

**Harvard Medical School/Harvard School of Dental Medicine
Format for the Curriculum Vitae**

Date Prepared: 1/3/2012
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Education

1970	BSc Hons	Chemistry	University of Exeter, UK
1972	MSc	Enzyme Chemistry	University of Kent, UK
1977	PhD	Organic Chemistry	Trent University, UK

Postdoctoral Training

1976-1978	Postdoctoral Fellow	Biosynthesis (Michael Grundon)	New University of Ulster, UK
1978-1979	Postdoctoral Fellow	Organic Chemistry (John Cadogan)	Edinburgh University, UK
1979-1982	Postdoctoral Fellow	Biosynthesis (James Buchanan)	Heriot Watt University, UK

Faculty Academic Appointments

1982-1984	Research Fellow	Dept of Biochemistry	Cambridge University, UK
1984-1987	Research Associate	Dept of Chemistry	Leicester University, UK
1990-1994	Senior Research Fellow	Dept of Surgery	Dundee University, UK
1994-1997	Instructor	Dept of Dermatology	Harvard Medical School
1997-2005	Assistant Professor	Dept of Dermatology	Harvard Medical School
2005-	Associate Professor	Dept of Dermatology	Harvard Medical School
2006-	Associate Member of Affiliated Faculty	Division of Health Science and Technology	Harvard-MIT

Appointments at Hospitals/Affiliated Institutions

1990-1994	Associate Chemist	Dept of Surgery	Ninewells Medical School, UK
1994-2005	Assistant Chemist	Wellman Center for Photomedicine	Massachusetts General Hospital

2005-	Associate Chemist	Wellman Center for Photomedicine	Massachusetts General Hospital
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Other Professional Positions

2006-	Associate Editor	Photodiagnosis and Photodynamic Therapy
2009-	Associate Editor	BMC Microbiology
2009	Associate Editor	Photochemistry and Photobiology
2010	Associate Editor	Journal of Nanotechnology and Nanomedicine
2011	Associate Editor	PLoS ONE
2011	Associate Editor	Discovery Biology and Medicine
2012	Executive Editor	Journal of Analytical & Bioanalytical Techniques

Major Administrative Leadership Positions

Local

2000-2003	Director Fall Tutorial Series	Wellman Center for Photomedicine
2003-	Joint Chair Lester Wolfe Symposia	MGH-MIT

National and International

2005-	Founding Chair, Mechanisms for Low Level Light Therapy	SPIE Photonics West
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Committee Service

Local

1999-	Education Committee	Wellman Center for Photomedicine
2000-	Subcommittee on Research Animal Care (IACUC)	Massachusetts General Hospital
2004-	Faculty Search Committee	Wellman Center for Photomedicine
2004-	Space Committee	Wellman Center for Photomedicine

National and International

2005-	Executive Organizing Committee BIOS	SPIE Photonics West
2005-	Program Committee, Biophotonics and Immune Responses	SPIE Photonics West
2005-	Program Committee, Mechanisms for Low Level light Therapy	SPIE Photonics West
2009	Program Committee, LLLT Symposium	American Society for Photobiology
2009	Organizing Committee, Therapeutic Applications of Lasers	ECBO, Munich, Germany
2009	Organizing Committee, Symposium on Photonics and Optoelectronics	SPO, Wuhan, China

Professional Societies

1994-	American Society of Photobiology	Member
1997-	European Society for Photobiology	Member
2004-	American Association for Cancer Research	Member
2004-	American Society for Microbiology	Member
2011	Society for Photoelectrical Instrument Engineers (SPIE)	Member

Grant Review Activities

2006	SBIR/STTR Phase I, Chip Based Biosensors, Bioreactors and Protein Separation and Detection Panel August 8, 2006	National Science Foundation
2007	Pilot Cycle V Proposal Review Panel; April 11, 2007	NIH-RAID
2008	ZRG1 IDM-Q (10) SBIR.STTR Study Section, March 6, 2008	NIH
2008	ZRG1 IDM-Q (10) B SBIR.STTR Study Section, Nov 7, 2008	NIH
2009	ZRG1 IDM-Q (10) B SBIR.STTR Study Section, Mar12-13, 2009	NIH
2009	ZRG1 IDM-Q (10) B SBIR.STTR Study Section, Jun 24-26 2009	NIH
2009	ZRG1 IDM-C (58) Challenge Grant Study Section;	NIH
2009	ZRG1 IMM-E (58). Challenge Grant Study Section;	NIH
2009	ZRG1 IDM-Q (10) B SBIR.STTR Study Section, Nov 3-5 2009	NIH
2010	ZRG1 IDM-Q (10) B SBIR.STTR Study Section, Feb 18-19 2010	NIH
2010	ZRG1 IDM-Q (10) B SBIR.STTR Study Section, Jun 22-24, 2010	NIH
2010	ZRG1 IDM-Q (10) B SBIR.STTR Study Section, Oct 28-29 2010	NIH
2011	ZRG1 IDM-Q (10) B SBIR.STTR Study	NIH

	Section, Mar 3-4, 2011	
2011	EUREKA NIH Study Section, Apr 5, 2011	NIH
2012	NANO NIH Study Section Feb 2-3, 2012	NIH
2002	Ad Hoc Reviewer	Ligue Suisse Contre le Cancer, Bern, Switzerland
2003	Ad Hoc Reviewer	National Cancer Institute of Canada, Toronto, ON, Canada
2003	Ad Hoc Reviewer	U.S. Civilian Research and Development Foundation (CRDF-ISTC)
2004	Ad Hoc Reviewer	Association for International Cancer Research, St Andrews, UK
2004	Ad Hoc Reviewer	Wellcome Trust, London, UK
2005	Ad Hoc Reviewer	International Union Against Cancer ICRETT Program,
2006	Ad Hoc Reviewer	National Medical Research Council (Singapore)
2006	Ad Hoc Reviewer	Associazione Italiana per la Ricerca sul Cancro (Milano, Italy)
2006	Ad Hoc Reviewer	National Research Foundation of South Africa
2006	Ad Hoc Reviewer	National Science Foundation, USA
2008	Ad Hoc Reviewer	University of Wisconsin, Milwaukee
2008	Ad Hoc Reviewer	Fondazione Cassa di Risparmio di Padova e Rovigo, Padova, Italy
2008	Ad Hoc Reviewer	Chief Scientist Office, Scottish Executive Health Dept, UK
2008	Ad Hoc Reviewer	National Health and Medical Research Council, Australia
2008	Ad Hoc Reviewer	Universities Programs for the Maryland Technology Development Corporation, Columbia, MD
2009	Ad Hoc Reviewer	Chief Scientist Office, Scottish Executive Health Dept, UK
2009	Ad Hoc Reviewer	University of Wisconsin, Milwaukee
2009	Ad Hoc Reviewer	Harvard Medical School Catalyst Grant Program
2010	Ad Hoc Reviewer	National Research Foundation of South Africa
2010	Ad Hoc Reviewer	Bankhead-Coley Cancer Research Program, Florida
2010	Ad Hoc Reviewer	Biomedical Research Council IRG, Singapore
2010	Ad Hoc Reviewer	Melanoma Research Foundation
2010	Ad Hoc Reviewer	The National Medical Research Council, Singapore
2010	Ad Hoc Reviewer	Agency for Science Technology and Research, Singapore
2011	Ad Hoc Reviewer	Technologiestichting STW, Open

2011	Ad Hoc Reviewer	Technology Program, Netherlands Florida Department of Health's James and Esther King Biomedical Research Program
2011	Ad Hoc Reviewer	A-star, Singapore
2011	Ad Hoc Reviewer	TEAM Program, Foundation for Polish Science, Poland
2012	Ad Hoc Reviewer	Research Fund for Control of Infectious Diseases, Hong Kong, China.
2012	Ad Hoc Reviewer	PMU Research Fund, Paracelsus Medical University, Salzburg, Austria
2012	Ad Hoc Reviewer	US Israel Bi-national Science Foundation
2012	Ad Hoc Reviewer	New Investigator Research Grant, Bankhead-Coley Florida Cancer Research Program
2012	Ad Hoc Reviewer	Innovational Research Incentives Scheme Veni, Netherlands Organization for Scientific Research

Editorial Activities

1994	Journal of Photochemistry and Photobiology. B: Biology	Ad Hoc Reviewer
1995	Photochemistry and Photobiology	Ad Hoc Reviewer
1996	Lasers in Surgery and Medicine	Ad Hoc Reviewer
1997	Journal of Biomedical Optics	Ad Hoc Reviewer
1998	International Journal of Radiation Biology	Ad Hoc Reviewer
1999	British Journal of Cancer	Ad Hoc Reviewer
2001	IEEE Journal of Selected Topics in Quantum Electronics	Ad Hoc Reviewer
2001	Applied Optics	Ad Hoc Reviewer
2003	Cancer Research	Ad Hoc Reviewer
2003	Journal of Antimicrobial Chemotherapy	Ad Hoc Reviewer
2003	Journal of Pharmacology and Experimental Therapeutics	Ad Hoc Reviewer
2003	Biochimica et Biophysica Acta	Ad Hoc Reviewer
2004	International Journal of Cancer	Ad Hoc Reviewer
2004	Antimicrobial Agents and Chemotherapy	Ad Hoc Reviewer
2004	Advanced Drug Delivery Reviews	Ad Hoc Reviewer
2004	Archives of Biochemistry and Biophysics	Ad Hoc Reviewer
2004	Bioorganic Chemistry	Ad Hoc Reviewer
2004	Biochemical Pharmacology	Ad Hoc Reviewer
2004	Optics Letters	Ad Hoc Reviewer
2004	Infection and Immunity	Ad Hoc Reviewer
2005	Food Technology and Biotechnology Journal	Ad Hoc Reviewer
2005	Current Pharmaceutical Design	Ad Hoc Reviewer

2005	Lasers in Medical Science	Ad Hoc Reviewer
2005	Journal of Investigative Dermatology	Ad Hoc Reviewer
2005	FEMS Immunology and Medical Microbiology	Ad Hoc Reviewer
2005	Applied and Environmental Microbiology	Ad Hoc Reviewer
2005	Clinical Cancer Research	Ad Hoc Reviewer
2005	British Journal of Dermatology	Ad Hoc Reviewer
2005	Molecular Pharmaceutics	Ad Hoc Reviewer
2005	Biochimica et Biophysica Acta – General Subjects	Ad Hoc Reviewer
2005	Neoplasia	Ad Hoc Reviewer
2006	Archives of Dermatology	Ad Hoc Reviewer
2006	Molecular Therapy	Ad Hoc Reviewer
2006	Journal of Infectious Disease	Ad Hoc Reviewer
2006	Journal of the American Chemical Society	Ad Hoc Reviewer
2006	Optics Express	Ad Hoc Reviewer
2006	Molecular Cancer Therapeutics	Ad Hoc Reviewer
2006	Vaccine and Clinical Immunology	Ad Hoc Reviewer
2006	Atherosclerosis	Ad Hoc Reviewer
2006	Clinical Orthopaedics and Related Research	Ad Hoc Reviewer
2006	Journal of Photochemistry and Photobiology. A: Chemistry	Ad Hoc Reviewer
2006	Experimental Cell Research	Ad Hoc Reviewer
2006	Lancet Oncology	Ad Hoc Reviewer
2006	Journal of Biomaterial Science Polymer Ed	Ad Hoc Reviewer
2006	Acta Biomaterialia	Ad Hoc Reviewer
2006	Water Research	Ad Hoc Reviewer
2006	Journal of Cellular and Molecular Medicine	Ad Hoc Reviewer
2006	Cellular and Molecular Life Sciences	Ad Hoc Reviewer
2006	Journal of Periodontology	Ad Hoc Reviewer
2007	Journal of Biological Physics	Ad Hoc Reviewer
2007	Biomaterials	Ad Hoc Reviewer
2007	Biomedical Signal Processing and Control	Ad Hoc Reviewer
2007	Nature Protocols	Ad Hoc Reviewer
2007	Cancer Immunology Immunotherapy	Ad Hoc Reviewer
2007	Carbohydrate Polymers	Ad Hoc Reviewer
2007	Journal of Applied Microbiology	Ad Hoc Reviewer
2007	Free Radical Biology Medicine	Ad Hoc Reviewer
2007	Organic and Biomolecular Chemistry	Ad Hoc Reviewer
2007	International Journal of Molecular Science	Ad Hoc Reviewer
2007	Archives of Medical Science	Ad Hoc Reviewer
2007	Bioorganic and Medicinal Chemistry	Ad Hoc Reviewer
2007	Cell Biology and Toxicology	Ad Hoc Reviewer
2007	Chemical Society Reviews	Ad Hoc Reviewer

2007	Journal of Applied Polymer Science	Ad Hoc Reviewer
2008	Physical Chemistry Chemical Physics	Ad Hoc Reviewer
2008	Current Medicinal Chemistry	Ad Hoc Reviewer
2008	International Journal of Radiation Oncology, Biology Physics	Ad Hoc Reviewer
2008	Archives of Dermatological Research	Ad Hoc Reviewer
2008	Future Virology	Ad Hoc Reviewer
2008	Dyes and Pigments	Ad Hoc Reviewer
2008	Journal of Applied Physics	Ad Hoc Reviewer
2008	Journal of Materials Chemistry	Ad Hoc Reviewer
2008	Ultrasound in Biology and Medicine	Ad Hoc Reviewer
2008	Trends in Food Science and Technology	Ad Hoc Reviewer
2008	Methods and Findings in Experimental and Clinical Pharmacology	Ad Hoc Reviewer
2008	Photomedicine and Laser Surgery	Ad Hoc Reviewer
2008	Photodermatology, Photoimmunology and Photomedicine	Ad Hoc Reviewer
2008	Nanomedicine	Ad Hoc Reviewer
2008	International Journal of Biological Sciences	Ad Hoc Reviewer
2008	Cellular and Molecular Biology Letters	Ad Hoc Reviewer
2008	Recent Patents on Anti-Infective Drug Discovery	Ad Hoc Reviewer
2008	Mini Reviews in Medicinal Chemistry	Ad Hoc Reviewer
2008	Chemosphere	Ad Hoc Reviewer
2008	The Analyst	Ad Hoc Reviewer
2008	Molecular Neurodegeneration	Ad Hoc Reviewer
2009	Chemical Communications	Ad Hoc Reviewer
2009	Journal of Medical Microbiology	Ad Hoc Reviewer
2009	Anti Cancer Drugs	Ad Hoc Reviewer
2009	International Journal of Molecular Sciences	Ad Hoc Reviewer
2009	Sensors	Ad Hoc Reviewer
2009	Journal of Medicinal Chemistry	Ad Hoc Reviewer
2009	Journal of Translational Medicine	Ad Hoc Reviewer
2009	Lasers and Photonics Reviews	Ad Hoc Reviewer
2009	Spectroscopy Letters	Ad Hoc Reviewer
2009	Chemical Reviews	Ad Hoc Reviewer
2009	Nature Nanotechnology	Ad Hoc Reviewer
2009	FASEB Journal	Ad Hoc Reviewer
2009	European Journal of Medicinal Chemistry	Ad Hoc Reviewer
2009	CARBON	Ad Hoc Reviewer
2010	Acta Biochemistry Biophysics Sinica	Ad Hoc Reviewer
2010	Biotechnology Advances	Ad Hoc Reviewer
2010	Biomedical Optics Express	Ad Hoc Reviewer
2010	Drug News & Perspectives - Proust Thomson Reuters	Ad Hoc Reviewer

2010	Journal of Biophotonics	Ad Hoc Reviewer
2010	Experimental Biology and Medicine	Ad Hoc Reviewer
2010	Journal of Porphyrins and Phthalocyanines	Ad Hoc Reviewer
2010	Future Oncology	Ad Hoc Reviewer
2010	International Journal of STD and AIDS	Ad Hoc Reviewer
2010	Journal of Molecular Structure	Ad Hoc Reviewer
2010	Cell Proliferation	Ad Hoc Reviewer
2010	Inflammation Research	Ad Hoc Reviewer
2010	Medicinal Research Reviews	Ad Hoc Reviewer
2010	Journal of ApiProduct and ApiMedical Science	Ad Hoc Reviewer
2010	Journal of Applied Physiology	Ad Hoc Reviewer
2010	Cancer Chemotherapy and Pharmacology	Ad Hoc Reviewer
2010	Cell Stress and Chaperones	Ad Hoc Reviewer
2010	Cell and Tissue Research	Ad Hoc Reviewer
2010	Marine Biotechnology	Ad Hoc Reviewer
2010	International Journal of Biological Sciences	Ad Hoc Reviewer
2010	Mitochondrion	Ad Hoc Reviewer
2010	Journal of Applied Phycology	Ad Hoc Reviewer
2010	Technology in Cancer Research and Treatment	Ad Hoc Reviewer
2010	ACS Nano	Ad Hoc Reviewer
2010	Journal of Laser Applications	Ad Hoc Reviewer
2010	Journal of Alternative and Complementary Medicine	Ad Hoc Reviewer
2010	Current Organic Chemistry	Ad Hoc Reviewer
2010	Anti-Cancer Agents in Medicinal Chemistry	Ad Hoc Reviewer
2010	British Journal of Dermatology	Ad Hoc Reviewer
2011	Journal of Clinical Investigation	Ad Hoc Reviewer
2011	Cancer Science	Ad Hoc Reviewer
2011	Chemical Physics Letters	Ad Hoc Reviewer
2011	European Journal of Cancer	Ad Hoc Reviewer
2011	Biotechnology Progress	Ad Hoc Reviewer
2011	European Polymer Journal	Ad Hoc Reviewer
2011	PM&R	Ad Hoc Reviewer
2011	Journal of Materials Science: Materials in Medicine	Ad Hoc Reviewer
2011	Pakistan Journal of Scientific and Industrial Research	Ad Hoc Reviewer
2011	Advances in Polymer Science	Ad Hoc Reviewer
2011	Nanoscale	Ad Hoc Reviewer
2011	International Journal of Microbiology	Ad Hoc Reviewer
2011	International Journal of Photoenergy	Ad Hoc Reviewer
2011	New Biotechnology	Ad Hoc Reviewer
2011	Science Translational Medicine	Ad Hoc Reviewer
2011	Theranostics	Ad Hoc Reviewer

2011	Clinical and Experimental Dermatology	Ad Hoc Reviewer
2011	Journal of Selected Topics in Quantum Electronics	Ad Hoc Reviewer
2011	Journal of European Academy of Dermatology Venereology	Ad Hoc Reviewer
2011	Applied Microbiology	Ad Hoc Reviewer
2011	Chemical Research in Toxicology	Ad Hoc Reviewer
2011	Bioorganic & Medicinal Chemistry Letters	Ad Hoc Reviewer
2011	Journal of Agricultural and Food Chemistry	Ad Hoc Reviewer
2011	International Journal of Radiation Biology	Ad Hoc Reviewer
2011	American Journal of Physical Medicine & Rehabilitation	Ad Hoc Reviewer
2012	Archives of Oral Biology	Ad Hoc Reviewer
2012	International Immunopharmacology	Ad Hoc Reviewer
2012	International Journal of Biochemistry & Cell Biology.	Ad Hoc Reviewer

Other Editorial Roles

2004-	Editorial Board Member	International Journal of Immunopathology and Pharmacology
2004-	Editorial Board Member	European Journal of Inflammation
2005-	Editorial Board Member	Photodiagnosis and Photodynamic Therapy
2008-	Editorial Board Member	International Journal of Molecular Sciences - Molecular Pathology
2009-	Editorial Board Member	Infectious Diseases: Research and Treatment
2009-	Editorial Board Member	Photochemistry and Photobiology
2009-	Editorial Board Member	Open Journal of Oncology
2010	Editorial Board Member	Journal of Nanomedicine & Nanotechnology
2010	Editorial Board Member	Journal of Nanoscience Letters
2011	Editorial Board Member	Nanotechnology Reviews
2011	Editorial Board Member	Journal of Clinical Medicine
2011	Editorial Board Member	PLoS ONE
2011	Editorial Board Member	Photonics and Lasers in Medicine

Promotion letters

2006	Juanita J Anders, PhD. Full Professor of Anatomy, Physiology and Genetics,	Uniformed Services University of Health Sciences, Bethesda, MD
2008	Lothar D Lilge, PhD. Full Professor at Dept of Medical Biophysics	Faculty of Medicine, University of Toronto, Canada
2009	Theresa M Busch, PhD, Associate Professor with Tenure	University of Pennsylvania School of Medicine
2010	Wei Chen, PhD. Associate Professor with Tenure	University of Texas at Arlington
2011	Anna Yaroslavsky, PhD, Associate Professor with Tenure	University of Massachusetts Lowell.

2012 Rachel Lubart PhD, Associate Professor Bar Ilan University, Israel

Thesis committees and external examinations

2005	Saskia Lambrechts, PhD	University of Amsterdam, Netherlands
2007	Denise Hawkins, PhD	University of Johannesburg, South Africa
2007	Edith Kabingu, PhD	University of Rochester
2008	Doris Gabriel, PhD	University of Geneva, Switzerland
2010	Xavier A Ragas, PhD	Institut Químic de Sarrià (IQS) – Universitat Ramon Llull, Barcelona, Spain
2011	Tatiana N Demidova-Rice, PhD	Tufts Medical School
2012	Maria Garcia-Diaz PhD	Institut Químic de Sarrià (IQS) – Universitat Ramon Llull, Barcelona, Spain

Honors and Prizes

2001	Poster of Distinction	MGH Scientific Advisory Council
2005	Hot Topics Speaker	BIOS Photonics West, SPIE
2006	Morris Hilleman Lectureship	Montana State University Bozeman, MT
2009	Article "Treatment of Helicobacter pylori infection with intra-gastric violet light phototherapy: a pilot clinical trial."	Faculty of 1000 Medicine
2009	Bosley Lectureship	17th ISHRS Meeting, Amsterdam, Netherlands.
2010	Keynote Address Speaker	WALT2010, Bergen, Norway
2012	Elected Fellow of SPIE	SPIE Photonics West 2012, San Francisco, CA

Report of Funded and Unfunded Projects

Funding Information

Past

- 1994-1996 Experimental Photoimmunotherapy of Ovarian Cancer. NIH R01 (Hasan PI)
Co-investigator
Synthesize, characterize and test antibody conjugates for IP PDT of ovarian cancer
- 1996-1998 Photodynamic therapy of periodontitis. Periodontix Sponsored Research (Hasan PI)
Co-investigator
Synthesize, characterize and test poly-lysine conjugates for PDT of periodontitis
- 1997-2002 Photoimmunotherapy for the local control of sepsis. DOD MFEL Program (Parrish PI)
Co-investigator
Synthesize, characterize and test antibody conjugates for antibacterial PDT applications
- 1997-2002 Macrophage targeted photodynamic regulation of wound healing. DOD MFEL Program (Parrish PI)
Co-investigator
Synthesize, characterize and test targeted conjugates for PDT of wound healing
- 1997-2000 Experimental Photoimmunotherapy of Ovarian Cancer. NIH R01 (competing renewal, Hasan PI)
Co-investigator
Synthesize, characterize and test antibody conjugates for IP PDT of ovarian cancer
- 2000-2005 Photodynamic destruction of tissue invasive pathogens in animal burn models. DOD MFEL Program (Parrish PI)
Co-investigator
Use mouse models of burn infection with bioluminescent bacteria to test antimicrobial PDT
- 2001-2002 Macrophage-targeted PDT for diagnosis and therapy of vulnerable plaque. CIMIT New Concept Award DAMD 17-02-2-0006
Principal Investigator
Synthesize, characterize and test targeted conjugates for PDT of atherosclerosis
- 2002-2003 Macrophage-targeted PDT for diagnosis and therapy of vulnerable plaque. CIMIT New Concept Award DAMD 17-02-2-0006 (competing renewal)
Principal Investigator
Synthesize, characterize and test targeted conjugates for PDT of atherosclerosis
- 2004-2005 Macrophage-targeted PDT for diagnosis and therapy of vulnerable plaque. CIMIT New Concept Award DAMD 17-02-2-0006 (competing renewal)
Principal Investigator
Synthesize, characterize and test targeted conjugates for PDT of atherosclerosis
- 2001-2003 Light-mediated killing of *Helicobacter pylori*: an in vitro and ex vivo study. Seedling Enterprises Sponsored Research
Principal Investigator
Develop blue light inactivation for *H. pylori* infection
- 2002-2005 Photosensitization of oral bacteria. NIH R01 (Soukos, PI)
Co-investigator
Develop PDT for periodontitis
- 2003-2004 Novel Nanostructures for Photodynamic Therapy. NIH R43 CA103268
Site Principal Investigator

2004 Test functionalized fullerenes for PDT
 Receptor-Targeted Photosensitizers for PDT of Cancers NIHR43 CA103177
 Site Principal Investigator
 Test folate PS conjugates for PDT

2004-2005 Antimicrobial effects of novel phospholipids. 3M Medical Products Inc Sponsored
 Research
 Principal Investigator
 Test phospholipids in mouse models of localized infection

2002-2006 Macrophage-targeted PDT. NIHR01 CA/AI838801
 Principal Investigator
 Synthesize, characterize and test scavenger-receptor targeted PS conjugates for PDT of
 cancer

2001-2006 In vivo PDT: Animals, Dosimetry and Statistics Core NIHPO1 CA84203 (Hasan)
 Core Director
 Direct core for Hasan P01

2002-2006 Phototherapy for *Helicobacter pylori* infection. LumeRx Sponsored Research
 Principal Investigator
 Develop blue light inactivation for *H. pylori* infection

2002-2007 Live microscopy and cytometry in vascular biology. NIH/BRP- 1R01 EY14106
 Project Principal Investigator
 Develop strategies for fluorescent targeting to retinal pigmented epithelium

2003-2007 Photodynamic Therapy for the Treatment of Localized Infections. NIHR01 AI050875
 Principal Investigator
 Investigate cationic conjugates for PDT of infections in mouse models

2004-2006 Photodynamic Blood Product Decontamination, NIHR42 HL75969
 Site Principal Investigator
 Test immobilized fullerenes for blood product decontamination

2005-2009 Photodynamic therapy for *Acinetobacter baumannii* burn infections DOD MFEL N00014-
 94-1-0927 (Parrish PI)
 Project Principal Investigator
 Test PDT for antibiotic resistant *A. baumannii* burn infections in mice

2006-2007 Ultraviolet C Therapy for Onychomycosis. NIHR41 AI069641
 Site Principal Investigator
 Test UVC in vitro and in a new ex vivo model of onychomycosis

2006-2007 Low level laser therapy for arthritis, Palomar Medical Technologies Sponsored Research
 Principal Investigator
 Test LLLT in zymosan-induced arthritis in rats

2007-2008 Photodynamic Therapy for the Treatment of Localized Infections. MGH ECOR Interim
 Support
 Principal Investigator
 Investigate cationic conjugates for PDT of infections in mouse models

2006-2009 Novel Nanostructures for Photodynamic Therapy, NIHR44 CA103268
 Site Principal Investigator
 Test functionalized fullerenes for PDT

2007-2009 Stable cationic bacteriochlorins for antimicrobial photodynamic therapy, NIHR41
 AI072854
 Site Principal Investigator
 Test new cationic bacteriochlorin photosensitizers for antimicrobial PDT

- 2008-2009 LLLT for hair regrowth Laser Hair Therapy of North America Sponsored Research
Principal Investigator
An immunohistochemical study on patient biopsies
- 2008-2009 LLLT for hair regrowth in mice Laser Hair Comb, Lexington Intl. Sponsored Research,
Principal Investigator
Test laser hair comb for hair regrowth in mice
- 2008-2009 Drug delivery for antimicrobial PDT, Photopharmica Ltd, Sponsored Research,
Principal Investigator
Use bioluminescent bacteria and mouse wounds to test drug delivery formulations
- 2005-2010 Antimicrobial effects of HemCon bandage. HemCon Inc Sponsored Research
Principal Investigator
Test HemCon chitosan acetate bandages and silver analogs for treating localized infections
- 2008-2010 Photodynamic Therapy of Disseminated Peritoneal Tumor Using New Sensitizers
NIH R44CA103177
Site Principal Investigator
Test a cationic fullerene in a mouse model of IP cancer using bioluminescence imaging
- 2009-2010 Low level laser light therapy for traumatic brain injury CIMIT Medium Science Award
DAMD17-02-2-0006
Principal Investigator
Test LLLT in vitro TBI models with cultured neurons
- 2009-2010 Mechanisms of LLLT for TBI, CDMRP Program in TBI W81XWH-09-1-0514
Principal Investigator
Explore the mechanisms of transcranial LLLT for TBI

Current

- 2008-2012 Photodynamic Therapy for the Treatment of Localized Infections. NIHR01 AI050875
(competing renewal)
Investigate cationic conjugates for PDT of infections in mouse models
- 2009-2011 Laser therapy for TBI, AFOSR Military Photomedicine Program FA9950-04-1-0079
Principal Investigator
Test LLLT in mouse brain slices
- 2009-2013 New Stereoregular Functionalized Fullerenes as Nanomedicines for PDT NIHR01
CA137108 (Chiang PI)
Co-investigator
Test new synthetic fullerene derivatives for PDT of cancer and infections
- 2010-2012 Mechanistic study of role of nitric oxide in LLLT for stroke. Photothera Inc Sponsored
Research
Principal Investigator
Test the hypothesis that LLLT can dissociate NO from cytochrome c oxidase

Report of Local Teaching and Training

Teaching of Students in Courses

- | | | |
|-----------|---|---|
| 1970-1971 | High School Chemistry Master, Taught chemistry to GCE 'O' level
Approx 30 students | St. Hughs High School, Birkenhead, U.K.
(full time teaching 1800 hours per year) |
|-----------|---|---|

1972-1976	Research Assistant Demonstrator, Lectures to B.Sc. Hons Applied Science students. Jointly ran laboratory classes in organic chemistry for all four years of B.Sc. Hons Applied Science course Approx 60 students,	Dept Chemistry Trent Polytechnic, UK (220 hours/year).
1982-1984	Supervisor, Conducted supervisions in organic chemistry for Trinity and Churchill colleges 6 students	Dept Chemistry, Cambridge University, (50 hours/year)
1984-1987	Demonstrator, Jointly conducted laboratory classes in organic chemistry for all three years of B.Sc. Hons Chemistry course 30 students	Dept Chemistry, Leicester University (100 hours/year).

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

1994-	Delivered tutorial lectures in Photomedicine 100 post-docs and faculty	Wellman Center for Photomedicine (5 hours per year)
1997	Course on Photodynamic Therapy and Fluorescence 12 students	Diagnosis for the Electro-Optics Center, Tufts University, Medford MA. (6 hours)
2007-	Course on Low Level Light Therapy for Fellows and Residents (20 students)	MGH Dermatology (2 hours per year)

Formally Supervised Trainees

Undergraduate students		
Imran Rizvi	1994-1997	Wellman Laboratories
Jaimie Miller	1994-1997	Wellman Laboratories
Pradeep Penta	1997	MIT
Naveen Murthy	1997	GlycoGenesis Inc
Yeshaya Koblick	1999	Tufts University
David Adam	2000	University of Toronto
Zaraq Khan	2001	Aga Khan Medical College
Azadeh Shirazi	2002	University of Kentucky
Aamir Ahmad	2002	Aga Khan Medical College
Maria Maqsood	2002	Aga Khan Medical College
Maleha Khan	2002	Aga Khan Medical College
Imran Khan	2003	Aga Khan Medical College
Umber Khan	2003	Aga Khan Medical College
Miram Afridi	2003	Aga Khan Medical College
Madiha Kamal	2003	Aga Khan Medical College
Sumbul Janjua	2004	Aga Khan Medical College
Hina Khawar	2004	Aga Khan Medical College
Ibrahim Rizqi	2004	Aga Khan Medical College
Minahil Satti	2005	Aga Khan Medical College
Fatima Jalil	2005	Aga Khan Medical College
Mariam Azeem	2005	Aga Khan Medical College

Madiha Rabbani	2006	Aga Khan Medical College
Sana Waqar	2006	Aga Khan Medical College
Zarmeneh Aly	2006	Aga Khan Medical College
Bushra Osmani	2006	Aga Khan Medical College
Fatima Aziz	2006	Aga Khan Medical College
Faizia Mir	2006	Aga Khan Medical College
Fahad Waqar	2006	Aga Khan Medical College
Sarwat Khalili	2007	Aga Khan Medical College
Aimen Naqvi	2007	
Qurat Naqvi	2007	
Amna Sheikh	2007	Aga Khan Medical College
Salema Khalid	2007	Aga Khan Medical College
Maryam Gondal	2007	Aga Khan Medical College
Sahar Janjua	2007	Aga Khan Medical College
Faryal Sarwar	2008	Aga Khan Medical College
Noureen Zohra	2008	Aga Khan Medical College
Nizar Bhulani	2008	Aga Khan Medical College
Zahra Kamal	2008	Aga Khan Medical College
Laiqua Khalid	2008	Aga Khan Medical College
Faria Bhatti	2008	Aga Khan Medical College
Marcus Hernandez	2009	Florida International University
Noor Anjum	2009	Aga Khan Medical College
Noor.Rabia	2009	Aga Khan Medical College
Mohammad Kashif	2010	Aga Khan Medical College
Anam Akbar	2010	Aga Khan Medical College
Kanza Aziz	2010	Aga Khan Medical College
Tyler St Denis	2010-2012	John Jefferies High School, Columbia University, NY
Anastasia Yaroslavsky	2011-	Boston University
Julie Chang	2011-	Harvard University
Caetano Sabino	2011-2012	ISPEN, Sao Paulo, Brazil
Pinar Avci	2012	Semelweiss University, Budapest, Hungary
Rakkiyappan Chandran	2012	Amity Institute of Nanotechnology, Uttar Pradesh, Noida, India.
Magesh Sadasivam	2012	Amity Institute of Nanotechnology, Uttar Pradesh, Noida, India.
Post-doctoral fellows		
Tetsuo Momma MD	1994-1996	Tokyo University Hospital, Japan
Nikolaos Soukos DDS, PhD	1994-2000	Assistant Prof, Forsyth Institute, Boston
Marco Del Governatore MD	1994-1996	University of Bologna, Italy
Linda Duska MD	1995-1997	Asst Prof, Massachusetts General Hospital
Frank Konig MD	1996-1998	Charite Hospital, Berlin, Germany
Misbah Huzaira MD	1997	Beckman Laser Center, Irvine CA
Tetsuya Kodama PhD	1998-2000	Assistant Prof, Shock Wave Res. Ctr., Inst. of Fluid Sci., Tohoku Univ, Japan
Touqir Zahra MD	2000-2001	Massachusetts General Hospital

Zihua Wang, Ph.D.	2002	Boston Biotech
Faten Gad, M.D.	2002-2004	deceased
Qingde Liu, M.D., Ph.D.	2002-2005	MetalloPharm, Athens, OH
Ana Patricia Castano, M.D.	2002-2007	BIDMC, Boston
Xun Sun, Ph.D.	2002-2004	Massachusetts Eye and Ear Infirmary
Andrea Bell, Ph.D.	2002	Leeds University, UK
George P Tegos, Ph.D.	2003-2009	Assistant Prof,
Changming Yang, PhD	2003-2005	Quest Diagnostics, CA
Florencia Anatelli, MD	2003-2005	Washington University Hospital, St Louis, MO
Dennisse Arcila Lopez, MD	2004-2005	Balearic Majorca Hospital, Spain
M. Yawar Yakoob, MD	2004-2005	Karachi, Pakistan
Gabriela Rolz-Cruz, MD	2005-2007	MGH Dermatology
Pawel Mroz, MD, PhD	2005-	Wellman Center
Barbara Garcia, MD	2005	Scripps Mercy Hospital, CA
K Ezster Borbas, PhD	2006	North Carolina State University
Tianhong Dai, PhD	2006-	Wellman Center
Aguinaldo S Garcez, DDS	2006	ISPEN, Sao Paulo, Brazil
Jong Min Park, MD	2006	Private practice, Korea
Liyi Huang, PhD	2007-	Wellman Center
Praveen Arany, DDS	2007-	Wellman Center/Harvard Dental School
Zongshun Lu, MD	2008-2009	Tianjin Medical University Hospital, China
Artemissia-Phoebe Nifli PhD	2008	Greece
Yingying Huang MD	2008-	Wellman Center
QiuHe Wu MD, PhD	2009	Jinan Central Hospital Affiliated to Shandong University, China
Divya Karup, MD	2009-	Wellman Center
Yumin Xia, MD, PhD	2009	Rockefeller University, NY
Sulbha K Sharma, PhD	2009-	Wellman Center
Javad Hashmi, MD	2009-2010	Wellman Center
Masamitsu Tanaka, MD	2010	National Defense Medical College, Tokyo, Japan
Gitika B Kharkwal, PhD	2010-2011	Wellman Center
Weijun Xuan, MD, PhD	2010	Wellman Center
Masayoshi Kawakubo, PhD	2010-	Wellman Center
Takahiro Ando, PhD	2010	Department of Electronics and Electrical Engineering, Keio University, Japan
Tao Xu, MD, PhD	2010	Laboratory of Anesthesiology, Shanghai Jiaotong University, China
Felipe Sperandio, DDS	2011-2012	Wellman Center
Daniela Vecchio, PhD	2011-2012	Wellman Center
Asheesh Gupta, PhD	2012	SERC Division, Department of Science & Technology, New Delhi, India
Shih-Fong Huang, MD	2012	Taipei Veterans General Hospital, China
Technicians		

Jaimie Miller BS	1997-1999	Columbia University, NY
Imran Rizvi, BS	1997-2002	Georgetown University, DC
Michael Bamberg BS	1994-1999	Ilex Oncology, Boston
David O'Donnell BS	1998-2000	Fleet Boston Financial, Boston
Atosa Ahmadi BS	2000-2001	Suffolk University, Boston
Jeremy Stern, BS	2001-2003	Law School, NY
Samuel J Whitaker, BS	2002	Philadelphia
Stephanie Chirico, BS	2002-2004	Providence RI
Jennifer Viveiros, BS	2002-2004	Bayer Corp, Boston
Tatiana Demidova, BS	2002-2004	Wellman Center
Victoria Hamrahi, BS	2002-	Shriners Burn Institute
Beth Anderson, BS	2004-2005	LumeRx Inc.
Marina Burkatovskaya BS	2005-2006	Novartis Research
Paul C Baldwin BS	2005-2006	University of Connecticut Medical School
William Lindmark BS	2006	Columbia University
Graduate students		
Saskia A Lambrechts, BS	2004	Amsterdam University, Holland
Tatiana N Demidova, BS	2004 -	Wellman Center/Tufts Medical School
Masahiro Anbe BS	2005	Graduate School of Engineering, University of Tokyo, Japan
Kayo Masago, BS	2006	Graduate School of Engineering, University of Tokyo, Japan
Kazue Miyuno, BS	2007	Graduate School of Engineering, University of Tokyo, Japan
Mitsuhiro Terakawa, BS	2007	Dept. Electronics and Electrical Engineering, Keio University
Aaron C-H Chen, BS	2007-2010	SUNY Albany
Timur Zhiyentayev BS	2008	Wellman Center/Department of Chemistry, MIT
Yohei Sawayama, BS	2008	Graduate School of Engineering, University of Tokyo, Japan
Daisuke Asanuma, BS	2009	Graduate School of Engineering, University of Tokyo, Japan
Yuichiro Koide, BS	2009	Graduate School of Engineering, University of Tokyo, Japan
Saphala Dhital, BS	2009	Graduate School of Engineering, University of Tokyo, Japan
Angelika Szokalska, BS	2009	Department of Immunology, Center of Biostructure, Medical University of Warsaw, Poland
Xavier Ragas Amalrich, BS	2009	Institut Químic de Sarrià (IQS) Universitat Ramon Llull, Barcelona, Spain
Mari Sajo, BS	2010	Graduate School of Pharmaceutical Sciences, The University of Tokyo
Aaron Konopko, BS	2010	Binghamton University, NY
Vida Bil De Arce, MSc	2010	Wellman Center

Sang Ho Nam BS	2011	KAIST
Maria Garcia-Diaz BS	2011	Wellman Center/ Institut Químic de Sarrià (IQS) Universitat Ramon Llull, Barcelona, Spain
Visiting Scientists		
Liyan Xi MD, PhD	2011	Sun Yat-San University, Guangzhou, China
Asheesh Gupta, PhD	2011-2012 -	Defence Research & Development Organization, Delhi, India

Local Invited Presentations

- 1994 Photochemical Targeting and Medical Applications IEEE Lasers and Electro-Optics Society LEOS 94, Boston, MA.
- 1997 Light mediated modulation of wound healing, in the Plenary Session 6: Laser Tissue Interactions and Wound Healing, of the Twentieth Biennial Cornea Research Conference, Massachusetts Eye and Ear Infirmary, Boston, MA.
- 2007 Low Level Light Therapy: Principles, Applications, and Traumatic Brain Injury, Aug 2007, Athinoula A. Martinos Center for Biomedical Imaging, MGH, Boston, MA

Report of Regional, National and International Invited Teaching and Presentations

Invited Presentations and Courses

Regional

- 2006 Antimicrobial Photodynamic Therapy, Tufts University Biomedical Engineering Department, Medford, MA
- 2009 Biphasic dose response in low level light therapy. Dose Response Conference 2009, Amherst, MA
- 2010 Mechanisms of low level light therapy for neurological disease. National Center for Post-Traumatic Stress Disorder, VA Boston Jamaica Plain, 2010
- 2010 Low level laser therapy for TBI. CIMIT Forum, Boston MA.
- 2011 Low level light therapy for Traumatic Brain Injury. CIMIT-Wellcome Trust workshop on traumatic brain injury (TBI) and post-traumatic stress disorder (PTSD). Boston MA
- 2011 Low level light therapy (LLLT): Mechanisms of Action. Science Summit. Photothera Inc, Boston MA.
- 2011 Low Level Light (Laser) Therapy. Laser and aesthetic skin therapy. What's the truth? Boston MA,
- 2012 Photobiomodulation or Low Level Light Therapy. Executive Briefing: MIT Industrial Liason Program and Johnson & Johnson Corporate Office of Science and Technology (COSAT).

National

- 1999 Photodynamic antiseptis, ONR Contractors Meeting, Institute of Surgical Research, Fort Sam Houston, San Antonio, TX
- 1999 Photodynamic therapy: mechanisms, targeting, and applications, Duke Medical Free Electron Laser Laboratory Duke University, Durham, NC
- 2000 Photodynamic inactivation of pathogenic bacteria in contaminated wounds, MFEL-ONR

- contractors meeting, Newport Beach, CA
- 2000 Use of luminescent bacteria to demonstrate photodynamic inactivation in contaminated wounds, Dept of Pediatrics, Stanford University School of Medicine, Stanford, CA
- 2002 Targeted photosensitizer conjugates: specific and versatile? Photodynamic Therapy Center, Roswell Park Cancer Center, Buffalo, NY
- 2002 Scavenger receptor-targeted photodynamic therapy of J774 tumors in mice: tumor response and concomitant immunity. BioS 2002 Biomedical Optics, SPIE Photonics West, Laser Tissue Interaction XIII: Photochemical, Photothermal, and Photomechanical. San Jose, CA
- 2003 BioS 2003 Biomedical Optics, SPIE Photonics West, Laser Tissue Interaction XIV: Photochemical, Photothermal, Photomechanical, San Jose, CA
- 2003 Induction of anti-tumor immunity by photodynamic therapy of mouse tumors. 31st Annual Meeting of American Society for Photobiology, Baltimore, MD
- 2004 Induction of anti-tumor immunity by photodynamic therapy of mouse tumors. BioS 2004 Biomedical Optics, SPIE Photonics West, Laser Tissue Interaction XV: Photochemical, Photothermal, Photomechanical, San Jose, CA
- 2004 Anti-tumor immunity generated by photodynamic therapy in a metastatic murine tumor. 32nd Annual Meeting of American Society for Photobiology, Seattle WA.
- 2004 Photodynamic modulation of wound healing and inhibition of tissue degradation. Light Activated Tissue Regeneration and Therapy I, Ohana Keauhou Beach Resort, Kona Coast, Hawaii.
- 2004 Photodynamic tissue repair and healing. Light Activated Tissue Regeneration and Therapy I, Ohana Keauhou Beach Resort, Kona Coast, Hawaii.
- 2004 Use of genetically engineered bioluminescent bacteria to develop animal models of localized infections suitable for photodynamic therapy. Medical Division, 3M Corporation, St-Paul, MN.
- 2004 Photodynamic therapy: a versatile platform technology. Lynntech Inc, College Station, TX.
- 2007 Role of cytokines in generation of antitumor immunity by PDT and cyclophosphamide. Laser Tissue Interaction XVI: Photochemical Photothermal, Photomechanical, BioS 2005 Biomedical Optics, SPIE Photonics West, San Jose, CA
- 2005 Applications of novel photosensitizers to antimicrobial PDT. Dept of Organic, Bio-organic, and Materials Chemistry, North Carolina State University, Raleigh, NC
- 2006 Hot Topics Speaker: Low level light therapy: Progress and possibilities. BioS 2006 Biomedical Optics, SPIE Photonics West, San Jose, CA
- 2006 Mechanisms of Low Level Light Therapy – an Introduction. Mechanisms for Low-Light Therapy I, Bios 2006, SPIE Photonics West, San Jose, CA
- 2006 Combination Immunotherapy and Photodynamic Therapy. Biophotonics and Immune Responses I, SPIE Bios 2006, Photonic West, San Jose, CA
- 2006 Morris Hilleman Lectureship; Antimicrobial Photodynamic Therapy; Montana State University, Bozeman, MT
- 2006 Photodynamic therapy stimulates anti-tumor immunity in murine models. 33rd Meeting of the American Society for Photobiology, Rio Mar, Puerto Rico, July 9-12th, 2006
- 2006 Chitosan treatment of infected wounds, burns, and healing. Hawaii Chitopure Science Summit, Waikiki, Oahu, Hawaii, Sep 8-9 2006.
- 2006 Optical approaches to monitor and treat infections and stimulate healing, Institute of Surgical Research, Fort Sam Houston, San Antonio, TX. October 2006
- 2007 Low-level light therapy for wound healing and arthritis in animal models. Mechanisms for

- 2006 Low-Light Therapy II, Bios 2007, SPIE Photonics West, San Jose, CA
 Cellular chromophores and signaling in LLLT. Mechanisms for Low-Light Therapy II, Bios 2007, SPIE Photonics West, San Jose, CA
- 2007 Photodynamic Therapy Stimulates Anti-Tumor Immunity in Murine Models. Biophotonics and Immune Responses II, SPIE Bios 2007, Photonic West, San Jose, CA
- 2007 Photodynamic therapy and anti-tumor immunity, July 2007, Dept of Dermatology, Case Western Reserve University and Cleveland Clinic, Cleveland OH
- 2007 Targeted photodynamic therapy for wound and burn infections. Advanced Technology Applications for Combat Casualty Care, Aug 2007, St Petes Beach FL
- 2008 Photodynamic Therapy and Anti-tumor Immunity, Biophotonics and Immune Responses III, SPIE Bios 2008, Photonic West, San Jose, CA
- 2008 The role of nitric oxide in LLLT, Mechanisms for Low-Light Therapy III, Bios 2007, SPIE Photonics West, San Jose, CA
- 2008 Low Level Light Therapy for Wound Healing: Basic Mechanisms and Animal Models, Laser 08; 28th Annual Conference of American Society for Lasers in Surgery and Medicine, Apr 2008, Kissimmee, FL
- 2008 Photobiomodulation Expert Sharing Session. Laser 08; 28th Annual Conference of American Society for Lasers in Surgery and Medicine, Apr 2008, Kissimmee, FL
- 2008 New Photosensitizers for Antimicrobial Photodynamic Therapy. 34th Meeting of American Society for Photobiology, June 2008, Burlingame, CA.
- 2008 Low Level Light Therapy for Wound Healing: Basic Mechanisms and Animal Models. 34th Meeting of American Society for Photobiology, June 2008, Burlingame, CA.
- 2008 Mechanisms for low level laser therapy. US Food and Drug Administration and Academy of Laser Dentistry Joint Symposium: Light Based Technology Utilization in Dentistry. 2008, Silver Spring, MD
- 2009 Role of reactive oxygen species in low-level light therapy. Mechanisms for Low-Light Therapy IV, Bios 2009, SPIE Photonics West, San Jose, CA
- 2009 Stimulation of dendritic cells enhances immune response after photodynamic therapy. Biophotonics and immune responses IV. BioS 2009, SPIE Photonics West, San Jose, CA
- 2009 Activation of cellular transcription factors by reactive oxygen species in low-level light therapy. Laser 09; 28th Annual Conference of American Society for Lasers in Surgery and Medicine, Apr 2009, National Harbor, DC
- 2009 Antimicrobial photodynamic therapy in a mouse model of *Acinetobacter baumannii* burn infection, International Photodynamic Association World Congress 2009, Seattle, WA
- 2009 Anti-tumor immune response after photodynamic therapy. International Photodynamic Association World Congress 2009, Seattle, WA
- 2009 Cellular and molecular mechanisms of LLLT: role of reactive oxygen species and nitric oxide. The Science behind LLLT-ASP Topical Symposium, 2009, Rochester NY
- 2009 Closing Panel Discussion. The Science behind LLLT-ASP Topical Symposium, 2009, Rochester NY
- 2010 Low-level light therapy for Traumatic Brain Injury. Mechanisms for Low-Light Therapy V, Bios 2010, SPIE Photonics West, San Francisco, CA
- 2010 Stimulation of anti-tumor immunity after PDT. Biophotonics and immune responses V. BioS 2010, SPIE Photonics West, San Francisco, CA
- 2010 Transcranial Low Level Light Therapy for Traumatic Brain Injury: In vitro and In vivo Studies. Laser 10; 29th Annual Conference of American Society for Lasers in Surgery and Medicine, Phoenix 2010, AZ
- 2010 Cellular responses induced by low level light in different cell types. Laser 10; 29th Annual

- 2010 Conference of American Society for Lasers in Surgery and Medicine 2010, Phoenix, AZ
- 2010 Transcranial laser therapy for acute and chronic traumatic brain injury. American Society for Photobiology ASP2010. Providence, RI.
- 2010 How to increase immune recognition of tumors after PDT. American Society for Photobiology ASP2010. Providence, RI.
- 2010 Photodynamic Therapy with Stable Synthetic Bacteriochlorins. International Conference on Porphyrins and Phthalocyanines, 2010, Albuquerque, NM
- 2010 Transcranial Low Level Light Therapy for Traumatic Brain Injury: In vitro and In vivo Studies. 3rd ECI Conference on Light Mediated Tissue Regeneration 2010, Burlington, VT
- 2010
- 2011 Photodynamic therapy and anti-T-reg strategies. Biophotonics and immune responses VI. Bios 2011, SPIE Photonics West, San Francisco, CA
- 2011 Low-Level Light Therapy for Traumatic Brain Injury. Mechanisms for Low-Light Therapy VI, Bios 2011, SPIE Photonics West, San Francisco, CA
- 2011 Low-Level Light Therapy for Traumatic Brain Injury. 30th Annual Conference of American Society for Lasers in Surgery and Medicine, Grapevine TX.
- 2011 Regrowing hair with lasers and light sources: is this practical? Cutting edge skin plenary session. 30th Annual Conference of American Society for Lasers in Surgery and Medicine, Grapevine TX.
- 2011 Low level light therapy (LLLT) for diseases of aging. American Academy of Anti-Aging Medicine (A4M). Orlando FL
- 2011 Biphasic dose response in low level light therapy – an update. Dose Response Conference 2011, Amherst, MA
- 2011 Therapeutic applications of light: PDT - the killer; LLLT - the healer. CLEO Laser Science to Photonic Application 2011, Baltimore MD
- 2011 Market Focus Therapeutic applications of light: CLEO Laser Science to Photonic Application 2011, Baltimore MD
- 2011 Mechanisms and application of LLLT for hair regrowth. Apira Science meeting. Madison NJ, 2011.
- 2011 Mechanism and Application of LLLT for Traumatic Brain Injury. NAALT (North American Association for Laser Therapy) Milwaukee, WI, 2011
- 2011 Drug design and animal models for antimicrobial photosensitizers. 51st ICACC (International Conference on Antimicrobial Agents and Chemotherapy), Chicago, IL, 2011
- 2011 Lasers, mitochondria and production of nitric oxide. Annual Symposium for the Association of Extremity Nerve Surgeons. Las Vegas, NV, 2011
- 2011 Low Level Light Therapy: Molecular Mechanisms and Transcranial Application to the Brain. AFOSR WORKSHOP on Photo-Electro-Magnetic Biostimulation for Enhancement of Performance and Protection, San Antonio, TX, 2011
- 2012 Mechanisms for Low Level Light Therapy - What's New? Mechanisms for Low-Light Therapy VII, Bios 2012, SPIE Photonics West, San Francisco, CA
- 2012 In vivo studies of LLLT for traumatic brain injury. Mechanisms for Low-Light Therapy VII, Bios 2012, SPIE Photonics West, San Francisco, CA
- 2012 Photodynamic therapy and anti-T-reg strategies. Biophotonics and immune responses VII. Bios 2012, SPIE Photonics West, San Francisco, CA
- 2012 Photodynamic therapy and anti-tumor immunity. Penn Radiation Oncology Seminar Series. University of Pennsylvania, Philadelphia, PA, 2012

International

- 2002 Use of genetically engineered bioluminescent bacteria to develop animal models of localized infections suitable for photodynamic therapy. IQEC/LAT2002 Conference on Lasers, Applications and Technologies, Moscow, Russia
- 2002 Degree of substitution of chlorine6 conjugated to charged poly-L-lysine chains affects their cellular uptake, localization and phototoxicity. Saratov International Workshop on Biophotonics – SIWB02 Saratov, Russia
- 2002 Scavenger receptor-targeted photodynamic therapy for diagnosis of vulnerable atherosclerotic plaques. Saratov International Workshop on Biophotonics – SIWB02 Saratov, Russia
- 2004 Antimicrobial photodynamic therapy. Centre for Photobiology and Photodynamic Therapy, School of Biochemistry and Molecular Biology, University of Leeds, United Kingdom.
- 2005 Antimicrobial PDT with phenothiazinium dyes: new mechanistic findings. European Society for Photobiology, Aix-les-Bains, France
- 2005 Antimicrobial PDT, University of Leiden Medical Center, Leiden, Netherlands
- 2005 Macrophage-targeted photodynamic therapy: applications to cancer and atherosclerosis. Dept of Pharmaceutics, Utrecht Institute Pharmaceutical Sciences, Utrecht University, Netherlands
- 2005 Photodynamic therapy for infected wounds, abscesses, burns and Helicobacter pylori infection, Laser Center, Amsterdam Medical Center, Amsterdam, Netherlands
- 2006 Microbial mutants reveal insights into mechanisms of antimicrobial photodynamic therapy. Invited lecture Session 10. Photodynamic Diagnosis and Therapy in Clinical Practice – October 2006. Brixen/Bressanone, Italy
- 2007 Antimicrobial photodynamic therapy, Shanghai Skin Disease and STD Hospital, Mar 2007, Shanghai, China,
- 2007 New Approaches to Microbial Photoinactivation: Synergistic combinations, 11th World Congress of the International Photodynamic Association, Mar 2007, Shanghai, China
- 2007 Photodynamic therapy and anti-tumor immunity, Dept of Head and Neck Surgery, Guanxi Medical University, Apr 2007, Nanning, China
- 2007 Combination Immunotherapy and Photodynamic Therapy. 2nd ECI Conference on Light Mediated Tissue Regeneration, Tomar, Portugal
- 2007 Photodynamic Therapy Stimulates Anti-Tumor Immunity in Murine Models, 12th Congress of the European Society for Photobiology, Sep 2007, Bath, UK
- 2007 Advances in Antimicrobial Photodynamic Therapy, 12th Congress of the European Society for Photobiology, Sep 2007, Bath, UK
- 2008 New developments in antimicrobial PDT. Photodynamic Therapy and Photodiagnosis in Clinical Practice 2008, Brixen/Bressanone, Italy
- 2008 Photodynamic therapy and anti-tumor immunity. Department of Pharmacy and Biopharmacy, University of Geneva, 2008, Geneva, Switzerland
- 2009 Mechanism of action of low-level laser therapy. 17th Annual Meeting of the International Society of Hair Restoration Surgery, 2009, Amsterdam, Holland.
- 2009 Photodynamic therapy stimulates anti-tumor immunity in murine models, Department of Immunology, Center of Biostructure, Medical University of Warsaw, Poland, 2009.
- 2009 Photodynamic Therapy for Cancer and Activation of Immune Response. 13th Congress of the European Society for Photobiology, 2009, Wroclaw, Poland

- 2010 Laser and light therapy mechanisms for the biphasic dose response in biological systems. WALT 2010, Bergen, Norway
- 2010 Antimicrobial photodynamic therapy for localized infections in novel animal models. 8th Brixen PDT and PD Meeting 2010. Brixen, Italy
- 2011 Antimicrobial PDT - Can resistance develop? 13th International Photodynamic Association World Congress 2011, Innsbruck, Austria
- 2011 Low Level Light Therapy for Traumatic Brain Injury. Topical Problems in Biophotonics, St Petersburg – Nizhny Novogorod, Russia 2011.
- 2011 Photodynamic therapy can induce a protective immune response against a bacterial pathogen. 14th Congress of the European Society for Photobiology, 2011, Geneva, Switzerland

Conference chairs

- 2003 Invited Chair - Contributed papers session 1, 31st Annual Meeting of American Society for Photobiology, Baltimore, MD
- 2004 Invited chair - Session 6, Optical Techniques for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy XIII, BioS 2004 Biomedical Optics, SPIE Photonics West, San Jose, CA
- 2004 Invited chair - Session 2, Laser Tissue Interaction XV: Photochemical Photothermal, Photomechanical, BioS 2004 Biomedical Optics, SPIE Photonics West, San Jose, CA
- 2005 Invited chair - Session 6, New Techniques: Mechanisms and Techniques in Photodynamic Therapy XIV, BioS 2005 Biomedical Optics, SPIE Photonics West, San Jose, CA
- 2005 Invited chair – Femtosecond Microscopy and Microsurgery: Make it Fast!. Spring 2006 Lester-Wolfe Workshop in Laser Medicine, Boston MA
- 2005 Invited Chair. Session III: Light Activated Tissue Repair and Regeneration Using Exogenous Chromophores. Light Activated Tissue Regeneration and Therapy I, Ohana Keauhou Beach Resort, Kona Coast, Hawaii.
- 2006 Founding chair: Conference 6140: Mechanisms for Low-Light Therapy I, BioS 2006, Biomedical Optics, SPIE Photonics West, San Jose, CA
- 2006 Invited chair - Session 3, New Techniques: Mechanisms and Techniques in Photodynamic Therapy XV, BioS 2005, SPIE Photonics West, San Jose, CA
- 2006 Invited chair - Session 1. Biophotonics and immune responses I. BioS 2006 Biomedical Optics, SPIE Photonics West, San Jose, CA
- 2006 Invited chair – Femtosecond Microscopy and Microsurgery: Make it Fast!. Spring 2006 Lester-Wolfe Workshop in Laser Medicine, Boston MA
- 2006 Invited chair – Inflammation and immunity in PDT. 33rd Meeting of the American Society for Photobiology, Rio Mar, Puerto Rico, July 9, 2006
- 2007 Founding chair: Conference 6140: Mechanisms for Low-Light Therapy II, BioS 2007, SPIE Photonics West, San Jose, CA
- 2007 Invited chair - Session 1. Biophotonics and immune responses II. BioS 2007 Biomedical Optics, SPIE Photonics West, San Jose, CA
- 2007 Invited chair – Optical Methods in Breast Cancer. Spring 2007 Lester-Wolfe Workshop in Laser Medicine, Boston MA
- 2007 Invited chair - Infectious diseases and immunology. 11th World Congress of the International Photodynamic Association, Shanghai China 2007.
- 2008 Founding chair: Conference 6140: Mechanisms for Low-Light Therapy III,

- BioS 2008, SPIE Photonics West, San Jose, CA
- 2008 Invited chair - Session 2. Biophotonics and immune responses III. BioS 2008, SPIE Photonics West, San Jose, CA
- 2008 Invited chair – Shining Light on Melanoma. Spring 2008 Lester-Wolfe Workshop in Laser Medicine, Boston MA
- 2009 Founding chair: Conference 7165: Mechanisms for Low-Light Therapy IV, BioS 2009, SPIE Photonics West, San Jose, CA
- 2009 Invited chair - Session 1. Biophotonics and immune responses IV. BioS 2009, SPIE Photonics West, San Jose, CA
- 2009 Invited chair –Stem Cells See the Light. Spring 2009 Lester-Wolfe Workshop in Laser Medicine, Boston MA
- 2009 Invited chair – Probing Blood Disorders With Light. Fall 2009 Lester-Wolfe Workshop in Laser Medicine, Boston MA
- 2009 Invited co-chair. Antimicrobial photodynamic therapy. 12th IPA World Congress. Seattle, WA
- 2010 Founding chair: Conference 7165: Mechanisms for Low-Light Therapy V, BioS 2010, SPIE Photonics West, San Francisco, CA
- 2010 Invited chair - Session 1. Biophotonics and immune responses V. BioS 2010, SPIE Photonics West, San Francisco,, CA
- 2010 Invited chair. Optogenetics: Probing the Brain with Light Spring 2010 Lester-Wolfe Workshop in Laser Medicine, Boston MA
- 2010 Invited co-chair – Photobiomodulation Sessions 1-3. Laser 10; 29th Annual Conference of American Society for Lasers in Surgery and Medicine, Phoenix, AZ
- 2010 Invited chair – Photobiomodulation Session. ASP, Providence RI
- 2010 Invited co-chair. A Scientific Tribute to Michael Feld. Fall 2010 Lester-Wolfe Workshop in Laser Medicine, Boston MA
- 2011 Founding chair: Conference 7165: Mechanisms for Low-Light Therapy VI, BioS 2011, SPIE Photonics West, San Francisco, CA
- 2011 Invited chair - Session 1. Biophotonics and immune responses VI. BioS 2011, SPIE Photonics West, San Francisco,, CA
- 2011 Invited co-chair - Photobiomodulation Sessions 1-3. Laser 11;30th Annual Conference of American Society for Lasers in Surgery and Medicine, Grapevine TX.
- 2011 Invited co-chair. Antimicrobial photodynamic therapy. 13th IPA World Congress. Innsbruck, Austria.
- 2011 Invited co-chair. Antimicrobial photodynamic therapy. 14th European Society of Photobiology Geneva, Switzerland.
- 2012 Founding chair: Conference Mechanisms for Low-Light Therapy VII, BioS 2012, SPIE Photonics West, San Francisco, CA
- 2012 Invited chair - Session 1. Biophotonics and immune responses VII. BioS 2012, SPIE Photonics West, San Francisco,, CA
- 2012 Invited chair. Lighting up the skin. Spring 2012 Lester-Wolfe Workshop in Laser Medicine, Boston MA

[Report of Technological and Other Scientific Innovations](#)

Jun 22, 1999 Trauner KB, Hasan T, **Hamblin MR**, inventors; Massachusetts General

- Aug 22, 2000 Hospital assignee. Inhibition of fibrosis by photodynamic therapy. US Patent 5,913,884. .
 Hasan T, **Hamblin MR**, Trauner KB, inventors; Massachusetts General Hospital assignee. Acceleration of wound healing by photodynamic therapy. US Patent 6,107,466..
- Oct 8, 2002 Hasan T, **Hamblin MR**, Soukos, NS, inventors; Massachusetts General Hospital assignee. Photosensitizer conjugates for pathogen targeting. US Patent 6,462,070.
- Aug 19, 2003. **Hamblin MR**, Khadem JJ, inventors. Massachusetts General Hospital assignee. Methods for tissue welding using laser-activated protein solders. US Patent 6,607,522.
- June 5, 2003. **Hamblin MR**, Tawakol A, Hasan T, Muller J, Fischman AJ, Anderson RR. inventors. Detection and therapy of vulnerable plaque with photodynamic compounds. United States Patent Application 20030103995,
- May 1, 2003 Fischman A, **Hamblin MR**, Tawakol A, Hasan T, Muller J, Anderson R, Elmaleh D, inventors. Methods and devices for detection and therapy of atheromatous plaque, United States Patent Application 20030082105,
- Aug 9 2002. Fischman A, **Hamblin MR**, Tawakol A, Hasan T, Muller J, Anderson R, Elmaleh D, Gewirtz H, Detection and therapy of vulnerable plaque with fluorescent and/or radiolabeled compositions. United States Patent Application 2006/0073100 A1
- Nov 20, 2003. **Hamblin MR**, Khadem JJ, inventors. Methods for tissue welding using laser-activated protein solders United States Patent Application 20030216718,
- Dec 5 2002 Hasan T, **Hamblin MR**, Soukos, NS, inventors; Massachusetts General Hospital assignee. Photosensitizer conjugates for pathogen targeting United States Patent Application 20020183245.
- Feb 28, 2005. Wharton JT, Gali H, **Hamblin MR**. inventors. Lynntech Inc. assignee. Photosensitizers for targeted photodynamic therapy. United States Patent Application 60/657,181.
- Sep 7, 2004 **Hamblin MR** and Demidova TN, Inventors. Photodynamic inactivation of bacterial spores. United States Patent Application 2004028971..
- Mar 30, 2006 **Hamblin MR** and Tegos GP, Inventors. Inactivation of microorganisms with multidrug resistance inhibitors and phenothiaziniums. PCT Application WO2006/034219A2.
- Jan 117, 2007 **Hamblin MR** and Foley JW. Antimicrobial photoinactivation using chalcogen analogs of benzo(A)phenoxazinium dyes. United States Patent Application US 2008/0015189 A1

Report of Scholarship

Publications

Peer reviewed publications in print or other media

Research Investigations

1. Coutts IG, **Hamblin MR**. Synthesis of N,N-diaryltoluene-4-sulphonamides. J Chem Soc Perkin I 1975;2445-6.

2. Coutts IG, **Hamblin MR**. An unusual reaction of methylmagnesium iodide with cyclohexadienones. *J Chem Soc Chem Commun* 1976;58-9.
3. Coutts IG, **Hamblin MR**, Tinley EJ. The enzymatic oxidation of phenolic tetrahydroisoquinoline-1-carboxylic acids. *J Chem Soc Perkin I* 1979;2744-50.
4. Grundon MF, **Hamblin MR**, Harrison DM. Biosynthesis of aromatic isoprenoids Part 5: The preparation of 1-(3,3-dimethylallyl)-L-tryptophan and cyclo-L-alanyl tryptophan and their non-incorporation into echinulin. *J Chem Soc Perkin I* 1980;1294-8.
5. Buchanan JG, **Hamblin MR**, Sood GR, Wightman RH. The biosynthesis of pyrazofurin and formycin. *J Chem Soc Chem Commun* 1980;917-8.
6. Coutts IG, **Hamblin MR**. Synthesis of spiroheterocycles by oxidative coupling of phenolic sulphonamides. *J Chem Soc Chem Commun* 1980;949-50.
7. Coutts IG, **Hamblin MR**. Spirodienones Part 2: The synthesis of some heterocyclic spirodienones by phenolic coupling. *J Chem Soc Perkin I* 1981;493-7.
8. Buchanan JG, **Hamblin MR**, Kumar A, Wightman RH. The biosynthesis of showdomycin – Studies with stable isotopes and the determination of principal precursors. *J Chem Soc Chem Commun* 1984;1515-7.
9. **Hamblin MR**, Potter BV. E. coli Ada regulatory protein repairs the SP diastereoisomer of alkylated DNA. *FEBS Lett* 1985;189(2):315-7.
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The oxidation of some phenolic amines. PhD thesis defended in 1977 and awarded by the Council for National Academic Awards, UK.

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Narrative Report (limit to 500 words)

The research in my laboratory is broadly in the area of phototherapy. This was originally concentrated in photodynamic therapy (PDT) but has subsequently broadened to include the modality known as low level light therapy or photobiomodulation. We have made a number of significant contributions in the treatment of infectious disease, cancer, heart disease, wound healing and neurology.

Antimicrobial PDT. Molecules with a pronounced positive charge are able to effectively target bacteria (both Gram (+) and Gram (-)) for photodestruction. This is because the outer-membrane permeability barrier typical of Gram (-) bacteria is disrupted by cationic molecules, while Gram (+) species have negatively charged but permeable cell walls. We have discovered several novel classes of cationic photosensitizers (PS);

Poly-L-lysine chlorin(e6) conjugates

Polyethylenimine chlorin(e6) conjugates

Quarternary salts of functionalized fullerenes

Selenium analogs of benzophenoxazine dyes

Considerable data on the structure-function relationships of these PS molecules and their efficiency in photodynamic inactivation of a wide range of pathogenic microorganisms has been obtained. Gram-positive, Gram-negative bacteria, mycobacteria, yeasts, filamentous fungi and even bacterial spores can all be effectively eradicated with more than 6 logs of killing. Multi-antibiotic resistant bacteria can be killed as easily as naive strains. Multi-drug resistance pumps can be overcome and specific small molecule efflux pump inhibitors are synergistic with PDT. PDT can also photoinactivate virulence factors and toxins that are secreted by pathogens.

PDT and anti-tumor immune response. The ideal cancer treatment should target both the primary tumor and the metastases with the minimal toxicity. This is best accomplished by educating the body's immune system to recognize the tumor as foreign so that after the primary tumor is destroyed, distant metastases will also be eradicated. PDT may accomplish this feat and stimulate long-term, specific anti-tumor immunity. PDT causes: an acute inflammatory response, the rapid induction of large amounts of necrotic and apoptotic tumor cells, induction of immunostimulatory heat-shock proteins tumor antigen presentation to naïve T-cells generation of cytotoxic T-cells that can destroy distant tumor metastases. By using various syngeneic mouse tumors in immunocompetent mice, we can study specific PDT regimens related to tumor type, the synergistic combination of low-dose cyclophosphamide and PDT, and PDT combined with immunostimulants (toll-like receptor ligands) to maximize the generation of anti-tumor immunity. The use of tumors expressing defined tumor associated antigens with known MHC class I peptides allows anti-tumor immunity to be quantitatively compared.

Low level light for stimulation of healing, reduction of inflammation and as a therapy for brain damage. It has been known for many years that low levels of laser or non-coherent light (LLLT) accelerate some phases of wound healing but the benefits of LLLT in wound healing are still

controversial. Partly this may be explained by the complicated dosimetry that pertains with regard to wavelength, total fluence pulse structure and power density. We have developed a quantitative and reproducible model of LLLT in mice and are exploring its use in a rat arthritis model. Transcranial LLLT with NIR light may be an effective therapy for stroke, traumatic brain injury, and degenerative brain diseases. We are exploring some of these applications in mouse models.

Functionalized fullerenes as nanostructures for PDT. A collaboration with Lynntech Inc to study the PDT efficacy of a series of rationally designed functionalized buckminsterfullerenes against both malignant and normal mammalian cells, bacteria and fungi.

Stabilized bacteriochlorins for PDT. In a collaboration with NIRvana pharmaceuticals we are exploring a new family of structurally related molecules that have the potential to surpass other existing tetrapyrroles as anti-cancer and antimicrobial photosensitizers.

Self-assembling nanomedicines for PDT. A collaboration with Prof Long Chiang from U Mass Lowell to study highly-derivatized fullerenes (C₆₀, C₇₀, C₈₄) with polycationic charges and attached electron donors.