

## Biographies

### Dr. Juanita J. Anders

Dr. Juanita J. Anders is a Professor of Anatomy, Physiology and Genetics at Uniformed Services University of the Health Sciences. She also has a secondary appointment as Professor of Neuroscience at USUHS. She received her Ph.D. in Anatomy from the University of Maryland Medical School and specializes in peripheral and central nervous system injury and repair mechanisms. While at the National Institutes of Health in the Laboratory of Neuropathology and Neuroanatomical Sciences, NINDS, she specialized in glial/ neuronal interaction in normal and injured nervous tissue. Since joining USUHS, her research interests have expanded to the use of light as a non-invasive therapy for deep tissue injuries and the interaction of light with pluripotent cells. Her research on the use of light applied non-invasively for repair of spinal cord injury has received international attention. She is recognized as an expert in light therapy and has been invited to speak and chair sessions at numerous international laser conferences. Dr. Anders serves on the Executive Councils and Scientific Advisory Boards of several laser societies. She is the past president of the North American Association of Laser Therapy and a founding member of the International Academy of Laser Medicine and Surgery. She serves on the Editorial Boards of Photomedicine and Laser Surgery and Lasers in Surgery and Medicine and as a reviewer for several other journals. She has published over 50 peer reviewed articles.

### Professor Jan M. Bjordal

Professor Jan M. Bjordal has 20 years of clinical experience with Low Level Laser Therapy in musculoskeletal disorders. His numerous research reports have been published in prestigious journals such as American Journal of Sports Medicine and British Medical Journal, and he is appointed external advisor to two Cochrane Reviews. In 2004 he led an expert group authoring a government-funded Norwegian Health Technology Assessment Report, which found LLLT to be effective in knee osteoarthritis.

The main contribution from professor Bjordal to the LLLT literature is the identification of distinct dose-response patterns for LLLT in musculoskeletal disorders. In his talk he will also explain why LLLT sometimes work and sometimes does not work. This work has been continued in the development of evidence-based LLLT dosage recommendations published by NAALT's sister association WALT, where professor Bjordal is appointed Scientific Secretary. In this position he has also led the work with developing standards for clinical LLLT studies. Lately he has been challenging the sparse scientific evidence behind the widespread use of non-steroidal anti-inflammatory drugs (NSAID), and he has shown through careful analyses that LLLT can be at least as effective and an almost risk-free alternative to NSAIDs. Professor Bjordal will also draw

from his longtime clinical experience when participating in the Saturday work-shop/hands-on session and he will communicate pitfalls and tricks to help You get the most out LLLT in Your clinic.

- Born: 1957
- Place: Bergen, Norway
- Education: Physical Therapist 1982, Master of Health Sciences 1998, Dr. Phil 2003, Full professor 2007
- Affiliation: Bergen University College & University of Bergen, Norway
- Publications: 21 papers in international peer-reviewed journals
- Presentations in International Congresses: 23
- Author of several bookchapters and the book "Clinical Electrotherapy - Your guide to optimal treatment" ( HYPERLINK "http://www.hoyskoleforlaget.no" \o "http://www.hoyskoleforlaget.no" www.hoyskoleforlaget.no)
- Editorial Board member for "Photomedicine and Laser Surgery", "Physical Therapy Reviews" and "Fisioterapia e Pesquisa" (Brazil)
- Referee for 14 International journals

### Rodrigo Alvaro Brandão Lopes Martins

Date of birth: February 26th, 1970; Age 37;

Civil status: Married

Dependents: 03 Kids

E-mail: rmartins@icb.usp.br

#### PROFESSIONAL FORMATION:

- BSc. in Biology - Federal University of Rio de Janeiro - UFRJ. August 1987 - December 1991.
- MSc. in Pharmacology - State University of Campinas - UNICAMP - Faculty of Medical sciences. March/92 - July/94. Supervisor : Dr. Edson Antunes.
- PhD. in Pharmacology - Oswaldo Cruz Foundation - FIOCRUZ -Cardiovascular Pharmacology. March/95 - September/98. Supervisor : Dr. Eduardo V. Tibiriçá
- Post-doctoral in Pharmacology - Department of Pharmacology, Institute of Biomedical Sciences - University of São Paulo - São Paulo - Brazil. Supervisor - Dr. Gilberto de Nucci - 1998-1999.

#### PRESENT POSITION

- Professor of Pharmacology - Institute of Biomedical Sciences - Department of Pharmacology - State University of São Paulo - SP - Brazil. Teaching Pharmacology for Graduating Courses in dentistry, Physical Therapy, Nurses, Medicine;
- Chief of the Research Group of Laser and Inflammation

## PAST POSITIONS

- Professor in Pharmacology – Faculty of Veterinary Medical Sciences – Dom André Arcoverde Foundation – Valença – Rio de Janeiro; 1997-1999; Teaching Pharmacology for Veterinary Medical Doctors;
- Professor in Pharmacology, Faculty of Health Sciences – University of Vale do Paraíba UniVaP – 2000 – 2005; Teaching Pharmacology for Nurses, Dentistry, Physical Therapy and Occupational Therapy; São José dos Campos – São Paulo;
- Coordenator of Physical Therapy Bachelor Course - University of Vale do Paraíba UniVaP – 2001 – 2004; São José dos Campos – São Paulo;

## RESEARCH LINES

- Inflammatory Diseases
- Low Power Laser Therapy and Inflammation
- Low Power Laser Therapy and Skeletal Muscle Fatigue
- Musculo-skeletal pain and inflammation

## RELEVANT INFORMATION

- Deam of Physical Therapy Faculty – UNIVAP 2001-2004.
- Coordenator of the Sports Programm - UNIVAP, 2001 – 2003
- Visiting Professor at University of Bergen – Norway – Department of Physical Therapy
- Member of the Scientific Comitee of World Association of Laser Therapy - WALT
- Coordenador of Pharmacology for Nursing EE-University of São Paulo
- Referee of Revista Brasileira de Fisioterapia
- Referee of Brazilian Journal os Sports Medicine

## *James Carroll*

James Carroll, AMInstP, FRSM, founder of THOR International Ltd (UK) has been involved in the design and manufacture of low level laser and LED Therapy products since 1998 and speaks internationally on beam measurement, dose rate effects, and the special requirements for LLLT laboratory studies. James.Carroll@thorlaser.com

## *Karen Carroll*

Karen Carroll, DO, ND, DPO, has lectured on the theory and clinical use of laser therapy for 20 years worldwide to MD's, PT's, RN's, DC,s and DO's.. Karen is an independent trainer offering full day introductory seminars, clinical training and user group meetings. She has her own private practice in Amersham, UK and is a Consultant at the Osteopathic Centre for Children (London, UK). Karen can be contacted at [photomedicineacademy.com](http://photomedicineacademy.com).

## *Dr Mary Dyson*

Dr Mary Dyson is Emeritus Reader in the Biology of Tissue Repair at Kings College London (KCL), University of London, UK. She is also a Biomedical Consultant and Executive Vice-President of Longport Inc (HYPERLINK “<http://www.longportinc.com>” \o “<http://www.longportinc.com>” [www.longportinc.com](http://www.longportinc.com)), a company specialising in high frequency diagnostic ultrasound. She has held Visiting Professorships in the University of Ulster and the University of Kansas Medical Center. She founded the Tissue Repair Research Unit (TRRU) at Guy's Hospital Medical School, now part of KCL, in 1986 and was its Director for 12 years. Much of her research on photobiomodulation, diagnostic and therapeutic ultrasound and on wound healing was carried out in the TRRU in collaboration with her colleagues there. She has been awarded Honorary Fellowships by the Chartered Society of Physiotherapy and the American Institute of Ultrasound in Medicine for her research. Mary is the author of over 100 research publications in peer-reviewed journals, a co-editor of the 37th and 38th Editions of Gray's Anatomy, and has contributed to textbooks and wound healing, electrotherapy, physiotherapy and ultrasound.

## *Levon Gasparyan*

Armenian born Levon Gasparyan graduated Yerevan Medical University in 1988, and became Head of Department of Laser Therapy of Republican Medical Centre Armenia in 1995 after completing his specialization in laser medicine in Moscow (Russia). He completed his PhD thesis in Laser Therapy and Radiology in 2000 (Medical Radiological Scientific Center, Obninsk, Russia).

In 2000 he moved to Finland where he is the head of Research and Development in EMRED (Electromedical Research and Development) where he is working with a variety of different types of lasers. He has specialized in intravenous laser treatment and has published several research papers on the subject. He is one of the first doctors to have developed clinical guidelines for the use of blue laser and now researching further the effects of green lasers. He is board member of the European Medical Laser Association as well as co-editor of the EMLA Laser Health Journal. He is a popular invited speaker at various laser conferences both in Europe as well as in Russia .

In 2004 Dr. Gasparyan married his colleague Dr. Makela and now they work together in laser research.

## *Eyad Hamade*

Eyad Hamade, born in Dubai 1978, and came from Lebanon. I earned my high school degree in 1996 from UAE. I got a Bachelor degree in Dentistry at 2001 from Damascus University, Syria. I finished a postgraduate

## Biographies *(Continued)*

program at Orthodontics department from the same university in 2003. In April 2007 I got a Master Degree in Orthodontics. My thesis was about "The relationship between pressures, cheeks and tongue and malocclusion". I started working on laser field since 2002 at Laser research from Lipsch unit at school of dentistry, Damascus university. I have made several researches using Er,Cr:YSGG, Nd:YAG and GaAlAs(LLLT) lasers. These researches were for:

- Etching Enamel surfaces with Er,Cr:YSGG laser for porcelain laminate veneers adhesion.
- Debonding of ceramic brackets using Nd:YAG laser.
- Solving gummy smile with Er,Cr:YSGG laser.
- Effect of LLLT during orthodontic movement (published in ISLD, Berlin)
- Effect of LLLT during RME.
- Effect of LLLT after decortication.

### *M. Joyce Heinrich*

M. Joyce Heinrich formed Texas Applied Biotechnology Services in April 1995 with primary interest in Regulatory Affairs and Quality Assurance consultation services to small, start-up medical device companies. In 1998 she formed Texas Applied Biomedical Services, Inc. (T.A.B.S.) with primary interest in clinical research consultation services. Mrs. Heinrich has over 30 years experience in the medical device field and was instrumental in obtaining FDA clearance for numerous companies including In-vitro Diagnostic Products, Cardiovascular devices and surgical and therapeutic lasers. She has been providing regulatory consulting services to the medical profession since 1986. Currently she is President of T.A.B.S. where she is responsible for the preparation and submission of FDA Premarket Notifications (i.e., PMAA, 510k, IDE, etc.) for new medical devices, development of quality systems and quality assurance programs, development of investigational protocol for clinical trials and multiple FDA Quality System/GMP compliance programs. She is also the Chairperson for TABS Research Review Committee, an independent Institutional Review Board (IRB).

Mrs. Heinrich attended the University of Tulsa and received her degree in Medical Technology following her internship at St. John's Hospital in Tulsa, Oklahoma.

### *Raymond J. Lanzafame*

Raymond J. Lanzafame, M.D., M.B.A., F.A.C.S. is an active general surgeon certified by the American Board of Surgery, and the American Board of Laser Surgery. His clinical expertise includes treatment of diseases of the breast, gallbladder, hernia disease, among other conditions; with par-

ticular interest in minimally invasive surgery and the use of lasers and other innovative technologies. He holds 27 organizational memberships including: Society of University Surgeons, SAGES, Central Surgical Association, and SSAT. He is Editor-in-Chief of Photomedicine and Laser Surgery, on Editorial Boards for General Surgery News, Journal of Laparoscopic Surgery, Journal of the Society of Laparoscopic Surgeons (JLS), Lasers in Surgery and Medicine, Lasers in Medical Science, and is on the Editorial Boards of numerous scientific and surgical journals. He is past president of the Upstate Chapter American College of Surgeons and American Society for Laser Medicine and Surgery (ASLMS) is Director of CME for ASLMS, and President of NAALT, and is Board member and Past-President of SLS. He testified before FDA on device regulation, participates national panels on lasers, credentialing, laparoscopy, managed care, performs medicolegal and biotech consulting, and is consultant to the General and Plastic Surgery Devices and Medical Devices Advisory Committee panels of FDA-CDRH. His publications include 190 papers and 3 textbooks. He received numerous awards and has 7 Who's Who listings. He participates national panels on lasers, credentialing, laparoscopy, managed care, performs medicolegal and biotech consulting, is consultant to the General and Plastic Surgery Devices and Medical Devices Advisory Committee panels of FDA-CDRH. He was Vice President for Medical Affairs at Lakeside Memorial Hospital (2004-2006). He is active on numerous RGH committees and the RGH Foundation Board of Directors, and the Monroe County Medical Society's Board of Directors.

### *Steve Liu*

Steve Liu, L.Ac., has a BS in Electrical Engineering, San Jose State University, San Jose, CA. He specializes in Laser Acupuncture in Tucson, Arizona and has written articles on Laser Acupuncture, published in the California Journal of Oriental Medicine (CJOM), by the California State Oriental Medical Association (CSOMA), and presented similar topics in the American Association of Oriental Medicine (AAOM) 2006 annual conference. Mr. Liu is a member of North American Association for Laser Therapy (NAALT) and International Society for Optical Engineering (SPIE). He is also President Emeritus of the Arizona Society of Oriental Medicine and Acupuncture (AzSOMA) and the founding member and President of American Society for Laser Acupuncture Therapy (ASLAT).

### *Anu Makela*

Born of Finnish parents Anu Makela grew up and studied in Australia, graduated with honors Medical Department of Australian National University (Canberra). She has worked with lasers since 1983 and became the dean of the Acupuncture and Bioenergy Research Institute of Finland in 1995. She has several doctorates including medicine, biochemistry, nutri-

tion and traditional Chinese medicine. She is the president of the Electrophysiologist's Union of Finland and Chairman of the EMLA Finland. She is a member of the Laser Academy of Sciences (Russia) and board member of the European Medical Laser Association as well as Editor of the EMLA Laser Health Journal.

She has published several books in the health sciences, and close to a hundred scientific articles.

She is head of a medical laser clinic in Helsinki, specialized in neurological and endocrinological diseases. She also holds lectures regularly to students studying medicine and laser sciences in Helsinki as well as has traveled widely as an invited lecturer.

### *Margaret Naeser*

Margaret Naeser, Ph.D., L.Ac., is Research Professor of Neurology, Boston University School of Medicine. Her research is funded by the NIH and the Department of Veterans Affairs. She has conducted brain imaging research with stroke patients who have aphasia, since 1974. Her current research investigates whether transcranial magnetic brain stimulation can be used to improve speech in these patients. [www.bu.edu/naeser/aphasia](http://www.bu.edu/naeser/aphasia)

She is also a licensed acupuncturist in Massachusetts (Diploma, New England School of Acupuncture, 1983). She first learned laser acupuncture in Shanghai, China in 1985. Her research with acupuncture and laser acupuncture to treat paralysis in stroke was funded by the Robert Wood Johnson Foundation in the 1980's; four papers were published. She has also published three papers on her research with laser acupuncture to treat carpal tunnel syndrome. [www.bu.edu/naeser/acupuncture](http://www.bu.edu/naeser/acupuncture)

She has written two invited reports for the FDA and the NIH, regarding acupuncture research with neurological disorders (1994, labeling change for acupuncture needles from Class III/Investigational to Class II/Safe; and in 1997, NIH Consensus Development Conference on Acupuncture). She has published one book on laser acupuncture, and one book on Chinese herbal patent medicines.

### *Michael Patterson*

Michael Patterson, M.Sc., B.M.Sc. graduated with a Master of Science degree in Medical Biophysics from the University of Western Ontario in 2006. During both his undergraduate and graduate work he was involved in developing diagnostic methods to study cellular metabolism during exercise. He has spent a substantial amount of time modeling the transmission of light through tissue in order to accurately measure tissue oxygen concentration. In addition to continuing to this work, Mike is currently working for Meditech International in Calgary, Alberta, Canada.

### *Anne Penman*

The Anne Penman Program was developed by Anne Penman in 1992. Her center in Glasgow Scotland was the first in the United Kingdom to offer Laser Treatment to help smokers quit. She has treated long-term smokers from all walks of life, who have given up smoking permanently. A reflection of the treatments level of success is that a high number of new clients come from personal recommendation. Anne was a heavy smoker for 20 years and understands the difficulties first hand. During the past fifteen years she has used her own personal experience and that of her clients to continually develop the Stop Smoking Program.

Anne Penman has been teaching technicians for 12 years.

The Anne Penman Program has been available in the America for three years.

### *David Rindge*

David Rindge DOM, LAc, RN has more than thirty years experience in health care as a doctor of oriental medicine, registered nurse, respiratory therapist, clinical lab technologist and perfusionist. He is President Emeritus of the Florida State Oriental Medical Association. David lectures nationally to certify health care providers in energetic therapies through Healing Light Seminars, HYPERLINK "<http://www.healinglightseminars.com>" [www.healinglightseminars.com](http://www.healinglightseminars.com), is co-author of Laser Therapy: A Clinical Manual and a regular columnist for Acupuncture Today.

### *Dr. Gerry Ross*

I practice dentistry in a small town just north of Toronto Canada. I have been using lasers since 1990 and low level lasers and phototherapy devices since 1993. I have lectured extensively both nationally and internationally and have written numerous articles on lasers. I am also president of Laser Light Canada which distributes numerous phototherapy devices to the dental profession.

### *Dr. Leonard Rudnick*

My first career was teaching Children with learning disabilities (ten years). I also established a special program for "mentally retarded children" at New York Medical College/FIwo and Fifth Avenue Hospitals, in East Harlem, New York. As a result of this innovative program, I was invited to speak at two International Conferences on Mental Retardation, University of Madrid, Spain and The Royal Society of Medicine, London, England.

I enrolled at Palmer College of Chiropractic, Davenport, Iowa in September, 1972. I graduated October 4, 1975. While still a student, I was one of four people who wrote the institutional self study leading to Palmer College being accredited by the U.S. Department of Education. For a



## 7th Annual Conference

### *Biographies* (Continued)

nine month period I was an student, instructor and administrator. I left for private practice in July 1976.

I have been in practice for 32 years, the last almost 12 years devoted exclusively to Low Intensity Laser Therapy. I have treated approximately 8,000 patients, about 98% of them being what I call, "end of the line patients". The success rate, in terms of improvement, is about 90%.

My introduction at the 4th Annual International Conference on Low Intensity Laser Therapy, Toronto, Canada, April 21-23, 2006 was, "The doctor who has treated more patients, hands on, with more varied conditions than any other doctor in North America, Possibly the world" (Fred Kahn, MD, Meditech International, Inc.).

I have lectured internationally and serve as a consultant to dozens of doctors throughout the U.S., Canada and some other countries.

#### *Anita Saltmarche*

Anita Saltmarche, RN, BScN, MHSc, completed her nursing training at George Brown College and degree at Ryerson University. Later she completed her Master of Health Sciences, with a clinical and research focus. Anita has been principle and co-investor on a variety of peer review studies. She has worked as a clinical nurse specialist and a variety of positions in acute care hospitals, long term care and home health care settings.

For the past six years, Anita has been VP of Clinical and Scientific Affairs for MedX Health, a manufacturer of low level laser and light therapy products. She has developed a detailed laser and light treatment manual and been involved in their regulatory approvals. Anita is general secretary for NAALT.

Over a decade ago Anita started HealthCare Associates which provides research, clinical and educational services, as well as product development for numerous health care associations, facilities and companies in Canada and the US.

#### *Marjorie Talacko*

As a Certified Hand Therapist (1993) and Occupational Therapist (1975) I am a leading provider of outpatient hand therapy on the North Shore of Massachusetts. My current project is to further develop expertise in using Low Level Laser Therapy as an adjunct treatment with of nerve and upper quadrant injuries; I recently presented a poster for the ASHT (American Society of Hand Therapists) national conference on the biological impact and benefits of LLLT for upper quadrant diagnoses and wrote an article on LLLT for their online publication. I am an active member of the New England Hand Society and past coordinator of the Bay State Hand Therapy Group.

#### *Heather Tick*

Heather Tick M.A., M.D. is the co-founder and present director of The RSI Clinic in Toronto: an Integrative Pain Treatment Centre. She has treated thousands of patients with Repetitive Strain Injuries and other myofascial disorders using complementary and alternative techniques integrated with conventional medicine. She is a practitioner and an instructor of Intramuscular Stimulation, an acupuncture technique that effectively treats myofascial injuries. She has used lasers in her practice since 1993. She is a frequent presenter on the topic of RSI and workplace safety, and healthy aging medicine. She is currently working with the University of Arizona Department of Family and community Medicine to start an Integrative Pain Centre in Tucson She is also involved in research projects with the University of Waterloo and the University of Arizona. She has recently completed a book on RSI: Life Beyond the Carpal Tunnel.

#### *Jerome M. True*

Jerome M. True, D.C., DABCN is a board certified chiropractic neurologist practicing in Stuart, FL. He is the co-author of the textbook Myelopathy, Radiculopathy and Peripheral Entrapment Syndromes published by CRC Press in 2002. He contributed the chapter "Nerve Injuries in Competitive Sports" to the second edition of: Conservative Management of Sports Injuries. Hyde, T. and Gengenbach M.(eds.), published by Jones and Bartlett in April 2007. He has recently published articles on laser safety and has published many articles in Chiropractic Association Journals. He has lectured for the California Orthopedic Association, the American Association of Orthopaedic Medicine, the Florida Chiropractic Association, the Illinois Chiropractic Association and many other county and local symposia.

#### *Dr. Nicholas A. Wise*

Dr. Nicholas A. Wise is a second generation chiropractor in private practice in Spartanburg, SC. He received a B.A. in Philosophy from the University of South Carolina in 1994, and graduated Magna Cum Laude from Sherman College of Straight Chiropractic in 2000. In Feb, 2005, Dr. Wise traveled to India and met with Members of Parliament, the Honorable Ministers of Health, Education, and Textiles, as well as many other government dignitaries regarding the creation of the chiropractic profession in India. Always striving to deliver the best possible clinical results, Dr. Wise developed the Cranial Laser Release Technique, which uses LLLT on a little known cranial microsystem for instant pain relief and soft tissue normalization. Dr. Wise is the author of It IS All in Your Head, the first textbook on CLRT, as well as an instructional DVD for clinicians. He also writes a regular column, "Healthcare for Geniuses," in the Spartanburg Today monthly magazine and plays drums in a rock and roll band.

# Abstracts

## *Light Interaction With Human Central Nervous System Progenitor Cells*

*Juanita Anders*

Juanita Anders 1, Tara Romanczyk 1, Helina Moges 1, Ilko Ilev 2, Ronald Waynant 2 and Leonardo Longo 3

1. Department of Anatomy, Physiology and Genetics, Uniformed Services University, Bethesda, MD, 2. Center for Devices and Radiological Health, Food and Drug Administration, Rockville, MD, 3. University of Siena, Siena, Italy

In this presentation two topics will be considered. The first topic is a possible downstream mechanism by which a light induced up regulation of ATP can cause neurite elongation in Normal Human Neural Progenitor cells (NHNPC). The second topic will examine the role of dosimetry and power density in neurite elongation of NHNPC.

We previously reported that NHNPC exposed to 810 nm light once daily for three days (Dose of 0.2 J/cm<sup>2</sup>, Power density of 50 mW/cm<sup>2</sup> for 4 seconds, 0.5 cm beam diameter) had significantly longer neurite extensions ( $p < 0.001$ ) than control NHNPC that were not treated with light. G protein-coupled receptors (GPCRs) are the largest super family of proteins in the body. One thousand different GPCRs have been identified, and some are activated by exogenous stimuli such as light, odors and taste. P2Y receptors are ubiquitous GPCRs that respond to adenine and/or uridine nucleotides. They are coupled to specific cellular functions including angiogenesis, neurotransmission, wound healing, morphogenesis, cell proliferation, and apoptosis. Suramin hexasodium salt is a non-selective P2Y purinergic antagonist that prevents G protein coupling to P2Y receptors by blocking the interface between the G protein subunits. The hypothesis for these experiments was that blocking G protein coupled P2Y receptors will inhibit light induced cellular responses. Therefore, the specific aim of this study was to determine if suramin inhibited light induced NHNPC neurite extension. The NHNPC were exposed to 810 nm light (as described above) in either media alone or media containing 100  $\mu$ M suramin. On day 3, the suramin and light treated NHNPC had a statistically significant decrease in the average number of neurites per neurosphere (light treated = 18.17; light +suramin = 1) and the average length of the neurites (light treated = 167.88  $\mu$ ; light +suramin = 76.33  $\mu$ ). Light induced neurite extension may be due to light interaction with cellular organelles leading to an increase in adenine or uridine nucleotides which stimulate the P2Y receptors.

Dosimetry and power density (intensity) are currently controversial phototherapy issues. Previously, we demonstrated that the optimal wavelength resulting in differentiation of NHNPCs was 810nm light. To refine

optimal parameters for phototherapy of in vitro NHNPC the dose and power density of 810 nm light was varied. NHNPC were placed into one of three treatment groups, two slides per group: 1) Control (no factors, no light); 2) Factors (no light); and 3) 810nm Light Treated (spot size 0.78cm<sup>2</sup>). The 810nm Light Treated consisted of 4 subgroups: 1) 0.01 J/cm<sup>2</sup> dose: 1, 5 and 19 mW/cm<sup>2</sup>; 2) 0.05 J/cm<sup>2</sup> dose: 1, 5, 15, 19, 25, and 50 mW/cm<sup>2</sup>; 3) 0.2 J/cm<sup>2</sup> dose: 1, 5, 15, 19, 25, and 50 mW/cm<sup>2</sup>; and 4) 1 J/cm<sup>2</sup> dose: 1, 5, 15, 19, 25, and 50 mW/cm<sup>2</sup> (see Table 1). NHNPC were treated accordingly for three consecutive days, fixed on day seven and statistically analyzed. Twenty random neurospheres per group were digitally captured for neurite assessment, which was the average of summed neurite length measurements per neurosphere. Based on this data, as power density (19-50 mW/cm<sup>2</sup>) and dosage (0.05-1J/cm<sup>2</sup>) were increased, neurite length was significantly greater. Meanwhile, low power density (1-15 mW/cm<sup>2</sup>) did not have an effect on neurite length. Our findings suggest that there is not one optimal combination of dose and power density, but rather an optimal window of effective combinations of dose and power density.

Supported by: DOD/USUHS Intramural grant

## *keynote*

*Jan Bjordal*

The Keynote Lecture will focus on the current status of LLLT research and give a condensed view on what we know and what we do not know about effective doses and anti-inflammatory effects. The topic will be explored by scrutinizing systematic Cochrane reviews and the scientific evidence behind LLLT and anti-inflammatory drug therapies like non-steroidal anti-inflammatory drugs (NSAID) and steroid injections. Optimal LLLT-doses and therapeutic windows will be described for neck pain, low back pain, knee osteoarthritis and tendinopathies where a total of 59 placebo-controlled trial have been published. The scientific evidence in favour of LLLT is stronger in tendinopathies and neck pain than it is for NSAID and steroid injections. Future directions for optimizing LLLT in musculoskeletal pain management will be outlined.

*Rodrigo Alvaro Brandão Lopes Martins*

Low level laser therapy (LLLT) is a promising tool for inflammatory and rheumatic diseases. The possible mechanisms behind LLLT are moving from myth to reality through an increasing number of clinical and experimental controlled trials. A literature search revealed 82 laboratory trials and 11 randomized controlled clinical trials reporting about LLLT effects in inflammatory processes and impaired metabolism of ligament, tendons and muscle. The possible mechanisms of action include reduction of PGE2 levels, reduction of edema and inflammatory cell migration and



## 7th Annual Conference

### Abstracts *(Continued)*

reduction of oxidative stress. In 4 head-to-head comparisons with non-steroidal anti-inflammatory drugs (NSAIDs), there were no significant difference between NSAIDs and LLLT. However, new paradigms concerning the resolution of inflammation have emerged considerable consistency. Results from our group are in accordance with the new theories about the resolution of the inflammatory process and shed light on the possible biomodulatory effect of LLLT in inflammation.

#### *A 3D Model For Low Level Laser / LED therapy Biostimulation And Bioinhibition*

*James Carroll AMInstP, FRSM (James.Carroll@thorlaser.com)*

There are minimal and maximal intensities and irradiation times for biostimulation and bioinhibition. A 3D Arndt Schulz style model is proposed to illustrate the possibility of a 'dose sweet spot' for laser and LED therapy.

#### *Contraindications And Precautions*

*Karen Carroll. DO, ND, DPO*

The popular view is that there are few "absolute" contraindications for Low Level Laser and LED therapy but there are "relative" contraindications. For example it is generally considered that treatment of the eyes (or accidental exposure) is inherently dangerous yet Whelan et al used an LED array to improved rod and M-Cone function in rats.

How can that be? Treatment of the eyes, malignant tumours, pregnant patients, patients taking anti-inflammatory drugs and other "relative" contraindications will be reviewed in this facilitated discussion

#### *Hands on treatment of Musculoskeletal Conditions: A discussion and facilitated workshop*

*Karen Carroll. DO, ND, DPO*

After you have taken the trouble to choose the best Low Level Laser or LED therapy equipment your budget will stretch to, how do you get the best results?

For musculoskeletal diseases and injuries, your treatment technique and "dosage" could make a significant difference to the result.

Treating for pain relief, treating for improved repair, where to treat and how long for? Questions and answers will be taken from the floor and debated with an expert panel.

#### *Modulation Of Granulation Tissue Development By Phototherapy*

*Mary Dyson*

Granulation tissue develops in damaged soft connective tissue during the proliferative phase of repair and is generally replaced by scar tissue. Evidence will be presented to show that phototherapy can modulate granulation tissue formation in vivo if this is defective. Changes monitored in the rate of wound contraction due to myofibroblasts activity and in angiogenesis will be described, together with their potential clinical relevance.

In vitro studies have demonstrated the direct effects of phototherapy on the proliferation of fibroblasts, endothelial cells and pericytes. Phototherapy can also affect the secretion of soluble mediators by macrophages. The proliferation of fibroblasts, endothelial cells and pericytes can be affected indirectly by phototherapy via these mediators.

When phototherapy is applied clinically both direct and indirect effects occur and summate to produce changes in clinical outcome. The metabolic status of the irradiated tissue components and the health of the patient, together with the treatment applied, collectively determine this outcome.

Laboratory investigations continue to provide improvements in our understanding of the mechanisms by which phototherapy produces its effects on cells and tissues. However, more clinical case studies and trials, informed by these investigations, are needed to demonstrate its effectiveness as a means of improving soft tissue repair in patients in whom this is defective.

#### *Mechanisms Of Activation Of Angiogenesis Under Influence Of Low Level Laser Radiation*

*Gasparyan L.V.1, Brill G.E.2, Makela A.M.3*

1. EMRED Oy, Helsinki, Finland
2. Saratov State Medical University, Saratov, Russia
3. ABER Institute, Helsinki, Finland

Currently laser phototherapy (low level laser therapy) is successfully used in the treatment of different pathologies. Several studies have reported improvement of blood circulation and activation of angiogenesis (in ischemic areas) after influence of laser light.

It has been shown in vitro and in vivo, that laser light can increase secretion of vascular endothelial growth factor (VEGF). VEGF induces angiogenesis and endothelial cell proliferation and it plays an important role in regulating vasculogenesis and vascular permeability. In experiments and clinical studies it has been shown that red laser irradiation of patients with type 1 diabetes can protect vessels of different muscles, pancreas, kidneys and other organs from degeneration. Very promising experimental

and clinical results have been obtained after applying laser irradiation for the treatment of ischemic heart disease and conditions, following myocardial infarction.

Activation of angiogenesis under laser irradiation is one of the feasible explanations for long lasting treatment effects of laser therapy. Possible mechanisms of activation of angiogenesis and their possible clinical outcomes and limitations are discussed in the current presentation.

## *Clinical Applications And Methods Of Laser Blood Irradiation*

*Gasparyan L.V.1, Makela A.M.2*

1. EMRED Oy, Helsinki, Finland
2. ABER Institute, Helsinki, Finland

Direct intravenous and extracorporeal irradiation of blood with red HeNe or other lasers is widely used in Russia and some other countries. Blood contains several substances, which can absorb visible light and start photochemical reactions. Blood receives some amount of laser light through the skin during the conventional laser phototherapy (low level laser therapy) sessions. Higher amount of light can be delivered through laser irradiation of mucous membranes, skin areas of larger veins and arteries.

In this presentation history and current state of the methods of laser blood irradiation (LBI) are discussed.

Summaries and reports about treatment results of LBI in application of different diseases (ischemic heart disease, atherosclerotic arterial disease, bronchial asthma, tinnitus, hearing loss, diabetes and other) are presented. Our original research results are presented with the discussion of dosage, equipment used, mechanisms of action. Existing equipment and possible further development of the method is also discussed.

Detailed discussion about absorption levels of blood in different wavelengths as well as consecutive effects is presented. Different wavelengths are absorbed by different molecules in blood and are able to start different chains of photochemical reactions. Nowadays bright narrow band LEDs of different wavelengths are available. New methods of irradiation of blood (with use of lasers and LEDs of different colours and methods of delivery) are still developing. Application of different wavelengths for blood irradiation can have different final effects.

*Eyad Hamadeh*

It has been emphasized that one of the most valuable treatment objectives in dental practice is to afford the patient a pain free treatment. By the evolution of laser applications, the dental committee aimed to achieve this goal without analgesic drugs and painful methods. Orthodontic treatment is one of these concerns, that one of the major components of patient to

reject treatment is the pain accompanied during the different treatment phases. Another great concern of the patient is not to get through prolonged periods of treatment.

The aim of this study is to evaluate the effect of the low energy (Ga-Al-As) diode laser (809nm, 100 mW) on the canines retraction during an orthodontic movement, and to assess pain level during this treatment.

A group of 15 adult patients with age ranging from 14-23 years were attended the orthodontic department at Dental school, Damascus University. The treatment plan for these patients included extraction of the upper and lower first premolars because there was not enough space for a complete alignment or presence of biprotrusion.

Our findings suggest that (LLLT) can highly accelerate tooth movement during orthodontic treatment and can also effectively reduce pain level.

## *FDA Regulatory Requirements For Medical Devices*

*M. Joyce Heinrich*

The Federal Food and Drug Administration (FDA) must clear all medical devices for use on human beings before they can legally be introduced into commercial distribution in the USA. What is involved in obtaining this "clearance" – PMAA, 510k, IDE, PDP, IRB? How do therapeutic lasers fit into the FDA's bowl of alphabet soup?

## *Wound Healing: An Update 2007*

*Raymond J. Lanzafame, MD MBA FACS, Rochester, New York*

BACKGROUND:

Understanding wound healing and the mechanisms of photobiomodulation are critical for successful phototherapy. This paper discusses recent work in our laboratory.

IN-VITRO STUDIES:

Oxidative Burst: Human HEP-2 and Murine L929 cell lines were cultured in complete DMEM media. Photoradiation treatments were administered using the THOR DDII LED Device @ 5.0 J/cm<sup>2</sup>/treatment at 670 and 870nm simultaneously. The Control group received no treatment. Cell samples were taken at 25 and 120 min post treatment. Cell responses were measured using CyQuant, MTT and 2, 7-dichlorofluorescein-diacetate (DCFH-DA) assays for oxidative burst. The relative response to photoradiation after 2 treatment cycles demonstrates that the oxidative burst is the first response to photoradiation, followed by an increase in general metabolism and DNA synthesis. The magnitude of these responses increases with subsequent exposure.

## Abstracts *(Continued)*

**Nitric Oxide Precursors:** This study was undertaken to investigate the effect of topical application of an NO precursor (topically applied 2% nitroglycerin) in combination with photoradiation in an experimental wound model. Sprague-Dawley rats (280-300gr) were anesthetized (45mg/kg Pentobarbital IP) and shaved. Five  $\approx$ 5.0 mm round full-thickness wounds were created on the dorsum. The animals were divided into groups (n=4/group) based on their treatment: Controls received neither treatment Group A received photoradiation (670nm, 5.0 J/cm<sup>2</sup>, NASA LED, Quantum Devices Barneveld, WI); Group B received NO precursor only Group C received photoradiation + NO precursor. Treatment was administered daily between 0-10 days post injury. Wound closure rate was measured by wound area calculation using digital imaging in 48 hour intervals for 18 days post injury. The use of a topical NO precursor in combination with 670nm photoradiation accelerated healing in this model.

**Effects of Melanin:** This study investigated the influence of melanin on the outcome of photoradiation at 670nm in a cell culture model. Gelatin photo filters were fabricated with varying melanin contents. Human HEP-2 and Murine L929 cell lines were cultured in complete DMEM media. Photoradiation at 670nm delivering 5.0 J/cm<sup>2</sup> per treatment/ 24hr (50 J/cm<sup>2</sup> total fluence) were carried out with melanin filters placed between the light source and the wells using a LED device. Five groups based on percent melanin were treated: Group #1: no filter Group#2: gelatin alone, Group#3: 0.0125%, Group#4: 0.025%, Group#5: 0.050%. Cell proliferation was measured using CyQuant and MTT assays for 240 hrs post photoradiation. Assay results demonstrated a significant dose response effect ( $p \leq 0.05$ ) in both cell lines with activity inversely proportional to melanin concentration. Cutaneous melanin content should be taken into consideration in photobiomodulation paradigms.

**Effects of Nonsteroidal Anti-inflammatory Drugs:** This study investigated LLLT outcomes in the presence of NSAIDs in vitro. Human HEP-2 and Murine L929 cell lines were cultured in complete DMEM media. Photoradiation was administered daily at 670nm using NASA LEDs (Quantum Devices, Barneveld, WI) at 5.0 J/cm<sup>2</sup>/treatment/day both in the presence or absence of NSAIDs. The NSAIDs ibuprofen, indomethacin, and acetyl salicylic acid (ASA), at concentrations 12.5, 25, and 50 mcg/ml and celecoxib at 0.75 mcg/ml were used to mimic typical serum concentrations. Cellular responses were measured using MTT for cellular metabolic rate and 2,7-dichloro-fluorescein-diacetate (DCFH-DA) assay for oxidative burst. Concomitant use of NSAIDs decreases the response to LLLT at 670nm in cell culture. This observation may partially explain the variable responses to LLLT for musculoskeletal disorders reported in the literature and suggests that photoradiation treatment parameters and NSAID use may require modification in these cases.

**Effects of Phototherapy Dose Interval:** Dosimetry and treatment frequency are controversial phototherapy issues. Efficacy of dose fractionation on photobiomodulation was evaluated in vitro. Human HEP-2 and murine L929 cell lines were cultured in complete DMEM media. Photoradiation (670nm, 5J/cm<sup>2</sup>/treatment, 50J/cm<sup>2</sup> total energy delivery), was performed varying treatments per 24hr period: Group I (Controls)- 0, Group II-1/d, Group III-2/d, Group IV-4/d. Cell proliferation was measured using Cyquant<sup>®</sup> (fluorescent DNA content) and MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrasolium bromide) assays for 240 hrs post therapy. A Proliferation Index: PI = (# Cells Experimental  $\div$  # Cells Control) was computed. MTT assay results demonstrated maximal response in Group III ( $p < 0.05$ , n=3). Cyquant<sup>®</sup> maxima occurred in HEP-2 Groups II and III ( $p < 0.045$ ) and L-929 Group III ( $p < 0.091$ ). Cellular response to dose frequency varies. More frequent treatments (2/24hrs) increased metabolism and proliferation in both cell lines. Further investigation of dose fractionation in phototherapy is warranted

### IN-VIVO STUDIES:

**Reciprocity of Phototherapy:** Energy Density and Exposure Time reciprocity is assumed and routinely used in Low Level Laser Therapy (LLLT) regimens. This study examined dose reciprocity effects on wound healing. Pressure ulcers were created on seven groups of C57/BL mice (n=18). Photoradiation was administered (18 days; 5 J/cm<sup>2</sup>/d @ 670 nm) using a custom LED apparatus and treatment matrix varying both intensity and exposure. Control animals were treated similarly, without LLLT. Ulcer staging was performed using a standardized scale. Changes in stage, wound area and wound closure rates were measured. Histology was performed. Photostimulatory effects at day 7 occurred with parameters of 125 s @ 40 mW x 1/d; 625 s @ 8 mW x 1/d; 62.5 s @ 40 mW x 2/d; and 312.5 s @ 8 mW x 2/d; and at day 18 using 625 s @ 8 mW and 312.5 s @ 8 mW x 2/d. Statistically significant increases in wound closure rates occurred using 625 s @ 8 mW; 62.5 s @ 40 mW x 2/d; and 312.5 s @ 8 mW x 2/d treatments. Mean ulcer grade scores were similar to controls. Varying Irradiance and Exposure Time to achieve a specified Energy Density affects phototherapy outcomes in this model. Variation of Exposure Time and Irradiance may account for conflicting results in the literature. Further studies of these effects are warranted.

### CLINICAL TRIALS:

Two studies are being conducted to determine whether light treatments, when given with other standard wound care treatments and regimens, are more effective in promoting wound healing than standard care alone. Light therapy is provided 4 days/week, until the wound is healed. All patients continue their routine wound care. Patients in one study are treated with the THOR-DDII LED at 660 and 850nm with a power density of 50mW/cm<sup>2</sup> and 150mW/cm<sup>2</sup> per wavelength respectively

and a fluence of 4 J/cm<sup>2</sup> (1.7 minute treatment). Light therapy patients achieved a partial response in 25% (5/20) and complete healing in 52% (11/21) cases. The control group patients were essentially unchanged (7% average reduction in wound area), and none of these wounds healed. These results are significant at  $P < 0.001$  level.

#### DISCUSSION:

Biological systems are complex, with feedback loops and steps that can be inhibited, stimulated, or provide critical components for other processes. Some processes can be bypassed or produce end products, given proper substrates. Some byproducts of activity of neutrophils, lymphocytes and other cellular components of the inflammatory cascade produce damage if left unchecked. Healing is affected by upregulation of specific substrates and inhibition of others. Collagen production is stimulated, various cytokines are upregulated (EGF, TGF- $\beta$ , FGF, etc.) and inflammatory cytokines (IL-6, IL-8, and IL-1) are downregulated by photobiomodulation. Upregulation of cytochromes, other transport and energy compounds (NADH, ATP, ADP, etc.), enhances activities of various cellular components in the local wound milieu. It should be possible to construct dose-response curves (matrices) for various wavelengths that are correlated with knowledge of specific tissue components and activities. Successful use of phototherapy is critically dependent on understanding its mechanisms and strict attention to treatment parameters.

#### *Laser Acupuncture Therapy (LAT): History, Recent Research And Development* By Steve Liu, BSEE, L.Ac.

In last few years across all medical practices public has seen tremendous increase of interest in low level laser therapy (LLLT) by various practitioners from medical doctors to physical therapists to chiropractors and acupuncturists. In our acupuncture profession we also have heard and seen several prominent American laser acupuncturists gave lectures and even published studies in laser acupuncture therapy (LAT). It is the intent of this paper to inform practitioners that the significant therapeutic effects of LAT should not be ignored and, instead, be encouraged to do further investigation by all acupuncture professionals. The procedure is non-invasive, produces no pain, and no heat, and it is environmentally clean, and best suitable in pediatric, geriatric care and needle-phobic adults. And the best of all, because of the non-needle feature laser acupuncture lends it self a perfect modality for double-blind studies. Laser acupuncture is not intended to replace needle acupuncture, but rather to add to our acupuncture modalities and broaden the effectiveness of traditional acupuncture therapy.

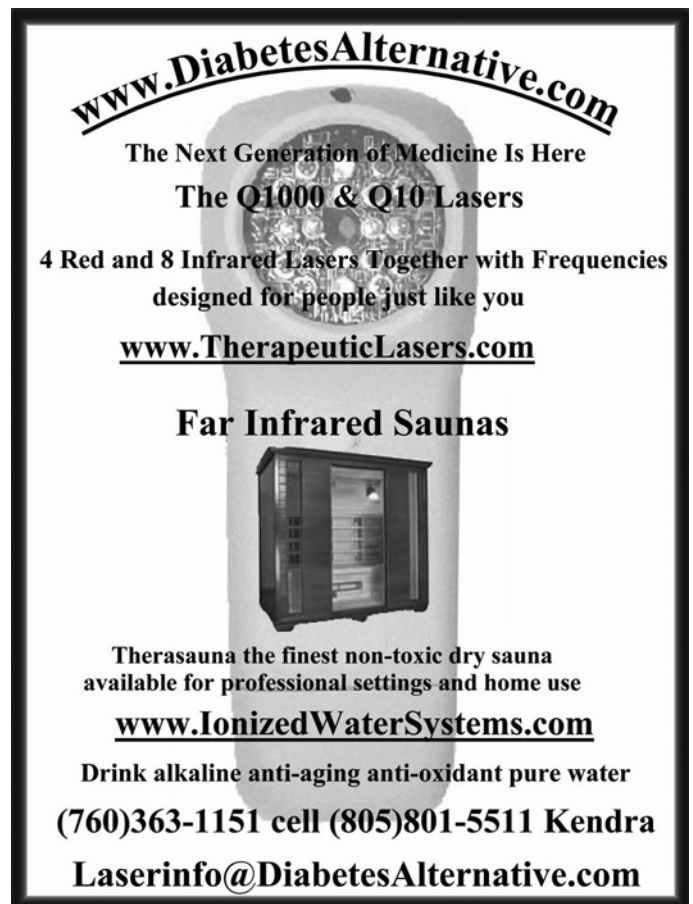
#### *Clinical Observations On Effects Of Laser Light On Blood Glucose Levels In Diabetics*

*Anu Makela ABER Institute, Helsinki, Finland*

Use of laser light in the treatment of diabetes has been under some controversy for several years. However, in Finland electrolaser-acupuncture treatments have been used for over 20 years in the treatment of diabetes with good results. This paper presents clinical observations of a group of diabetic patients.

20 diabetic patients, 15 insulin resistant, 6 type 1 diabetics were treated with ELAPS 04 electro-laser therapy equipment (EMRED OY, Finland) 10 times every 2-4 weeks. First three treatments were every 2 weeks, next 3 treatments at 3 week intervals and the next 4 once a month. Blood glucose levels recorded were average glucose levels throughout the day with 6 full blood measurements made daily.

Amount of insulin used was regulated by patient according to need. When blood glucose values under 4 mmol/l were measured repeatedly, insulin dose was decreased.




**[www.DiabetesAlternative.com](http://www.DiabetesAlternative.com)**

The Next Generation of Medicine Is Here  
**The Q1000 & Q10 Lasers**

**4 Red and 8 Infrared Lasers Together with Frequencies  
designed for people just like you**

**[www.TherapeuticLasers.com](http://www.TherapeuticLasers.com)**

**Far Infrared Saunas**



**Therasauna the finest non-toxic dry sauna  
available for professional settings and home use**

**[www.IonizedWaterSystems.com](http://www.IonizedWaterSystems.com)**

**Drink alkaline anti-aging anti-oxidant pure water**

**(760)363-1151 cell (805)801-5511 Kendra**

**[Laserinfo@DiabetesAlternative.com](mailto:Laserinfo@DiabetesAlternative.com)**



## Abstracts *(Continued)*

Results: Blood glucose levels lowered on average from 11,66 mmol/l to 6,52 mmol/l after 10 treatments with a subsequent decrease in amount of insulin used from average 26,45 units to 10,9 units, as shown in table 1.

**Table 1 Change in blood glucose levels and amounts of insulin used during course of treatments.**

	Before treatment	After 3 treatments	After 6 treatments	After 10 treatments
<b>Amount of insulin (average)</b>	26,45	22,3	16,35	10,9
<b>Glucose levels</b>	11,66	9,59	7,54	6,52

Blood glucose levels tested immediately before and immediately after the treatment showed a notable decrease of glucose levels during the one hour of treatment from average 11,89 mmol/l to 10,65 mmol/l. The largest drop was from 15,6 mmol/l to 11,2 mmol/l and the smallest was from 6,5 mmol/l to 6,2 mmol/l, as shown in table 2.

**Table 2. Changes in glucose levels immediately after treatment**

	Immediately before treatment mmol/l	Immediately after treatment mmol/l
<b>Average glucose</b>	11,89	10,655
<b>Largest drop in glucose level</b>	15,6	11,2
<b>Smallest drop in glucose level</b>	6,5	6,2

Patients also reported of the improvement of their general condition.

Results of our clinical study show that electrolaser therapy is a valuable tool in the treatment of different types of diabetic patients.

### *Laser Acupuncture And Laser Therapy Compared With Traditional Acupuncture*

*Makela A.M.1, Kaplan M.A.2*

1. ABER Institute, Helsinki, Finland
2. Medical Radiological Research Center, Obninsk, Russia

Several studies have shown functional changes in metabolic processes after acupuncture and laser acupuncture as well as laser irradiation. This study illustrates some of the morphological changes and histological changes at organ level (liver, thyroid, kidney, blood vessels, brain, lung and pancreas) and cellular levels after visible red 633 nm, 660 nm and infrared 890 nm laser irradiation at varying frequencies and doses.

The presentation compares the effects of needle acupuncture and laser acupuncture, gives some of the biochemical backgrounds and examines

histochemical reactions involved in these effects and offers some explanations at cellular level for the physiological changes occurring after light irradiation previously observed by several researchers.

The effects of these changes are considered not only from point of view of oxygenation but also the substrates released from blood cells are examined. The various effects of light on the release of cytokines, hormones and growth factors from blood cells and their effects on tissue function are discussed. The changes occurring in various types of organ tissues are presented as semi-thin light microscopic pictures, ultrasound, MRI and histological culture pictures before and after irradiation as well as follow-up explanations of these effects at functional organ level.

### *Laser Acupuncture And Microamps TENS Treatment Program For The HAND - For Carpal Tunnel Syndrome Pain Or Hand Paresis In Stroke*

*Margaret Naeser, Ph.D., L.Ac.,*

This paper will review use of this treatment program to treat pain in with Carpal Tunnel Syndrome (CTS); or mild-moderate hand paresis (weak, clumsy hand) in stroke patients or other CNS disorders (head injury, encephalitis, spinal cord injury or M.S.). This HAND treatment program is suitable for supplementary home treatments. Patients with hand paresis may have some improved hand function after 3 months of treatment. If there is severe hand spasticity ("fisted" hand in flexion) there may be no improved hand function following this treatment program, however, there may be some reduction in the spasticity following at least 3 months of treatment.

### *Laser Acupuncture And Microamps TENS Treatment Program For The FOOT - For Leg Spasticity (Sci); Peripheral Neuropathy; Poor Circulation In The Foot*

*Margaret Naeser, Ph.D., L.Ac.,*

This short teaching module will review clinical use of this laser acupuncture and micro-amps TENS treatment program for the foot. This program may be used, for example, with spinal cord injury patients to reduce cramping and spasticity in the leg and foot muscles. The program is suitable for supplementary home treatments. This treatment protocol may also be used with patients who have peripheral neuropathy (of diabetic or neurological origin) or poor circulation to the feet, including foot ulcers. This protocol may also be tried with stroke patients, or early-stage M.S. patients with mild ankle dorsi-flexion problems ("foot drop"). This protocol includes both microamps TENS and red-beam low-level laser.

## *Laser Treatment Program For Alopecia Areata*

*Margaret Naeser, Ph.D., L.Ac.,*

This short teaching module reviews clinical use of this treatment program to treat alopecia areata. (Naeser MA, Wei XB. *Laser Acupuncture - An Introductory Textbook for Treatment of Pain, Paralysis, Spasticity and Other Disorders*. 1994, Boston, Boston Chinese Medicine, pp. 110-117). Photos of before, and after laser treatment on the bald patches, are in this book.

In alopecia areata, there are patches of bald spots on the head. This may occur in children, or adult women or men. The etiology is unknown, but it is often associated with an immune system abnormality (auto-immune disorder) where there is inflammation in the hair follicles. The low-level laser treatment will have an anti-inflammatory effect, thus reducing inflammation in the follicles, and allowing hair re-growth.

## *The Properties Of Light In Tissue: Lessons Learned From Studying Oxygen Delivery*

*Michael Patterson, M.Sc., B.M.Sc.*

The continued development of light/laser therapy is highly dependant on understanding the basic principles of what wavelengths, intensities, and other light properties yield the best results for each specific medical condition. The major dilemma in determining this optimal dosage is that the properties of light in tissue are dependent on a multitude of factors including, wavelength, incident power, and the specific tissues properties including the rate of scatter and absorption. Another major obstacle in modeling light in tissue for laser therapy is the fact that there is a dosage response curve and the end point of this curve (the intensity for each specific wavelength where a beneficial effect will be seen) remains a mystery.

Fortunately for the field of light/laser therapy we do not have to begin at ground zero as a large amount of data studying these wavelengths has already been performed. Researchers working to develop a method to determine concentrations of oxidized and reduced forms of both cytochrome and hemoglobin molecules have published numerous papers on the travel of near-infrared light through many different types of tissues.

The travel of any specific wavelength of light is determined by three essential properties. The first of which is the intensity of the light. A higher intensity of light (measured in mW or in some machines in W) increases the photon density effects the depth of penetration directly. The second two factors are tissue specific and wavelength specific properties. The first of these constants is the scatter coefficient  $\mu_s$  which is a measure of the scatter within the tissue. The second of these factors is the absorption coefficient  $\mu_a$ , which is a measure of the total absorption of light by the tissue.

The focus of this presentation will be to bring to light the background of knowledge that has already been performed on the properties of near infrared light through human tissue. The presentation will also highlight methods that can be used to better estimate the actual dosage within the tissue.

## *Smoking Cessation, Using Low Level Laser And The Anne Penman Method*

*Anne Penman*

In the United States, around 26 million men and 22.7 million women are smokers. These individuals are high risk for cardiac failure (heart attacks), strokes, chronic lung disease and cancer...not to mention treated like social outcasts and with less respect than drug addicts.

I have been practicing as a smoking cessation therapist, using (LLLT) low level laser therapy, for the past 15 years. I have continuously improved my approach over the years and my success is reflected in a world-wide client base, from all walks of life, the bulk of which are referrals from successful quitters.

The challenges within the USA have included clinical trials, working under the protocols associated with an (IIRB) Independent Institutional Review Board, sourcing the best practitioners, and dealing with adverse press coverage. None of these challenges were insurmountable but they provide important learning for anyone planning to use laser therapy for smoking cessation purposes.

## *Is The Arndt-schulz Rule Really Valid? Choosing The Right Dose - It's The Terrain!*

*David Rindge*

Dosimetry is one of the most challenging issues in laser therapy. The Arndt-Schulz rule asserts that there is an "ideal" dosage for a best possible response and that too little energy will have no effect and too much will be suppressive. Is this really true?

Laser dosimetry has been considered mostly from an external perspective. How much energy at the skin will achieve the desired results at the tissue targeted? Yet if we could know or at least estimate the level and distribution of the energy already within our patients, couldn't we make better dosage decisions?

In this presentation we will explore the ancient Chinese concepts of harmony, deficiency and stagnation of energy and consider how they may provide a useful model for laser dosimetry in modern clinical practice. How does one assess the level and circulation of energy in one's patients? When and where might low and high laser dosages best be chosen?

## Abstracts *(Continued)*

### *Clinical Study Of The Use Of Low Level Lasers In The Treatment Of Hyperemia Of The TMJ*

*Dr. Gerry Ross*

**Aim of the Study** – To evaluate the effectiveness of the laser in the treatment of hyperemia (Edema) as assessed by a TMJ Doppler on 22 consecutive joints showing TMJ Hyperemia

**Materials & Methods** – The hyperemia of the joint was first evaluated using a TMJ Doppler device with a 5MHz transducer (Great Lakes Orthodontic Products – Buffalo NY) and it was recorded as severe, moderate or mild. The Doppler records fluid movement into and out of the joint and so can be used to calibrate the degree of inflammation. A DioBeam 830nm, 150mw cw laser with a 1 cm beam was used in this study (manufactured by CMS Dental Copenhagen Denmark). A dose of 16 J/cm<sup>2</sup>; 8J/cm<sup>2</sup> with the mouth open to treat of lateral pole of the Condyle and 8J/cm<sup>2</sup> with the mouth closed to treat the internal components of the joint. The treatment time was 2 minutes per joint. The hyperemia was assessed immediately following the treatment by the use of the Doppler.

**Results** – 22 Joints were evaluated on 16 patients. 12 had severe hyperemia, 9 had moderate hyperemia and 1 had mild hyperemia. All 22 Joints showed complete resolution of the hyperemia immediately after laser therapy. There were no negative clinical results associated with the treatments.

**Conclusion** – The Low Level Laser was an effective tool in the treatment of Hyperemia of the TMJ

**Discussion** – Often one of the presenting symptoms of patients complaining of facial pain is a feeling of fluid in their ears. They have often visited their physician who has found no ear problems. This feeling is coming from the Temporomandibular Joint because of the immediate proximity of the ear canal. The back wall of the joint is medial wall of the ear canal.

**Supporting Articles** – In addition reference articles will be presented which support the findings of this study.

### *Preliminary Study Of LLLT As An Adjunct In The Treatment Of Carpal Tunnel Syndrome*

*Marjorie Talacko*

After noting the effectiveness of low level laser particularly on my nerve injured patients, I became interested in developing an evidence based protocol to incorporate low level laser into my non surgical treatment of carpal tunnel syndrome.

From my perspective as a hand therapist, anything that decreased the space in the carpal tunnel can cause symptoms. Causative factors include

swelling, tendinitis, a poor wrist position and direct pressure on the nerve. As a hand therapist my treatment for CTS has included night splinting, modification of everyday tasks, education of the patient in the CT anatomy and proper wrist positioning, soft tissue mobilization, iontophoresis with sclerolytic agents, ultrasound, stretching, nerve gliding exercises, and postural and intrinsic muscle strengthening.

Understanding the physiological effect of laser on cells as well as using appropriate dosages has enabled me to treat CTS more effectively. The Primary impact of laser on tissue is through the mitochondria, leading to cell growth and repair. The nerve cells that form the median nerve originate in the spinal column between C5 and T1. These nerve cells synapse in the spinal column; the cell body in that region contains the cell nucleus and mitochondria; only the dendrite or axon of the nerve cells reach the carpal tunnel. Therefore, we apply LLLT to the cervical spine as well as to the local tissue in the carpal tunnel to promote healing. I will discuss the findings of Karu, Dyson, and Rochkind as they relate to clinical reasoning and protocol development as well as at least 5 prior studies on LLLT with CTS.

I chose to measure the efficacy of our treatment with the phalens, tinels, monofilament testing, pinch/grip strength, tolerance to neurotension, the VAS, and the DASH. I have since found that using the Moberg test may pinpoint small changes in sensation.

I will discuss the results to date of this study and it's limitations. The study is weakened by the fact that it is not a double blind study and the numbers are small. However, it certainly demonstrates a trend that the treatment rendered did result in less pain, more strength, better tolerance to nerve tests and most significantly, a markedly improved DASH (Disability of the Arm, Shoulder, and Hand) score. The measures used may be helpful for others who wish to pursue this as a double blind study in a non clinical setting.

### *The Non Surgical Treatment of Carpal Tunnel Syndrome*

*Heather Tick MA, MD*

Carpal Tunnel Syndrome (CTS) can be a confusing area for the clinician. The diagnosis is often used inaccurately—given for a heterogeneous collection of complaints of pain or dysaesthesia in the upper limb. Other times when the diagnosis is reserved for the classic constellation of numbness and pain in the distribution of the median nerve, the diagnosis may be incomplete since the carpal tunnel symptoms may be only a small part of the patient's problem.

Further confounding the diagnosis is the tendency for patients with the label of CTS to get speedy referrals to surgeons despite a growing litera-

ture supporting the non-surgical treatment of CTS. the surgical treatment frequently relieves only a small part of the patients' symptomatology.

This presentation will follow 3 clinical cases of CTS treated by a multidisciplinary pain clinic using an integrative approach to pain management and rehabilitation. Dr Tick will review the scope of the pathology present in most cases of CTS and will present 3 cases of successful the non-surgical interventions used. Each case highlights certain aspects of the diagnosis and has a different course of recovery. Laser was part of the treatment in each case.

### *Class IV Laser Treatment Of Neuromusculoskeletal Disorders: Case Studies*

*Jerome M. True, D.C., DABCN*

Laser therapy practitioners and researchers are debating the optimum laser dosage and fluence levels needed to penetrate to deep musculoskeletal target tissues. Many tissue and cell cultures have been studied with optimum dosages for biostimulation ranging from 2-12J. Research supporting deep tissue stimulation with high dose cutaneous exposure of near IR wavelengths from diode lasers is scant. However, clinical observational studies have demonstrated significant positive outcomes for class IV laser therapy in many neuromusculoskeletal disorders.

Lecture Synopsis: Overview of laser photobiomodulation principles, basic laser safety for high power lasers, laser tissue interaction, and current supportive research.

Case studies: Shoulder impingements; Neurogenic thoracic outlet case; Radiculopathy cases; Rib fracture cases; Polytraumatized patients; and cervical stenosis cases.

*Dr. Nicholas Wise*

Cranial Laser Release Technique (CLRT) is an exciting new development in natural pain relief and soft tissue normalization. Dr. Wise will teach you about the existence of little-known microsystem that exists on the cranium of every human being that corresponds to and directly controls the tone of every major muscle. Using non-invasive LLLT to stimulate these cranial reflexes, a CLRT practitioner can achieve results that defy common sense and turn conventional wisdom on its head—so to speak. In this enlightening and entertaining presentation, Dr. Wise will present the case report of a patient with chronic stroke-induced muscle spasms that resolved within seconds using this amazing method.

*For Future Events  
Visit Us At:  
**www.naalt.org***

**Meditech**  
INTERNATIONAL INCORPORATED

### LOW INTENSITY LASER THERAPY

- Meditech operates the largest laser therapy clinic in the world.
- All systems include a three day laser certification course.
- After-sales service includes clinical and technical support.
- Patient management software records each patients treatment history, including the dosage delivered in J/cm<sup>2</sup> and time in seconds.
- Flexible large surface arrays follow anatomical contours of the body ensuring the light enters the tissue and is not reflected.
- Hands-free operation allows one therapist to treat multiple patients simultaneously.
- Each system includes a library of clinically tested protocols which is based on 19 years of clinical experience.



**Research & Education Centre**  
415 Horner Ave #1, Toronto  
Ontario, Canada, M8W 4W3  
Toll Free: 888.557.4004  
[www.bioflexlaser.com](http://www.bioflexlaser.com)