CURRICULUM VITAE

Date Prepared: March 12, 2012

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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 Dermatology, Health Sciences Technology, Massachusetts Institute of Technology
1991-2000	Associate Professor of Dermatology (Biochemistry), Harvard Medical School
1991-2000	Associate Professor of Dermatology, Health Sciences Technology, Massachusetts Institute of Technology
2000-	Professor of Dermatology (Biochemistry) Harvard Medical School
2005	Member of the Affiliated Faculty of the Harvard-MIT Division of Health Sciences and Technology (HST)
2009-	Professor of Dermatology, Harvard-MIT Division of Health Sciences and Technology (HST)

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-	Biochemist, Department of Dermatology, Massachusetts General Hospital

2005-	Member Affiliated Faculty, Harvard-MIT Division of Health Sciences and Technology (HST)
2005-2011	Director, Office of Research Career Development, Massachusetts General Hospital

Other Professional Positions

1990	Visiting Professor, University Clinic Ulm, Ulm, Germany

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
2004-	Committee of Professors, Wellman Center for Photomedicine, Massachusetts General Hospital
2004-	Faculty Executive Council, Wellman Center for Photomedicine, Massachusetts General Hospital
2005-2011	Director, Office of Research Career Development, Massachusetts General Hospital
2005-	Committee of Professors, Department of Dermatology, Harvard Medical School
2009-	President-Elect, American Society for Photobiology
2010-	President, American Society for Photobiology

Committee Service

Years of Membership	Name of Committee and Institution/Organization
Local:	
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-	Member, Research Council, Massachusetts General Hospital
1993-1994	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-	Member, Joint Committee on the Status of Women at Harvard Medical School
1998	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
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)
2008-2011	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, Student Review Board, Harvard Medical School
2009-	Member, Council of Mentors, HMS Office for Diversity and Community Partnership
2009-	Member, Task Force on Research Activities in the Department of Anesthesia and Critical Care, Massachusetts General Hospital
2010-	Member, Scientific Advisory Board, Department of Biomedical Engineering, Tufts University, Medford, MA
2012-	Member, Review Committee on Student Misconduct

National:

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
1979-	Member, Miscellaneous committees (Search, space committees)

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	Co-Chair, International Photodynamic Association, Seattle, WA
2011-	Member, External Scientific Advisory Committee for the Dartmouth Center for Cancer Nanotechnology Excellence (DCCNE), Dartmouth, NH

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-	Treasurer, International Photodynamic Therapy

2009-	Member, Search Committee, Translational Health Science and Technology Institute, India (THSTI)

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
2000-	American Society for Lasers in Surgery and Medicine

Grant Review Activities

Years of Membership	Name of Committee and Organization
National:	
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)

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 Biotechnology
  - Nature Medicine
  - Nature Protocols
  - Oncogene
  - Photochemistry & Photobiology
  - The Journal of the North American Menopause Society
  - The Lancet

- Other Editorial Roles

Year	*Role*	*Journal Name*
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)

Honors and Prizes

Year	*Name of Honor/Prize*	*Awarding Organization*
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	Mentor Award	National Postdoctoral Association

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 *In Vivo* Studies
1988-1989	American Cancer Society Institutional Grant (P.I.) Selective Photodestruction of Bladder Carcinoma Cells *In Vivo* 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

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. Iinuma, 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 Cisplatinum 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. "Fluorescence Detection and Laser Treatment of Female Lower Genital Tract Dysplasias Utilizing 5 Aminolevulinic Acid (ALA)-Induced Protoporphyrin IX"
5/1/98-4/30/00	NIH NRSA K. Rajagopalan, Ph.D. "Photomodified Antibodies for Photodynamic Therapy"
7/1/00-6/30/01	Department of Energy Marcella Del Carmen, M.D. "PDT using anti-epidermal growth factor receptor antibody C225 in the treatment of advanced epithelial ovarian cancer"
7/1/01-6/30/02	Department of Energy Tri Dinh, M.D. "The use of PDT to Enhance N-(4-Hydroxyphenyl Retinamide based Differentiation Therapy for the Treatment of Advanced Epithelial Ovarian Cancer"
9/1/00-8/31/01	Department of Energy Boleslav Kosharskyy, M.D. "Antiangiogenesis with PDT: A new combination treatment for prostate cancer"
7/1/04-6/30/06	National Cancer Institute of Canada Nicolas Solban, Ph.D. "Optical strategies for studying metastatic mechanisms, tumor cell detection, and for monitoring the treatment of prostate cancer."
9/15/04-9/14/06	Department of Defense Nicolas Solban, Ph.D. "Optical Strategies for Studying Metastatic Mechanisms, Tumor Cell Detection and Treatment of Prostate Cancer"
10/1/08-9/30/11	NIH NRSA Daniel Neuman, Ph.D. "Targeted Photoactivated Nanoparticles for the Treatment of Ovarian Cancer"
4/1/09-3/31/12	NIH NRSA Conor Evans, Ph.D. "Multimodality Microendoscope for Metastatic Ovarian Cancer Detection & Treatment"
4/1/10-3/31/13	NIH NRSA Bryan Q. Spring, Ph.D. "Hyperspectral Microendoscopy to Monitor VEGF during Pancreatic Cancer Therapy"
8/1/11-7/31/13	NIH K99/R00 Jonathan Celli, Ph.D. "Mechanism-based therapies for pancreatic cancer informed by stromal microrheology"

Current Funding Information

Years Funded	Role on Project	Funding Source, Grant Type and Number
2011-2016	Principal Investigator	NIH/NCI R01CA158415 (Hasan)

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.

2011-2016 Principal Investigator NIH/NCI R01CA160998 (Hasan)
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.

2011-2015 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.

2009-2013 Program Director NIH/NCI P01 CA084203-06 (Hasan)
Molecular Response and Imaging-based Combination Strategies for Optimal PDT
This project will build 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.

2009-2011 Principal Investigator (PI) NIH/NCI, RC1 CA146337-01 (Hasan)
Targeted Photoactivatable Nanocells to Image and Treat Metastic Ovarian Cancer
The long term goal of this research is to develop mechanism and nanotechnology-based image-guided combination regimens with photodynamic therapy, an FDA approved treatment for certain cancers and in clinical trials for Ovarian Cancer.

2010-2011 Project Leader DOD/AFOSR: FA9550-10-1-0537 (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 "Nanotechnology Based Topical PDT for Cutaneous Leishmaniasis".

2008-2012 Co-Principal Investigator Israel US BSF 2007191 (Hasan)
ALA Prodrugs for Photodynamic Treatment
The goal of this research is to introduce novel synergistic approaches to phototherapy, chemotherapy and photodynamic detection of brain cancer, using mutual prodrugs of ALA-derivatives.

2011-2012 Principal Investigator DOD/AFOSR: FA9550-11-1-0331 (Anderson)
Programmatic 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".

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.

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 "Photodyamic 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)

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

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. (Associate Professor and Chief of Dermatopathology) Dept. of Pathology, Duke University Medical Center, Durham, NC
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 Opthalmology, 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 Kosharskyy, 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. (Research Fellow) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2000-02	David Sharlin, B.S. (Ph.D.)(Research Assistant) University of New Hampshire, Durham, NH
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-	Sarika Verma, PhD (Senior Research Scientist) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2006-07	Gregory Watt, PhD (Research Fellow) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2006-2009	Humra Athar, PhD (Instructor) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2006-2008	Arshi Malik, PhD (Assistant Professor) College of Medicine, King Khalid University, Kingdom of Saudi Arabia
2007-2011	Ulysses Sallum, PhD (Research Fellow) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2007-	Xiang Zheng, PhD (Research Scientist) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2007-	Jonathan Celli, PhD (Instructor) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2007-2010	Lei Z. Zheng, PhD (Research Fellow) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2007-2009	Daniel Neuman, PhD (Research Fellow) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2008-2011	Adnan Abu Yousif, PhD (Research Fellow) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2008-2010	Prakash R. Rai, PhD (Research Fellow) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2008-	Bryan Spring, PhD (Research Fellow) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2008-2010	Ramtin Rahmanzadeh, PhD (Research Fellow) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2008-2010; 2011-	Toshihiro Kushibiki, PhD (Visiting Associate Professor) Osaka University, Japan
2008-2009	Yupeng Tu (Research Technologist)

	Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2009-2011	Stefan Elrington (Research Technologist) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2009-	Youssef Mir, PhD (Research Fellow) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2010-	Srivalleesha Mallidi, PhD (Research Fellow) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2010-	Shifalika Tangutoori, PhD (Research Fellow) Wellman Center for Photomedicine, Massachusetts General Hospital Boston, MA
2010	Iqbal Massodi, PhD (Research Fellow) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2011-7/2011	Wael Al-Daraji, MD, PhD (Visiting Assistant/Associate Professor) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2011	R. Bryan Sears, PhD (Research Fellow) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2011	Stanley Kimani, PhD (Research Fellow) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2011	Sriram Anbil (Research Technologist) 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	Lawrence B. Mensah, D.Phil (PhD) (Senior Research Technologist) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2011	Shazia Khan, PhD (Research Fellow) Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA
2011	Lei Z. Zheng, PhD (Research Fellow) 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, Tufts University School of Engineering, Department of Biomedical Engineering, “Photodynamic Therapy: A Bridge between Science, Technology and Medicine”, February 5, Medford, 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 Mechanis m-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. 4th International Symposium on ICG-Angiography, Baden-Baden, Germany
1999 Invited Lecture, PDD/PDT in Clinical Practice. 3rd 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. 13th 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, 9th 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, 5th 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. 10th 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, 57th 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, 4th World Congress on Leishmaniasis, "Photodynamic Therapy for Cutaneous Leishmaniasis", February 3-7, Lucknow, India

2009 Invited Lectures, 12th 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, 15th 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, 13th 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

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^2 program

2011 Thesis Committee, Juwell 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

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

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 compostions. 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 Multimensional Multiplexed Luminescence Imaging and Diagnosis. U.S. Patent App Serial No. 12/016,051. Pending.
17. **Hasan T**, Verma S, Sallum U, Zheng X, Massachusetts General Hospital assignee. Fluorescent Substrates for the Detection of Bacterial Virulence Enzymes. Provisional Filing Pending.

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 e*scherichia 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 sancycline 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.
46. Hu LK, **Hasan T**, Gragoudas ES, Young LHY. Photoimmunotherapy of human uveal melanoma Cells. Experimental Eye Research 1995; 61:385-91.
47. Miller JW, Walsh AW, Kramer M, **Hasan T**, Michaud N, Flotte TJ, Haimovici R, Gragoudas ES. Photodynamic therapy of experimental choroidal neovascularization using lipoprotein-delivered benzoporphyrin. Arch Opthalmol 1995; 113:810-18.
48. Schmidt-Erfurth U, Flotte TJ, Gragoudas ES, Schomacker K, Birngruber R, **Hasan T**. Benzoporphyrin-lipoprotein mediated photodestruction of intraocular tumors. Experimental Eye 1996; 62:1-10.
49. Cincotta L, Szeto D, Lampros E, **Hasan T**, Cincotta AH. Benzophenothiazine and benzoporphyrin derivative combination phototherapy effectively eradicates large murine sarcomas. Photochem Photobiol 1996; 63(2):229-37.
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51. Gillies R, Kollias N, **Hasan T**, Diddens H. Spectral characterization of the benzoporphyrin derivative monoacid ring-A photoproduct formed in fetal calf solutions during irradiation with 694 nm continuous-wave radiation. J Photochem Photobiol B Biol 1996; 33:87-90.
52. Kramer M, Miller JW, Michaud N, Moulton RS, **Hasan T**, Flotte TJ, Gragoudas ES. Liposomal benzoporphyrin derivative verteporforin photodynamic therapy of choroidal neovascularization in monkeys. Opthalmology 1996; 103:427-38.
53. Molpus KL, Koelliker D, Atkins L, Kato D, Buczek-Thomas J, Fuller AF, **Hasan T**. Characterization of a xenograft model of human ovarian carcinoma which produces intraperitoneal carcinomatosis and metastases in mice. Int J Cancer 1996; 67:588-95.
54. Hamblin MR, Miller JL, **Hasan T**. Effect of charge on the interaction of site-specific photoimmunoconjugates with human ovarian cancer cells. Cancer Res 1996; 56:5205-10.
55. Goff BA, Blake J, Bamberg MP, **Hasan T**. Treatment of ovarian cancer with photodynamic therapy and immunoconjugates in a murine ovarian cancer model. Br J Cancer 1996; 74:1194-98.
56. Schmidt-Erfurth U, Diddens H, Birngruber R, **Hasan T**. Photodynamic targeting of human retinoblastoma cells using covalent low-density lipoprotein conjugates. Brit J Cancer 1997; 75(1):54-61.
57. Duska LR, Hamblin MR, Bamberg MP, **Hasan T**. Biodistribution of charged F $(ab')_2$ photoimmunoconjugates in a xenograft model of ovarian cancer. Brit J Cancer 1997; 75(6):837-44.
58. Haimovici R, Kramer M, Miller JW, **Hasan T**, Flotte TJ, Schomacker KT, Gragoudas ES. Localization of lipoprotein-delivered benzoporphyrine derivative in the rabbit eye. Curr Eye Res 1997; 16:83-90.
59. 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.
60. Pogue BW, **Hasan T**. A theoretical study of light fractionation and dose rate effects in photodynamic therapy. Radiat Res 1997; 147:551-59.
61. Pogue BW, **Hasan T**. Fluorophore quantitation in tissue-simulating media with confocal detection. IEEE Journal of Quantum Electronics 1996; 959-64.
62. Momma T, Hamblin MR, **Hasan T**. Hormonal modulation of the accumulation of 5-aminolevulinic acid-induced protoporphyrin and phototoxicity in prostate cancer cells. Int J Cancer 1997; 72:1062-69.

63. Pogue BW, Lilge L, Patterson MS, Wilson BC, **Hasan T**. Absorbed photodynamic dose from pulsed versus continuous wave light examined with tissue-simulating dosimeters. Appl Optics 1997; 36(28):7257-69.
64. Buczek-Thomas JA, Chen N, **Hasan T**. Integrin-mediated adhesion and signalling in ovarian cancer cells. Cell Signal 1998; 10(1):55-63.
65. Trauner KB, Gandour-Edwards R, Bamberg M, Nishioka NS, Flotte T, Autry S, **Hasan T**. The influence of light delivery on photodynamic synovectomy in an antigen induced arthritis model for rheumatoid arthritis. Laser Surg Med 1998; 22:147-56.
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67. Trauner KB, Gandour-Edwards R, Bamberg M, Shortkroff S, Sledge C, **Hasan T**. Photodynamic synovectomy using benzoporphyrin derivative in an antigen-induced arthritis model for rheumatoid arthritis. Photochem Photobiol 1998; 67(1):133-39.
68. Ortel B, Brissette J, Chen N, Dotto GP, **Hasan T**. Differentiation-specific increase of ALA-induced protoporphyrin IX accumulation in primary mouse keratinocytes. Br J Cancer 1998; 77(11):1744-51.
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71. Hamblin MR, Bamberg MP, Miller JL, **Hasan T**. Cationic photoimmunoconjugates between monoclonal antibodies and hematoporphyrin: selective photodestruction of ovarian cancer cells. Applied Optics 1998; 37(31):7184-92.
72. Momma T, Hamblin MR, Wu HC, **Hasan T**. Photodynamic therapy of orthotopic prostate cancer with benzoporphyrin derivative: local control and distant metastasis. Cancer Res 1998; 58:5425-31.
73. Pogue BW, Redmond RW, Trivedi N, **Hasan T**. Photophysical properties of tin ethyl etiopurpurin 1 (SNET2) and tin octaethylbenzochlorin (SnOEBC) in solution and bound to albumin. Photochem Photobiol 1998; 68(6):809-15.
74. Pogue BW, Momma T, Wu HC, **Hasan T**. Transient absorption changes *in vivo* during photodynamic therapy with pulsed-laser light. Brit J Cancer 1999; 80(3/4):344-51.
75. Runnels JM, Chen N, Ortel B, Kato D, **Hasan T**. BPD-MA-mediated photosensitization *in vitro* and *in vivo*: cellular adhesion and β_1 integrin expression in ovarian cancer cells. Br J Cancer 1999; 80:946-53.
76. Hamblin MR, Rajadhyaksha M, Momma T, Soukos NS and **Hasan T**. *In vivo* fluorescence imaging of the transport of charged chlorin *e*6 conjugates in a rat orthotopic prostate cancer. Brit J Cancer 1999; 81(2):261-68.
77. Duska LR, Hamblin MR, Miller JL, **Hasan T**. Combination photoimmunotherapy and cisplatin: effects on human ovarian cancer *ex vivo*. J Nat Cancer 1999; 91(18):1557-63.
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79. Iinuma S, Schomacker KT, Wagnieres G, Rajadhyaksha M, Bamberg M, Momma T, **Hasan T**. *In vivo* fluence rate and fractionation effects on tumor response and photobleaching in photodynamic therapy with two photosensitizers in an orthotopic rat tumor model. Cancer Res 1999; 59(24):6164-70.

80. Del Governatore M, Hamblin MR, Piccinini EE, Ugolina G, **Hasan T**. Targeted photodestruction of human colon cancer cells using charged 17.1A chlorin $_{e6}$ immunoconjugates. Br J Cancer 2000; 82(1):56-64.
81. Lein M, Ortel B, Koenig F, Misdraji J, McDougal WS, Jung K, Loening SA, **Hasan T**. Laser-induced hyperthermia in rat prostate cancer: role of site of tumor implantation. J Urology 2000; 56(1):167-72.
82. Molpus KL, Hamblin MR, Rizvi I, **Hasan T**. Intraperitoneal photoimmunotherapy of ovarian carcinoma xenografts in nude mice using charged photoimmunoconjugates. Gynecol Oncol 2000; 76(3):397-404.
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84. Lein M, Jung K, Le D, **Hasan T,** Ortel B, Bochert D, Winkelmann B, Schnorr D, Loening S. Synthetic inhibitor of matrix metalloproteinases (Batimastat) reduces prostate cancer growth in a orthotopic rat model. Prostate 2000; 43(2):77-82.
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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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79. **Hasan T**. Nanoconstructs for combinations based on PDT and oncogenic inhibitors. SPIE Photonics West, San Francisco, CA, 2012.
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Narrative Report (limit to 500 words)

Prof. Tayyaba Hasan has an active research program in photobiology and photodynamic therapy (PDT). PDT is a photochemistry-based process that is increasingly used to treat a wide number of diseases and require three components: (i) light of appropriate wavelength, (ii) a light activatable chemical compound (photosensitizer or PS), and (iii) molecular oxygen. The major aspects of PDT that are currently studied in our laboratory are:

a) **Site-directed PDT of tumors:** To exert its acute cytotoxic effect, PDT entails two steps: (i) preferential localization of the photosensitizer, and (ii) spatial localization of the activating light. Photosensitizers generally accumulate in tumors more than in normal tissues, mainly due to the

higher permeability of the tumor microvasculature. Combined with site-selective irradiation, the resulting dual selectivity minimizes normal tissue damage. Besides directly targeting tumor tissues, PDT can be targeted to the tumor vasculature. We are currently investigating vascular-targeted PDT as a means to enhance the treatment outcome of pancreatic and prostate tumors with a focus on reducing tumor growth as well as the metastases associated with PDT. Also, tumor cells express distinct cell-surface molecules at higher levels, providing opportunities to target these cells selectively. For the tumor cell-specific delivery of photosensitizers, our group is currently employing two strategies: photosensitizer immunoconjugates (PIC), and photosensitizer nanoparticle aptamer conjugate therapies (SNACT).

b) **Site-directed PDT of Microorganisms**: (i) *Infectious Diseases:* The emergence of clinical isolates that are resistant to many or even all 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 β-lactamase-producing phenotype of drug resistant pathogens. (ii) *Cutaneous Leishmaniasis:* PDT is an efficient antimicrobial local modality with good esthetic outcome and is used for the treatment of Cutaneous Leishmaniasis (CL). As currently practiced PDT requires multiple treatments (up to 15-20), is non-selective, and causes wide tissue destruction, our precise 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. Due to the high complexity of carcinomas and their ability to induce survival pathways and become resistant to chemotherapeutics, 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: (i) Combining PDT with anti-angiogenesis agents, (ii) EGFR as a molecular target for PDT, and (iii) Combining PDT with cell-differentiating agents.

d) **Optical imaging:** Online imaging capabilities can provide a wide variety of structural, physiological, and molecular information in living systems. In order to understand and further optimize PDT effects, we are developing and utilizing various imaging technologies: (i) *in vitro* studies using a commercial confocal microscope, (ii) instrumentation of fluorescence microscopes for *in vivo* imaging of small animals and (iii) contrast agents for molecular imaging.

Dr. Tayyaba Hasan was the founding Director of the Office for Research Career Development (ORCD) until 2011. The ORCD was created to engender an environment conducive to the development and success of careers of the research faculty. As the Director, Dr. Hasan supervised the overall functioning of ORCD. Their goals were divided into four major categories: (i) *Office utilization* for Professional Development Programs, Research Recognition events and meetings with individual researchers, (ii) *Initiatives and Infrastructure* for the Research Community such as postdoctoral policies, (iii) *Collaborations* with existing MGH infrastructure such as Research Ventures and Licensing Office to promote innovation and inventions amongst researchers, and (iv) *Communications* at various levels via ORCD's website *(www.massgeneral.org/orcd)* and Newsletter.