Lasers in Dentistry – Current Status, Partnerships, Stakeholders and Future Paths Forward

Tues. March 10, 2015 11:45 am – 12:45pm
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View from the OSA Incubator
Aug 2014

ADEA Lasers in Dentistry Special Interest Group

Current stakeholders and future paths forward
Who is OSA?

OSA is the leading professional society for scientists, engineers, students and business leaders who fuel discoveries, shape real-world applications and accelerate achievements in the science of light.
OSA Incubators

Collaborate. Innovate. Discover.

OSA Incubators provide unique, focused experiences that connect innovators, deliver insights and spark explorations at the cutting edge of optics. Researchers, engineers and business leaders discuss new and burgeoning fields in a way that cannot be achieved through traditional meetings.

Topics for future OSA Incubators come from accomplished members of the optics and photonics community. Have an idea? Contact us today!

osa.org/incubator

OSA Incubators:
- Focus on niche or emerging topics
- Disseminate valuable information and ideas
- Encourage discussion and collaboration
- Provide a launching pad for further advancement
- Establish lasting professional networks
Adopted by the United Nations, and endorsed by more than 100 partners from over 85 countries.

Be part of IYL 2015.

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Low-level light therapy (LLLT)

- Uses visible & near-infrared non-ionizing radiation
- Treats many clinical conditions, from stroke to sports injuries
- Absorbed by endogenous chromophores; like those in mitochondria, porphyrins and flavins
- Generates nonthermal and nontoxic biological reactions
- Some promising clinical trials
- Not widely adopted by mainstream medicine & research
- **Incubator** brought research, health care, government & industry together to *explore science behind LLLT*
LLLT has been around for nearly 50 years

- Gordon-like conferences in 2004, 2007 and 2010
- Each focused on finding and collating data to support observations when lasers and other light devices were used to treat a variety of clinical issues
- Light was making patients recover faster & often helped chronic wounds heal when traditional methods failed
- ECI Gordon-like conferences very prolific; still needed work
- OSA Incubator format fit the mission & OSA agreed.
What is LLLT?

- **Photobiomodulation, or PBM**, is the preferred name.
- PBM is the set of mechanisms that produce the clinical responses to various uses of low level light.
- **PBM is the practice & study of the different ways light can be used to heal.**
- Beneficial for a wide range of injuries and diseases.
- PBM can be tailored to a patient’s needs by varying the wavelengths of light, brightness, & location, as well as the duration & profile of exposure.
What is the biggest obstacle to mainstream use of PBM?

- The field is very broad
- Health care professionals get overly excited about the therapeutic potential of PMB
- Some professionals skip working through all the variables to ensure effective treatment
What’s the strongest argument for its use?

- Light is **nontoxic, clean and easy to use**
- In traumatic brain injury and post-traumatic stress disorders, PBM can work when usual therapy fails
- PBM **hastens healing**, reduces pain and inflammation and modulated immune responses
- **Shortened treatment time** brings down health care costs
- Also **reduces patient discomfort**
Did the Incubator suggest any pathways toward more general acceptance of PBM?

• One pathway is the *establishment of a center of excellence*

• Where biomarkers associated with effective healing from LLLT can be developed and monitored

• Where the devices for administering light therapy can also be developed and monitored.

• Where the design of a center of excellence’s *activities can better mesh with existing health care, research, education & payment systems*
Are there social, ethical and professional themes or issues surrounding PBM?

- Role of professional thinking over pure marketplace thinking
- Patients & families value collaborative communication & compassion in their caregiver relationships.
- Business & bureaucratic side of our profession places more value in competition and regulation
- This mix of values sometimes gets out of whack
- We tend to focus more on our individual desires for success instead of improving care and advancing our field of study
Need to come together

• Representatives from the PBM education, research, health care, industry & government communities **need to define a common mission**

• A little coherence will shine a better and brighter light on all of us
What was the most striking clinical part of the OSA meeting—actual experiences with PBM?

Several new reports on the use of PBM to successfully treat:

- macular degeneration
- mucositis
- pre-conditioning in athletic performances
- chronic wounds
- Addictions

All added to existing evidence that PBM therapy should become common practice for these ailments
Where do we want to go, and how do we get there?

- Build a common/unique home for PBM science & education
- Explore what a PBM center of excellence would look like & where it should be located
- Articulate a common professional PBM mission & vision
- Effectively communicate why current practice standards should include PBM
- Engage other researchers, educators, health care providers, government, and industry representatives
- Promote widespread use of known PBM in clinical settings
Is there a follow up OSA in the works?

• Yes!
• Purpose is to bring key current PBM researchers/educators together
• Articulate a common mission, vision, and core values
• Develop home for higher quality research and education
• Develop integrated system for higher quality publications
• Develop higher quality and more efficient conference gatherings
• Provide foundation for industrial support and development
More Information on OSA PBM Incubator

http://www.osa.org/en-us/meetings/osa_incubator_meetings/
low_level_light_therapy_the_path_forward/

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Why does dentistry have a key role?

- Photoactivation of Endogenous Latent Transforming Growth Factor–β 1 Directs Dental Stem Cell Differentiation for Regeneration

Praveen R. Arany, Andrew Cho, Tristan D. Hunt, Gursimran Sidhu, Kyungsup Shin, Eason Hahm, George X. Huang, James Weaver, Aaron Chih-Hao Chen, Bonnie L. Padwa, Michael R. Hamblin, Mary Helen Barcellos-Hoff, Ashok B. Kulkarni, and David J. Mooney

REGENERATIVE MEDICINE 28 May 2014: 238ra69
Bio-Bay Vieques, Puerto Rico
Protozoan of the family dinoflagellata

Pyrodinium bahamense
Jellyfish
Fish