silen Lifetime Achievement in Mentoring Award	Harvard Medical School
2009	Pioneer Award in Biomedical Optics, Bench to Bedside Translation	National Institutes of Health
2010	Catalyst Award Honoree for Dedication to equity in Science, Engineering and Technology	Science Club for Girls, Cambridge, MA
2012	10 <sup>th</sup> Anniversary Mentor Award	National Postdoctoral Association
2014	Special Directors Award for Service to HST community	Harvard-MIT Division of Health Sciences & Technology (HST), Harvard Medical School
2015	Lifetime Achievement Award in PDT Research for research Excellence in the field of Photodynamic Therapy	15 <sup>th</sup> World Conference of the International Photodynamic Association, Rio de Janeiro, Brazil

## **Recognitions**

2012	Annual Dr. T. Hasan's Massachusetts General Postdoctoral Association (MGPA) Meeting
2012	The posters of excellence tier awards at the MGH poster day celebration were named "Tayyaba Hasan, PhD, Office for Research Career Development Awards"

## **Report of Funded and Unfunded Projects**

### **Past Funding Information**

1986-1995	Department of Defense. Program Director: J.A. Parrish (Project Leader) The Use of High Intensity Short-Pulse Irradiation in Photodynamic Activation
1987-1988	Foundation for Cancer Treatment Research (P.I.) Antibody-Mediated Photochemotherapy <i>In Vivo</i> Studies
1988-1989	American Cancer Society Institutional Grant (P.I.) Selective Photodestruction of Bladder Carcinoma Cells <i>In Vivo</i> using Rhodamine and Benzophenothiazinium Dyes
1989-1990	Ford Foundation (P.I.) "Cellular, Immunological and Photophysical Studies on Conventional and Antibody-Conjugate Photosensitizers"
1990-1992	Whitaker Foundation (P.I.) Focal Photorelease of Second Messengers and Antibody-Mediated Photoinactivation of Proteins in Single Cells
1990-1992	Cutaneous Biology Research Center Grant (P.I.) Metallothionein and Resistance to UV-Induced Cutaneous Injury
1991-2001	Department of Energy. Program Director: J.A. Parrish (Project Leader) Center for Excellence in Laser Medicine
1991-1992	NIH R43 (Academic P.I.)

Effect of Pulsed Irradiation in Cellular Phototoxicity  
1991-1992 Milton Fund (P.I.)  
Experimental Photochemotherapy of Ovarian Cancer Using Antibody-Chromophore  
Conjugates

1991-1992 Fight for Sight, Inc. (P.I.)  
Carrier Systems for Improved Selectivity of PDT in Vascular Occlusion

1991-1996 NIH R29 (P.I.)  
Tetracycline Phototoxicity: Photobiology and Photophysics

1992-2002 NIH R01 (P.I.)  
Experimental Photoimmunotherapy of Ovarian Cancer

1995 ARPA (P.I.)  
Dual Wavelength Red/Infrared Laser for PDT

1996-1998 Department of Defense (Program Director: J.A. Parrish) (Project Leader: T. Hasan)  
Macrophage Targeted Photodynamic Regulation Of Wound Healing

1996-1998 Department of Defense (Program Director: J.A. Parrish) (Project Leader: T. Hasan)  
Photoimmunotherapy for the Local Control of Sepsis

1997-1998 Center for Innovative Minimally Invasive Therapy (Co-P.I.)  
Fluorescence Detection and Laser Treatment of Female Lower Genital Tract  
Dysplasias Utilizing 5 Aminolevulinic Acid (ALA)-Induced Protoporphyrin IX

1997-2000 NIH R43 (Academic P.I.)  
Functionalized Benzochlorins for PDT

1997-2007 NIH/NCI Training Grant (B. Chabner) (Mentor)  
Training Program in Cancer Biology

1998-2004 P30 Training Grant  
Skin Disease Research Center

1999-2001 DOD (P.I.)  
Surgical Laser Application from MFEL studies

2000-2004 DOD/AFOSR  
Research to Develop Biomedical Applications of Free Electron Laser Technology

2001 MDPH (P.I.)  
Her-2/Neu based Photochemical Destruction of Breast Cancer Cells

2001-2008 NIH P01 (Program Director)  
Physical and Biological Determinants for Optimal PDT

2002-2008 NIH R01 (Co-I)  
In Vivo Immunofluorescence Microscopy and Cytometry

2003-2006 NIH R01 (Co-I)  
Photodynamic Therapy of Localized Infections

2003-2005 NIH/SBIR (G. Burke)  
Investigating the Tissue Response Dosimetry for PDT in Barrett's Esophagus

2003-2008 T32 Training Grant (R. Jain)  
Training in Integrative Pathophysiology of Tumors

2003-2009 NIH R01 (Hasan)  
Experimental Photoimmunotherapy of Ovarian Cancer

2004-2008 Air Force/MFEL  
Photochemistry Based Approach to the Destruction of Leishmaniasis

2004-2008 Air Force/MFEL  
PDT for Mycobacterium Tuberculosis

2004-2006 NIH/SBIR (S. Davis)  
Real-Time Singlet Oxygen Detector for Photodynamic Therapy

2006-2008 Air Force/MFEL  
Targeted PDT for Leishmaniasis

2008-2009 Bill and Melinda Gates Foundation  
GP63-Targeted Conjugate for Photodynamic Therapy of Visceral Leishmaniasis

2004-2009 DOD/AFOSR: FA9550-04-1-0079 (Anderson)  
Research to Develop Biomedical Applications of Free Electron Laser Technology

2008-2010 Japan Science & Technology Agency  
Controlling cell function with light technology

2005-2010 NIH T32-CA-115305 (M. Seiden)  
Training Grant "Mentored Research in Ovarian Cancer"

*Industry:*

1993-1995 QLT PhotoTherapeutics, Inc. (P.I.)  
Photodynamic Therapy for Rheumatoid Arthritis

1993-1998 Binary Therapeutics, Inc. (P.I.)  
Tumorigenicity and Metastasis Assays for Ovarian Cancer

1993-1995 DUSA Pharmaceuticals, Inc. (P.I.)  
Mechanisms of ALA-induced PDT

1994-1995 Scotgen (P.I.)  
Selective Photodestruction of Cells and Tissue with Antibody-Photosensitizer Conjugates

1996- QLT PhotoTherapeutics, Inc. (P.I.)  
Mechanistic Studies of Photodynamic Therapy of Arthritis

1996- PDT Systems, Inc. (P.I.)  
Photophysics and Photochemistry of Tin Etiopurpurins

1996-1997 Periodontix, Inc. (P.I.)  
Photodynamic Therapy of Periodontitis

1997-1999 Periodontix, Inc. (P.I.)  
Photodynamic Therapy of Periodontitis, Phase 2

2000- Royalty Stream, Novartis/QLT

2008- Covidien Ltd. (P.I.)  
Research gift for Photodynamic Therapy

2008 Photopharmica Ltd  
Research gift for Photodynamic Therapy

2012- Canon U.S.A. (P.I.)

*Mentorship for Research Funding:*

7/1/89-6/30/91 German Research Council  
R. Bachor, M.D.  
"Carrier-mediated Photodestruction of Bladder Cancer Cells"

7/1/90-6/30/92 German Research Council  
M. Scholz, Ph.D.  
"Cellular and Subcellular Localization and Kinetics of Photosensitizers by Confocal Laser Scanning Microscopy"

7/1/90-6/30/92 German Research Council  
U. Schmidt, M.D.  
"Photosensitizer Conjugates for Closure of Neovasculature in Ophthalmologic Disorders"

9/1/90-8/31/93 NIH NRSA

W.G. Roberts, Ph.D.  
 “Biochemistry and Photochemistry of Conjugated Sensitizers”  
 6/1/91-5/31/92 American College of Obstetrics and Gynecology  
 B. Goff, M.D.  
 “Applications of Photodynamic Therapy to the Treatment of Ovarian Cancer”  
 7/1/92-6/1/93 Department of Energy  
 C. Sekar, M.D.  
 “Photodynamic Inhibition of Restenosis in a Rat Model”  
 7/1/93-6/30/94 Swiss National Science Foundation  
 G. Wagnieres, Ph.D.  
 “Fluorescence Diagnostics of Early Bladder Cancer using Metachromatic Dyes”  
 7/1/93-6/30/94 Department of Energy  
 D. Kato, M.D.  
 “Immunophotodiagnosis of Ovarian Carcinoma”  
 7/1/93-6/30/94 Department of Energy  
 S. Inuma, M.D.  
 “Photodynamic Treatment of Solid Tumors in Combination with Anti-Angiogenesis Therapy”  
 7/1/94-6/30/95 Department of Energy  
 D. Kato, M.D.  
 “Photodynamic Therapy of Advanced Ovarian Cancer in a Murine Model”  
 7/1/95-6/30/96 Department of Energy  
 T. Momma, M.D.  
 “Experimental Photodynamic Therapy in a Metastatic Rat Prostate Cancer Model”  
 7/1/95-6/30/97 Department of Energy  
 K. Trauner, M.D.  
 “Transcutaneous Photodynamic Treatment of Rheumatoid Arthritis”  
 7/1/95-6/30/96 Department of Energy  
 K. Molpus, M.D.  
 “Photodynamic Therapy of Ovarian Carcinoma”  
 7/1/96-6/30/97 Department of Energy  
 N. Soukos, D.D.S.  
 “Epidermal Growth Factor Receptor Targeted Immunophotodiagnosis of Oral Cancer and Precancer”  
 7/1/97-6/30/98 Department of Energy  
 L. Duska, M.D.  
 “Photoimmunotherapy in Combination with Cisplatin in the Treatment of Advanced Epithelial Ovarian Cancer”  
 7/1/97-6/30/98 Department of Energy  
 M. Lein, M.D.  
 “Laser-induced Hyperthermia and Metalloproteinases in a Rat Prostate Cancer Model”  
 7/1/97-6/30/98 Department of Energy  
 N. Soukos, D.D.S.  
 “Epidermal Growth Factor Receptor as a Target for Photoimmunotherapy and Immunophotodiagnosis of Oral Cancer”  
 9/1/97-8/31/98 Center for Innovative Minimally Invasive Therapy  
 L. Duska, M.D.

5/1/98-4/30/00 "Fluorescence Detection and Laser Treatment of Female Lower Genital Tract Dysplasias Utilizing 5 Aminolevulinic Acid (ALA)-Induced Protoporphyrin IX"  
NIH NRSA  
K. Rajagopalan, Ph.D.

7/1/00-6/30/01 "Photomodified Antibodies for Photodynamic Therapy"  
Department of Energy  
Marcella Del Carmen, M.D.

7/1/01-6/30/02 "PDT using anti-epidermal growth factor receptor antibody C225 in the treatment of advanced epithelial ovarian cancer"  
Department of Energy  
Tri Dinh, M.D.

9/1/00-8/31/01 "The use of PDT to Enhance N-(4-Hydroxyphenyl Retinamide based Differentiation Therapy for the Treatment of Advanced Epithelial Ovarian Cancer"  
Department of Energy  
Boleslav Kosharsky, M.D.

7/1/04-6/30/06 "Antiangiogenesis with PDT: A new combination treatment for prostate cancer"  
National Cancer Institute of Canada  
Nicolas Solban, Ph.D.

9/15/04-9/14/06 "Optical strategies for studying metastatic mechanisms, tumor cell detection, and for monitoring the treatment of prostate cancer."  
Department of Defense  
Nicolas Solban, Ph.D.

10/1/08-9/30/11 "Optical Strategies for Studying Metastatic Mechanisms, Tumor Cell Detection and Treatment of Prostate Cancer"  
NIH NRSA  
Daniel Neuman, Ph.D.

4/1/09-3/31/12 "Targeted Photoactivated Nanoparticles for the Treatment of Ovarian Cancer"  
NIH NRSA  
Conor Evans, Ph.D.

4/1/10-3/31/13 "Multimodality Microendoscope for Metastatic Ovarian Cancer Detection & Treatment"  
NIH NRSA  
Bryan Q. Spring, Ph.D.

9/1/12-8/31/15 "Hyperspectral Microendoscopy to Monitor VEGF during Pancreatic Cancer Therapy"  
NIH F32  
Srivalleesha Mallidi, Ph.D.

8/1/11-7/31/16 "Glioblastoma PDT Design: Nanoagent Uptake and Tumor Oxygenation Based Dosimetry"  
NIH K99/R00  
Jonathan Celli, Ph.D.

5/1/14-4/30/19 "Mechanism-based therapies for pancreatic cancer informed by stromal microrheology"  
NIH K99/R00  
Imran Rizvi, Ph.D.

"Targeting Determinants of OvCa Metastases in Engineered 3D Microfluidic Platforms"

1/1/14-12/31/14	<p>Bullock Fellowship (Harvard/MGH)          Girgis Obaid Ph.D.          “A multifunctional liposomal delivery system for image-guided PDT-based combination treatments and anti-angiogenic response in an <i>in vivo</i> glioblastoma model”</p>
9/1/14-8/31/14	<p>Tosteson Fellowship (Harvard/MGH)          Huang-Chiao Huang, Ph. D          “Tumor-activatable Nanoconstructs for Image-guided Photochemotherapy of Glioblastoma <i>in vivo</i>”</p>

**Current Funding Information**

Years Funded	Role on Project	Funding Source, Grant Type and Number
2014-2017	Co-Principal Investigator	NIH/NCI UH3 CA189901 (Hasan/Celli)
<p>Low-cost Enabling Technology for Image-guided Photodynamic Therapy (PDT) of Oral Cancers            The goal of this phased innovation cooperative agreement award mechanism is to introduce a low-cost enabling technology for photodynamic therapy (PDT)-based treatment of oral cancer and to conduct clinical trials in a low- and middle-income country (LMIC) setting. The proposal is divided into two major phases: First, a largely pre-clinical and engineering design phase in the U.S. with a minor clinical component to be performed at the foreign site (UH2); then, a primarily clinical phase with the performance site being in India (UH3). The technological adaptation and validation detailed herein will lead to a sustainable cancer technology in an intermediate regional clinic in India with the potential for dissemination to neighboring rural villages. This quest for lowering healthcare costs will also have potential significance in the U.S. where oral cancer is the 8<sup>th</sup> leading cause of cancer deaths amongst men.</p>		
2011-2017	Principal Investigator	NIH/NCI R01CA158415 (Hasan)
<p>Heterocellular 3D ovarian tumor arrays for imaging and mechanistic combinations            The long-term goal of this research is to develop, integrate and validate key platform technologies to screen mechanism-based combination regimens with photodynamic therapy (PDT) for residual and recurrent OvCa. Heterocellular 3D printed tumor arrays that incorporate critical determinants of OvCa biology (endothelial and mesothelial cells with macrophages and fibroblasts) along with hyperspectral microscopy for simultaneous quantitative imaging of multiple biomarkers will provide exceptional insight into OvCa growth and treatment response on a high throughput platform.</p>		
2011-2017	Principal Investigator	NIH/NCI R01CA160998 (Hasan)
<p>Ovarian Cancer PDT: Multi-intracellular targeting and Image-guided dosimetry            The long term goal is to develop, integrate and validate key platform technologies to combine quantitative fluorescence imaging for drug delivery monitoring and customized dosimetry with "Targeted Phototoxic Multi-Inhibitor Liposomes" (TPMILs) that selectively target and simultaneously block interconnected survival pathways associated with aggressive ovarian cancer.</p>		
2015-2019	Co-Program Director	NIH/NCI P01 CA084203 (Hasan/Pogue)
<p>Molecular Response and Imaging-based Combination Strategies for Optimal PDT            This project builds on recent advances in the understanding of cancer biology, in mechanisms of current and emerging therapies as well as the enormous progress made in imaging technologies, to propose new photodynamic therapy (PDT)-based combination treatments for pancreato-biliary and non-melanoma skin cancers.</p>		



2015-2020 Investigator NIH/NCI R01 CA192878-01A1 (Yun)  
Bioluminescence-activated photodynamic therapy of breast cancer  
The proposed research will develop and test novel photodynamic therapy (PDT) for killing cancer cells in the tumor margin and regional lymph nodes with minimal damage to normal tissues.

2013-2017 Project Leader DOD/AFOSR: FA9550-11-1-0331  
(Anderson)  
Research to Develop and Apply Biophotonics to Military Medicine Needs  
The major goals of this project are to further research in areas of military medicine.  
Dr. Hasan's project is "Rapid Fluorescence Based Antibiotic Susceptibility Assay".

2016-2018 Principal Investigator Bristol-Myers Squibb (Hasan)  
The goal of this proposal is to establish a 3D bioprinting platform to screen immuno-oncology agents, in combination with photodynamic therapy, to boost antigen specific T-cell mediated tumor killing. This platform, in conjunction with quantitative fluorescence imaging and analysis, will enable antibody drug conjugates and biologics to be screened for their capacity to enhance tumor killing by lymphocytes in a highly reproducible 3D setting that better represents the heterogeneity and complexity of the tumor microenvironment. This collaborative agreement with Bristol-Myers Squibb will form the basis for bioprinting and imaging-based 3D assay development to improve preclinical prediction of single and combination immuno-oncology agents, ultimately with goal of identifying patient-specific regimens.

2016-2018 Co-Principal Investigator NIH/FIC R21TW010202(Hasan/Palanisami)  
Rapid Treatment Guidance for Antibiotic-Resistant Disease at the Point of Care  
This study will test a recently developed platform for characterizing bacterial infection at the POC for allowing clinicians to more effectively prescribe antibiotic therapies and to chart the spread of antibiotic resistance e.g., extended spectrum beta-lactamase (ESBL). This platform will be validated on clinical specimens in Chiang Mai, Thailand.

### **Current Unfunded Projects**

2000- Mentor Massachusetts General Hospital Interns  
Oversee medical students and train them on basic laboratory research practices.

2004- Mentor Wellman Summer fellowships  
Teach and train international students for one month in summer about laboratory practices and applications of Photodynamic therapy.

2005- Mentor HST: Summer Biomedical Optics  
Teach and train students from various US universities about laboratory practices and applications of Photodynamic therapy.

### **Completed Research Support**

2011-2016 Principal Investigator NIH/NCI R01 CA156177 (Hasan)  
Targeted Photoactivable Nanocells: Image-based Drug Delivery and Dosimetry in GBM  
The major goal of this research is to develop a combination of drug delivery nanoconstructs with magnetic resonance guided optical imaging for the treatment of glioblastoma multiforme.

2015-2016                      Subcontract PI                      NIH/NIBIB U54 EB015403 (Klapperich)  
Image-Guided Phototherapy to Prevent Ovarian Cancer Recurrence (through Boston University)  
This proposal aims to reduce the high rate of ovarian cancer (OvCa) recurrence and mortality by monitoring and selectively destroying residual, microscopic tumors using a “theranostic” platform that integrates fluorescence microendoscopy and near infrared phototherapy.

2010-2016                      Principal Investigator                      Covidien A206704  
Continued Studies on the Effect of Combining Quaternary Alkaloids and Chemotherapeutic(s) in a Orthotropic Pancreatic Cancer Mouse Model  
In this continuation phase of the project, the inhibitory synergism of the optical isomers of morphinan alkaloids in combination with other agents in the pancreatic cancer model will be elaborated.

2012-2015                      Principal Investigator                      Canon Inc. A210162.06  
Image Guided PDT for Glioma Using Photoactivatable Nanocarriers  
The first goal of this project is to develop new nano-compositions, including targeting entities that show preferential accumulation in Glioblastoma multiforme. The second objective of the project is to test these compositions in imaging and therapy to reinforce image-guided platforms for treatment of cancer.

2012-2013                      Project Leader                      NIH/NIBIB U54 EB015408 (Parrish)  
Point of Care Technology Research Center in Primary Care (through CIMIT)  
The goals of this cooperative agreement are to create and facilitate clinically-driven point-of-care solutions that address critical areas of unmet need in primary care, including funding, testing and evaluating prototype performance in simulated clinical environments and clinical living laboratories, transitioning prototypes into commercially licensable or start-up company opportunities, and disseminating lessons learned and best practices in innovation methodology in collaboration with other NIBIB Point of Care Technology Research Centers.  
Dr. Hasan’s project is entitled “Rapid Fluorescence-Based Determination of Antibiotic Susceptibility”.

## **Report of Local Teaching and Training**

### **Teaching of Students in Courses**

- a.     *Medical School/School of Dental Medicine courses:*
- 1989    Photomedicine Lecture Series, Health Sciences and Technology (HMS/MIT)
  - 1990    Introduction to Photomedicine, Health Sciences and Technology (HMS/MIT), 5 students (undergraduate/graduate)
  - 1991    Harvard University Continuing Education Course “Update and Advances in Head and Neck Cancer,” 20-25 students (Residents and Fellows)
  - 1993    “Biology of Cancer” Harvard University (Coordinator: Osma Kandil, Ph.D.), approx. 60 students (undergraduate/graduate)
  - 1993    “Pathophysiology of Tumors” HST Course (Coordinator: R. Jain, Ph.D. MIT-Harvard Joint Program), 15-20 students (undergraduate/graduate)
  - 1995    “Pathophysiology of Tumors” HST Course (Coordinator: R. Jain, Ph.D. MIT-Harvard Joint Program), 15-20 students (undergraduate/graduate)
  - 1997    “Pathophysiology of Tumors” HST Course (Coordinator: R. Jain, Ph.D. MIT-Harvard Joint Program), 15-20 students (undergraduate/graduate)

- 1999 "Pathophysiology of Tumors" HST Course (Coordinator: R. Jain, Ph.D. MIT-Harvard Joint Program), 15-20 students (undergraduate/graduate)
- 2000 "Medical Applications of PDT: Present and Future," Harvard University Continuing Medical Education Course (Coordinator: Raphael Bueno, M.D.)
- 2001 "Medical Applications of PDT: Present and Future," Harvard University Continuing Medical Education Course (Coordinator: Raphael Bueno, M.D.)
- 2002 "Photodynamic Therapy," Molecular, Cellular and Tissue Radiation Biology, Harvard Medical School (Coordinator: Kathryn Held, Ph.D.)
- 2002 Photochemical approaches in biomedical applications," Cutaneous Biology Research Center Course, Harvard Medical School (Coordinator: Jerome Gross, Ph.D.)
- 2002 "Photodynamic Therapy," BioOptics IAP, Harvard Medical School (Coordinator: Thomas Deutsch, Ph.D.)
- 2002 "Medical Applications of PDT: Present and Future," Harvard University Continuing Medical Education Course (Coordinator: Raphael Bueno, M.D.)
- 2005 "Photodynamic Therapy," Molecular, Cellular and Tissue Radiation Biology, Harvard Medical School (Coordinator: Kathryn Held, Ph.D.)
- 2006 "Photodynamic Therapy," Molecular, Cellular and Tissue Radiation Biology, Harvard Medical School (Coordinator: Kathryn Held, Ph.D.)
- 2008 "9th biennial Biomedical Science Careers Student Conference" The Biomedical Science Careers Program (Coordinator: J. Reede, MD HMS - Dean for Diversity and Community Partnership), 2-4 students (high school-postdoctoral level)

#### International

- 2007- Pakistan Institute of Engineering and Applied Sciences (PIEAS) Islamabad, Pakistan
- 2012- The Catholic University of Korea-Harvard Wellman Center for Photomedicine Core Technology Development Center
- 2012- Wellman Center for Photomedicine, Massachusetts General Hospital, Harvard Medical School-Shanghai Dermatology Hospital, Shanghai Tongji University School of Medicine

#### *b. Graduate courses, seminars:*

- 1995 Lecture Series, Grand Rounds, Hematology-Oncology, Brigham & Women's Hospital, Boston, MA
- 1997 Lecture Series, Grand Rounds, Joint Center for Head and Neck Surgery, Brigham and Women's Hospital, Boston, MA
- 1997 Lecture Series, Photons in Biomedical Applications, Photonics Center, Boston University, Boston, MA
- 1998 Photodynamic Therapy: Molecular Basis and Clinical Applications, Collaborative Course on Biology of the Skin, Dept. of Dermatology, Boston University School of Medicine, Boston, MA
- 2003 Photodynamic Therapy, Biomedical Optics, Tufts University, Boston, MA
- 2004 Photodynamic Therapy, Biomedical Optics, Tufts University, Boston, MA
- 2005 Photodynamic Therapy, Biomedical Optics, Tufts University, Boston, MA
- 2006 Photodynamic Therapy, Biomedical Optics, Tufts University, Boston, MA
- 2007 Photodynamic Therapy, Biomedical Optics, Tufts University, Boston, MA
- 2008 Photodynamic Therapy, Biomedical Optics, Tufts University, Boston, MA
- 2009 Photodynamic Therapy, Biomedical Optics, Tufts University, Boston, MA

- 2010 “Frontiers in Biomedical Engineering and Physics” HST 500, Health Sciences and Technology/Massachusetts Institute of Technology (Coordinator: Sangeeta N. Bhatia, M.D., Ph.D.). Title of Talk “Photodynamic Therapy: Basic Principles and Imaging Applications” - 15 graduate students, March 11
- 2010 “Biophysics 242r”, Harvard Medical School (Coordinators: Guillermo J. Tearney, M.D., Ph.D. and Brett Bouma, Ph.D.). Title of Talk “Photodynamic Therapy: A Bridge between Medicine and Technology - 15 graduate students, March 23
- 2010 “Clinical Experience” HST 212, Massachusetts General Hospital (Coordinators: R. Rox Anderson, M.D. and Warren M. Zapol, M.D.). Title of Talk “Photodynamic Therapy: a bridge between science and medicine” - 9 graduate students, March 29
- 2013 Photodynamic Therapy, Biomedical Optics, Tufts University, Boston, MA

### **Formal Teaching of Residents, Clinical Fellows and Research Fellows (post-docs)**

- 2003- Radiation Oncology Course for residents and clinical fellow  
Role in course: Lecturer

### **Laboratory and Other Research Supervisory and Training Responsibilities**

- 04/ 2008 Advisor at 9th Annual Biomedical Science Careers Student Conference  
Assigned two to four students of different academic levels. Served as a source of information and inspiration for the students. Had opportunity to dialogue with the students throughout the day.

### **Formally Supervised Trainees**

- 1982-84 Dorina Abdulah, M.D. (Staff)  
Dept. of Geriatrics, Spaulding Rehabilitation Center, Harvard Medical School, Boston, MA
- 1984-86 Annette Thompson, Ph.D. (Editor)  
Nature, London, United Kingdom
- 1986-88 Mark Latina, M.D. (Associate Clinical Professor)  
Tufts-New England Medical Center, Mass Eye & Ear, and MGH, Harvard Medical School, Boston, MA
- 1986-89 Kenneth Linden, Ph.D., M.D.  
Dermatology/Dermatologic Oncology, UCI Medical Center, Irvine, CA
- 1986-89 Christopher Shea, M.D. (Professor, Chief, Section of Dermatology)  
The University of Chicago Medicine  
Chicago, IL
- 1987 Alice Tserozoglu, M.D. (Faculty)  
Dept. of Gynecology, Athens Hospital, Athens, Greece
- 1987-94 Anthony Cincotta, Ph.D. (President and CEO)  
Gematria Sciences, LLC., Tiverton, RI
- 1988-90 Katsumi Hanada, M.D. (Professor and Chairman)  
Dept. of Dermatology, Hirosaki University School of Medicine, Hirosaki, Japan
- 1989-91 Manfred Scholz, Ph.D. (Senior Scientist)  
Bioconsulting Lafaire & Partner, Cambridge, MA
- 1989-91 Rüdiger Bachor, M.D. (Assistant Professor)  
Dept. of Urology, Urologische Universitätsklinik Ulm, Ulm, Germany
- 1989-92 W. Gregory Roberts, Ph.D. (Research Scientist)  
University of California San Diego Cancer Center, San Diego, CA

1989-92 Paolo Ortu, M.D. (Staff)  
Dept. of Vascular Surgery, General Hospital, Sardinia

1990-92- Barbara Goff, M.D. (Professor)  
Dept. of Obstetrics & Gynecology, University of Washington Medical Center,  
Seattle, WA

1999-93 Ursula Schmidt-Erfurth, M.D. (Professor and Chair)  
Medical University of Vienna, Department of Ophthalmology, Vienna, Austria

1991-92 Amitava Chatterjee, Ph.D. (Head)  
Dept. of Biochemistry, Chittaranjan National Cancer Institute, Calcutta, India

1991-92 Dani Vooijs (Research Scientist)  
Industry, The Netherlands

1991-92 Ulrich Hermanto, M.D.  
Ph.D. Program, New York University, New York, NY

1991-93 Chandra Sekar, M.D. (Resident)  
Boston University Medical School, Boston, MA

1991-94 Seiichi Iinuma, M.D. (Staff)  
Saiseikai Chuoh Hospital, Dept. of Urology, Tokyo, Japan

1992 Fernando E. Kaffe, M.D., F.A.C.S.  
Sacred Heart Hospital and Baptist Hospital, Peripheral Vascular and  
Endovascular Care, Pensacola, Florida

1992-94 Daniel Kato, M.D. (Assistant Professor)  
University of California San Francisco Medical Center, San Francisco, CA

1993-94 Benedicte van den Bergh, (Ph.D. Candidate)  
Dept. of Medicinal Photochemistry, Leiden University, Leiden, Netherlands

1993-94 George Wagnieres, Ph.D. (Associate Professor)  
LPAS, Batiment di Chemie, EPFL, Lausanne, Switzerland

1993-94 Beatrice Aveline, Ph.D. (Instructor)  
Wellman Laboratories of Photomedicine, Massachusetts General Hospital,  
Harvard Medical School, Boston, MA

1993-95 Elisabeth Jeremiasse (Industrial Scientist)  
The Netherlands

1994-95 Marco Del Governatore, M.D. (Staff)  
Dept. of Surgery, University Hospital, Bologna, Italy

1994-95 Giampaolo Ugolini, M.D. (Staff)  
Dept. of Surgery, University Hospital, Bologna, Italy

1994-96 Tetsuo Momma, M.D. (Staff)  
The 2nd National Hospital, Tokyo, Japan

1994-96 Kelly Molpus, M.D. (Associate Professor and Chief)  
Dept. of Obstetrics & Gynecology, Vanderbilt University Medical Center,  
Nashville, TN

1994-96 Bernhard Ortel, M.D. (Associate Professor of Medicine)  
University of Chicago Medical Center  
Chicago, IL

1995-96 Brian Pogue, Ph.D. Professor of Engineering  
Dartmouth Dean of Graduate Studies  
Thayer School of Engineering at Dartmouth, Hanover, NH

1995-96 Linda Duska, M.D. (Assistant Professor)  
Dept. of Gynecologic Oncology, Harvard Medical School, Massachusetts General  
Hospital, Boston, MA

1995-96 Martijn van Duijn (Ph.D. Program)  
Dept. of Medical Biochemistry, State University Leiden, Leiden, Netherlands

1995-97 Kenneth Trauner, M.D. (Surgeon)  
Kaiser Oakland Dept. of Orthopedic Surgery, Oakland, CA

1995-97 JoAnn Buczek-Thomas, Ph.D. (Instructor)  
Dept. of Biochemistry, Boston University School of Med, Boston, MA

1995-98 Nikos Soukos, D.D.S. (Founder and Director)  
Applied Molecular Photomedicine Laboratory, Forsyth Institute,  
Boston, MA

1997 Nedret Altiok, M.D. (Associate Professor)  
Pharmacology & Institute of Medical Sciences, Istanbul Science University,  
Istanbul, Turkey

1997 Michael Lein, M.D. (Professor Doctor)  
Dept. of Urology, University Hospital Charitè, Humboldt University, Berlin,  
Germany

1997-98 Akira Ito, M.D., Ph.D. (Staff)  
Department of Dermatology, Kobe University School of Medicine,  
Kobe, Japan

1998-99 Hans Guenther Loew, M.Sc. (Graduate Student)  
University of Vienna, Vienna, Austria

1998-99 Laurence Booth, (Postdoctoral Fellow)  
UK (current location unknown)

1998-99 Krishnan Rajagopalan, Ph.D. (Managing Partner-Industry)  
Tysons Corner, McLean, VA

1998-99 Máire Doyle, Ph.D. (Research Associate)  
National Institutes of Health, Bethesda, Maryland

1998-99 Claudia Alge, M.D. (Resident)  
Dept of Ophthalmology, Ludwig-Maximilians University, Munich, Germany

1998-00 Mark Savellano (Manager)  
Fluroescent Imaging Laboratory, Norris Cotton Cancer Center, Lebanon, NH

1999-01 Anne Moor, Ph.D. (Industry)  
The Netherlands (exact location unknown)

1999-00 Boleslav Kosharsky, Ph.D. (Assistant Professor)  
Dept of Anesthesiology, Mt. Sinai School of Medicine, New York, NY

1999-02 Marcela del Carmen, M.D., MPH (Clinical Director)  
Gillette Center for Gynecologic Oncology, Massachusetts General Hospital,  
Boston, MA

2000- Imran Rizvi, Ph.D. (Assistant Professor)  
Wellman Center for Photomedicine, Massachusetts General Hospital,  
Boston, MA

2000-02 David Sharlin, Ph.D. (Assistant Professor)  
Department of Biological Sciences at Minnesota State University,  
Mankato

2000-03 Tri A. Dinh, M.D. (Physician)  
Gynecologic Oncology, The Methodist Hospital, Houston, TX

2002-02 Mabubur Bhuiyan, MBBS, Ph.D. (Research Fellow)  
Wayne State University, Detroit, Michigan

2000- Alok Sinha, MD (Resident Physician)  
Dept. of Family Medicine, Lutheran Medical Center,

Brooklyn, NY  
 2001-03 Lisa Goel, MS (Company Founder)  
 Nanobiosym, Inc.  
 Medford, MA

2001-03 Marietta Ambrose, MD (Research Fellow)  
 Tufts University Medical School / New England Medical Center, Boston, MA

2001-03 Edward Maytin, MD, PhD (Assistant Professor, Assistant Staff)  
 Cleveland Clinic Lerner College of Medicine of Case Western Reserve University  
 Cleveland, OH

2001-03 Pål Selbo, PhD (Scientist)  
 Institute for Cancer Research, The Norwegian Radium Hospital, Oslo, Norway

2002-07 Nicolas Solban, PhD (Research Fellow)  
 Wellman Laboratories of Photomedicine, Massachusetts General Hospital,  
 Boston, MA

2003-2004 Juan Benavides, MS (Research Engineer)

2003-05 Ralph Peteranderl, PhD (Research Fellow)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA

2003-06 Sachiko Kosaka, MD, PhD (Senior Assistant Professor)  
 Nippon Medical School  
 Tokyo, Japan

2004 Brett Johnson, PhD (Research Scientist)  
 Novartis, Cambridge, MA

2004-2009 Oleg E. Akilov, MD, PhD (Instructor)  
 Department of Dermatology, University of Pittsburgh, Pittsburgh, PA

2004-06 Kathleen O’Riordan, PhD (Research Fellow)

2004-2008 Sung K. Chang, PhD (Medical Sciences Manager)  
 Medical Sciences, Amgen, Thousand Oaks, CA

2004-05 Amor Khachemoune, MD, CWS (Dermatologist, Clinical Instructor)  
 SUNY Downstate Medical Center  
 Brooklyn, NY

2004- Zhiming Mai, PhD (Instructor)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA

2005-2007 Wei Zhong, PhD (Research Navigator)  
 Harvard Catalyst,  
 The Harvard Clinical and Translational Science Center, Harvard Medical School,  
 Boston, MA

2005-2007 Thomas Stepinac, PhD (Research Fellow)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA

2006-2013 Sarika Verma, PhD (Principal Scientist)  
 Healthcare Optics Research Laboratory  
 Innovation Center Division, Canon (USA), Boston, MA

2006-07 Gregory Watt, PhD (Research Fellow)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA

2006-2009 Humra Athar, PhD (Senior Research Scientist)  
 Boston University School of Medicine,

Boston, MA  
 2006-2008 Arshi Malik, PhD (Assistant Professor)  
 College of Medicine, King Khalid University, Kingdom of Saudi Arabia  
 2007-2011 Ulysses Sallum, PhD (Licensing Manager/Innovation)  
 Partners Healthcare  
 Boston, MA  
 2007-2011 Xiang Zheng, PhD (Senior Scientist)  
 Pfizer, Inc.  
 Pearl River, NY  
 2007-2012 Jonathan Celli, PhD (Assistant Professor)  
 University of Massachusetts  
 Boston, MA  
 2007-2010 Lei Z. Zheng, PhD (Senior Scientist)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA  
 2007-2009 Daniel Neuman, PhD (Group Leader)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA  
 2008-2009 Conor Evans, PhD (Assistant Professor)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA  
 2008-2011 Adnan Abu Yousif, PhD (Scientist)  
 Merrimack Pharmaceuticals  
 Boston, MA  
 2008-2010 Prakash R. Rai, PhD (Assistant Professor)  
 University of Massachusetts Lowell,  
 Lowell, MA  
 2008-2015 Bryan Spring, PhD (Assistant Professor)  
 Department of Physics, Northeastern University  
 2008-2010 Ramtin Rahmanzadeh, PhD (Research Fellow)  
 University of Lübeck, Germany  
 2008-2010 Toshihiro Kushibiki, PhD (Associate Professor)  
 Osaka University, Japan  
 2008-2009 Yupeng Tu (PhD candidate)  
 Brandeis University, Waltham, MA  
 2009-2011 Stefan Elrington (PhD candidate)  
 Yale University, New Haven, CT  
 2009-2011 Youssef Mir, PhD (Research Fellow)  
 Centre de biochimie Structurale  
 CNRS UMR 5048 - UM 1 - INSERM UMR 1054  
 Montpellier Cedex - France  
 2010- Srivalleesha Mallidi, PhD (Instructor)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA  
 2010-2013 Shifalika Tangutoori, PhD (Postdoctoral Research Associate)  
 Northeastern University  
 Boston, MA  
 2010-2012 Iqbal Massodi, PhD (Pharmacist)  
 Rite, Williamsburg, Virginia



2011-9/2011 Toshihiro Kushibiki, PhD (Associate Professor)  
National Defense Medical College, Japan

2011-7/2011 Wael Al-Daraji, MD, PhD (Consulting Dermatologist)  
Wellman Center for Photomedicine, Massachusetts General Hospital,  
Boston, MA

2011-2012 R. Bryan Sears, PhD (Assistant Professor of Chemistry)  
Emmanuel College  
Boston, MA

2011-2012 Stanley Kimani, PhD (Adjunct Professor)  
Rutgers, New Jersey Medical School  
Newark, NJ 07103

2011-2013 Sriram Anbil (MD candidate)  
University of Texas School of Medicine at San Antonio  
San Antonio, Texas

2015- Sriram Anbil (Howard Hughes Medical Institute Research Fellow)  
Wellman Center for Photomedicine, Massachusetts General Hospital,  
Boston, MA

2011- Akilan Palanisami, PhD (Research Scientist)  
Wellman Center for Photomedicine, Massachusetts General Hospital,  
Boston, MA

2011-2013 Lawrence B. Mensah, D.Phil (PhD) (Research Associate)  
Department of Chemical Engineering  
The Koch Institute for Integrative Cancer Research, MIT

2011-2014 Shazia Khan, PhD (Scientific Editor/Scientist)  
Elsevier

2011-2013 Lei Z. Zheng, PhD (Research Scientist)  
Wellman Center for Photomedicine, Massachusetts General Hospital,  
Boston, MA

2012-2013 Ruth Goldschmidt, PhD (Research Scientist)  
Wellman Center for Photomedicine, Massachusetts General Hospital,  
Boston, MA

2012- Huang Chiao Huang, Ph.D. (Research Fellow)  
Wellman Center for Photomedicine, Massachusetts General Hospital,  
Boston, MA

2012-2015 Kohei Watanabe, PhD, (Research Scientist)  
Wellman Center for Photomedicine, Massachusetts General Hospital,  
Boston, MA

2012-2013 Ashwini Ghogare, M.Sc (Research Fellow)  
Wellman Center for Photomedicine, Massachusetts General Hospital,  
Boston, MA

2012-2014 Sultan Sibel Erdem, PhD (Assistant Professor)  
Istanbul Medipol University  
International School of Medicine, Department of Medical Biochemistry  
Regenerative and Restorative Medical Research Center (REMER)

2012-2014 Chun-Te (Patrick) Chiang, PhD (Research Scientist)  
Center for Applied Molecular Medicine, Keck School of Medicine  
University of Southern California

2013- Girgis Obaid, PhD (Research Fellow)  
Wellman Center for Photomedicine, Massachusetts General Hospital,

Boston, MA  
 2013-2016 Emma Briars (PhD. Candidate)  
 Boston University  
 Boston, MA  
 2013-2016 Zachary Simpson (Program Coordinator)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA  
 2013-2014 Heather Gudejko, PhD (Product Scientist II)  
 Cell Signaling Technology (CST)  
 2013-2014 Rehab Amin, PhD (Assistant Professor)  
 National Institute of Laser Enhanced Science (NILES)  
 Cairo University, Egypt  
 2014 Nan Xu, MD, PhD (Associate Professor/Administrative Director of Dermatology)  
 Shanghai East Hospital, Tongji University  
 Shanghai, China  
 2014 Jia Chen, MD, PhD (Attending Physician)  
 Shanghai Skin Disease Hospital, China  
 2014-2016 Joyce Liu (MD/PhD Candidate)  
 University of Pennsylvania  
 Philadelphia, PA  
 2014- Anne-Laure Bulin, PhD (Research Fellow)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA  
 2014-2016 Daniela Vecchio, PhD (Research Scientist)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA  
 2015- Jerrin Kuriakose, PhD (Research Fellow)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA  
 2015- Ahmed Alkhateeb, PhD (Research Fellow)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA  
 2015- Mans Broekgaarden, PhD (Research Fellow)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA  
 2015- Amjad Khan, PhD (Research Scientist)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA  
 2016 Shazia Bano (PhD Candidate)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA  
 2016- Baldeep Gandhi, MS (Program Coordinator)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA  
 2016- Michael Pigula (Research Technician I)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,  
 Boston, MA  
 2016 Shubhankar Nath, PhD (Research Fellow)  
 Wellman Center for Photomedicine, Massachusetts General Hospital,

2017 Boston, MA  
Shazia Bano, PhD (Visiting Scholar)  
Wellman Center for Photomedicine, Massachusetts General Hospital,  
Boston, MA

**Formal Teaching of Peers (e.g., CME and other continuing education courses)**

2000- Gynecology Oncology basic Translational Seminar Series, Massachusetts  
General Hospital and Dana-Faber Cancer Institute.

**Local Invited Presentations**

- 1988 Invited Lecture, "Selective Phototoxicity Using Monoclonal Antibody-Photosensitizer Conjugates", SPIE, Boston, MA
- 1988 Invited Lecture, "Selective Phototoxicity Using Monoclonal Antibody-Photosensitizer Conjugates", SPIE, Boston, MA
- 1991 Invited Lecture, "The Society for Minimally Invasive Therapy", Boston, MA
- 1997 Plenary Lecture, Laser/Tissue Interaction and Wound Healing Session. 1997 Cornea Research Conference, Boston, MA
- 2003 Invited Lecture, "Leadership Development for Physicians and Scientists," Harvard Medical School, Boston, MA
- 2008 Invited Lecture, 'The Landsdowne Seminar Series', MIT, "Photodynamic Therapy: A bridge between photochemical technology and medicine", April 24, Cambridge, MA.
- 2008 Invited Lectures, Radiation Research Society (RRS) in Connection with American Society for Therapeutic Radiology and Oncology (ASTRO), (i) "Photodynamic Activation: A Platform for Optical Imaging and Therapeutics"; (ii) "Photonanotechnology: An Emerging Platform for Targeted Imaging and Treatment", September 21-24, Boston, MA
- 2009 Invited Lecture, "Leadership Development for Physicians and Scientists", Harvard Medical School, March 31-April 3, Boston, MA
- 2009 Invited Lecture, Merrimack Pharmaceuticals, "Light-triggered Nanoconstructs as Combinatorial Therapeutics for Cancer", December 7, Cambridge, MA
- 2010 Invited Lecture, Joint IEEE-Photonics Society & Boston University Biomedical Optics Workshop, "Photodynamic Therapy: A Bridge between Medicine and Technology", March 30, Boston, MA
- 2011 Invited Lecture, 20th Annual R. William Gange Lecture, "Exploiting cellular molecular responses for enhanced Photodynamic Treatments", December 1, MGH, Boston, MA
- 2012 Invited Lecture, Massachusetts General Postdoctoral Association Annual Meeting, "Career Development at MGH", January 30, MGH, Boston, MA
- 2012 Invited Lecture, Tufts University School of Engineering, Department of Biomedical Engineering, "Photodynamic Therapy: A Bridge between Science, Technology and Medicine", February 5, Medford, MA
- 2012 Invited Lecture, Wellman Noon Tutorial, "The Cancer Cell and its Evil Ways", November 27, MGH, Boston, MA
- 2013 Invited Lecture, New England Biolabs, "Photodynamic Therapy a photochemistry-based bridge between technology, science and medicine", March 28, Ipswich, MA
- 2013 Invited Lecture, PanAmerican Photodynamic Association (PAPDT), Sheraton Boston Hotel/Hynes Convention Center, "Optimizing PDT: Are Molecular Targets the way to go?", April 6, Boston, MA

- 2014 Invited Lecture, Optics and Spectroscopy Seminar Series, “Photodynamic Therapy: A Bridge between Science, Technology and Medicine”, March 11, Laser Biomedical Research Center, MIT, Cambridge, MA
- 2014 Invited Lecture, MGH–University of Tokyo Symposium: Frontiers in Biomedical Engineering, “Photodynamic Therapy: a bridge between science, technology and medicine”, September 24, Boston, MA
- 2015 Invited Lecture, Vincent Center for Reproductive Biology Seminar Series (VCRB) “Targeting resistance in ovarian cancer with photochemistry-based processes”, March 16, Boston, MA

## **Report of Regional, National and International Invited Teaching and Presentations**

### **Regional, National and International Invited Presentations and Courses**

#### *Graduate Courses, seminars:*

- 1992 Grand Rounds, Hamilton Regional Cancer Center, Ontario, Canada
- 1993 Seminar, Photoimmunotherapy: Principles and Applications, Department of Dermatology, Hirosaki University, Japan
- 1993 Invited Teaching, Introduction to Photodynamic Therapy, Department of Tumor Biology, Sendai University, Japan
- 1998 Strategies for Selective Phototargeting, Grand Rounds, Dept. of Radiation Oncology, University of Pennsylvania, Philadelphia, PA
- 1999 Biomedical Chemistry and Photodynamic Sciences, Fulbright College of Arts & Sciences, University of Arkansas, Fayetteville, AK
- 2000 Strategies for Selective Photodynamic Therapy, Roswell Park Memorial Cancer Institute, Buffalo, NY
- 2006 Molecular Mechanism-Based Strategies for Enhanced Photodynamic Therapy Wayne State University School of Medicine, Detroit, MI
- 2006 EGFR/VEGF in Photodynamic Therapy, Institute of Hepatology, University London College, London, UK

#### *Invited presentations:*

- 1987 Invited Lecture, Targeting of Drugs. NATO ASI, Cape Sunion Beach, Greece
- 1988 Invited Lecture, Photochemical Targeting of Cancer Cells. Gordon Conference on Lasers in Medicine, New Hampshire
- 1989 Invited Lecture, Immunologic Targeting of Cancer Cells. SPIE, Los Angeles, CA
- 1990 Invited Lecture, Photochemical Effects in Laser-Tissue Interactions. SPIE Conference on Progress in Biomedical Optics, Los Angeles, CA
- 1990 Invited Lecture, Tissue Targeting of Photosensitizers. SPIE Conference on Progress in Biomedical Optics, Los Angeles, CA
- 1990 Invited Lecture, Selective Photosensitization, Conference on Photodynamic Treatments: Virus Eradication and Tumor Therapy. University of Muenster, Germany
- 1990 Invited Lecture, Approaches to Tumor Targeting. Workshop on Photodynamic Therapy, Ulm, Germany
- 1990 Invited Lecture, Targeted Photosensitization Using Carrier Systems. Institute of Biochemistry, Swiss Institute for Experimental Cancer Research, Lausanne, Switzerland
- 1990 Invited Lecture, Intensity Dependent Photosensitization. National Laser Center, London University, London, England

- 1992 Plenary Lecture, International Lithuanian-Italian Workshop on Photosensitized Therapy, Lithuania
- 1992 Plenary Lecture, Laser Induced Selective Destruction of Ovarian Cancer Cells. International Conference on Monoclonal Antibody Immunoconjugates for Cancer, San Diego, CA
- 1992 Invited Lecture, Multiphoton Photobiologic Effects. SPIE, Los Angeles, CA
- 1992 Invited Lecture, 11th International Congress on Photobiology, Kyoto, Japan
- 1993 Seminar, Strategies to Selective Phototargeting. Beckman Laser Institute, Irvine, CA
- 1993 Invited Lecture, Role of Carrier Molecules in PDT. EEC Workshop, Lubeck, Germany
- 1993 Invited Lecture, American Society for Photobiology, Chicago, IL
- 1994 Invited Lecture, Lasers & Applications, Advances in Science, Medicine and Technology. National Institute of Laser Enhanced Sciences, Cairo, Egypt
- 1994 Invited Lecture, Gordon Research Conference on the Chemistry and Biology of Tetrapyrroles. Wolfeboro, NH
- 1994 Invited Lecture, Gordon Conference on Lasers in Medicine and Biology, Meriden, NH
- 1994 Seminar, Photochemical Destruction of Cancer Cells. Rush Cancer Institute, Chicago, IL
- 1994 Plenary Lecture, International Conference on Monoclonal Antibody Immunoconjugates for Cancer, San Diego, CA
- 1995 Invited Lecture, Experimental Photodynamic Therapy of Intraabdominal Cancers. University of Bologna, Italy
- 1995 Invited Lecture, The European Biomedical Optics Symposium Week, Barcelona, Spain
- 1995 Plenary Lecture, Photodynamic Therapy: An Overview. Conference on Lasers and Electro-Optics, Baltimore, MD
- 1997 Invited Lecture, Photodynamic Treatment of Antigen-Induced Arthritis with BPD-MA, Future Directions in Photodynamic Therapy. European Society for Photobiology, Stresa, Italy
- 1997 Invited Lecture, BiOS Europe '97, San Remo, Italy
- 1997 Invited Lecture, Engineering Foundation Conference on Lasers in Medicine and Biology, Snowbird, UT
- 1998 Invited Lecture, New Advances in Photodynamic Therapy Targeted Photodynamic Therapy. Annual Meeting of the Radiation Research Society, Louisville, KY
- 1998 Invited Lecture, Therapeutic Laser Applications Topical Meeting, Optical Society of America, Orlando, FL
- 1998 Invited Lecture, First World Congress of Photomedicine in Gynecology, Zurich, Switzerland
- 1998 Seminar, Oregon Medical Laser Center Lecture Series, St. Vincent Hospital and Medical Center, Portland, OR
- 1998 Invited Lecture, Overview of Current Status of Photodynamic Therapy. Gordon Research Conference, Meriden, NH
- 1999 Invited Lecture, New Directions in Photodynamic Therapy. Symposium of New Technologies sponsored by Johnson & Johnson, San Jose, CA
- 1999 Invited Lecture, Advances in Optics for Biotechnology, Medicine and Surgery Conference, Kailua-Kona, Hawaii
- 1999 Invited Lecture, Selective Photosensitizer Localization in PDT. Symposium on Photosensitization (ESP), European Society for Photobiology, Granada, Spain.
- 1999 Invited Lecture, Principles of Photodynamic Therapy and Preclinical Studies, New Aspects in Indocyanine-Green-Angiography. 4<sup>th</sup> International Symposium on ICG-Angiography, Baden-Baden, Germany

- 1999 Invited Lecture, PDD/PDT in Clinical Practice. 3<sup>rd</sup> International Symposium on Photodynamic Diagnosis and Therapy in Clinical Practice, Innsbruck, Austria.
- 2000 Invited Lecture, Fundamentals of Photochemistry and Photodynamic Therapy. SPIE Photonics West 2000, San Francisco, CA
- 2000 Invited Lecture, Progress and Novelties in Photodynamic Therapy: Basic Research Aspects. Workshop on Photodynamic Therapy, Marrakech, Morocco
- 2000 Invited Lecture, Recent Advances in Photodynamic Therapy. First International Conference on Porphyrins and Phthalocyanines, Dijon, France
- 2001 Invited Lecture, Fundamentals of Photochemistry and Photodynamic Therapy. SPIE Photonics West 2001, San Jose, CA
- 2001 Invited Lecture, Mechanisms of Cellular Response to PDT. 13<sup>th</sup> International Congress on Photobiology, San Francisco, CA
- 2001 Invited Lecture, Photodynamic Therapy for Cancer. International Conference on Technology in Cancer Research and Treatment in the New Millennium, Albany, NY
- 2001 Invited Lecture, Photochemically Targeted Destruction of Bacteria *in vivo*. 9th Congress, European Society for Photobiology, Lillehammer, Norway
- 2001 Invited Lecture, Photodynamic Activation in the Possible Treatments of Arthritis. 4th International Symposium on Photodynamic Diagnosis and Therapy in Clinical Practice, Bressanone, Italy
- 2001 Invited Lecture, Therapeutic and Diagnostic Approaches using Light Activatable Chemicals. Van Andel Research Institute, Grand Rapids, MI
- 2001 Invited Lecture, EGFR: A Molecular Target for PDT of Cancer. Hong Kong International PDT Conference, Hong Kong, China
- 2002 Invited Lecture, Photochemistry based Strategies in Cancer Treatment and Diagnosis with EGFR as a Molecular Target, IGERT Seminars, Austin, TX
- 2002 Invited Lecture, Photochemistry Based Approaches to Cancer Treatment and Diagnosis, Mount Sinai School of Medicine, Derald H. Rottenberg Cancer Center, NY, NY
- 2002 Invited Lecture, Photodynamic Therapy, University of Pennsylvania, Philadelphia, PA
- 2003 Invited Lecture, PDT and Growth Factors, SPIE Photonics West 2003, San Jose, CA
- 2003 Invited Lecture, Angiogenetic Effects in Photodynamic Therapy, 9<sup>th</sup> World Congress of The International Photodynamic Association, Miyazaki, Japan
- 2003 Invited Lecture, Modulation to Achieve Targeted Photodynamic Action affects the Mode of Cell Death, American Society for Photobiology, Baltimore, MD
- 2003 Invited Lecture, Molecular Responses and Modulation in PDT, 5<sup>th</sup> International Symposium on Photodynamic Diagnosis and Therapy in Clinical Practice, Brixen/Bressnone, Italy
- 2003 Invited Lecture, Targeted Optical Imaging and Photodynamic Therapy, Ernst Schering Foundation's Molecular Imaging Symposium, Berlin, Germany
- 2004 Invited Lecture, Photochemical Effects in Laser-Tissue Interactions: Photodynamic Therapy, An Overview, SPIE Photonics West 2004, San Jose, CA
- 2004 Keynote Invited Lecture, Optical Imaging in the Mechanistic Understanding of Photodynamic Therapy, SPIE Photonics West 2004, San Jose, CA
- 2004 Invited Lecture, Tumor Metastasis, Cell Type, Animal Species, and Tumor Cell Monitoring *In Vivo*, SPIE Photonics West 2004, San Jose, CA
- 2004 Invited Lecture, Great Lakes Symposium, Cleveland, OH
- 2004 Invited Lecture, ICPP-3, Medical Applications of Porphyrin-based compounds, New Orleans, LA
- 2004 Invited Lecture, Biophotonics 2004, Directing Photodynamic Therapy toward Specific Molecular Targets, Stockholm, Sweden

- 2004 Invited Lecture, ASP, Erb BI Mediated Targeting of Ovarian Cancer: Immunoconjugate Processing and Cytotoxic Efficacy, Seattle, WA
- 2005 Invited Lecture, SPIE, Combination Photodynamic and Differentiation Therapy: Preclinical and Clinical Studies, San Jose, CA
- 2005 Invited Lecture, SPIE, The Need for Optical Imaging in the Understanding and Optimization of Photodynamic Therapy, San Jose, CA.
- 2005 Invited Lecture, FDA, Photodynamic Therapy: Mechanisms, Applications and Imaging, Washington, DC
- 2005 Invited Lecture, IPA, Molecular Targets in Photodynamic Therapy. 10<sup>th</sup> World Congress, Munich, Germany
- 2005 Invited Lecture, Molecular Responses of PDT on Prostate Tumors and Implications, Deutsche Gesellschaft für Lasermedizin, Ulm, Germany
- 2006 Invited Lecture, Molecular Target Modulation: A Strategy for Optimization of Photodynamic Therapy, Dept. of Gastroenterology, University College of London Institute of Hepatology, London
- 2006 Invited Lecture, Strategies for Optimizing Photodynamic Treatments in Dermatology, Nippon Medical School, Tokyo, Japan
- 2006 Invited Lecture, Strategies for Optimizing Photodynamic Treatments in Dermatology, 57<sup>th</sup> Annual meeting of the Central Division of the Japanese Dermatological Association, Nagoya, Japan
- 2006 Invited Lecture, Molecular Mechanism-Based Strategies for Enhanced Photodynamic Therapy, Wayne State University School of Medicine, Detroit, MI
- 2007 Invited Lecture, SPIE, Molecular Imaging of Photodynamic Therapy Efficacy, San Jose, CA
- 2007 Invited Lecture, Photochemical and Photophysical Strategies for the Treatment and Diagnosis of Disease. PIEAS, Islamabad, Pakistan
- 2007 Invited Lecture, Molecular Response and Imaging-based Combination Treatments for Pancreatic Cancer, IPA, Shanghai, China
- 2007 Invited Presentation, Advances in Optics for Biotechnology, Medicine, and Surgery, Naples, FL
- 2007 Invited Lecture, European Conference in Biomedical Optics, Munich, Germany
- 2007 Invited Lecture, European Society for Photobiology, Bath, UK
- 2007 Invited Lecture, Frontiers in Optics 2007 (Optical Society of America), “Molecular Response and Imaging-based Combination Strategies for Optimal PDT”, San Jose, CA
- 2008 Invited Lecture, SPIE, Photonics-West, “Mechanisms of synergy between epidermal growth factor receptor targeted immunotherapy and photodynamic treatment of ovarian cancer”, January 19-24, San Jose, CA
- 2008 Invited Lecture, Wayne State University School of Medicine, “Photodynamic Therapy: A Bridge between Technology and Medicine”, May 16, Detroit, MI
- 2008 Invited Lecture, Washington University School of Medicine, “Photodynamic Therapy: A Platform for Bridging Photochemistry, Photobiology and Medicine”, June 4, St. Louis, MO
- 2008 Invited Lectures, International Conference on Porphyrins and Phthalocyanines (ICCP-5), “Strategies for targeted Photodynamic Therapy”, July 7-11, Moscow, Russia
- 2008 Invited Lectures, Korean Photodynamic Association, The Catholic University of Korea, (i) “Photodynamic Therapy: A Platform Bridging Chemistry, Biology and Medicine”; (ii) “Strategies for Targeted Photodynamic Therapy”, August 23, Seoul, Korea

- 2008 Invited Lecture, 3rd Annual NCI Alliance for Nanotechnology in Cancer Investigators Meeting, “Targeted nanomaterials for photodynamic therapy and imaging in ovarian cancer models”, September 8-10, Chicago, IL
- 2008 Invited Lectures, 7th International Symposium on Photodynamic therapy and Photodiagnosis in Clinical Practice, (i) “Getting optimal PDT response via molecular target identification”; (ii) “Approaches to selectivity in PDT”, October 7-11, Brixen, Italy
- 2009 Invited Lectures, SPIE, Photonics-West, (i) “Photodynamic agents and imaging: applications in therapy monitoring”; (ii) “Molecular imaging and therapy strategies”; (iii) “Optimization of combinatorial therapy using EGFR inhibition and photodynamic therapy in novel ovarian cancer models”, January 24-29, San Jose, CA
- 2009 Invited Lecture. World Leish 4, 4<sup>th</sup> World Congress on Leishmaniasis, “Photodynamic Therapy for Cutaneous Leishmaniasis”, February 3-7, Lucknow, India
- 2009 Invited Lectures, 12<sup>th</sup> World Congress of the International Photodynamic Association, (i) “Molecular Target- based Combinations with PDT for Enhanced Treatment Outcomes”; (ii) “Photodynamic Therapy for Cutaneous Leishmaniasis”, June 11-15, Seattle, WA
- 2009 Invited Lectures, 15<sup>th</sup> International Congress on Photobiology, (i) “Delivery of photosensitizers and other therapeutic agents using nanocells”; (ii) “Mechanism based enhancement of PDT response”, June 18-23, Dusseldorf, Germany
- 2009 Invited Lectures, 13th Congress of the European Society for Photobiology, (i) “Targeted Photodynamic Therapy: the photoimmunoconjugate approach”; (ii) “Molecular Targets in Antimicrobial PDT”; (iii) “Molecular response-based PDT combinations: the importance of models”, September 3-11, Wroclaw, Poland
- 2009 Invited Lecture, 4th Annual NCI Alliance Investigators Meeting, “Targeted nanomaterials for imaging and photodynamic therapy in orthotopic cancer models”, October 20-22, Manhattan Beach, CA
- 2009 Invited Lecture, NCI Translational Science Meeting (TSM 2), “Molecular Response and Imaging-based Combination Strategies for Optimal PDT”, November 4-7, Vienna, VA
- 2009 Invited lecture, Frontiers in Optics 2009/Laser Science XXV, “Photodynamic Therapy: A Bridge between Technology and Medicine”, October 14-19, San Jose, CA
- 2010 Invited Lectures, SPIE Photonics West, (i) “Combination treatments with PDT are enhanced by co-encapsulation of PDT agents and biologics in targeted nanoconstructs”; (ii) “Targeted Theranostic Nanoparticles for Biomedical Applications”, January 23-29, San Francisco, CA
- 2010 Invited Lecture, University of Pennsylvania School of Medicine-Department of Radiation Oncology, “Mechanism and Imaging-Based Therapeutic Strategies for Metastatic Ovarian Cancer in 3D and in vivo models”, April 15, Philadelphia, PA
- 2010 Invited Lecture, H Foundation Basic Science Symposium: Bioengineering and Cancer, Robert H. Lurie Comprehensive Cancer Center of Northwestern University, “Molecular Response and Imaging-based Combination Strategies for Optimal Photodynamic Therapy (PDT)”, April 23, Chicago, IL
- 2010 Invited Lecture, Wayne State University School of Medicine, “Photodynamic Therapy: A Translational Bridge between Chemistry and Medicine”, May 21, Detroit, MI
- 2010 Invited Lecture, The University of Missouri, Ellis Fischel Cancer Center and School of Medicine Oncology Grand Rounds, “Photodynamic Therapy: A Translational Bridge Between Technology and Medicine”, September 21, Columbia, MO
- 2010 Invited Lectures, 8th International Symposium on Photodynamic Therapy and Photodiagnosis in Clinical Practice, (i) “PDT for intracellular pathogens”; (ii) “Selective tumor targeting in PDT”, Brixen/Bressanone (South Tyrol, Italy), October 6-9, 2010.



- 2011 Invited Lectures, SPIE Photonics West, (i) "PDT simultaneously with inhibition of EGFR and c-Met pathways enhances treatment outcomes in experimental pancreatic cancer"; (ii) "Imaging enabled platforms for development of therapeutics", January 22-27, San Francisco, CA
- 2011 Invited Lecture, Florida International University, Herbert Wertheim College of Medicine, "Photodynamic Therapy: A Bridge between Science, Technology and Medicine", February 25, Miami, FL
- 2011 Invited Lectures, 13<sup>th</sup> World Congress International Photodynamic Association, (i) "Targeted PDT and its clinical relevance"; (ii) "Nanoconstructs for simultaneous delivery of PDT and oncogenic inhibitors"; (iii) "PDT School-Fundamental Principles of Photodynamic Therapy and Strategies for Optimization", May 10-14, Innsbruck, Austria
- 2011 Invited Lecture, Advances in Optics for Biotechnology, Medicine and Surgery XII An ECI Conference Series (Engineering Conferences International), "Imaging enabled platforms for development of therapeutics", June 5-8, Naples, FL
- 2011 Invited Lecture, 21st Annual Meeting of the Japan Photodynamic Association, "Photodynamic Therapy: A Bridge between Science, Technology and Medicine", July 2-3, Osaka, Japan
- 2011 Invited Lecture, 14th Congress of the European Society for Photobiology, "Combination of Photodynamic and Nano Technologies for Therapy and Treatment Monitoring", September 1-6, Geneva, Switzerland
- 2011 Invited Lecture, 14th Congress of the European Society for Photobiology, "Image-based anti-vascular therapy with PDT", September 1-6, Geneva, Switzerland
- 2011 Invited Lecture, 14th Congress of the European Society for Photobiology, "Enzyme Targeted Photodynamic Therapy and Rapid Optical Diagnostics", September 1-6, Geneva, Switzerland
- 2011 Invited Lecture, University of Chicago, "Photochemistry as a Tool for Diagnostics and Therapy", October 7, Chicago, IL
- 2011 Invited Lecture, Cancer Institute Forum, University of Arkansas for Medical Sciences, "A Bridge between Science, Technology and Medicine", October 24, Little Rock, Arkansas
- 2011 Invited Lecture, Translational Biomarkers in Diagnostics and Therapeutics, "Optical Strategies for Monitoring Biomarkers in vivo for Treatment Design", November 16-18, Mumbai, India
- 2012 Invited Lectures, SPIE Photonics West, (i) "Nanoconstructs for combinations based on PDT and oncogenic inhibitors"; (ii) "Targeting drug resistance mechanism for a rapid optical identification of specific antibiotic utility: Photosensitizers as multifunctional molecular probes", January 21-26, San Francisco, CA
- 2012 Invited Lecture, Washington University in St. Louis, 8th Annual Postdoctoral Scientific Symposium, "So you have a Ph.D.? What next? A personal perspective" March 28, St. Louis, MO
- 2012 Invited Lecture, Wayne State University School of Medicine, "Mechanism, imaging and model-based optimization of photodynamic therapy", April 13, Detroit, MI
- 2012 Invited Lecture, University of California, Fourth Annual Allan Oseroff Lecture, Beckman Laser Institute and Medical Clinic, "Getting the best of Photodynamic Therapy: Are molecular targets the way to go?", April 24, Irvine, CA
- 2012 Invited Lecture, Department of Pharmaceutics, College of Pharmacy, University of Minnesota "Photodynamic Therapy: A Bridge between Technology and Medicine", April 26, Minneapolis, MN

- 2012 Invited Lecture, The Optical Society (OSA), Biomedical Optics Conference “Molecular probes in Photodynamic Therapy”, April 30, Miami, FL
- 2012 Invited Lecture, The Ohio State University (OSU) Comprehensive Cancer Center-James Cancer Hospital and Solove Research Institute, 1<sup>st</sup> Annual International Photodynamic Medicine Symposium, “Maximizing Photodynamic Therapy: Molecular Targets?”, May 11-12, Columbus, OH
- 2012 Invited Lecture, Biophotonics and Imaging Graduate Summer School (BIGSS12), “Imaging and Photodynamic Therapy: Mechanisms, Monitoring and Optimisation”, June 7-13, Galway, Ireland
- 2012 Invited Lecture, 36th Meeting of The American Society for Photobiology, “Photodynamic Therapy: A Bridge Between Photobiology, Photochemistry and Technology”, June 23-27, Montréal, Canada
- 2012 Discussion Leader in Molecular Probes, Gordon Conference on Lasers in Medicine and Biology, July 22-27, Holderness, NH
- 2012 Invited Speaker, 3rd Light for Health 2012, “Photodynamic Therapy: A Bridge between Medicine and Technology”, September 21, Barcelona, Spain
- 2012 Invited Lecture, 9th International Symposium on Photodynamic Therapy and Photodiagnosis in Clinical Practice, “Optimizing PDT: are molecular targets the way to go?”, October 16-20, Brixen/Bressanone, (South Tyrol) Italy
- 2012 Invited Lecture, 9th International Symposium on Photodynamic Therapy and Photodiagnosis in Clinical Practice, “Image guided drug delivery and therapy in GBM”, October 16-20, Brixen/Bressanone, (South Tyrol) Italy
- 2012 Invited Presentation, Pakistan Institute of Engineering and Applied Sciences (PIEAS) Colloquium, "Applying Basic Science to Developing Targeted Treatment of Disease", November 5-9, Islamabad, Pakistan
- 2012 Invited Lecture, PAEC General Hospital, "Molecular Modulation of Cancer Tissue for Enhanced Treatment Response", November 5-9, Islamabad, Pakistan
- 2012 Invited Lecture, The GRDC (Global R&D Center) Symposium, Green Science and Engineering for Health and Environment, “Photodynamic Therapy: A bridge between science, technology and medicine”, November 12-13, Seoul, Korea
- 2012 Invited Lecture, Cancer Nanotechnology Mechanisms in Nanoparticle Hyperthermia “Targeted Nanoconstructs and Light Activated Treatment of Cancer”, December 1, Hanover, NH
- 2013 Invited Lecture, SPIE Photonics West, “Determinants of treatment resistance in 3D cellular models of cancer”, February 2-8, San Francisco, CA
- 2013 Invited Lecture, Initiative for Maximizing Student Development (IMSD) Program and Chemistry Colloquium Seminar, “Strategies for Molecular Targeting in Photodynamic Therapy”, March 15, Baton Rouge, Louisiana
- 2013 Invited Lecture, Radiobiology & Imaging Retreat Program: Bioengineering in Cancer Therapy and Imaging: Illuminating New Directions in Nanoparticle Research Symposium, “Photoactivatable Multi-inhibitor Nanoconstructs in Cancer Therapy”, May 9, Philadelphia, PA
- 2013 Invited Lecture, The 14th World Congress of International Photodynamic Association, “Molecular Target-Based Photodynamic Therapy Combination Therapies”, May 26-31, Seoul, Korea
- 2013 Invited Lecture, 3<sup>rd</sup> Shanghai International Forum on Photodynamic Medicine, “Photodynamic Therapy: A Bridge between Science, Technology and Medicine”, May 31-June 3, Shanghai, China

- 2013 Invited Lecture, Tongji University, “Optimizing Photodynamic Therapy via Molecular Targeting”, June 3, Tongji, China
- 2013 Invited Lecture, Food and Drug Administration/Center for Drug Evaluation and Research (FDA/CDER), “Mechanism and Imaging-based Approach to Photodynamic Therapy of Cancer”, June 10, Silver Spring, MD
- 2013 Invited Lecture, IV International Symposium, Topical Problems of Biophotonics, “Photodynamic Therapy: A slice of clinical biophotonics bridging science, technology and medicine”, July 21-27, Nizhny Novgorod - the Volga River, Russia
- 2013 Invited Lecture, 15th Congress of the European Society for Photobiology, “Photodynamic therapy-based combinations made more effective with multi-inhibitor nanoconstructs”, September 2-6, Liège (Belgium)
- 2013 Invited Lecture, Arizona State University, “Photodynamic Therapy: A slice of biophotonics bridging science, technology and medicine”, October 17, Tempe, AZ
- 2013 Invited Lecture, University of Pittsburgh Cancer Institute, “Photodynamic Therapy: A slice of biophotonics bridging science, technology and medicine”, December 10, Pittsburgh, PA
- 2014 Invited Lecture, SPIE Photonics West, “Drug resistance mechanisms, Photodynamic Therapy (PDT) and combination treatments”, February 1-6, San Francisco, CA
- 2014 Invited Lecture, 25 years of Laser-Tissue Interaction at SPIE Photonics West, “PDT: Back to the future (25 years of follies and fortunes)”, February 1-6, San Francisco, CA
- 2014 Keynote Invited Speaker, Annual Postdoc Boot Camp for Graduate Students in the School of Medicine at University of North Carolina at Chapel Hill, “So you have a PhD and more, now what?”, April 3, Chapel Hill, NC
- 2014 Invited Lecture, PanAmerican Photodynamic Association (PAPDT), “PDT Pearls Science”, April 5, Phoenix, AZ
- 2014 Invited Lecture, International Congress on Photodynamic Applications (ICPA), “Molecular Targeted Photodynamic Therapy”, May 25-27, Dundee, Scotland
- 2014 Invited Lecture, Biomedical Engineering Materials and Applications (BEMA) Roundtable Committee Meeting, “Low Cost Enabling Technology for Image Guided Photodynamic Therapy of Oral Cancer”, June 5-6, Woods Hole, MA
- 2014 Invited Lecture, Howard Schlossberg Retirement Symposium & Reception, “Photodynamic Therapy: A Bridging Technology for Science & Medicine”, June 8, San Jose, CA
- 2014 Invited Lecture, International Conference on Porphyrins and Phthalocyanines (ICPP-8), “Targeting Porphyrins to Key Cancer Cell Molecules for Enhanced Treatment Outcome”, June 22-27, Istanbul, Turkey
- 2014 Invited Lecture, Photodynamic therapy and photodiagnosis in Clinical Practice, “Targeted PDT in cancer, parasites and bacteria: An overview of promises and limitations”, October 15-18, Bressanone/Brixen, (South Tyrol) Italy
- 2014 Invited Lecture, Barbara Ann Karmanos Cancer Institute Grand Rounds, “Photodynamic Therapy and Nanotechnology: A special Relationship?” Wayne State University, December 4, Detroit, MI
- 2015 Invited Lecture, 3rd International Conference of Photodynamic and Nanomedicine for Health Sciences, Luxor & Cairo, “Photodynamic Therapy: a bridge between science, technology and medicine”, Egypt, January 2-7, Cairo, Egypt
- 2015 Invited Lecture, SPIE Photonics West, “Exploiting PDT effects in the Design of Mechanism-based Combination Treatments”, February 7-12, San Francisco, CA
- 2015 Invited Lecture, SPIE Photonics West, “Photodynamic Therapy”, February 7-12, San Francisco, CA

- 2015 Invited Lecture, AACR-SNMMMI Joint Conference on State-of-the-Art Molecular Imaging in Cancer Therapeutics, “New Frontiers: Combining molecular imaging and nanomedicine to light up and selectively destroy cancer”, February 10-13, San Diego, CA
- 2015 Invited Lecture, Biochemistry Seminar, University of Oklahoma, “Combining molecular imaging and nanomedicine for selective destruction and imaging of cancer cells”, April 6, Norman, Oklahoma
- 2015 Invited Lecture, Optical Molecular Probes, Imaging and Drug Delivery (OMP), “Photodynamic Therapy (PDT): A Photochemical Slice of Clinical Biophotonics”, April 12-15, Vancouver, Canada
- 2015 Invited Lectures, The International Symposium of Catholic- Harvard Wellman Photomedicine Center, (i) “Photodynamic Therapy: An Overview and Future Directions”, (ii) “Molecular Imaging in therapy guidance and monitoring”, April 21-31, Seoul, Korea
- 2015 Invited Lecture, “Nanotechnology in light-activated therapy and monitoring”, Frontiers of Biomedical Imaging Science V, Vanderbilt University Institute of Imaging Science, Student Life Center, May 13-15, Nashville, TN
- 2015 Invited Lecture, Cancer Summer Course, “Photodynamic Therapy (PDT): A photochemical slice of biophotonics for cancer treatment”, September 7-11, Lausanne, Switzerland
- 2015 Invited Lecture (students’ retrospective session), Cancer Summer Course, “The convoluted route from molecular vibrations and chemical kinetics to translational cancer research”, September 7-11, Lausanne, Switzerland
- 2015 Invited Lecture, SPIE/NIH Biophotonics from Bench to Bedside Workshop, “Photodynamic Therapy: does it have a role in Low to Middle Income Countries”, September 23-26, Bethesda, MD
- 2016 Invited Lecture, Society of Nuclear Medicine and Molecular Imaging (SNMMI) Educational Sessions focusing on “First-in-Humans Molecular Imaging Technologies,” “Image-guided photodynamic therapy of pancreatic cancer: in man and mouse”, January 27-29, Orlando, FL
- 2016 Invited Lecture, SPIE Photonics West, “Spatiotemporally synchronized cancer combination therapy using photo-activated nanoparticle drug delivery systems”, February 13-18, San Francisco, CA
- 2016 Invited Lecture, TRI Innovation & Translation Symposium, “Combining molecular imaging with spatiotemporally synchronized cancer combination therapy using photo-activated nanoparticle drug delivery systems to light up and selectively destroy cancer”, March 1-2, Brisbane, Australia
- 2016 Invited Lecture, Department of Medicine Grand Rounds, University of Chicago, “Optically activatable nanoconstructs for image-guided therapeutics in pancreatic cancer”, March 29, Chicago, IL
- 2016 Invited Lecture, Micro- and Nanotechnology Sensors, Systems, and Applications Conference, “Multifunctional Nanoconstructs for Biomedical Applications”, April 17-21, Baltimore, MD
- 2016 Keynote Invited Speaker, Annual Scientific Retreat, Leads Discovery Optimization (LDO), (Bristol-Myers Squibb), “Optically-triggered and image-guided targeted cancer therapeutics”, June 28, Princeton, NJ
- 2016 Invited Lecture, Photodynamic Therapy and Photodiagnosis update, “Exploiting cellular behavior to maximize cancer treatment outcomes”, Nancy, France, October 24-28

*b. Professional leadership roles related to teaching:*

- 1990 Course on Bioconjugates (American Chemical Society), 50 students (postgraduate)
- 1992 "Simple Rules in Photodynamic Therapy: Applications and Dosimetry"  
Course: The International Society for Optical Engineering (SPIE), 15 students (graduate and postgraduate; mix of physics, chemistry, engineering, biology)
- 1993- "Fundamentals of Photochemistry and Photodynamic Therapy" Course: The International Society for Optical Engineering (SPIE), 25 students (graduate and postgraduate; mix of physics, chemistry, engineering, biology)
- 1995 "Introduction to Medical Optics and Lasers" Course: Tufts/New England Eye Center (Coordinator: Thomas F. Deutsch, Ph.D.), 25 students (graduate)
- 2000 Visiting Professor, Fulbright College of Arts & Sciences, University of Arkansas, Fayetteville, AR

*Doctoral Theses:*

- 1996 Thesis Committee, Modestus O.K. Obochi, "Prevention of murine skin allograft rejection by Photodynamic Therapy (PDT) using benzoporphyrin derivative monoacid ring A (BPD)," University of British Columbia
- 1996 Thesis Committee, R.B. Veenhuizen, "Photodynamic therapy for minimal residual cancer in the peritoneal cavity," Frije Universiteit, Amsterdam
- 1997 Thesis Co-Advisor, Mark Savellano, "Photoimmunotargeting with Benzoporphyrins," University of Michigan
- 1998 Thesis Committee, Stephen Yip, "Ex vivo bone marrow purging using BPD-mediated photodynamic therapy," University of British Columbia.
- 1999 Thesis Committee, Pål Selbo, "Prostate Cancer Metastasis/Physical and Biological Determinants for Optimal PDT," University of Oslo, Oslo, Norway.
- 2004 Thesis Committee, Mark Niedre, "Development and Validation of Singlet Oxygen Luminescence-based Photodynamic Therapy Dosimetry," University of Toronto, Canada
- 2006 Thesis Committee, Xiaodong Zhou, "Designing Treatment Individualization in Photodynamic Therapy to Compensate for Pharmacokinetic Variability," Dartmouth College, New Hampshire
- 2006 Thesis Committee, Chao Sheng, "Dosimetry for ALA-PpIX Photodynamic Therapy of Barrett's Esophagus," Dartmouth College, New Hampshire
- 2006 Thesis Committee, Summer Gibbs, "Noninvasive Fluorescence Imaging for Functional Monitoring of Murine Glioma Treatment Strategies," Dartmouth College, New Hampshire
- 2008 Thesis Committee, Chu Shihng Meir, "Photodynamic Therapy (PDT) in Human Epithelial and Myometrial Multidrug Resistant Tumor Cell Models," The Hong Kong Polytechnic University, Hong Kong
- 2010 Thesis Co-Advisor, Imran Rizvi, "Microenvironment-specific 3D Models to Reliably Evaluate Novel Treatment Strategies for Human Tumors," Thayer School of Engineering, Dartmouth College, New Hampshire
- 2010 Proposal Catalyst, Leah Acker, "Flexible optical array for delivering light to the cochlea," Harvard-MIT Division of Health Sciences and Technology (HST), Medical Engineering and Medical Physics, HST's IDEA<sup>2</sup> program
- 2011 Thesis Committee, Juwelly Wendy Wu, "Near-Infrared Emitting Quantum Dots for Cellular and Vascular Fluorescent Labeling in In Vivo Multiplexed Imaging Studies", Massachusetts Institute of Technology, Boston
- 2011 Thesis Committee (External Examiner), Jonathan Franklin Lovell, "New Porphyrin Architectures for Biomedical Applications", University of Toronto, Canada

- 2012 Thesis Preparation Committee (External Examiner), Michael Jermyn, “Advancing the Clinical Use of Nirfast: A Computational Tool for Modeling Near-Infrared Light Transport in Tissue”, Thayer School of Engineering, Dartmouth College, New Hampshire
- 2013 Thesis Committee (External Examiner), Michael Jermyn, “Clinical Implementation of Image-Guided Optical Modeling Tools for Dosimetry in Pancreatic Cancer Photodynamic Therapy”, Thayer School of Engineering, Dartmouth College, New Hampshire
- 2016 Thesis Committee (External Examiner), Luis Gabriel Borges Rocha, “Development of a Novel Photosensitizer for Photodynamic Therapy of Cancer”, Universidade De Coimbra, Portugal

*Master’s Theses:*

- 1998 Thesis Advisor, Hans Guenther Lowe, “Intracellular aggregation-dynamics of photodynamic sensitizers for PDD specific damage of mitochondria by selective resonance absorption during CW and femtosecond-pulse-fractionated PDT using ALA,” University of Vienna, Vienna, Austria
- 2001 Thesis Advisor, Lisa Goel, “Effect of photodynamic therapy on metastasis-related properties: viscoelasticity and E-cadherin-based adhesion in tumor cells using optical tweezer,” Tufts University, Boston, MA
- 2004 Thesis Committee, Chao Sheng, “Dosimetry for ALA-PpIX/Photofrin Based Photodynamic Therapy of Barrett’s Esophagus,” Dartmouth College, New Hampshire
- 2004 Thesis Committee, Xiaodong Zhou, “Dynamics of Photosensitizer Distribution in Photodynamic Therapy of Prostate Tumors: Experimental and Theoretical Analysis with Verteporfin,” Dartmouth College, New Hampshire
- 2008 Thesis Committee, Johannes Wittmann, “Phase 1 Animal Safety Study of New Second Generation Porphyrin based Photosensitizer in the Syrian Golden Hamster,” University of New South Whales, Sydney, Australia
- 2013 Thesis Advisor, Albert S. Chiou, “Combination-based Photodynamic Therapy to Disrupt Compensatory VEGF Signaling in Pancreatic Cancer”, Harvard-M.I.T. Division of Health Sciences and Technology, Boston
- 2015 Thesis Referee, Hossam Zakaria Hussein Mohamed, “Tissue-Simulating Phantom for Photothermal Interaction Mediated by Nanoparticles, National Institute of Laser Enhanced Science, Cairo University, Egypt
- 2016 Thesis Advisor, Dmitriy Timerman, “Improving Photodynamic Therapy Response in a Subcutaneous Glioblastoma Model”, Harvard-M.I.T. Division of Health Sciences and Technology, Boston

*Other:* Miscellaneous graduate and undergraduate theses and research

## **Report of Technological and Other Scientific Innovations**

*Patents*

1. Trauner K, **Hasan T**, Hamblin M, inventors; Massachusetts General Hospital assignee. Inhibition of fibrosis by photodynamic therapy . U.S. Patent No. 5,913,884. 1999 Jun 22.
2. **Hasan T**, Trauner K, Hamblin M, inventors; Massachusetts General Hospital assignee. Acceleration of Wound Healing by Photodynamic Therapy. U.S. Patent No. 6,107,466. 2000 Aug 22.

3. Levy J, Miller JW, Gradoudas ES, **Hasan T**, Schmidt-Erfurth, U. inventors; Massachusetts General Hospital assignee. Use of green porphyrins to treat neovasculature in the eye. U.S. Patent No. 5,707,986. 1998 January 13.
4. Trauner K, **Hasan T**, inventors; Massachusetts General Hospital assignee. Photodynamic therapy for the destruction of the synovium in the treatment of rheumatoid arthritis and the inflammatory arthritides. U.S. Patent No. 5,368,841. 1994 Nov 29.
5. Cincotta A, Cincotta L, **Hasan T**, inventors; Massachusetts General Hospital, Rowland Institute for Science assignees. Benzophenothiazine and Benzoporphyrin Dye Combination Photodynamic Therapy of Tumors. U.S. Patent No. 5,952,329. 1999 Sep 14.
6. Trauner K, **Hasan T**, inventors; Massachusetts General Hospital assignee. Photodynamic Therapy for the Treatment of Osteoarthritis. U.S. Patent No. 5,942,534. 1999 Aug 24.
7. **Hasan T**, Hamblin M, Soukos N, inventors; Massachusetts General Hospital assignee. Photosensitizer Conjugates for Pathogen Targeting. U.S. Patent No. 7,268,155. 2007 Sept 11.
8. **Hasan T**, Gross J, Nau G, inventors; Massachusetts General Hospital assignee. Photosensitizer Conjugates for Targeting Intracellular Pathogens. U.S. Patent No. 6,977,075. 2005 Dec 20.
9. **Hasan T**, Savellano M, Skobe M, inventors; Massachusetts General Hospital assignee. Photoimmunotherapies for Cancer using Combination Therapies. U.S. Patent No. 7,498,029 B2. 2009 Mar 3.
10. **Hasan T**, Ortel B, Maytin E, inventors, Massachusetts General Hospital assignee. Treatment and Analysis of Proliferative Disorders. U.S. Patent App No. 20040228871. Pending.
11. Fishman A, Hamblin M, Tawakol A, **Hasan T**, Muller J, Anderson T, Elmaleh D, Gewirtz H, Massachusetts General Hospital assignee. Detection and therapy of vulnerable plaque with fluorescent and/or radiolabeled compositions. U.S. Patent App No. 20030082105.
12. Pogue B, O'Hara J, Swartz H, **Hasan T**, Massachusetts General Hospital assignee. Methods of Adjuvant Photodynamic Therapy to enhance Radiation Sensitizer. U.S. Patent App No. 20050112131. Pending.
13. **Hasan T**, Massachusetts General Hospital assignee. Indirectly linked photosensitizer immunoconjugates, processes for the production thereof and methods of use thereof. U.S. Patent App No. 20070020272. Pending.
14. **Hasan T**, Nau G, Aveline B, Massachusetts General Hospital assignee. Activatable Antimicrobial Agents. U.S. Patent App Serial No. 60/736,917. Pending.
15. **Hasan T**, Massachusetts General Hospital assignee. Use of Nanotechnology & PDT to Treat Diseases. U.S. Patent App Serial No. 11/921,597. Pending.
16. Tearney G, Bouma B, **Hasan T**, Verma S, Peng L, Massachusetts General Hospital assignee. Methods and Devices for Multidimensional Multiplexed Luminescence Imaging and Diagnosis. U.S. Patent App Serial No. 12/016,051. Pending.
17. **Hasan T**, Verma S, Sallum U, Massachusetts General Hospital assignee. Photoactivatable Antimicrobial Agents and Therapeutic and Diagnostic Methods of Using the Same. PCT/US2009/00812.

## **Report of Scholarship**

### **Peer Reviewed Publications in print or other media**

1. **Hasan T**, Sims LB, Fry A. Heavy atom isotope effect studies of elimination reaction mechanisms: a kinetic and carbon-14 kinetic isotope effect study of the base-promoted dehydrochlorination of substituted 1-Phenylethyl-14C chlorides. J Am Chem Soc 1983; 105:3967-75.

2. Goldman RA, **Hasan T**, Hall CC, Strycharz WA, Cooperman BS. Photoincorporation of tetracycline into *Escherichia coli* ribosomes: identification of the major proteins photolabeled by native tetracycline and tetracycline photoproducts and implications of the inhibitory action of tetracycline on protein synthesis. *Biochemistry* 1983; 22:359-68.
3. Kerlavage AR, **Hasan T**, Cooperman BS. Reverse-phase high performance liquid chromatography of *escherichia coli* ribosomal proteins: standardization of 70S, 50S, and 30S protein chromatograms: functional activity of purified proteins. *J Biol Chem* 1983; 258:6313-18.
4. Kerlavage AR, Weitzmann CJ, **Hasan T**, Cooperman BS. Reverse-phase high-performance liquid chromatography of *escherichia coli* ribosomal proteins: characteristics of the separation of a complex protein mixture. *J Chromatography* 1983; 226:225-37.
5. **Hasan T**, Kochevar IE, McAuliffe DJ, Cooperman BS, Abdulah D. Mechanism of tetracycline phototoxicity. *J Invest Dermatol* 1984; 83:179-83.
6. **Hasan T**, Kochevar IE, Abdulah D. Amiodarone phototoxicity to human erythrocytes and lymphocytes. *Photochem Photobiol* 1984; 40:715-19.
7. **Hasan T**, Cooperman BS. Reversed-phase high performance liquid chromatographic separations of tetracycline derivatives using volatile mobile phases. *J Chromatography* 1985; 321:462-66.
8. **Hasan T**, Allen M, Cooperman BS. Anhydrotetracycline is a major product of tetracycline photolysis. *J Org Chem* 1985; 50(10):1755-57.
9. **Hasan T**, Goldman R, Cooperman BS. Photoaffinity labeling of the tetracycline binding site of the *escherichia coli* ribosome: the use of a high intensity light source and of radioactive tetracycline derivatives. *Biochem Pharmacol* 1985; 34(7):1065-71.
10. **Hasan T**, Khan AU. Phototoxicity of the tetracyclines: photosensitized emission of singlet delta dioxygen. *Proc Natl Acad Sci* 1986; 83:4604-06.
11. Shea C, Wimberly J, **Hasan T**. Mitochondrial phototoxicity sensitized by doxycycline in cultured human carcinoma cells *in vitro*. *J Invest Dermatol* 1986; 87(3):338-42.
12. Oseroff A, Ohuoha D, **Hasan T**, Bommer JC, Yarmush ML. Antibody-targeted photolysis: selective photodestruction of human T-cell leukemia cells using monoclonal antibody-chlorin e6 conjugates. *Proc Natl Acad of Sci* 1986; 83:8744-48.
13. Shea CR, Whitaker D, Murphy GF, **Hasan T**. Ultrastructure and dynamics of selective mitochondrial injury in carcinoma cells after doxycycline photosensitization *in vitro*. *Am J Pathol* 1988; 133(2):391-98.
14. Shea CR, Long F, Deutsch T, **Hasan T**. Doxycycline-sensitized phototoxicity following excimer laser irradiation: effects of irradiance. *Lasers in the Life Sciences* 1988; 2(1):29-38.
15. **Hasan T**, Lin CW, Lin A. Laser-induced selective cytotoxicity using monoclonal antibody-chromophore conjugates. *Prog Clin Biol Res* 1989; 288:471-77.
16. **Hasan T**, Lin A, Yarmush D, Oseroff A, Yarmush M. Monoclonal antibody-chromophore conjugates as selective phototoxins. *J Control Release* 1989; 10(1):107-17.
17. Shea CR, Chen N, **Hasan T**. Dynamic aspects of rhodamine dye photosensitization *in vitro* with an argon-ion laser. *Laser Surg Med* 1989; 9:83-89.
18. Shea CR, Chen N, Wimberly J, **Hasan T**. Rhodamine dyes as potential agents for photochemotherapy of cancer in human bladder carcinoma cells. *Cancer Res* 1989; 49:3961-65.
19. Shea CR, Sherwood ME, Flotte TJ, Chen N, Scholz M, **Hasan T**. Rhodamine 123 phototoxicity in laser-irradiated MGH-U1 human carcinoma cells studied *in vitro* by electron microscopy and confocal laser scanning microscopy. *Cancer Res* 1990; 50:4167-72.
20. Shea CR, Hefetz Y, Gillies R, Wimberly J, Dalickas G, **Hasan T**. Mechanistic investigation of doxycycline photosensitization by picosecond-pulsed and continuous-wave laser irradiation of cells in culture. *J Biol Chemistry* 1990; 265(11):5977-82.



21. Ortel B, Gange RW, **Hasan T**. Investigations of a manganese-containing mimic of superoxide dismutase in riboflavin phototoxicity in human cells in vitro. *Photochem Photobiol* 1990; 7:261-76.
22. Bachor R, Shea CR, Gillies R, **Hasan T**. Photosensitized destruction of human bladder carcinoma cells treated with chlorin-e6 conjugated microspheres. *Proc Natl Acad Sci* 1991; 88:1580-84.
23. Goff B, Bamberg M, **Hasan T**. Photoimmunotherapy of human ovarian carcinoma cells ex vivo. *Cancer Res* 1991; 51:4762-67.
24. Bachor R, Scholz M, Shea C, **Hasan T**. Mechanism of photosensitization by microsphere-bound chlorin e6 in human bladder carcinoma cells. *Cancer Res* 1991; 51:4410-14.
25. Bachor R, Shea C, **Hasan T**. Free and conjugated chlorin e6 in the photodynamic therapy of human bladder carcinoma cells. *J Urology* 1991; 146:1654-58.
26. Hanada K, Gange RW, Siebert E, **Hasan T**. Protective effects of cadmium chloride against UVB injury in mouse skin and in cultured human cells: a possible role of cadmium-induced metallothionein. *Photodermatol Photo* 1991; 8:111-15.
27. Roberts WG, **Hasan T**. Role of neovasculature and vascular permeability on the tumor retention of photodynamic agents. *Cancer Res* 1992; 52(4):924-30.
28. Ortu P, LaMuraglia G, Roberts G, Flotte T, **Hasan T**. Photodynamic therapy of arteries: a novel approach for the treatment of experimental intimal hyperplasia. *Circulation* 1992; 85(3):1189-96.
29. Bachor R, Flotte T, Scholz M, Dretler S, **Hasan T**. Comparison of intravenous and intravesical administration of chloro-aluminum sulfonated phthalocyanine for photodynamic treatment in a rat bladder cancer model. *J Urology* 1992; 147(5):1404-10.
30. Goff BA, Bachor R, Kollias N, **Hasan T**. Effects of photodynamic therapy with topical application of 5-aminolevulinic acid on normal skin of hairless guinea pigs. *J Photochem Photobiol B: Biology* 1992; 15:239-51.
31. Bhatta N, Anderson RR, Flotte T, Schiff I, **Hasan T**, Nishioka NS. Endometrial ablation by means of photodynamic therapy with photofrin II. *Am J Obstet Gynecol* 1992 Dec; 167(6):1856-63.
32. Roberts WG, **Hasan T**. Tumor-secreted vascular endothelial growth factor influences photosensitizer uptake. *Cancer Res* 1993; 53:1-5.
33. LaMuraglia GM, Ortu P, Flotte TJ, Roberts WG, Schomacker KT, Chandrasekar NR, **Hasan T**. Chloroaluminum sulfonated phthalocyanine partitioning in normal and intimal hyperplastic artery in the rat: implications for photodynamic therapy. *Am J Pathol* 1993; 142(6):1-9.
34. Frisoli JK, Tudor EG, Flotte TJ, **Hasan T**, Deutsch TF, Schomacker KT. Pharmacokinetics of a fluorescent drug using laser-induced fluorescence. *Cancer Res*. 1993 Dec 15;53(24):5954-61.
35. Shea CR, Olack GA, Morrison H, Chen N, **Hasan T**. Phototoxicity of lumidoxycycline. *J Invest Dermatol* 1993; 101(4):1-5.
36. LaMuraglia GM, ChandraSekar NR, Flotte TJ, Abbott WM, Michaud N, **Hasan T**. Photodynamic therapy inhibition of experimental intimal hyperplasia: acute and chronic effects. *J Vasc Surg* 1994; 19:321-31.
37. Schmidt U, Bauman W, Gragoudas E, Flotte TJ, Michaud NA, Birngruber R, **Hasan T**. Photodynamic therapy of experimental choroidal melanoma using a lipoprotein-delivered benzoporphyrin. *Ophthalmology* 1994; 101(1):89-99.
38. Iinuma S, Farshi SS, Ortel B, **Hasan T**. A mechanistic study of cellular photodestruction with 5-aminolevulinic acid-induced porphyrin. *Brit J Cancer* 1994; 70:001-8.
39. Aveline B, **Hasan T**, Redmond RW. Photophysical and Photosensitizing Properties of Benzoporphyrin Derivative Monoacid Ring A (BPD-MA). *Photochem Photobiol* 1994; 59(3):328-35.

40. Goff BA, Hermanto U, Rumbaugh J, Blake J, Bamberg M, **Hasan T\***. Photoimmunotherapy and biodistribution with an OC125-chlorin immunoconjugate in an *in vivo* murine ovarian cancer model. *Brit J Cancer* 1994; 70:474-80.
41. Schmidt-Erfurth U, **Hasan T**, Gragoudas E, Michaud N, Flotte TJ, Birngruber R. Vascular targeting in photodynamic occlusion of subretinal vessels. *Ophthalmology* 1994; 101:1953-61.
42. Bachor R, Hautmann R, **Hasan T**. Comparison of two routes of photosensitizer administration for photodynamic therapy of bladder cancer. *Urological Research* 1994; 22:21-23.
43. Iinuma S, Bachor R, Flotte TJ, **Hasan T**. Biodistribution and phototoxicity of delta amino-levulinic acid-induced PpIX in an orthotopic rat bladder tumor model. *J Urology* 1995; 153:802-06.
44. Schmidt-Erfurth U, **Hasan T**, Schomacker K, Flotte TJ, Birngruber R. *In vivo* uptake of liposomal benzoporphyrin derivative and photothrombosis in experimental corneal neovascularization. *Lasers Surg Med* 1995; 17:178-88.
45. Aveline BM, **Hasan T\***, Redmond RW. The effects of aggregation, protein binding and cellular incorporation on the photophysical properties of benzoporphyrin derivative monoacid ring A (BPD-MA). *J Photochem Photobiol B Biol* 1995; 30:161-69.
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52. Kramer M, Miller JW, Michaud N, Moulton RS, **Hasan T**, Flotte TJ, Gragoudas ES. Liposomal benzoporphyrin derivative verteporfin photodynamic therapy of choroidal neovascularization in monkeys. *Ophthalmology* 1996; 103:427-38.
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56. Pogue BW, **Hasan T**. Fluorophore quantitation in tissue-simulating media with confocal detection. *IEEE Journal of Quantum Electronics* 1996; 959-64.
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60. Soukos NS, Hamblin MR, **Hasan T**. The effect of charge on cellular uptake and phototoxicity of polylysine chlorin *e6* conjugates. *Photochem Photobiol* 1997; 65(4):723-29.
61. Pogue BW, **Hasan T**. A theoretical study of light fractionation and dose rate effects in photodynamic therapy. *Radiat Res* 1997; 147:551-59.
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#### **Non-peer reviewed scientific or medical publications/materials in print or other media**

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## Thesis

Heavy atom isotope effect studies of elimination reaction mechanisms: a kinetic and carbon-14 kinetic isotope effect study of the base-promoted dehydrochlorination of substituted 1-Phenylethyl-14C chlorides.

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### **Narrative Report (limit to 500 words)**

Prof. Tayyaba Hasan's research program in Biomedical Optics is focused on image and mechanism guided therapeutics with an emphasis on photodynamic therapy (PDT). PDT is a photochemistry-based approach that is increasingly used to treat a wide number of diseases and requires: (i) light of appropriate wavelength, (ii) a light activatable chemical compound (photosensitizer or PS), and (iii) molecular oxygen. PDT achieves its cytotoxic effect by producing active molecular species including oxygen radicals and singlet oxygen. The major aspects of PDT that are currently studied in our laboratory are:

- a) **Targeted PDT of tumors:** Specificity in PDT emanates from: (i) preferential localization of the photosensitizer in tissues of interest, and (ii) spatial localization of the activating light. Nano-construct formulations of PS are being used to increase accumulation within the tumor. The site directed localization, combined with selective irradiation, results in a dual selectivity that

minimizes normal tissue damage. Additional selectivity is achieved using targeting moieties such as antibodies and peptides.

- b) **Site-directed PDT of Microorganisms:** (i) *Infectious Diseases:* The emergence of clinical isolates that are resistant to standard antimicrobial chemotherapeutics provides the necessary impetus to develop treatments that are not hindered by microbial resistant mutants. PDT has a potential to be that treatment due to its acute nature of photokilling. We are developing microbial-specific photosensitizers for use in PDT that exploits the  $\beta$ -lactamase-producing phenotype of drug resistant pathogens. (ii) *Rapid Fluorescence based assay for Antibiotic Efficacy:* A  $\beta$ -lactamase sensitive PS has been constructed to result in a probe that, when cleaved (<30 min) produces a strong fluorescence signal. (iii) *Cutaneous Leishmaniasis:* Our interest is in the development of selective phototherapeutic agents for improved outcome.
- c) **Mechanism-based PDT combination therapies:** We are interested in the biological consequences of PDT at both the cellular and molecular level. Our lab is developing mechanism-based PDT combination treatments in which one treatment will nullify the tumor survival responses resulting from the other treatment. The strategies involve nano carriers with multiple inhibitors of oncogenic pathways.
- d) **Image-guided therapeutics:** Understanding targeting and treatment effects is a key bottleneck in the development of new drugs and PDT treatment protocols. These projects include: (i) *in vivo* longitudinal quantification of disease progression and drug targeting via confocal microendoscopy, (ii) drug uptake information of individual organs and tissues using *in vivo* fluorescence imaging of whole small animals, (iii) non-invasive monitoring of *in vivo* tumor volume, vasculature, and oxygenation using ultrasound/photoacoustic imaging, and (iv) on-line, non-invasive fluorescent monitoring of cytotoxic singlet oxygen generation during PDT for personalizing PDT dose parameters in the clinic.
- e) **Model Development:** Biological inadequacies in the 2D cultures and slow speed in animal models is a major barrier for evaluation of a broad array of combination treatments. Our laboratory is developing heterocellular 3D models with quantitative imaging as a viable, rapid platform for testing a larger variety of combination strategies, combined with biomarker monitoring by high throughput imaging and acoustic cell printing. This work provides a platform for evaluating therapies for a broad array of cancers.