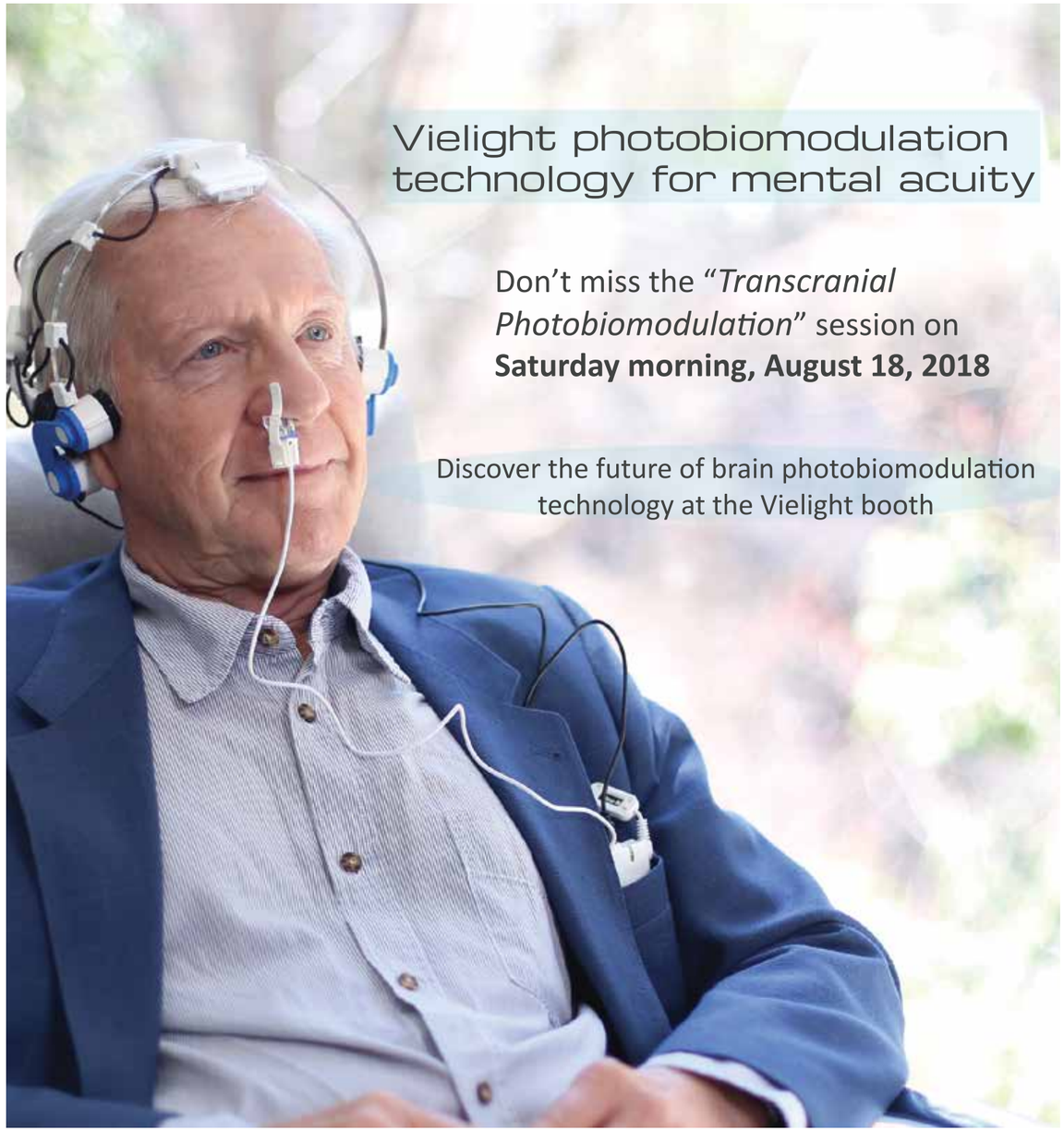
NAALT
North American Association for PhotobiomoduLation Therapy



Annual 2018 Conference | August 17-19, 2018

Detroit, Michigan | Marriott Renaissance Hotel

Conference Agenda | Scientific Program



President's Welcome

Dear Colleagues,

It is my great pleasure to welcome you to the 2018 NAALT Annual Conference, August 17-19 at the Detroit Marriott at the Renaissance Center. Under the able leadership of our scientific chair, Dr. Nicholas Wise, the 2018 program builds on our years of success, featuring renowned experts spanning the broad clinical and research realms of PBM Therapy. The theme of this year's meeting will be to showcase the tremendous excitement with PBM Therapy in Drug-Free Management of Pain.

This year's keynote speakers will focus on the use of PBM therapies for pain relief and tissue repair, with a strong practical clinical focus including demonstration-based workshops. In keeping with the growing recognition of the field and honoring innovative contributors, we have instituted a NAALT Lifetime Achievement Award named after Dr. Endre Mester. We will also have our prior awards: the Chukuka Enwemeka NAALT Award for PBM Leadership, Mary Dyson NAALT Young Investigator Award for PBM Clinician, and Tiina Karu NAALT Young Investigator Award for Fundamental PBM Research.

This conference guide outlines various details of the scientific program, the beautiful venue and other activities. NAALT is focusing on the practicing clinician in this year's program, who will learn how to best integrate PBM into their daily practices. This year's focus on pain management is critical, given the President's recent declaration of a Public Health Emergency surrounding the Opioid Epidemic in our country. The problem is significant: use of opioids for pain management is leading to epidemic misuse and addiction, with a total economic burden of $78.5 billion in the US.

Also significant this year, NAALT is establishing the first Commercial Partner Advisory Board position to participate with the NAALT Board of Directors, assist in the development of the organization and our membership, and bring commercial concerns to the attention of the organization. As a supporter of this event your company will be provided with a commercial membership, as well as an opportunity to act as NAALT board liaison based on the level of sponsorship. Your support for the NAALT Annual Meeting provides a great forum for PBM enthusiasts and experts, and the resources made available will help build a stronger organization for new PBM initiatives and activities.

Thank you for your interest in PBM. Together we can move this science forward.

Best,

Terrance L. Baker, MD, MS
President 2017-2019,
North American Association for PhotobiomoduLation Therapy (NAALT)

Friday, August 17, 2018
Morning Sessions

7:30a - 8:30a	***Breakfast / Registration***
8:30a - 8:40a	**Conference Opening** Nicholas Wise, DC, MSCR, Chair of NAALT Science Committee
8:40a - 9:00a	**President's Welcome** Terrance Baker, MD, NAALT President
9:00a - 9:45a	**Opening Keynote Address** Dr. Marie-Josée Robichaud: Light for Pain: Translating the Science into Successful Practice
9:45a - 10:00a	**Important Announcement** from Journal for Photobiomodulation Editorial Staff
10:00a - 10:30a	***Coffee Break / Networking***
10:30a - 12:30p	**Wound Healing and Basic Science Session (Praveen Arany, DDS, PhD Chair)**
	10:30a - 11:00a **P. Arany, DDS, PhD** Molecular Mechanisms of PBM
	11:00a - 11:30a **V. Bumah, PhD** *Developments in bacterial kill using novel pulsed blue 450 nm printed LEDs at significantly reduced dosages*
	11:30a - 12:00p **C. Castel, PhD** A Practical Guide to Wound Healing with PBM
	12:00p – 12:15p Q & A
12:30p - 2:00p	***Lunch***

Afternoon Sessions

2:00p - 3:30p	**Musculoskeletal Disorders (Nicholas Wise, DC, MSCR Chair)**
	2:00 – 2:25p **E. Leal-Junior, PhD, PT** *What is the optimal time-response window for the use of photobiomodulation therapy (PBMT) for the improvement of exercise performance? A randomized, triple-blinded, placebo-controlled trial*
	2:25 – 2:50p **D. Gendron, PhD** *Photobiomodulation therapy for musculoskeletal disorders and osteoarthritis of relevance to Canada*

NAALT 2018 Conference Program

Friday, August 17, 2018
...continued

	2:50 – 3:10p **N. Wise, DC** *Cranial Laser Reflex Technique for hamstring flexibility, strength and pain pressure threshold: a pilot study*
	3:10 – 3:30p Q & A
3:30p - 4:00p	**Coffee Break / Networking**
4:00p - 5:00p	**Innovations in Photobiomodulation Technology (Sandeep Gopalkrishnan, PhD Chair)**
	4:00 – 4:20p **M. Hack** *Phosphorescent OLEDs: A New Photobiomodulation Light Source*
	4:20 – 4:40p **R. Rubin, DMD** *Infrared laser for inflammation, wound healing and pain reduction*
	4:40 – 5:00p **D. Vila** *When quantum physics joins medicine - focus on night work*
5:00p – 6:30 p	**Clinical Masterclass 1: Welcome to The State of the Art**
	The first of two multidisciplinary clinical workshops designed to catch you up to speed with the latest in PBMT technology and practice. This class will lay the groundwork for successful clinical usage and cover the three D's of photobiomodulation therapy: Devices, Dosage & Safety. New and experienced PBMT practitioners alike will come away with a clear understanding of the evidence base and how to apply it to maximize results.
6:30p - 8:00p	***Welcome Reception / Networking***

Saturday, August 18, 2018
Morning Sessions

7:00a - 8:30a ***Breakfast / Registration***

8:30a - 9:00a **Keynote Address: Dr. Chukuka Enwemeka**

9:00a - 11:00a **Transcranial Photobiomodulation (Michael Hamblin, PhD Chair)**

9:00 - 9:25a **M. Hamblin, PhD** *Transcranial Photobiomodulation: Shining light on the brain*

9:25 - 9:50a **H. Liu, PhD** *Non-invasive boost of human cerebral metabolism and connectivity by transcranial photobiomodulation*

9:50 - 10:15a **M. Naeser, PhD** *Transcranial PBM to improve cognition in chronic TBI, and in a 65 Yr. Retired, Professional Football Player with possible CTE*

10:15 - 10:40a **L. Lim, PhD** *New Evidence Presents New Ways for Transcranial Pho to-biomodulation to Improve Brain Functions*

10:40 - 11:05a **L. Chao, PhD** *Effects of Transcranial and Intranasal Photobiomodulation for Cognitive and Behavioral Function, Cerebral Perfusion and Resting State Functional Connectivity in Patients with Dementia -- A Pilot Clinical Trial*

11:05 - 11:15a Q&A

11:15a - 11:30a ***Coffee Break / Networking***

11:30a - 1:30p **Translational Research in Photobiomodulation (Ann Liebert, MD Chair)**

11:30 - 11:55a **A. Liebert, PhD** *Photomolecular research: the interaction between PBMt mechanisms and translation*

11:55 - 12:20p **L. Laakso, PhD** *PBMT and treatment of neurological diseases: on the cusp*

12:20 - 12:45p **B. Bicknell, PhD** *Photobiomodulation and the microbiome: implications for metabolic and neurological diseases*

NAALT 2018 Conference Program

Saturday, August 18, 2018
...continued

12:45 - 1:15p **J. Mitrofanis, PhD** *Photobiomodulation therapy for Parkinson's disease: translating the evidence in animal models to humans*

1:15 - 1:30p Q&A

1:30p - 2:00p ***Lunch***

Afternoon Sessions

2:00p - 4:00p **Photobiomodulation for Pain (Chris Castel, PhD Chair)**

2:00p - 2:30p **C. Castel, PhD** *Novel technology platform for treatment of post-surgical and acute soft tissue injury offers the potential for reduction of opiate addiction*

2:30p - 2:55p **J. Rigby, PhD, ATC** *Consideration for Injury Prevention and Pain Manage-ment using Wearable Pulsed Blue-Red Photobiomodulation*

2:55p - 3:20p **A. Wells, PhD, ATC** *Management of pain and recovery at point-of-care in acute sports and industrial injuries using PBM*

3:20p - 3:45p **C. Enwemeka, PhD, PT** *Treatment Parameters and Efficacy of Photo-biomodulation for Pain Relief*

3:45p - 4:00p **T. Baker, MD** *Practical pain management in daily clinical practice – Optimizing Outcomes & Addiction Reduction*

4:00p - 4:30p ***Coffee Break / Vendor Networking***

4:30p - 6:30p **Clinical Masterclass 2: Practical Pain Management**

Instructors: Nick Wise, DC; Chris Castel, PhD; Aaron Wells, PhD, ATC; Justin Rigby, PhD, ATC; and T. Baker, MD

This multi-disciplinary workshop will focus on real-world methods to help you treat pain with PBM for outcomes and profit. Our panel of experts will demonstrate the numerous effective treatment methods for multiple pain conditions that they have perfected on thousands of patient encounters, as well as how to assess outcomes and use PBM with adjunctive therapies to optimize results for acute and chronic pain.

7:30p - 10:30p ***Gala Dinner Banquet*** with updates from the NAALT Board and ***Motown Karaoke!***

NAALT 2018 Conference Program

Sunday, August 19, 2018

7:30a - 8:30a ***Breakfast / Poster Session***

8:30a - 9:00a **Keynote Address:** **Hanli Liu, PhD** *Time to Think Big: How to Successfully Get NIH Funding for PBM Research* Dr. Liu is the recipient of the first multi-million-dollar NIH/ Brain Initiative grant to study photobiomodulation.

9:00a - 11:00a **Photobiomodulation in Dentistry (Gerald Ross, DDS Chair)**

9:00 - 9:25a **A. Darbar, DDS** *The Oral Physician - Role of PBM in dentistry today*

9:25 - 9:50a **M. Burchman, DDS** *Using Dental Lasers to Treat the Medically Compromised Patient*

9:50 - 10:15a **G. Ross, DDS** *Photobiomodulation in a dental practice - my 25-year journey*

10:15 - 10:40a **E. Varigos** *PBMT in Complex Regional Pain Syndrome*

10:40 – 10:50a Q & A

11:00a - 11:30a ***Coffee Break / Networking***

11:30a - 1:00p **Multidisciplinary PBMT (Janis Eells, PhD Chair)**

11:30 - 11:50a **J. Eells, PhD** *Unblinded by the Light: PBM for the Treatment of Retinal Aging and Disease*

11:50 - 12:10p **J. Diduro, DC** *Recovery of Olfactory Dysfunction via Photobiomodulation Therapy in a Neurodegenerative Disease*

12:10 - 12:30p **R. Godine, DVM** *Photobiomodulation for Chronic Kidney Diseases*

12:30 – 12:50p **S. Parmar, MD** *PBMT in the Clinical Setting – a Model for Success*

12:50 – 1:00p Q & A

1:00p ***Conference Closing***

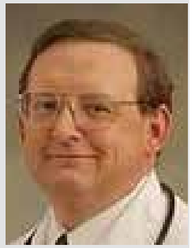
NAALT 2018 Conference Lecturers



Praveen R. Arany DDS, PhD
Molecular Mechanisms of PBM

Praveen R Arany received his dental degree and completed a joint PhD-Residency program in dental medicine at Harvard University. He has two certificates in clinical translational research from Harvard Medical School and National Institute of Health. He pursued postdoctoral fellowships at Indian Institute of Sciences, National Cancer Institute and Harvard School of Engineering & Applied Sciences. He served as an Assistant Clinical Investigator at NIDCR, NIH, Bethesda. He is currently an Assistant Professor in Department of Oral Biology and Biomedical Engineering, University at Buffalo. He has over 80 publications including book chapters, invited reviews and editorials; is a recipient of numerous awards; has been inv ited to speak in various national and international forums; reviews for several scientific journals, serves on editorial boards and reviews for national and international funding agencies.

Dr. Arany currently holds various key leadership positions including Immediate Past-President of the North American Association for Photobiomodulation Therapy (NAALT) and current President-Elect of the World Association of Laser Therapy (WALT). His primary research focuses on the molecular mechanisms and clinical translation of Photobiomodulation therapy.



Terrance L. Baker, M.D., M.S.
Practical pain management in daily clinical practice, Optimizing Outcomes & Addiction Reduction

Dr. Baker received his Bachelor of Science and Master of Science Degrees from John Hopkins University in Baltimore, Maryland. He completed is Doctrine of Medicine, M.D. Degree of George Washington School of Medicine. Dr. Baker was accepted and completed his internship and residency program in family medicine, added studies in woman's health and emergency medicine at the Medical College of Virginia in Richmond, Virginia. Dr. Baker is board certified in family medicine, emergency medicine, geriatric medicine and forensic medicine. He is a certified medical director (CMD) by the American Medical Directors Association (AMDA).

Dr. Baker has served for the last ten (10 years) as the Base Station Medical Director at the Medstar Good Samaritan Hospital emergency department. Dr. Baker is a clinical preceptor at the University of Maryland School of Nursing. He has written and lectured extensively on medical practice issue including emergency medicine, family medicine and laser medicine. Dr. Baker has been in full-time clinical practice for over 30 years.



Brian Bicknell BSc, PhD
PBMT and the microbiome: a new therapeutic target?

Brian Bicknell graduated from Sydney University and the University of NSW as a microbiologist. He has experience in molecular biology and phylogenetics and has conducted research into marine microbiology, bioremediation, microbial nutrient cycling, sulphur cycling, geomicrobiology and cellular signalling. Dr Bicknell is an Honorary Fellow at Australian Catholic University in the faculty of Health Science and a Visiting Researcher at the Australasian Research Institute. He research is currently focussed on the effect of PBM on the microbiome in mice (in conjunction with Dr Daniel Johnstone), the molecular signalling in response to PBM in a nematode (C. elegans) model and the translational implication in neurodegenerative diseases.



Violet Bumah, PhD
Developments in bacterial kill using novel pulsed blue 450 nm printed LEDs at significantly reduced dosages.

Dr. Violet Bumah is a Research Associate Professor and Lecturer at the Department of Chemistry and Biochemistry, San Diego State University. Prior to her present position, she worked as a Research Associate at the University of Wisconsin-Milwaukee and was Principal Investigator to several funded projects. She was recruited to the University of Wisconsin from the University of Buea, Cameroon, West Africa where she served as Coordinator of University Seminars and Lecturer. She was awarded the prestigious Fulbright Senior Research Scholarship to the Fienberg School of Medicine, Northwestern University, Chicago.

Furthermore, she also received the Burroughs Welcome Fellowship as a Senior Scholar to continue her research on host – pathogen interactions and the development of potential antigen candidate vaccines against malaria. Her research interests include the development of protocols to investigate host-pathogen interactions, with one of such modalities involving the use of monochromatic radiations. She has authored several publications on the use of blue light as an antimicrobial armamentarium and in wound healing. She has collaborated with professionals from different nationalities, partnered with many leading authorities in the field of photobiomodulation and is known for her work on the interactions of blue light and microbes.

NAALT 2018 Conference Lecturers



Mel A. Burchman D.D.S. M.A.L.D.
Using Dental Lasers to Treat the Medically Compromised Patient.

Dr. Burchman has maintained a general dentistry practice in Bucks County, Pennsylvania since 1976. He began using lasers in 1999 and now has eight lasers in his practice. In 2001 he received Advanced Proficiency in Nd: YAG from the A.L.D. In November 2003 He received the “The Science Behind the Clinic of Laser Dentistry” award for his presentation on, “Nd:YAG and Diode Laser Therapy in the Medically Compromised Patient”. Also in 2003 his office was written up in Men’s Health Magazine in an article titled, “The Drill Is Gone.” In 2005 he received “Certified Laser Educator” status from the Academy. He received his “Certificate of Mastership” from the Academy in 2008. He has been published twice in the laser academy journal “Wavelengths” on “Lasers in the Medically Compromised Patient” and in 2012 received the “Leon Goldman Award” for laser clinical excellence the ALD for this work.

Dr. Burchman has presented on this topic over a 30 times and it is his passion. He has served the academy as: Mentor, Examiner, and Chairman of many committees, a member of the academy Board of Directors, Executive Committee, Secretary and Treasurer. In 2015 he was the General and Scientific Chairman of the A.L.D conference and in 2016 was the Co-Program Chair of the ASLMS conference. In 2016 he received his, “Recognized Course Provider” certification and is currently the ALD Vice-President AND Chairman of the 2019 academy conference. Previously he has lectured for: Sirona Dental, Benco Dental and Henry Schein Dental.



J. Chris Castel, PhD
A Practical Guide to Wound Healing with PBM

J. Chris Castel PhD received his PhD at Showa University in Tokyo, Japan in Physical Medicine and Rehabilitation Research. His expertise is in the development, regulatory approval and commercialization of therapeutic medical devices for physical medicine, rehabilitation, and wound healing. Dr. Castel has and continues to manage numerous clinical trials for energy delivery medical devices in the fields of PBM, Ultrasonics, Electrotherapy, and PEMF. He has extensive experience in the medical device regulatory approval process with the FDA, national and international regulatory agencies and oversaw the process and obtained positive national coverage determinations from CMS for Electrotherapy devices in wound healing and incontinence management, along with a team of professional associations and industry leaders. Dr. Castel established a new venture, CareWear in 2017, to develop patient oriented therapeutic wearables which use breakthrough technologies such as printed light and ultrasonic substrates. CareWear was a 2018 SPIE Startup Challenge winner. Dr. Castel is a NAALT Board member and is active in the association. Dr. Castel holds numerous patents and has published extensively. As an international lecturer he has taught and presented at a post-graduate global level in such areas as neurorehabilitation, pain management, LLLT - PBM, Magnetic Field Therapy and Ultrasonics. He was one of the first researchers during the 1980s to publish the effects of infrared and red light on collagen synthesis and has spent his career developing new technologies to treat pain and accelerate healing. He looks forward to bringing PBM to mainstream medicine.



Linda Chao, PhD
Effects of Transcranial and Intranasal Photobiomodulation for Cognitive and Behavioral Function, Cerebral Perfusion and Resting State Functional Connectivity in Patients with Dementia -- A Pilot Clinical Trial

Linda Chao, PhD, is an Associate Adjunct Professor in the Department of Radiology and Biomedical Imaging and in the Department of Psychiatry at the University of California, San Francisco. Dr. Chao obtained her BS in Biological Science from the University of California, Davis in 1991, and she completed her PhD studies in Neuroscience from UCD in 1996. For the past 11-years, she has served as leader for the Psychiatry Block of the Interdepartmental Studies course 104, Brain, Mind and Behavior for first-year medical students.

Dr. Chao's professional activities primarily consist of conducting basic research using neuropsychological and imaging techniques to characterize how normal aging, neurodegenerative processes, stress, and exposure to neurotoxins affect the brain and cognition. She has an ongoing project, funded by the Department of Veterans Affairs, that seeks to use cognitive tests, structural, and diffusion tensor imaging to examine the effects of low-level exposure to sarin on brain structure and brain function in Gulf War Veterans. Dr. Chao has another project that is funded by the US Army Military Operational Medicine Research Program. The purpose of this project is to investigate the links between post-traumatic stress disorder (PTSD) and dementia. Dr. Chao serves as an Academic Editor for PlosOne and she has previously served as a reviewer for 26 scientific journals. Dr. Chao has 25 published articles and she has written 58 abstracts, 44 peer-reviewed articles, and 5 significant publications resulting from her research.



Arun Darbar, DDS
The Oral Physician- Role of PBM in dentistry today

Dr. Arun Darbar is a multi-award winning Laser and Aesthetic Dentist. At the forefront of Laser Dentistry, he is dedicated to providing cutting edge dentistry to his patients for nearly 35 years. He is an Accredited Member of the British Academy of Cosmetic Dentistry and is on the credentialing committee. Dr. Darbar continuously runs courses and trains dentists worldwide. He is also an invited speaker and published author on lasers in dentistry worldwide. Instrumental in pioneering the use of Low Level Laser Therapy (LLLT) with high power surgical lasers with diffusers he continues to be involved in research & development, designs and beta testing of numerous laser units. As a leading member of the ALD (Academy of Laser Dentistry), he holds a 'Masters' and Certified Educator' status.

Professionally he serves on the ALD Board of Directors, was the International Relations Committee Chair, and co-chairs the Education and Certification committees, invited member of the Science and Research committee, and is also an examiner. Served as Chair of ALD 2018 General and Scientific sessions and Co-Chairs the same for iLED 2018 Dubai conference.He has been awarded Fellowship and Diplomat status with (WCMID) World Congress of Minimally Invasive Dentistry.

NAALT 2018 Conference Lecturers



J. DiDuro, DC
Recovery of Olfactory Dysfunction via Photobiomodulation Therapy in a Neurodegenerative Disease

Dr. DiDuro earned his Bachelor of Arts degree from the State University of New York at Buffalo 1983 He received his Doctor of Chiropractic Degree from Palmer College of Chiropractor in Dav-enport, Iowa 1986. Dr. DiDuro also completed further specialized training in Amsterdam, The Netherlands for the American Chiropractic Association's American Board of Chiropractic Neu-rology and has Diplomate Status in Chiropractic Neurology 2000. Dr. DiDuro attend Palmer Cen-ter for Chiropractic Research and completed an NIH funded program for a Masters Degree in Clinical Research 2006.

Dr. DiDuro is dedicated to helping people live a more fulfilling life. His passion is to help people by teaching them how they can create neuroregeneration and healing in their own lives. He is the Founder and President of the Neuropathy Treatment Centers of America, a 501(c)(3) non-profit organization. He is president of ProNeuroLIGHT a medical technologies company.

In his 32 years of clinical experience, Dr. DiDuro has come to understand the very low quality of life that people affected by neurodegenerative diseases experience and that their disability touches every aspect of person's existence; personal, social and family. Dr DiDuro has made it his life's work to help end this suffering, initiate their recovery and restore their humanity.



Janis T. Eells, PhD
Unblinded by the Light: PBM for the Treatment of Retinal Aging and Disease

Professor, Department of Biomedical Sciences, UW-Milwaukee, Member of McPherson Eye Research Institute, UW-Madison, Honorary Research Fellow, Waisman Center Stem Cell Biology Group. UW-Madison, Adjunct Professor, Department of Ophthalmology Medical College of Wisconsin, Adjunct Professor, Department of Cell Biology, Molecular Biology and Anatomy, Medical College of Wisconsin.

Research in the Eells lab is directed at understanding the mechanism of action and exploring the therapeutic application of photobiomodulation (PBM) in the treatment of retinal degenerative disease. Exposure of cells to low-energy photon irradiation in the far-red to near-infrared (NIR) range of the spectrum, collectively termed photobiomodulation (PBM), has been demonstrated restore the function of damaged mitochondria, upregulate the production of cytoprotective factors and prevent apoptotic cell death. Research by the Eells' team has demonstrated improved functional and structural outcomes in animal models of retinal injury, diabetic retinopathy and retinitis pigmentosa. Dr. Eells holds two U.S. patents related to the use of PBM as a treatment for retinal disease or injury.



C. Enwemeka, PhD, PT
Antimicrobial blue light: recent developments and mechanisms of action.

Dr. Enwemeka is a Professor in the College of Health and Human Services, San Diego State University, San Diego, California. He served the university as Provost and Senior Vice President for Academic Affairs from July 2014 to April 2018 before returning to the faculty. He joined SDSU following a five year tenure as Distinguished Professor and Dean of the College of Health Sciences, University of Wisconsin—Milwaukee (August 2009 to June 2014), and more than six years as Professor and Dean, School of Health Professions, New York Institute of Technology, Old Westbury, NY (March 2003 to July 2009). Moreover, Professor Enwemeka held professorial positions at the University of Kansas, the University of Miami and the University of Texas Health Science Center at San Antonio before his appointments as Dean.

Dr. Enwemeka earned his Ph.D. from New York University, and is a Fellow of both the American College of Sports Medicine and the American Society for Laser Medicine and Surgery. Professor Enwemeka served as the President of the World Association for Laser Therapy (WALT) from 1998 to 2000, and also as founder and pioneer chairman of the North American Association for Laser Therapy from 2000 to 2006. World-wide, Professor Enwemeka is one of the foremost authorities in photobiomodulation. As an international figure, Professor Enwemeka's academic engagements, including visiting professorships, invited lectures, conference presentations and leadership of funded research projects, has taken him to thirty-nine countries on five continents.



Denis Gendron, PhD
Photobiomodulation therapy for musculoskeletal disorders and osteoarthritis of relevance to Canada

Denis Gendron grew up on a dairy farm in Quebec's Richelieu Valley. In 1984, he started work in biophysics, during an undergraduate coop on Positron-Electron Tomograph (PET) detectors project at U. Sherbrooke.

In 1997, he graduated with a Physics Ph.D. from U. Waterloo, for his study on photodissociation dynamics of HI molecule with VUV laser spectroscopy. After over a decade of exciting work with various laser and electronics technologies, Denis shifted to an applied laser engineering career, and join the National Research Council in Ottawa. He later join leading US laser corporations, as a laser engineer, in Washington DC and in Silicon Valley, to develop and to produce industrial quality lasers. In 2002, Denis returned to Canada and biophysics by joining a leading medical laser, where he was task to evaluate the validity of LLLT. In 2003, Denis founded Claire Lasers to apply his applied skills in laser and optics as an entrepreneur. He has developed a few products for industrial and medical market. Since 2010, applied research contract with research hospital led Denis to devote larger focus to PBM, and in 2016, he founded invitalize to focus on PBM research and promote PBM applications. He is now leading collaboration between invitalize, academic and corporate players to test and validate PBM methodologies.

NAALT 2018 Conference Lecturers



R. Godine, DVM
Photobiomodulation for Chronic Kidney Diseases

Dr. Godine is a small animal practitioner in central Virginia who has been using photo-therapy in his practice since 2008. He has been actively involved in organized veterinary medicine his entire career having served as the president of the Virginia Veterinary Medi-cal Association, Virginia delegate to the American Veterinary Medical Association, and alumni board member for the Virginia-Maryland College of Veterinary Medicine. He has received the Veterinary Service Award from the VVMA and the Lifetime Achievement Award from the VMCVM. Dr, Godine has also been active in organized Photobiomodula-tion having served as the president of the North American Association for Light Therapy (NAALT) and Section Chair for veterinary PBM sessions at the ASLMS conferences. He has contributed chapters to three textbooks on PBM in veterinary medicine and has lectured internationally on the same topic. Dr. Godine is married to fellow veterinarian, Dr. Caro-line Godine and has four children.



Michael Hack
Phosphorescent OLEDs: A New Photobiomodulation Light Source

Dr. Michael Hack, is Vice-President of Business Development at Universal Display Corporation. He is responsible for developing and commercializing advanced high efficiency next generation OLED products, with a special focus on flexible display applications and solid-state lighting. Prior to joining UDC in 1999, he was associated with dpiX, a Xerox Company, where he was responsible for manufacturing flat panel displays and digital medical imaging products based on amorphous silicon TFT technology. Dr. Hack received his Ph. D. degree from Cambridge University, England in 1981 and in 2007 Dr. Hack was elected a Fellow of the Society for Information Display. In 2014 Dr. Hack was nominated to serve on the board of the U.S. OLED Lighting Coalition to promote the advancement and commercialization of OLED lighting.



Michael R. Hamblin, PhD
Transcranial Photobiomodulation: Shining light on the brain

Michael R Hamblin Ph.D. is a Principal Investigator at the Wellman Center for Photomedicine, Massachusetts General Hospital, an Associate Professor of Dermatology, Harvard Medical School and affiliated faculty at Harvard-MIT Division of Health Science and Technology. He directs a laboratory of around a dozen scientists who work in photodynamic therapy and photobiomodulation. He has published 356 peer-reviewed articles, is Editor or Associate Editor for 10 journals and serves on NIH Study-Sections. He has an h-factor of 77 and over 21,700 citations. He has edited 11 proceedings volumes together with ten other major text-books on PDT and photomedicine. In 2011 Dr Hamblin was honored by election as a Fellow of SPIE.



Liisa Laakso, PhD
PBMT and treatment of neurological diseases: on the cusp

Mater Research Institute, South Brisbane; and Menzies Health Institute Queensland, Australia Dr. Laakso's research interests include the role of electrophysiological agents (EPAs) and physical activity in symptom control and recovery after cancer. In particular, she is interested in the effect of laser photobiomodulation on pain, as well as muscle recovery after exercise. She has published widely in these fields and spoken at numerous national and international conferences on her laser research. Dr. Laakso is an executive committee member of the Australian Medical Laser Association (AMLA) and past-president of the World Association for Laser Therapy (WALT).

NAALT 2018 Conference Lecturers



Ernesto Cesar Pinto Leal-Junior, Prof. PhD, M.Sc., PT
What is the optimal time-response window for the use of photobiomodulation therapy (PBMT) for the improvement of exercise performance? A randomized, triple-blinded, placebo-controlled trial.

Bachelor degree in Physical Therapy, Master´s degree in Biomedical Engineering, and he defended his PhD thesis in 2010 at University of Bergen – Norway. In 2012 he finished his Post-Doctoral internship at Department of Pharmacology of University of Sao Paulo. Full Professor at Nove Julho University in Sao Paulo (Brazil) since 2010, where he is the head of Laboratory of Phototherapy in Sports and Exercise and supervises several Post-doctoral fellows, Ph.D. candidates and master degree students.

Currently Dr. Leal-Junior has almost 100 scientific papers published in international peer-reviewed jour¬nals (indexed by Pubmed/Medline). Member of the editorial board of Photomedicine and Laser Surgery, and associate editor of Brazilian Journal of Physical Therapy. Since January 2015, Dr. Leal-Junior is a recipient of the Research Productivity Award given by Brazilian Council of Research and Development. Since 2013 he acts as Senior Research Director for Multi Radiance Medical (Solon – OH, USA). He has been granted by government research agencies and by private companies with more than USD 1,000,000 in grants and scholarships.



Ann Liebert, BApplSci, Grad. Dip Manip. Ther., PhD
Photomolecular research: the interaction between PBMt mechanisms and translation.

Dr Ann Liebert is a clinician/scientist and holds the position of Director of Photomolecular Research at the Australasian Research Institute at the Sydney Adventist (San) Hospital Group in Sydney and is an Adjunct Senior Lecturer in the Department of Medicine, Sydney University. She was awarded her PhD in 2016 in the use of photobiomodulation in the treatment of cervicogenic headache. Ann's current research is focussed on the molecular mechanisms of photobiomodulation and she is also currently in the process of implementing a number of clinical trial to assess the effectiveness of photobiomodulation to treat cervicogenic and migraine headache, to treat and circumvent cognitive decline (including Alzheimer's disease) and to prevent cardiac damage and cognitive decline following cardiac artery bypass graft surgery. Ann has published a number of manuscripts on the mechanisms of photobiomodulation and has presented at numerous international conferences. In addition to cardioprotection, other areas of current research include the use of PBM in the treatment and prevention of neuroinflammation, including chronic headache and neurodegenerative diseases such as Alzheimer's and Parkinson's diseases. She has spoken at numerous international conferences in the past 2 years on the topics of translational research and the proteomics of PBM. She currently holds the position of vice-president of the Australian Medical Laser Association (AMLA) and has recently been appointed to the scientific advisory board of the World Association of Laser Therapists (WALT) and is in on the Global Research Steering Committee for the North American Association of PhotobiomoduLation Therapy (NAALT).



Lew Lim, PhD
Lew Lim is the Founder & CEO of Vielight Inc. He is the main inventor of the photobiomodulation products of the company that are now used all over the world, recognized for their effectiveness in improving brain health, and easy-to-use features. He is leading the endeavors of the company to continuously find new ways to enhance brain functions and performance. He has a background in engineering and neuroscience, and is a doctor of natural medicine.



Hanli Liu, PhD
Hanli Liu received her MS and PhD degree in Physics from Wake Forest University in 1990 and 1994, respectively, followed by postdoctoral training at the University of Pennsylvania. She is now a Full Professor of Bioengineering and Distinguished University Professor at the University of Texas at Arlington. She is also a Fellow of American Institute for Medical and Biological Engineering. Her expertise lies in the field of near-infrared spectroscopy of tissues, functional brain imaging, transcranial photobiomodulation, and respective clinical applications. Recently, she received an NIH grant from the BRAIN (Brain Research through Advancing Innovative Neurotechnologies) initiative, which will apply fNIRS and EEG to investigate brain circuitry under transcranial laser stimulation.



John Mitrofanis, PhD
Photobiomodulation therapy for Parkinson's disease: translating the evidence in animal models to humans

John Mitrofanis gained his PhD at the University of Sydney in 1990. He then won a Fellowship from the Royal Society (UK) to work in Oxford. In 1993, he was sent back to the Department of Anatomy, University of Sydney as a free man. To this day, he remains free. He was the foundation Professor of Anatomy at the ANU Medical School (2005-2008) and the Associate Dean (Curriculum) at the Sydney Medical School (2007-2012). He is currently Professor of Anatomy at Sydney Medical School. His research over the years has explored patterns of neural connectivity in the adult and developing brain, together with neuroprotection in Parkinson's disease. At present, his is examining the impact of red to infrared light therapy (λ=600-1070nm), known also as photobiomodulation, on the activity of neural circuits in the human brain in both health and disease (eg Alzheimer's and Parkinson's patients).

NAALT 2018 Conference Lecturers



Margaret Naesar, PhD

Margaret Naeser, PhD, LAc, is Research Professor of Neurology, Boston University School of Medicine and located at the VA Boston Healthcare System. She has had VA-/NIH-funded research for over 40 years, with emphasis on neuroanatomy of lesion location on CT/MRI scans in stroke patients who have language problems. She has over 100 publications. She has published research on using red and near-infrared (NIR), low-level laser (acupuncture) to treat paralysis in stroke, and pain in carpal tunnel syndrome. Since 2009, she has studied the effect of transcranial, red/NIR light-emitting diodes (LED) to treat chronic, traumatic brain injury, PTSD, Gulf War Veterans Illnesses, stroke/aphasia and most recently, dementia. She has a strong interest in neuroplasticity and utilizing photobiomodulation (PBM) to promote neuromodulation for brain recovery. This includes studying changes in functional connectivity on fMRI scans within specific, intrinsic neural networks which are damaged (but not destroyed), in various central nervous system disorders. She is on the editorial board, Photomedicine and Laser Surgery and Fellow, ASLMS.



Shikha S. Parmar MBChB (Auck), DipPaed, DipObs, FRACGP (Australia)
PBMT in the Clinical Setting – a Model for Success

Dr Shikha Parmar, is a vocationally trained Family Physician (General Practitioner) of 23 years. In 2011, Shikha expanded her practice to include the delivery of Photobiomodulation Therapy. She now heads a dedicated medical clinic focused on delivering treatment for chronic musculoskeletal pain and dysfunction, utilising PBMT at the centre of a comprehensive and holistic treatment approach. Her passion is in managing patients with unresolved musculoskeletal issues achieve lasting remission and return to function through the use of photomedicine.



J. Rigby, PhD, ATC
Consideration for Injury Prevention and Pain Management using Wearable Pulsed Blue-Red Photobiomodulation.

Dr. Rigby is an Assistant Professor in the department of Health and Human Performance at Texas State University. Dr. Rigby earned his bachelor's degree from the University of Utah, master's degree from Texas State University and his doctorate from Brigham Young University.

Dr. Rigby performs and oversees research in the Therapeutic Interventions Laboratory at Texas State University. The lab focuses on research to determine the healing and clinical effectiveness of therapeutic modalities, with a primary focus on light and laser therapy, therapeutic ultrasound, and transdermal drug delivery systems. Dr. Rigby has work in measuring endogenous and exogenous analytes using microdialysis, measuring muscle performance, and performing randomized clinical trials associated with chronic tissue pathologies. In Dr. Rigby's short career, he has over 35 peer-reviewed publications and presentations.

Dr. Rigby has been a certified athletic trainer since 2008. He has worked in a variety of settings as an athletic trainer including a high school, a rehabilitation specialist at a physical therapy clinic, and collegiate hockey.



Marie-Josee Robichaud, DC
Light for Pain: Translating the Science into Successful Practice

Following her graduation from the Canadian Memorial Chiropractic College, Dr. Marie-Josee Robichaud joined her father's practice in her hometown of Moncton, New Brunswick, Canada.

Dr. Robichaud has dedicated over 30 years to a chiropractic practice oriented towards the care of neuromusculoskeletal conditions in patients of all ages. She pioneered the use of laser therapy in the Greater Moncton Area early in her career, combining photobiomodulation therapy and chiropractic in a way that has been very successful in providing patients with pain relief and improved functional capacity resulting in an overall improvement in their quality of life. Although laser therapy had always played an important role at the Clinique Robichaud Levesque Clinic/Centre Chirotech Laser Center, the introduction of Meditech's Bioflex Laser system in her practice in 2008, revolutionized patient care at the clinic. The Bioflex Laser provided Dr. Robichaud with a tool that has no precedent in providing a non-pharmaceutical, non-invasive, safe and effective treatment option to a growing number of patients seeking alternative options to main-stream care. Marie-Josee and Pierre Levesque own and operate the largest chiropractic and laser therapy center in the province of New Brunswick, where they employ dedicated staff that sincerely care for their patients' well-being.

NAALT 2018 Conference Lecturers



Gerry Ross, DDS
Photobiomodulation in a dental practice- my 25-year journey.

Gerry Ross has practiced general dentistry for 48 years with an emphasis on Lasers and facial pain. He holds Standard Proficiency, Advanced Proficiency , and Is a Certified Course Provider from Academy of Laser Dentistry. He is also holds Fellowship Status from ASLMS. He has given over 200 courses and lectures on Surgical soft tissue lasers and well as PBM. He does peer review for 4 laser journals. He is also a past president of NAALT, is a board member of ALD and their scientific chair of their 2019 conference.



Ronald L. Rubin, DMD
Infrared laser for inflammation, wound healing and pain reduction.

Dr. Ronald L. Rubin is currently in private practice in Boca Raton, Florida. He received his Dental Education at the Howard University College of Dentistry in Washington, D.C. where he was on the Dean's list for 4 years. While there he was granted an Oral Cancer Society Fellowship and participated in training at the Sloan-Kettering Memorial Cancer Hospital. His next goal was accomplished by his Certification in Oral and Maxillofacial Surgery while attending the prestigious Tufts University – New England Medical Center Hospitals and the Boston City Hospital. He was pleased to add an extra year to his Residency, when he was granted an Oral Cancer Fellowship in Head and Neck Cancer by the American Cancer Society, where he performed experimental research in Radiotherapy Modalities and Applications at the New England Medical Center.

Dr. Rubin is on the active status of the Surgical Staff of the Boca Raton Regional Hospital. He was a founding member of the Dean's Advisory Board of the Florida Atlantic University College of Medicine, and is an Assistant Professor of Clinical Biomedical Science in their Department of Surgery. Dr Rubin was the Chief Investigator of "The Evaluation of Low Level Laser Therapy - 810/830nm on Photorejuvenation and Photobiomodulation, participating within an Institutional Review Board - Division of the FDA.

Dr. Rubin maintains a role in local Community Leadership as well as in the International Rotary Club and Soroptimist Organizations, and participates in the care of Holocaust Survivors and the Mason Angel Fund.



Euahna Varigos
PBMT in Complex Regional Pain Syndrome.

Dr Euahna Varigos graduated in medicine MB.BS., from the University of Melbourne Australia. She then obtained her fellowship in Anaesthesia, FANZCA. An interest in pain management and a focus to reduce pain with minimal pharmaceutical requirements led her to not only develop expertise in anaesthetic interventional techniques, but to also study Medical Acupuncture (Melbourne and China) and obtain her fellowship of the Australian Medical Acupuncture College, FAMAC (John Woodley Award, for the top student) and to study Low Level Laser Therapy.

Dr Varigos' private pain practice of 30 years has involved the treatment of patients referred to her by various surgical and medical specialists for the management of acute and chronic pain. Apart from treating a wide variety of pain conditions she has treated numerous acute injuries and sporting injuries of many elite athletes.

More importantly, with her understanding of the theatre environment, surgical procedures and anaesthesia, she has been able to work with many surgeons in the management of their patients during the peri operative period. As an anaesthetist she has been involved with over 1,000 hospital consultations for pain, where she has included PBM as part of the multimodal management of patients immediately before and/or after surgery to help optimise their recovery. She has repeatedly clinically witnessed a reduction in post-op swelling, inflammation, and pain in these patients. She has observed that PBM treatment can often reduce patients anxiety and apprehension prior to surgery She has also made a personal observation that patients treated with PBM appear more alert and have a 'clarity of thought' which can assist with their objectivity regarding their operation, pain and surgical experience.

Dr Varigos lectures in Australia and overseas to Medical Specialists, General Practitioners, and other health professionals and gives educational lectures to patients and the public, on the clinical use of PBM and laser acupuncture.

She was involved in a research study of laser acupuncture for menopause symptoms at the Baker Medical Research Institute in Melbourne and was integral in establishing the use of acupuncture with Monash IVF in Melbourne.

NAALT 2018 Conference Lecturers



Damien Vila
When quantum physics joins medicine - focus on night work.

Damien Vila is an Engineer in electronics (and signal processing) and Agrégé in Physics and Chemistry. He was research engineer in telecommunications and Professor since 2003. His medical interest is quantum medicine: anti-aging effects and regeneration of the body, specially impacts of light and sound. He is also an international speaker and the Secretary-General of EMALT (Euro-Mediterranean Association for Light Therapy).



A. Wells, PhD, ATC
Management of pain and recovery at point-of-care in acute sports and industrial injuries using PBM.

Dr. Wells is an Associate Professor of Exercise Sciences at Brigham Young University in Provo, UT. He is also the Clinical Coordinator for the Athletic Training Program at BYU. He has published and presented in various settings on modality use and treatment of musculoskeletal injuries. Prior to joining BYU Dr. Wells served as an adjunct faculty at Utah Valley University as well as an Athletic Trainer for the Los Angeles Angels baseball team for many years. While working with the Angels he developed mechanisms through which the Angels evaluated pitchers upon reporting for the season to determine injury probability as well as need for specific shoulder ROM increases.



Nicholas Wise, DC
Cranial Laser Reflex Technique for hamstring flexibility, strength and pain pressure threshold: a pilot study.

Dr. Nicholas Wise is a second-generation chiropractor from Chapel Hill, NC. After 14 years in private practice, in 2014 he became the first chiropractor to be accepted as a T-32 research fellow at UNC-Chapel Hill in the Program on Integrative Medicine. He completed the MS in Clinical Research degree program and currently serves as adjunct faculty in the Department of Physical Medicine & Rehabilitation at the University of North Carolina School of Medicine. He is a board member of the North American Association for Laser Therapy (NAALT) and current chair of the Scientific Committee. He is also the developer of Cranial Laser Reflex Technique and has trained thousands of doctors around the world in this technique for musculoskeletal pain relief. He was instrumental in establishing the legal recognition of the chiropractic profession in India, and co-founded the first full time chiropractic clinics in India in 2010. His research interests include understanding the brain mechanisms of photobiomodulation therapy, and their effects on stress, function and pain. He has 3 teenage children and maintains a private practice in Chapel Hill and enjoys playing competitive soccer and loud guitar music.

Light for Pain: Translating the Science into Successful Practice

Dr. Marie-Josée Robichaud

Keynote Speaker - Friday, August 17, 2018

Abstract

In this time of opioid crisis, photobiomodulation is well positioned to be recognised as a potential solution for drug-free management of pain.

Pain is the biggest reason motivating patients to seek care at the Robichaud-Lévesque clinic, a chiropractic practice focusing on the treatment of musculoskeletal conditions. Photobiomodulation therapy has permitted the successful treatment of a multitude of conditions that has resulted in improving patients quality of life and wellbeing.

Laser therapy has been part of Dr. Robichaud's practice for the past 30 years. The introduction of the Bioflex laser system, 10 years ago, was a turning point for the clinic. The resulting transformation in their treatment application widened their scope of practice and has enhanced the delivery of patient care.

Dr. Robichaud will discuss successful cases treated with laser therapy at her clinic. Ultimately, she hopes that a greater awareness of the benefits of photobiomodulation therapy will enhance its utilisation.

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NAALT 2018 Conference Abstracts

Molecular Mechanisms of Photobiomodulation Therapy: Harnessing stem cells to promote Wound Healing and Tissue Regeneration

P. Arany DDS, PhD[1]*

[1]*Department of Oral Biology and Biomedical Engineering, University at Buffalo, NY*

*Corresponding author: prarany@buffalo.edu

Keywords: photobiomodulation therapy, wound healing, molecular mechanisms, stem cells, regeneration

Background

There is increased appreciation from systems and synthetic biology on a bottoms-up approach to modelling and modulating biological responses. The use of biomaterials such as simple wound dressings to sophisticated scaffolds as well as biophysical modalities such from ultrasounds, lasers or radiofrequency are now available to promote tissue healing and regeneration. A major effort of these approaches is on harnessing the regenerative potential of stem cells to promote therapeutic benefits. Among various modalities, the use of low dose biophotonics treatments, termed Photobiomodulation Therapy, has been noted to be effective for expansion of stem cells as well as directing their differentiation to generate tissues.

Methods

Combination of in vitro (cell culture-based), in situ (biomaterial scaffolds) and in vivo (animal and human studies) has led to significant insights into the molecular mechanisms of PBM therapy.

Results

There are now three well understood molecular pathways known to be involved with PBM therapy namely an intracellular, mitochondrial cytochrome C oxidase, cell membrane receptors and transporters and extracellular latent TGF-β1 activation. All three processes have discrete downstream signal transduction and gene expression responses that are integrated into therapeutic biological responses. Our group has specifically focused on the implications of these mechanisms on the discrete phases of wound healing. We have outlined the direct effects of PBM-activated TGF-β1 on epithelial closure and stem cell expansion, myofibroblast transformation and wound contraction, macrophage functions, secretion of antimicrobial peptides such as beta-Defensins.

Conclusions

This presentation will highlight the current status of PBM molecular mechanisms and its implications on specific phases of wound healing namely hemostasis, inflammation, angiogenesis, epithelial closure and matrix synthesis and remodeling. PBM therapy is poised to become a major tool for wound managements and offers a safe, reproducible, potent tool for wound care.

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Funding

We have received funding support from the University at Buffalo, National Institutes of Health and Philips Research Laboratories, American Society of Lasers in Surgery and Medicine. The Arany lab has also received equipment donations from QMBI Photomedicine, Weber Medical, Biolase and LigthScalpel.

Developments in Bacterial Kill Using Printed 450 nm LEDs at Lower Dosages

Violet V. Bumah[1], PhD, Daniela Masson-Meyers[2], PhD, Dawn Castel[3] PT, Chris Castel[3], PhD,
Chukuka S. Enwemeka[4], PhD, FACSM

Department of Chemistry and Biochemistry, San Diego State University, CA 92182[1], Department of Biological Sciences, Marquette University, Milwaukee, WI 53233[2], CareWear Corp. 1225 Financial Blvd, Reno NV 89502[3] and College of Health Sciences[4], San Diego State University, CA 92182, USA

Background and Objective

The increasing burden of multiple drug resistant bacteria underscores the need to find innovative therapeutics for bacterial infection in clinical situations. Our team has shown that blue light is antimicrobial, and has the potential to speed wound repair. To advance our line of work, we utilized a breakthrough technology, the CareWear® wound patch with printed LEDs and hydrogel laminate, emitting pulsed blue 450 nm light, to treat P. acnes and MRSA in vitro.

Materials and Methods

Bacteria were grown in their respective media aerobically/anaerobically at 37°C until they reached logarithmic growth phase. Concentrations of 1x106 colony forming units (CFU) /mL of Propionibacterium acnes (P. acnes) and methicillin-resistant Staphylococcus aureus (MRSA) were plated and bacteria assigned to two groups; control and treated. Various irradiation protocols (average irradiance of 2, 3.5 and 4.5 mW/cm2 in continuous wave mode and 2 or 3.5 mW/cm2 in pulsed modes; and fluences ranging from 5 – 60 J/cm2) were applied after which plates were incubated at 37°C, colonies photographed, counted and percent survival computed.

Results

CareWear® 450 nm light patches, effectively suppressed the growth of P. acnes and MRSA at low levels of optical irradiance and fluence when applied in specific pulsed modes and treatment sequences. Levels as low as 5 J/cm2 demonstrated 100% bacterial kill rates in vitro. This finding is a significant improvement over similar continuous wave blue light devices, which require energy levels greater than 60 J/cm2 to achieve comparable results. Moreover, it shows that, for maximum antimicrobial effect, it is not necessary to irradiate at the relatively high energy densities of 50 – 60 J/cm2 or higher as reported in our previous studies and those of others.

Conclusion

Blue light inactivates a host of bacteria, including the notoriously deadly MRSA and other drug-resistant bacteria. Our results show that bacterial clearance is achievable at much lower energy fluences using the new technology and protocol, which is not only more effective but naturally safer for patients and others.

NAALT 2018 Conference Abstracts

A Practical guide to wound healing with PBM

J.C. Castel PhD[1]

[1]Carewear Corp. Reno NV USA

**Corresponding author: ccastel@carewear.net*

Keywords: PBM Wound Healing update 2018

Background

The impact of light on Wound healing has been documented extensively since D. Andre Mester first began his research work in 1965. In 1985 our research group at Harbor UCLA began investigating the use of red 632 nm and Infrared at 904 nm on collagen synthesis in vitro and in Vivo on hairless mouse and porcine models. These were some of the first publications indicating that light had the ability to influence healing rates. Since then many thousands of articles have been published indicating that PBM is effective in various stages of wound healing.

Guidelines

The wound healing process consists of three basic phases inflammation, proliferation and remodeling. Many clinical trials fail to take into consideration the optimal wavelengths and dose based on the stage of healing, wound infection, level of exudate and patient co-morbidities. In addition, good wound management involves wound debridement and the appropriate dressing choices for the stage of healing as well as identification of factors inhibiting wound healing.

The type of wound and chronicity is also a determinant factor for consideration in the treatment approach. Postsurgical wounds (with or without infection or sepsis), pressure ulcers, arterial or venous insufficiency and diabetic ulcers are generally managed with specific clinical pathways. We also consider deep tissue injury and contusions as part of wound healing which require a different treatment approach. Key elements involved in wound healing such as light transmission considerations, fluence and irradiance, pulsed vs CW modes and complimentary therapies will be discussed with presentations of optimal clinical pathways for treatment of various wound types.

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What is the Optimal Time-Response Window for the Use of Photobiomodulation Therapy (PBMT) for the Improvement of Exercise performance? A Randomized, Triple-Blinded, Placebo-Controlled Trial

Ernesto Cesar Pinto Leal-Junior, PT, PhD[1]*, Heliodora Leão Casalechi[1], Caroline dos Santos Monteiro Machado[1], Adriane Aver Vanin[1], Paulo de Tarso Camillo de Carvalho[1], Shaiane Silva Tomazoni[2]

[1]Laboratory of Phototherapy in Sports and Exercise, Nove de Julho University. São Paulo - SP, Brazil.

[2]Masters and Doctoral Programs in Physical Therapy, Universidade Cidade de São Paulo (UNICID), São Paulo, SP, Brazil.

Keywords: phototherapy, low-level laser therapy, light emitting diodes, performance, exercise recovery, award.

Background

The optimal time-response window for photobiomodulation therapy (PBMT) using low-level laser therapy (LLLT) and/or light emitting diodes therapy (LEDT) before physical activity still wasn't fully investigated. Objective: To investigate the better of four time-response windows for PBMT use before exercise in humans.

Methods

A randomized, triple-blinded, placebo controlled trial was performed. Fifty healthy untrained male subjects were randomly allocated to five experimental groups: Placebo, PBMT 5 mins, PBMT 3h, PBMT 6h and PBMT 1 day. PBMT was applied precisely two minutes after baseline MVC test. Then, after five minutes, 3, 6 hours or 1 day (24 hours) of PBMT the eccentric exercise protocol was performed. We analyzed maximum voluntary contraction (MVC), creatine kinase (CK) activity and delayed onset muscle soreness (DOMS). Assessments were performed at baseline, immediately after, 1, 24 and 48 hours after the eccentric exercise protocol.

Results

All PBMT groups increased ($p<0.05$) MVC from immediately after to 1h after eccentric exercise and decreased ($p<0.05$) CK activity at all time points. However, PBMT 5 mins, 3h and 6h groups showed better results both in MVC and CK analysis from 24h to 48h, and also to DOMS ($p<0.05$) at all time points.

Conclusion

PBMT can be used from 5 minutes to 24 hours before exercise. However, the effects start to decrease when a 24h time-response window is used. The findings of this study also show that the time-response window in mice and humans isn't the same, therefore, clinical recommendations must be made based only in randomized controlled trials.

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NAALT 2018 Conference Abstracts

Photobiomodulation Therapy for Musculoskeletal Disorders and Osteoarthritis of Relevance to Canada

Denis J. Gendron, PhD & Michael R. Hamblin, PhD

Abstract

Musculoskeletal disorders and osteoarthritis (MSD/OA) (taken together) are a growing problem in Canada, due to overall aging of the general population and a progressive lack of exercise. Moreover, a range of chronic conditions including cardiovascular and mental diseases show significantly higher co-morbidity with MSD/OA. Conventional medical treatments include non-steroidal anti-inflammatory drugs and opiate pain-killers. The major drawbacks of these drugs include relative lack of efficacy, potential for addiction and even death (Vioxx scandal). Photobiomodulation (PBM), has not attained widespread acceptance by the medical community despite its discovery over 50 years ago. The increasing clarity of knowledge, about precise molecular mechanisms of action, is enabling formal metrology of physiological response. This may enable rationalization amongst the bewildering array of different wavelengths and dosimetry parameters used in the field studies.

The goal of this review is to survey literature reports of PBM used for treatment of MSD/OA, concentrating on the growth over time, different wavelengths employed, and application to different joints. Higher intensity PBM therapy for MSD joint pain has become an important trend to deliver efficient treatment in practical timeframe. The emerging trend is for more effective treatments and a better understanding of the parameters. Finally, we highlight the knowledge gap, barriers to further clinical trials, and we suggest that the present body of evidence indicating efficacy, and the almost total lack of side-effects, encourages wider range of clinical applications, while ongoing clinical research is being conducted.

Cranial Laser Reflex Technique for Hamstring Flexibility, Strength and Pain Pressure Threshold: A Pilot Study

Nicholas Wise[1], Jacob Hill[1], Mark Weaver[2], Brian Pietrosimone[3]

[1]Department of Physical Medicine & Rehab, University of North Carolina at Chapel Hill, NC, [2] NC TraCS Biostatistics, University of North Carolina at Chapel Hill, NC, [3]Department of Exercise & Sport Science, University of North Carolina at Chapel Hill, NC

**Corresponding author: nicholas_wise@med.unc.edu*

Keywords: CLRT, sports injuries, hamstring injuries, flexibility, strength, pain pressure threshold

Background

Hamstring injuries are a common occurrence in sports that involve sudden and/or explosive movements, such as jumping and sprinting. Soccer and lacrosse players are especially at risk for these frustrating injuries, which have the highest rate of recurrence (12-63%) in sports(1). While age, reduced flexibility, reduced strength, and fatigue may contribute to the etiology of hamstring strains, the most significant risk factor associated with hamstring injury is the history of a prior hamstring injury(2). At this time, there is no clear consensus on the most effective protocols for prevention of hamstring injuries. Static stretching is widely performed, though it may cause a significant loss of strength(3), endurance(4), and explosive performance for 24 hours(5). Cranial Laser Reflex Technique (CLRT) is a novel intervention for musculoskeletal conditions that incorporates elements of laser acupuncture with chiropractic cranial reflexes to modulate muscle function(6). This pilot study is the first investigation of the effects of CLRT on three aspects of hamstring function (flexibility, strength, and pain) in healthy young adults. CLRT was posited to increase muscle flexibility and decrease sensitivity in a clinical population while having no detrimental effect on strength.

Methods

This study was a randomized, assessor-blinded, sham-controlled crossover trial with a one week washout period. 44 healthy, young adult participants aged 18-35 (average age of 24.02; n=35 female) were randomized to one of two treatment periods: verum CLRT or sham. Participants completed three functional hamstring tests: the 90-90 knee extension angle test (KEA) for flexibility, handheld dynamometry (HHD) for strength, and pain pressure threshold (PPT) for muscle sensitivity. Either verum or sham CLRT was performed on the hamstring cranial reflex on top of the head, and the three hamstring tests were repeated. After a one week washout period, the participants returned and received the other intervention with pre- and post- hamstring tests. The treatment device used in this study is a Class IIIB 810nm 200mW near-infrared GAAlAS diode laser (THOR Photomedicine Ltd, Great Britain); the estimated dose along the hamstring reflex line was calculated to be 1.65 J/cm2.

Results

42 subjects completed both study sessions. The mean increase in flexibility (KEA) between pre- and post- tests in the verum CLRT group was 1.24° [95% CI: 0.14, 2.33]; this was not statistically different from sham. Mean PPT difference between pre- and post- in the verum CLRT group was 0.74 Kg/cm2 [95% CI: 0.10,1.39]. Mean HHD did not significantly differ between pre- and post- tests in either verum or sham groups. We performed a subgroup analysis on the main outcome of KEA based on participants' reported histories of hamstring strain. In those with no prior hamstring strains, a mean difference between the verum and sham groups of -1.89° was noted [95%CI: -3.45, -0.34], indicating a decrease in flexibility. In those participants that did report a prior hamstring injury (n=8), the mean difference between verum and sham treatments was an increase in flexibility of 2.8° [95% CI: -0.45, 6.06]. Participants were unable to correctly identify the verum treatment from sham. No significant adverse events were reported.

Conclusions

CLRT is a safe, painless laser intervention with no reported adverse effects. Among this population of healthy young adults with above-average flexibility, verum CLRT had no statistically significant effect on KEA compared to sham. Interestingly, in the subgroup that most approximates a clinical population (history of hamstring strain), there was a trend towards increased flexibility, while a statistically significant trend in the opposite direction appeared in those with no history of hamstring strain. This is consistent with the ability to increase or decrease muscle tone depending on the direction of stimulation of the cranial reflex. Further research on CLRT in a clinical population with hamstring injuries is needed.

Funding

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NAALT 2018 Conference Abstracts

Phosphorescent OLEDs: A New Photobiomodulation Light Source

Michael Hack

Abstract

Given the recent rapid growth of red and near infra-red lighting devices to enable all the numerous health benefits of photobiomodulation, we are developing phosphorescent OLED lighting devices as a thin, flexible and light weight light solution for PBM sources.

OLED displays made on plastic have now become the dominant display technology for high-end smart phones and a rollable OLED TV was recently demonstrated at CES. OLED lighting panels on flexible substrates are now also being commercialized. OLEDs offer very efficient large area light sources, with emission spectra determined by the chemistry of the phosphorescent emitters used to convert electricity into light. Patterning and stacking of OLEDs allows for multiple wavelengths to be emitted from the same surface, and the output intensities can easily be controlled.

The use of light weight plastic substrates enables very thin sources of illumination allowing for a new generation of portable and user friendly PBM products. Rollable light sources will soon also be available, ideal for transportation and mobility.

In this presentation we will review the current status of the technology, and introduce OLED lighting and its ability to become a new energy efficient form of PBM illumination.

A Study to Evaluate and Maximize the Efficacy of the Time Machine Infrared Laser (Lllt) for the Treatment of Inflammation, Wound Healing and Pain Reduction, Within a Non-Invasive Modality.

Ronald Rubin DMD, Bradley Schoengood

Abstract

The Time Machine Program has been developed to provide pain reduction and health enhancements with patient safety and value to remain as our prime concerns. This incorporates advice on recommended timing of exposure, as well as pre-planning a region of the body for TMP therapy. The standout benefits to be seen is the premise that the Laser does not cause burning, pain, ablation nor any swelling or downtime to the patients. There is an abundance of lasers on the market, with a high concentration in the field of pain management. Many papers on these have been reviewed over the past two years and have shown various levels of success. However, there is an overall lack of guidance of how to use these devices regarding timing of exposures in their application. This omission leaves the “door wide open” for unwanted and potential safety hazards, negative side effects as well as a lack of patient expectations.

This paper is presented to give details of therapy that are remiss in too many prior literature reviews. The focus of the laser treatment is in the decrease and/or the elimination of inflammation. This is brought about by an increase of local blood circulation and healing factors which could yield a decrease in discomfort and inflammation. In its help to reduce wounds and scars, there is an increase in elasticity and a decrease in erythema and hypertrophy.

The laser is designed to increase local blood circulation and therefore initiate the healing factors which could yield a decrease in pain and inflammation. There have been numerous studies on various lasers, but we feel that this can add to and/or enhance some of the current trials, with the objective of increasing patient care and desired results.

The 810/830nm will be evaluated for its efficacy on pain reduction/ elimination as well as on promoting wound healing via photobiomodulation and photobiostimulation.

When Quantum Physics Joins Medicine - Focus on Night Work

Damien Vila

Secretary-General of EMALT (Euro-Mediterranean Association for Light Therapy), Engineer in electronics and signal processing, Agrégé in Physics and Chemistry

Background / Introduction

The experience is about increasing sleeping time for people who work during the night, using different waves (light and sound).

Patients, Material, Methods

The protocol has been tested with 20 night workers who were working with this specific rhythm for more than 2 years: 12 men and 8 women. Many patients were used either to have difficulties to sleep during the day (and to take sleeping pills) or to sleep a shorter amount of hours than before the night work. With 7 sessions (45 minutes) by person, we have tested the influence of early or late sessions for each patient (after or before work).

The protocol mixed different waves for each session: 3 or 4 different colored lights (range of 7 colors) were used simultaneously with one sound (range of 7 sounds). The combination varied depending on the person and the session. The indicators are: increase of sleeping time and concentration/performance at work; reduction of fatigue and use of medicine.

Results

Sleeping time was increased for all the patients (average of 2.3 hours) and the use of sleeping peels was drastically reduced. The moment of the day to implement the protocol depends on the individual.

Conclusion

This protocol is efficient to help night workers to align the circadian clock on their specific rhythm.

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Antimicrobial Blue Light: Recent Developments and Mechanisms of Action

Chukuka S. Enwemeka, PhD, FACSM[1]

[1]College of Health Sciences, San Diego State University, San Diego, CA 92182, USA

**Corresponding author: Enwemeka@sdsu.edu*

Keynote Speaker - Saturday, August 18, 2018

Keywords: antimicrobial blue light, pulsed, continuous, porphyrin fluorescence

Summary

This keynote address presents a comprehensive review of research investigations showing the antimicrobial effect of blue light. Special emphasis will be placed on the bactericidal effects of blue LEDs in the optical spectrum of 405nm to 475 nm. Our research works, spanning several decades, and those of others will be analyzed and synthesized to reveal the preponderance of evidence that blue light is antimicrobial, with the capacity to suppress the growth of a multitude of bacteria; including Staphylococcus aureus, methicillin-resistant Staphylococcus aureus (MRSA), Propionibacterium acnes, Escherichia coli, Group B streptococcus (GBS), P. aeruginosa, H. Pylori, etc. Experimentally verified mechanisms of action, such as the role of porphyrins and other chromophores, and the capacity of blue light to engender reactive oxygen species (ROS), disrupt cell membrane, and modulate A-DNA and other cellular processes will be presented and discussed. Ongoing studies aimed at improving our understanding of the mechanisms involved, and the emerging evidence that significantly higher kill rates can be achieved at relatively lower energy fluences will be presented as well. The clinical implications of these findings will be discussed along with suggested practical benefits of photobiomodulation using blue light.

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Transcranial Photobiomodulation: Shining Light on the Brain

Michael R Hamblin, PhD

Abstract

Photobiomodulation (PBM) describes the use of red or near-infrared light to stimulate, heal, regenerate, and protect tissue that has either been injured, is degenerating, or else is at risk of dying. One of the organ systems of the human body that is most necessary to life, and whose optimum functioning is of most concern to humans in general, is the brain. The brain suffers from many different disorders that can be classified into three broad groupings: sudden events (stroke, traumatic brain injury, and global ischemia), degenerative diseases (dementia, Alzheimer's and Parkinson's), and psychiatric disorders (depression, anxiety, post traumatic stress disorder, autism). There is some evidence that all these seemingly diverse conditions can be beneficially affected by applying light to the head. There is even the possibility that PBM could be used for cognitive enhancement in normal healthy people. In this transcranial PBM (tPBM) application, near-infrared (NIR) light is often applied to the forehead because of the better penetration (no hair, longer wavelength). Some workers have used lasers, but recently the introduction of inexpensive light emitting diode (LED) arrays has allowed the development of light emitting helmets or "brain caps". Transcranial LED light sources are ideally suited to be home use devices. This lecture will summarize the mechanisms of action of PBM and our studies on TBI in mice. The key clinical trials in TBI, dementia (Alzheimer's) and psychiatric disorders and the MGH ELECTRA trial for cognitive enhancement will be discussed.

Non-Invasive Boost of Human Cerebral Metabolism and Connectivity by Transcranial Photobiomodulation

Hanli Liu, PhD

Bioengineering Dept., University of Texas at Arlington, Arlington, TX

Abstract

In recent years, different forms of non-invasive, transcranial brain stimulations, such as transcranial magnetic stimulation (TMS), transcranial direct current stimulation (tDCS) and transcranial alternate current stimulation (tACS), have been investigated as promising neuromodulation tools to treat a variety of neurological brain disorders. Furthermore, transcranial photobiomodulation (tPBM) using NIR laser or light emitting diodes (LEDs) has also demonstrated promises to improve human memory and cognition. However, underlying principles or mechanisms of these transcranial brain stimulations are not well understood. It is necessary to investigate stimulation-induced changes in cerebral hemodynamics and brain circuitry.

In this talk, I will present two sub-topics of research in studying tPBM by 1064-nm laser delivered on the human forehead: (1) Quantitative evidence on upregulation of cerebral cytochrome-c-oxidase and hemodynamics in response to tPBM will be presented. (2) Significant alterations in tPBM-induced electrophysiological patterns across the entire human head, determined by 64-channel EEG measurements, will be demonstrated. For the latter topic, I will show what direction of information flow occurs before, during, and after tPBM by applying the Phase Transfer Entropy (PTE) analysis on multi-channel EEG measurements. Overall, this talk intends to shed light on the mechanism of action of tPBM, which may have great potential to become a non-invasive, low-cost, intervention device for improving human cognition in the near future.

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Transcranial PBM to Improve Cognition in Chronic TBI, and in a 65 Yr. Retired, Professional Football Player with Possible CTE

Margaret A. Naeser[1,2,*], Paula I. Martin[1,2], Michael D. Ho[1,2], Maxine H. Krengel[1,2], Yelena Bogdanova[1,3], Jeffrey Knight[4], Andrea Fedoruk[1], Michael R. Hamblin[5-7], Bang-Bon Koo[8]

[1]VA Boston Healthcare System, Boston, MA, [2]Dept. of Neurology, Boston University School of Medicine, Boston, MA, [3]Dept. of Psychiatry, Boston University School of Medicine, Boston, MA, [4]National Center for PTSD, VA Boston Healthcare System, Boston, MA, [5]Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA, [6]Dept. of Dermatology, Harvard Medical School, Boston, MA, [7]Harvard-MIT Division of Health Sciences and Technology, Cambridge, MA, [8]Boston University Center for Biomedical Imaging, Boston, MA, *Corresponding author: mnaeser@bu.edu

Keywords: photobiomodulation (PBM), traumatic brain injury (TBI), chronic traumatic encephalopathy (CTE)

Background

We have previously published reports where transcranial PBM was observed to improve cognition in chronic TBI.1,2 The impaired cognition was associated with closed-head, mild-TBIs due to motor vehicle accident, sports-related injury, or IED blast injury. Cognitive dysfunction was present for 10 Mo to 8 Yr. There was significant improvement in executive function and cognition, even at 2 Mo after the final, 18th transcranial LED (t-LED) treatment. Participants had fewer PTSD symptoms. The present report compares results of t-LED therapy in the previous TBI studies, and results for a 65 Yr, retired, professional football player, where cognitive dysfunction was due to a different etiology – estimated thousands of subconcussive hits to the head during a football career.

Methods

Football player (middle linebacker, playing from age 10, Pop Warner, college and 1.5 years in professional football) had 4-Yr history of cognitive decline, compatible with possible development of chronic traumatic encephalopathy (CTE).3 After football, he earned a PhD in Sports Physiology, and taught in college, high school until he retired early. He was treated with two, t-LED treatment series: 1st, In-Office, and later 2nd, At-Home. The 1st, In-Office series treated 3x/Wk, 6 Wks, 500mW, red/NIR (633/870nm) LED cluster heads, each 22.45 cm2, 22.2 mW/cm2, 26 J/cm2 applied to 11 scalp locations: midline and bilaterally on frontal, parietal, and temporal areas. Post-testing at 1 Wk, 1 and 2 Mo after 18th t-LED Treatment; No-Treatment period, 2-3 Mo. The 2nd, At-Home series used 810nm, 40 Hz, LEDs of 25, 75 and 100mW; 15, 45, and 60 J/cm2 (NIR head-frame, intranasal device) to treat only the cortical nodes of Default Mode Network (mesial prefrontal cortex, precuneus, angular gyrus, hippocampal areas).

Results

After the 1st, In-Office series, post-testing at 1 Wk and 1 Mo. after the final, 18th t-LED treatment showed significant improvements in cognition, and clinically significant reduction in PTSD and depression (BDI-II). At 2 Mo, however, the original deficits began to return.4 After a No-Treatment period of 2-3 Mo, he purchased his own NIR LED head-frame with intranasal; and an extra, red intranasal LED device. After the 2nd, At-Home series with 3 Mo of LED home treatments, there were improvements in cognition, along with reduced PTSD (fewer emotional outbursts) and no depression. Resting-state functional-connectivity MRI scans showed increased functional connectivity at 1 Wk after each t-LED treatment series, but not after the No-Treatment period. This football player differed from the previous TBI cases, due to his decline at the 2 Mo post- testing after the 1st In-Office series, with 2-3 Mo of No t-LED Treatments. He possibly has progressive neurodegenerative disease, CTE. Continued t-LED home treatments will be important in neurodegenerative disease. The 40 Hz pulse rate may also have aided phagocytosis effect of microglia to remove abnormal protein deposits (tau).5 A form of tau is present in deep cortical sulci areas in CTE.3

Conclusions

Future t-LED research is warranted with chronic TBI, as well as with athletes who are at risk for developing CTE.

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Funding: *Department of Veterans Affairs; and the Boston VA Research Institute (BVARI)*

New Evidence Presents New Ways for Transcranial Photobiomodulation to Improve Brain Functions

L. Lim, PhD

Abstract

To date, most studies on transcranial photobiomodulation (tPBM) have shown promises for treating a variety brain insults. These include stroke, traumatic brain injury (TBI), depression, dementia and Alzheimer's disease, depression and possibly multiple sclerosis. They all credit the effects of low level doses of red and near infrared (NIR) light on the mitochondria. However, there are many ways of modulating the mitochondria, with new evidence that these effects can be fine-tuned by varying the parameters.
Our data increasingly demonstrate the safety and effectiveness of non-laser light emitting diodes (LEDs), with 810 nm as a preferred wavelength, driven by power density of up to 100 mW/cm2. Focusing on the default mode network (DMN) appears to provide better results as many brain insults are associated with dysfunctional DMNs.

We observed that pulsing at 10 Hz has generally produced good all-round outcomes, and 40 Hz for neurodegenerative disease such as Alzheimer's disease (AD) and Parkinson's disease (PD). This suggests that there are yet undiscovered treatment properties using other oscillation frequencies.

Electroencephalogram (EEG) literature have shown that AD, PD, stroke, attention deficit disorder (ADD) and autism present low power in the faster brain wave oscillations of alpha, beta and gamma, and high power in the slower brainwaves in delta and theta. When we direct tPBM at gamma pulse rate of 40 Hz to impaired brains as well as healthy brains we observe significant correction of the undesired brainwave signatures at the time of treatment – increased power in the faster brain oscillations and reduced power in the slower oscillations. These are outcomes sought by researchers in brain stimulation methods. In addition, pulsing at 40 Hz modifies microglia to help clear toxic by-products in the brain.

The expressed EEG measures prove that low power non-laser LED when applied extra-cranially stimulates the brain to produce impressive outcomes, dispelling arguments that only much higher-powered lasers can effectively treat brain trauma. Various signaling and transport mechanisms in living mammals are helping to carry PBM effects deeper into the brain.

Looking forward, the prospect that pulsed tPBM directed at brain networks can influence brain patterns opens new ways to enhance brain functions. We can now investigate the personalized treatments by varying parameters to correct abnormal EEG patterns that are often unique to the individual.

It may also be feasible to apply pulsed tPBM to enhance mental state. Long-term meditators have persistent gamma oscillations, and they can magnify that state at will; an ability that is out of reach of most meditators. Sports and mental performance can be improved when the brain oscillates in the desired brainwaves. Alpha states are desired in golf and shooting, and Gamma states are desired in fast-moving sports such as hockey, football and fighting.

In conclusion, low energy tPBM is safe and effective for treating many brain conditions and potentially enhance performance. We are at the beginning stage of research that could lead to personalized treatments. Pivotal clinical studies are now needed to underscore these findings and provide deeper understanding of the effects of different parameters.

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Effects of Transcranial and Intranasal Photobiomodulation for Cognitive and Behavioral Function, Cerebral Perfusion and Resting State Functional Connectivity in Patients with Dementia -- A Pilot Clinical Trial

Linda L. Chao, PhD

University of California, San Francisco, Departments of Radiology & Biomedical Imaging and Psychiatry,

San Francisco Veterans Affairs Medical Center

Background: Saltmarche and colleagues (2017) recently published a case series of report where 5 patients with dementia exhibited significant cognitive improvement after transcranial plus intranasal photobiomodulation (PBM) treatments. The present study sought to replicate and extend these findings by quantifying brain function with arterial spin-labeled (ASL) perfusion and resting state functional magnetic resonance imaging (rs-fMRI).

Methods: Eight older adults with dementia (mean age: 78+8.8 years) were randomized to receive either 12 weeks of PBM or 12 weeks of usual care (UC). All participants underwent cognitive assessment and MRI on a Siemens 3 Tesla Skyra MR scanner prior to and after completing 12 weeks of PBM or UC. Cognitive assessments were also performed at 6-weeks. Participants in the PBM group received 20 minutes of transcranial and intranasal PBM every other day at home with the aid of a study partner. PBM was delivered via transcranial and intranasal light-emitting diode (LED) devices that pulsed near-infrared (810nm) light at 40 Hz (i.e., the Vielight Neuro Gamma device). Participants randomized to UC group had the option of receiving PBM upon completion of the 12-week assessments.

Results: After 12 weeks, subjects randomized to PBM showed significant improvements on the Alzheimer's Disease Assessment Scale cognitive subscale (ADAS-cog, p=0.01) and Neuropsychiatry Inventory (NPI, p=0.02). There was also increased cerebral perfusion in the frontal, parietal, and temporal lobes and increased functional connectivity in the default mode network (DMN) after 12 weeks in the PBM group. Two UC subjects opted to undergo PBM after 12 weeks of UC. Although these subjects showed declined cognitively and functionally during UC, their scores on the ADAS-cog and NPI improved after 6 weeks of PBM.

Conclusions: These findings reaffirm Saltmarche et al.'s report that transcranial and intranasal PBM improves cognitive function and behavioral symptoms in patients with dementia. Not only do these preliminary results support the potential of PBM as a safe, non-pharmacological intervention that can be used as an effective home treatment for dementia, but the finding that PBM also enhanced cerebral perfusion and functional connectivity within the DMN in patients with dementia suggest that larger, controlled trials are warranted.

Photomolecular Research: The Interaction Between PBMT Mechanisms and Translation

Ann Liebert, MD

Abstract

There is increasing awareness of the need for alternate non-pharmaceutical treatments in the management of chronic pain, neurodegenerative and other diseases of chronic inflammation (including oral mucositis in Australia, the US and in Britain). While there are numerous clinical trials to assess the effectiveness of PBMt, this talk will examine the importance of studying the mechanisms of PBM in parallel with translational PBMt in order to enhance its effectiveness and acceptance. To obtain full value from translational clinical trials using novel PBM treatments, it is necessary to have a more complete understanding of mechanisms underlying PBMt. Recent advances in revealing the pathways of signal transduction following light stimulation/activation, including mechanotransduction involving opsins and other proteins as light absorbers and signal propagators are important elements in the design of effective treatments. The importance of the non-visual photoacceptor pathways including neuropsin and encephalopsin, are central to this activation by photons, as is the subsequent modulation of cytokines and nuclear signal transduction and the modulation of the cytoskeleton in neuronal, endothelial and red blood cell membranes. The modulation of the cytoskeleton also has effects on neural networks involving proteins, including ion channels and ionic flux, which influences cell-to-cell communication. This protein network modulation controls many of the local effects of PBMt, as well as the bystander and distal bystander (abscopal) effects. PBM has a role in the up and down regulation of transcription factors and also has a role in post-translational modification of proteins, both of which influence genomic stability through mechanotransduction modification of the nucleus including, potentially, telomere length and levels of telomerase. A new area of research in PBM is the effect of light on the microbiome and the potential value of this in the treatment of metabolic, cardiovascular and neurodegenerative diseases. The combination of the effect on the microbiome and the host cell genome (as epigenetic modulation and telomere length) is encompassed as the effect of PBM on the holobiome. The measurement of changes to the microbiome and telomere length may prove useful additions to the usual assessment of clinical signs and inflammatory markers, in the evaluation of the effectiveness of PBM treatments in translational medicine.

Any concept of the mechanism of PBM must take into account the interplay of actions of light on photoreceptors, membrane ion channels, transporter proteins, protein networks, (including the cytoskeleton) and the genetics/epigenetics of the cells and tissues being treated and potentially, the microbiota living in close association with these cells and tissues. I would argue that the mechanism of PBM action should be a parallel arm of translational PBMt research, particularly in the treatment of diseases of inflammation, such as cardiac disease and neuroinflammation, including chronic headache, Parkinson's disease and Alzheimer's disease. These are currently being investigated by our research group, both from a translational and from a mechanistic viewpoint.

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PBMT and Treatment of Neurological Diseases: On The Cusp

Liisa Laakso, PhD

Mater Research Institute, South Brisbane; and Menzies Health Institute Queensland, Australia

Background: Saltmarche and colleagues (2017) recently published a case series of report where 5 patients with dementia exhibited significant cognitive improvement after transcranial plus intranasal photobiomodulation (PBM) treatments. The present study sought to replicate and extend these findings by quantifying brain function with arterial spin-labeled (ASL) perfusion and resting state functional magnetic resonance imaging (rs-fMRI).

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Photobiomodulation and the Microbiome: Implications for Metabolic and Neurological Diseases

Brian Bicknell, PhD

Abstract

Photobiomodulation is known to have a therapeutic effect on inflammation and neurological disorders and has been reported to influence metabolic disorders and obesity. The human microbiome is also known to be intimately associated with human health, with a role in obesity, metabolic diseases such as type 2 diabetes, and such divergent diseases as cardiovascular and neurodegenerative diseases. Increasing evidence has demonstrated the gut-brain link for a variety of neurological disorders, including depression, mood disorders, schizophrenia, Alzheimer's disease and especially Parkinson's disease, in which the gut microbiome appears to be intimately connected with the development of the disease and influence both motor and sensory deficit. Changing the microbiome (by diet, probiotics or faecal transplants) has flow-on effects to health outcomes. The possibility that photobiomodulation could influence the microbiome was examined in a mouse model by irradiating the abdomen of mice with either red light, infrared light or a sham treatment. Faecal samples were used to extract DNA, which was sequenced to determine the microbial diversity of the microbiome. Results showed a significant change in microbial diversity after two weeks of thrice weekly treatment, with one bacterial species (Allobaculum sp.) being significantly increasing after infrared (but not red) photobiomodulation treatment. This species of bacterium is associated with a healthy mouse microbiome and has been shown to increase as a proportion of the microbiome by a change from a high fat diet to a healthy diet and by treatment with metformin. While an effect of PBM on the human microbiome has still to be established, the possibility that using PBMt to alter the microbiome of humans opens a new treatment possibilities for metabolic and neurological diseases, especially Parkinson's disease, in which the microbiome is known to play a significant role. If this can be confirmed in humans, the possibility exists for PBMt to be used as an adjunct therapy in treatment of obesity and other lifestyle related disorders, as well as cardiovascular and neurodegenerative diseases.

Photobiomodulation for Parkinson's Disease: Evidence for Neuroprotection in Animal Models and the Potential For Translation To Humans

John Mitrofanis, PhD

Abstract

Parkinson's disease is a movement disorder with cardinal signs of resting tremor, akinesia and rigidity. These manifest after a progressive death of many dopaminergic neurones in the midbrain. Although current therapies help reduce the signs of the disease, the progression of this neuronal death has proved difficult to slow or stop, and the condition is relentlessly progressive. Hence, there is a real need to develop treatments that slow the pathology of the disease. Photobiomodulation is emerging as an effective therapy that is capable of slowing or stopping the death of neurones. In this talk, I will discuss the evidence that photobiomodulation improves behaviour and offers neuroprotection to the midbrain dopaminergic cells in several animal models of the disease, from mice to monkeys. Following, I will consider some early observations on the impact of transcranial photobiomodulation on four patients with movement disorders. These observations will hopefully lay the groundwork for clinical trial and development of photobiomodulation as a treatment option in humans.

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Novel Technology Platform for Treatment of Post-Surgical and Acute Soft Tissue Injury Offers the Potential for Reduction of Opiate Addiction

J.C. Castel PhD[1]

[1]CareWear Corp. Reno NV USA

**Corresponding author: ccastel@carewear.net*

Keywords: *PBM, Light Bandage, Post-surgical pain, Opiate-addiction*

Background

Post-operative pain is associated with a broad range of negative consequences, including increased morbidity, development of chronic post-operative pain, impaired function, delayed recovery from surgery, decreased quality of life, prolonged opioid use, and increased medical costs. Typically, opioids are used to treat post-operative and acute pain with the potential for addiction in as little as five days of use[1]. As many as 2 Million patients out of 17 Million annual surgical procedures will transition to persistent opioid use following outpatient elective surgery this year[2]. In 2013, it was estimated that the total economic burden was $78.5 Billion. Opioid prescribing rates increased most among specialists in Surgery (37%), Physical Medicine and Rehab (36%) and Pain Medicine (49%). Many more will become addicted as a result of an acute occupational injury, military training or combat injury. Finding a non-opiate solution to manage pain and prevent the onset of Opioid Use Disorder is of utmost importance to reverse this trend.

Methods

Photobiomodulation Therapy offers the potential to reduce post-operative and acute injury pain and inflammation and accelerate healing which has been demonstrated in the literature[3,4] and through our clinical trials. One of the barriers to its widespread use has been the availability of a simple to use hands free portable light delivery system which conforms to the tissue surface and delivers appropriate levels of irradiance without excessive heat. Our team focused on the development of new roll-to-roll printed micro LED technology in combination with a cadmium-free quantum dot film to provide a combination of 450 nm blue and red 640 nm light in a flexible light bandage. The micro LEDs are printed on 125 micron film and laminated to a flexible Printed Circuit and CFQD layer. A transparent hydrogel acts as a light pipe and adhesive to hold the flexible light source to the tissue to be treated. The light patch is powered by a small Bluetooth enabled controller module making it a hands free, wire free wearable system. The patch may be placed over a transparent film dressing when used post-surgically or placed directly over intact skin over the area of soft tissue injury.

Results

Printed LED light patches in sizes ranging from 25 to 70 cm2 have been successfully developed at irradiance levels of 9 mW/cm2 in pulsed modes at 33% DF. These highly flexible light sources closely couple light to the treatment site using optical matching layers designed to optimize optical transmission to the tissue. The devices deliver 5.4J/cm2 over a 30-minute treatment period which falls within the dosage window for successful pain management and acceleration of tissue repair[3,4]. CareWear is sponsoring ongoing research which will be presented at the NAALT conference demonstrating the efficacy of these class II medical devices.

Conclusions

The application of a novel flexible light patch directly over acute post-surgical wounds and soft tissue injury provides another tool for pain reduction and accelerated tissue healing. It is expected that this will decrease the need for post-surgical narcotic administration and their addictive sequelae and impact on patients' lives.

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Consideration for Injury Prevention and Pain Management using Wearable Pulsed Blue-Red Photobiomodulation for Parkinson's Disease: Evidence for Neuroprotection in Animal Models

Justin H. Rigby, PhD, LAT, ATC, Stephan R. Fisher, MS, LAT, ATC, Austin M. Hagan
Department of Health and Human Performance, Texas State University, San Marcos, TX
**Corresponding author: justinrigby@txstate.edu*
Keywords: *muscle fatigue, athletic injury, printed LEDs*

Background
Youth, adolescent, and collegiate sports in the United States have led to 0.95 - 23.0 injuries per 1,000 athletic exposures [1, 2] and cost approximately $935 million per year. Muscle strains are one of the leading causes of sports-related injuries, with the majority of muscle strains occurring late in competition or practice.[2]

Methods
A series of studies were conducted to determine effectiveness of a novel flexible LED printed blue 450 nm and red 630 nm light patch on muscle fatigue in order to potentially limit sport-related injury and pain. First, we enrolled 34 strength trained individuals and determined their 1 repetition maximum (RM) for a controlled elbow flexion task using their nondominate arm. After at least 4 days rest the participants completed a fatigue task using a weight of 50% of their 1 RM. During the fatigue task a marker was set to 90° of elbow flexion. The participant complete elbow flexion repetitions at 25 rep/min. The task was stopped when the participant was unable to move the weight back to the marker or they were in the wrong position at the metronome beat. After the fatigue task a 30-minute active red-blue or sham treatment, determined by random assignment, was applied. The active treatment had a peak irradiance of 9 mW/cm2, 33% duty cycle, and fluence of 5.4 J/cm2. After the treatment, participants repeated the fatigue protocol with the same working weight (50% of 1 RM). The number of repetitions were counted during the pre- and post-treatment fatigue tasks. Second, we enrolled 42 strength trained participants to determine the treatment application timing effects on an isometric fatigue
task. Participants were randomly assigned to a 0 h pre-, 5 h pre-, 24 h pre-, or sham-treatment group. On the first visit, participants completed an extensive orientation of the Biodex isometric dynamometer procedures. On the second visit, the participants isometric maximum voluntary contraction (MVC) was determined. A 30-minute active or sham treatment was applied using the same treatment parameters as above. At their designated exercise time, participants isometrically contracted 50% of their MVC for 20 s repetitions and 2 seconds rest between reps. A guide line was provided for visual encouragement. The fatigue task was stopped once the participant's isometric force dropped below 45% of their MVC for ≥ 2 s. Immediately after the fatigue task participant's post-fatigue MVC was measured.

Results
First, 29.4% of active treatment participants improved the number of fatigue repetitions while no participants in the sham treatment improved during the post-treatment fatigue task (P = 0.045). Second, less isometric fatigue occurred during the 0 h (8.2±15.5%) and 5 h (8.9±11.8%) treatment groups over the 24 h (18.6±9.8%) and sham (-14.6±17.8%) groups.

Conclusions
The use of a blue 450 nm and red 630 nm flexible light patch applied with a hydrogel light guide over a muscle group can reduce muscle fatigue during intense exercises. This is of high importance to the current state of muscle injury and pain, where high rates of injuries occur when the muscle is in a fatigued state.

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Management of Pain and Recovery at Point-Of-Care in Acute Sports and Industrial Injuries Using PBM

Aaron Wells PhD , ATC[1], Justin H. Rigby, PhD, LAT, ATC[2], David O. Draper, EdD, ATC, LAT, FNATA, PRT-c1
[1]Brigham Young University, Department of Sports Science, Provo Utah
[2]Texas State University, Department of Health and Human Performance, San Marcos, TX
**Corresponding author: aaron_wells@byu.edu*
Keywords: *PBM, Printed LEDs, acute injury, AWARD*

Background
Following a blow to the muscle, a muscle contusion often develops leading to a hematoma, a loss of activity, or a decrease in the ability to perform activities of daily living. Many strategies including ice massage, manual massage, therapeutic ultrasound, and anti-inflammatory drugs have been used to decrease symptoms of muscle contusions.
Recently, an increase in research has been conducted to understand the influence photobiomodulation on symptoms of muscle damage. We are of the opinion that photobiomodulation using a combination of pulsed blue 450 nm and red 630 nm light using a printed flexible LED light patch and hydrogel interface, can have a positive impact on this type of injury.

Methods
Our study was approved by the BYU Institutional Review Board. Each participant report to our lab where they were screened for the study eligibility criteria and then provided informed consent. Each participant had a photo taken and a MSK imaging ultrasound scan of the proposed injury site over the anterior thigh to measure the qualities of the target tissue. Participants then reported to the tennis courts for the muscle contusion protocol. Using a tennis ball-serving machine, participants were hit with a tennis ball in the belly of the quadriceps muscle.[1] The tennis ball traveled at 136 kilometers/hour, for 26 cm until it struck the target tissue. Each participant then performed 10 squats and marked a 100 mm visual analog scale to mark their level of pain. Participants returned to the lab where a follow up photo was taken, followed by MSK imaging ultrasound. Each participant then received a 30 minute active or placebo PBM treatment using a printed LED flexible blue and red light at a peak irradiance of 9mW/cm2, 33% duty cycle, and fluence of 5.4 J/cm2. Immediately after the treatment participants complete 10 squats and marked their pain on the visual analog scale, had a photo and scan using MSK imaging ultrasound of the injury site to determine the extent of the injury and the tissue compliance. Every day for four more days, participants returned to the lab where they were treated with either the active blue-red light patch or placebo "infrared" patch. Pre and post measures of pain, photography, and MSK imaging ultrasound were obtained.

Results
Based on initial observations on 36 subjects, we observed a more rapid decrease in pain, improved acceleration of healing based on the color transition of the bruise and a reduced muscle hardness on the subjects treated with the blue-red light patches as compared to the placebo. We are continuing the study and will provide appropriate statistical analysis as part of our presentation; however, the data appears compelling that the bruising and tissue compliance measures are definitive in favor of the active blue-red light therapy. We are also evaluating the use of hyperspectral imaging [2] as an added assessment tool.
Conclusion The use of a flexible printed blue 450nm and red 630 nm LED light patch applied using a conforming hydrogel light guide adhesive provides a promising therapy for the immediate treatment after an acute contusion injury. This provides the potential for an immediate point of care treatment for accelerated recovery in sports and industrial injury.

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Treatment Parameters and Efficacy of Photobiomodulation for Pain Relief

Chukuka S. Enwemeka, PhD, FACSM[1]
[1] College of Health Sciences, San Diego State University, San Diego, CA 92182, USA
*Corresponding author: Enwemeka@sdsu.edu
Keywords: antimicrobial blue light, pulsed, continuous, porphyrin fluorescence

Summary
Photobiomodulation (PBM) has been widely used for pain relief for more than 35 years. However, its efficacy continues to be questioned. This paper presents case reports and summarizes three rigorous metaanalysis, which clearly show that PBM effectively relieves pain of various etiology, and suggests treatment parameters that seem most effective.

Methods
Two cases of excruciating pain; one occasioned by traumatic injury to the cervical spine, and the other caused by degenerative thoraco-lumbar disk disorder, are summarized and presented. Both were treated successfully with appropriate doses of a combination of red and infrared PBM, thus stemming the need for surgical intervention. In three meta-analysis of the literature, we aggregated and coded relevant original studies from every available source. Papers that met pre-established inclusion criteria were subjected to statistical meta-analysis, using Cohen's d statistic to determine treatment effect sizes. In one of the meta-analysis, we used machine learning technology to predict essential treatment parameters that seem to optimize treatment

Results
In our initial meta-analysis studies, 52 effect sizes were computed from the 22 papers that met the inclusion criteria. The resulting overall mean effect size was highly significant; d = +0.84 (95% confidence interval = 0.44 to 1.23). The effect size remained significant even when a high outlying d-value was conservatively excluded from the analysis; d = +0.66 (95% confidence interval = 0.46 – 0.86). The Fail-Safe number associated with the overall treatment effect, i.e., the number of additional studies in which phototherapy has negative or no effect on pain needed to negate the overall large effect size of +0.84, was 348. A total of 96 papers with 232 treatment effect sizes were used for machine learning study. As with our first two meta-analyses, the average effect size was highly significant: d=+1.36 (confidence interval [95% CI] = 1.04–1.68). The most effective treatment parameter was found to be total energy, in the bimodal ranges of 120–162 J and 15.36–20.16 J. None of the remaining parameters was independently effective for pain relief. Conclusion: These studies indicate that appropriate doses of PBM effectively relieves pain of various etiologies; making it a valuable addition to contemporary pain management armamentarium.

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Practical Pain Management in Daily Clinical Practice – Optimizing Outcomes & Addiction Reduction A Clinical Model of Practice

Terrance L. Baker, MD, MS, Hana Kelele, CRNP, PhD, Modesta Vesonder, CRNP, MS,
Sollay Laser Center of Excellence, Baltimore, Maryland

Abstract

The American Medical Association (AMA) Opioid Task Force established to identify best practices for combating opioid abuse, recently issued a 2018 Progress Report outlining opioid trends. The Task Force found that opioid prescriptions decreased by more than 55 million (22%) between 2013 and 2017. During this period of time nearly 550,000 healthcare professionals completed continuing medical education in pain management, substance abuse disorders and learned to use alternate treatments for acute and chronic pain. Photobiomodulation therapy is an effective alternative to the use of opioid medications in the treatment of acute and chronic pain. Photobiomodulation therapy (PBM) either alone or in combination with an interdisciplinary approach including the physician, physical therapist, athletic trainer, chiropractor, acupuncture and neurostimulation can provide complete relief of patients acute and chronic pain symptoms.

Since 2006, Sollay Laser Center has used PBM to treat thousands of patients for acute pain; acute exacerbation of chronic pain; and chronic pain. Common sources of pain include musculoskeletal, osteoarthritis, sports injuries, soft tissue, neuropathic, wounds, and ischemic.

This presentation will present a model for using PBM therapy either alone or as part of an interdisciplinary approach to pain management with the goal of opioid free pain management.

Time to Think Big: How to Successfully Get NIH Funding for PBM Research

Hanli Liu, PhD

Keynote Speaker - Sunday, August 19, 2018

Abstract

It is very challenging to successfully win NIH funding for biomedical research in general; it is more difficult for research in PBM. This talk will provide general information on (1) why it is difficult to win NIH funding in PBM, (2) what major components and/or keys a winning grant proposal should have, (3) when you are ready to write it, and (4) how to revise a rejected proposal.

The Oral Physician- Role of the Dentist Today

Arun Darbar, DDS

Abstract

In dental practice, we encounter medical conditions and medical therapies that may have oral manifestations that require diagnosis and management and these may impact dental care. As life expectancy increases we are faced with complex medical conditions and side effects relating to medications being prescribed and treatment protocols used.

Mucositis is an example of a common and sometimes a life-threatening side effect of cancer treatment for patients who are treated with chemotherapy and radiotherapy and in intensive chemotherapy that may be combined with bone marrow transplant. Mucositis has oral manifestations and as dentists we are positioned to help these people at the worst time of their lives with use of light based technology. PBM has been shown to reduce the severity and duration of mucositis and to reduce mucosal pain due to mucositis.

One of the major issues in the use of these modalities arises from the limited awareness of the evidence of efficacy of PBM among conventional and orthodox oncology faculties around the world as this common complication in these patients is expected and they believe that only pain medications can be provided.

Some of the data presented in this workshop/presentation is recommended as a guide for management. The objectives of this workshop are:

1. Understand the manifestation of mucositis
2. Classify the degrees of mucositis
3. Review the concepts and protocol of PBM treatment
4. Gather knowledge to make the relevant professionals aware of the potential positive effects of light based treatment in prevention and management of mucositis in radiation and chemotherapy treatment side effects.

Using Dental Lasers to Treat the Medically Compromised Patient

Mel Burchmann, DDS

Abstract

With medical and technological advances, people are living longer and contending with a wider variety of illnesses and diseases than ever before. As a result, the role of health care providers has never been more challenging. However, it is not just the elderly that are medically compromised and these techniques can be used on our young patients also. These same medical and technological advances have also opened new doors for practitioners, particularly where laser dentistry is concerned.

In this presentation, Dr. Burchman will present two cases 1.a severe Parkinson's patient and 2. a patient with Cicatrical Phemphigoid that lasers made possible to treat in the dental office who would have previously required hospitalization to receive their dental care. The ability to successfully treat these patients with as little disruption to their lives as possible while also lowering treatment costs can make laser integration an invaluable asset to any office.

NAALT 2018 Conference Abstracts

Photobiomodulation- Reflection on 25 years of Clinical Experience

G. Ross, DDS

Abstract

The presentation will cover how the science of PBM has evolved over my 25 years of using Low Level lasers and LED's.

In the early days it was push a button and hope I got the desired result. Over the years both the science evolved as well as my understanding of the science so now when I apply the device I expect to get a result. I will cover dosages I used early and what I have found effective now. I will also discuss how my practice has evolved clinically.

PBMT in Complex Regional Pain Syndrome

E. Varigos

Abstract

PBM as part of peri operative pain management in the era of the opioid crisis. Can it do the job ?

Photobiomodulation (PBM) is a safe, non-invasive and easy to administer therapy. It is the application of low level red and/or near infrared light to biological tissue. The application of particular wavelengths of light onto cells has been shown to induce physiological changes, including at the mitochondrial level where photons are absorbed in Cytochrome C Oxidase.

Though the exact mechanisms of PBM cellular interaction continues to be studied, clinical experience for over 40 years indicates the therapy to have efficacy – primarily in the treatment of inflammation, chronic joint swelling, oedema and pain reduction.

PBM has been advocated for the improvement of wound healing and tissue regeneration. Some studies have also reported it can help alleviate anxiety.

The peri-operative period is often a difficult time for patients.

This presentation will refer to studies on outcomes of acute post surgical pain and the development of chronic pain. Anxiety and catastrophising have been shown to be a major risk factor for increasing acute post-op pain. Certain surgical sites have been found to have a higher incidence of developing chronic pain. Post-op mortality and morbidity statistics will be highlighted. Post operative prescribing of opioids has exponentially increased in recent years not only has this had a significant impact on overdose deaths in the community but it has had an influence on surgical patients morbidity and mortality , this is now recognised as The Opioid Crisis

The armoury of knowledge of what to address and treat, will enable the practitioner to develop an approach with PBM to reduce factors contributing to pain and help optimise patient recovery. As a consequence of the reduction in pain and opioid use, there is often improved return of function and mobility.

A brief outline of treatment options will be discussed, although there is no specific protocol, as treatments require individualisation to each patient. If time permits, a short case presentation will illustrate the effect of PBM in the peri-operative period, illustrating the reduction in anxiety, pain and swelling and associated reduction in Opioid consumption enabling an enhancement in surgical recovery.

Unblinded by the Light: PBM for the Treatment of Retinal Aging and Disease

Janis T. Eells, PhD

Professor, Department of Biomedical Sciences, UW-Milwaukee

Abstract

Mitochondrial dysfunction and oxidative damage to the retina and its components, including photoreceptors, retinal pigment epithelium and retinal ganglion cells, has been implicated in many forms of retinal injury and degeneration including methanol intoxication, light-induced retinal damage, retinopathy of prematurity, age-related macular degeneration (AMD), retinitis pigmentosa and diabetic retinopathy. Mitochondrial repair and attenuation of oxidative stress are key to the long-term survival of the retina. Therapeutic strategies directed towards improving mitochondrial integrity and function and reducing oxidative stress have considerable potential for the treatment of retinal disease. Low-intensity farred to nearinfrared (FR/NIR) light has been shown to act on mitochondriamediated signaling pathways to preserve mitochondrial function, attenuate oxidative stress, stimulate the production of cytoprotective factors and prevent cell death. FR/NIR photons penetrate the brain, retina and optic nerve and this treatment, commonly known as photobiomodulation (PBM) has documented efficacy in the treatment of retinal injury and disease. This seminar will focus on investigations into the mechanism of action and therapeutic efficacy of PBM in experimental and clinical retinal disease.

Recovery of Olfactory Dysfunction via Photobiomodulation Therapy in a Neurodegenerative Disease

Farzad Salehpour and Joseph Diduro, DC

Abstract

A case study of improvement in olfactory function after photobiomodulation therapy.

Photobiomodulation for Chronic Kidney Diseases

Richard Godine, DVM

Abstract

In small animal veterinary medicine, chronic kidney disease (CKD) is extremely common and in fact is the number one killer of cats and number two killer for dogs. It has been the author's observation and others that the use of Photobiomodulation (PBM) as an adjunctive treatment modality significantly improves the appetite, nausea, and gastrointestinal problems associated with this disease. Retrospective data from Ruckersville Animal Hospital and Brockton Animal Hospital shows improvement in several biomarkers of renal disease both in the short term and in the long term. The pathophysiology of this disease will be reviewed along with how PBM is thought to benefit patients with CKD. Graphs of biomarker (Creatinine, Phosphorous, BUN, and SDMA) improvement over time from both hospitals will be presented and a look at its significance vis a vis concurrent treatments will be discussed.

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PBMT in the Clinical Setting – a Model for Success

Shikha Parmar, MD

Abstract

Recognizing the NAALT Conference mission statement includes: "It is our intention to promote photobiomodulation therapy as a valid treatment…." NAALT is "dedicated to advancing the science and state of the art of photobiomodulation therapy"

I am a General Practitioner in Melbourne Australia, having practiced PBM therapy for musculoskeletal, soft tissue conditions for the last 7 of my 23 years as a family medicine physician.

Research is king in advancing innovative medical therapies and the NAALT 2018 conference showcases excellence in leading edge research to its audience.

However, curiously and unfortunately PBMT still suffers from lack of mainstream medical acceptability in wider practice, despite 50 years of science and evidence published by international researchers from reputable institutions in leading journals, particularly in the realm of musculoskeletal medicine.

PBMT practitioners are disrupters of the traditional paradigm of pain management and there is a lot of skepticism and even hostility from ignorant quarters, and combatting that in the patients we see and seek to help is half the battle.

I run a clinic dedicated to providing PBMT as the primary treatment in a holistic approach to assist patients to achieve recovery through relief from chronic pain and restoration of function and strength. I conduct about 20 patient consultations a day, 6 days a week.

I see patients who self refer and who are referred by other clinicians, and I have also been approved as medical provider by medical insurance policies covering work-place injuries and road trauma.

As a provider at the delivery end, it has been quite a journey reaching this point, navigating numerous obstacles and barriers, to promote this treatment to achieve acceptance from patients, colleagues, health- care providers and the wider public.

Thousands of patient encounters later, I would like share my experience of what the challenges have been and how I have negotiated them. I will discuss a clinical model that has maintained a track record of success and acceptability by patients and health providers alike in delivering positive outcomes that persist.

I do not present data, statistics or research, as my focus over the past 7 years has been on operating a dedicated PBMT clinic offering therapeutic management, focused on outcome.

I would like to make an Podium Presentation on my qualitative experience of delivering our unique and valuable treatment successfully. This in an environment of competing yet failing drug, surgical and manual therapies which do not address the essence of what underlies chronic musculoskeletal pain - unresolved, "dystopian" inflammatory response. It is not my intention to justify PBMT as the ultimate treatment tool in this situation (which preaches to the converted), rather, to demonstrate how I have successfully circumnavigated the many barriers to help patients in chronic pain on their road to recovery, well beyond just pain management, to achieve freedom from drugs and poor health and return to meaningful service, leisure and normal life.

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