ASP NEWS

Connect

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ASP 2016

There are only eight weeks until the **38th ASP scientific meeting May 21-26, 2016** at the Tampa Marriott Waterside Hotel & Marina, Tampa FL! Please visit the conference website at http://photobiology.org/2016minisite/ for continuously updated information.

1. Registration is open online. Please register before April 18 in order to get the early rate.

2. Hotel reservations may be placed on the website. You will also find information about transportation to and from the airport and many of the exciting activities that are available in the Tampa area.

3. Abstract submission has closed but we will soon make available a "late-breaking" abstract submission opportunity for both poster presenters and a limited number of speakers.

4. The Meeting-at-a-glance is available as a downloadable pdf from the website, scientific program tab. Check this regularly as dates and times for some sessions are still being assigned.

5. I want to give a special shout-out to Ashwini Ghogare and Joe Huang who have been organizing several outstanding events for the Associate members. These include the pizza party at Tampa Pizza Company, the Mentor lunch, a grant-writing workshop and a "Careers in Industry" panel discussion event. Check the Associate Members tab for updates!

See you in Tampa!

-Beth Gaillard, PhD

ASP Votes: Election 2016

Online voting for the ASP Election 2016 will begin on April 1. Information about the candidates and the ballot will available online. Please participate in the voting process.

PSO: An Update

Many are familiar with the excellent resource of Photobiological Sciences Online (PSO), which is maintained by John Lee and Kendric C. Smith, Co-Editors and Co-Webmasters and accessible at http://photobiology.info. Here is an update:

A. GOOD NEWS FOR PSO

Photobiological Sciences Online is listed by the National Library of Medicine:
NLM ID: 101673292
PSO has been assigned an International Standard Serial Number (ISSN)
ISSN 2470-2749

B. USER STATISTICS

In December there were 12,253 Unique Page Views. The total Page Views was 14,043. PSO is very well read.

The 20 most read articles:

Article	Reads
Hamblin.html	1342
Jones.html	1303
Lin.html	1277
Crouch.html	1007
LeeBasicBiolum.html	862
Hist-Photosyn.html	859
Ilichev.html	757
Rozanowska.html	747
Oleinick.html	718
Photochem.html	660
Branchini2.html	618
Ohmiya.html	614
Brennan.htm	595
Visser-Rolinski.html	572
Hockberger.html	540
Sawhney.html	469
Roberts-CR.html	434
Shinkle.html	412
Chalker-Scott.html	397
Christie.html	384

C. NEW or REVISED MODULES

Basic Bioluminescence
John Lee Revised: 11/18/15

Analytical Applications of Luminous Bacteria Enzymes
Valentina Kratasyuk and Elena Esimbekova New: 09/18/15

The Diversity of Light-Producing Marine Organisms
Steven H.D. Haddock Revised: 7/16/15

Joseph Priestley and the Evolution of Oxygen In Photosynthesis
Thomas M. Brennan New: 02/06/15

Low Level Laser (Light) Therapy (LLLT) for Cosmetic Medicine and Dermatology
Mossum K. Sawhney and Michael R. Hamblin New: 12/04/14

Bystander Effect Induced by UV Radiation
Maria Widel New: 09/08/14

Oxygen Evolution
Charles Yocum Revised: 08/21/14

Photosynthetic Reaction Centers
Charles Yocum Revised: 08/14/14

Photoreactivity of Drugs in vitro and in vivo
Hanne Hjorth Tønnesen and Steven W. Baertschi Revised: 05/14/14

Determining the Mechanism for Photosensitized Oxidations
Jeffrey R. Kanofsky Revised: 04/24/14

DNA-Protein Crosslinks
Kendric C. Smith and Martin D. Shetlar Revised:

04/09/14

Basic Bioluminescence
John Lee Revised: 03/24/14

Basic Photophysics
Antonie J.W.G. Visser and Olaf J. Rolinski Revised: 03/24/14

Introduction to Photodynamic Therapy
David Kessel Revised: 03/23/14

UV Radiation and Spontaneous Mutagenesis
Kendric C. Smith Revised: 03/20/14

Experiments: UV Radiation Effects on Molecules and Cells
Kendric C. Smith Revised: 03/20/14

Low-Level Laser or LED Therapy is Photobiology
Kendric C. Smith Revised: 03/20/14

Basic Ultraviolet Radiation Photobiology
Kendric C. Smith Revised: 03/19/14

DNA Double-Strand Breaks
Kendric C. Smith Revised: 03/19/214

What is Photobiology?
Kendric C. Smith Revised: 03/18/14

Photobiology in Art
Kendric C. Smith Revised: 03/18/14

Basic Photochemistry
Kendric C. Smith Revised: 03/18/14

Bioluminescence - History
John Lee Revised: 02/28/14

Applications of Bioluminescence: Cell Based Assays and Imaging
Yoshihiro Ohmiya New: 01/29/14

Recombinational DNA Repair
Kendric C. Smith Revised: 01/01/14

-Kendric Smith, PhD

We need YOU!

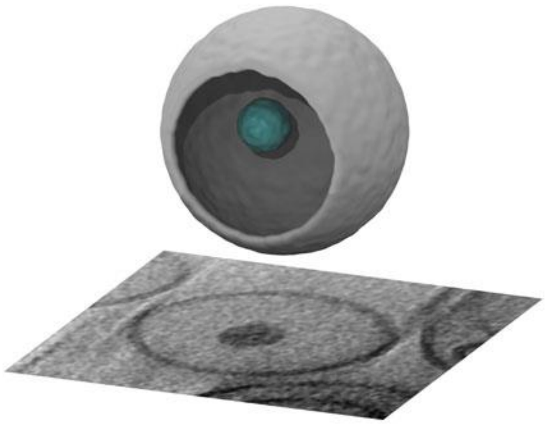
Please submit content (science highlights, suggested links, personal stories, etc) to ASP News.
Email: jflovell@buffalo.edu

Phototherapy: NIR-Activated Nanoparticle Therapy Suppresses Tumors

A nanoparticle drug-delivery system that combines photodynamic and molecular therapies has been shown to suppress tumor progress and metastatic outgrowth in animal models. The complementary treatment could improve outcomes and mitigate toxicity for patients with pancreatic cancer and other treatment-resistant tumors.

The research was conducted by the laboratory of professor Tayyaba Hasan, based at the Wellman Center. Hasan's lab focuses on photochemistry-based approaches for treatment and diagnosis of disease with the goal of developing molecular mechanisms and optical imaging-based combination treatment regimens.

Photodynamic therapy (PDT) uses chemicals called photosensitizers — activated by exposure to specific wavelengths of light — to release reactive molecules that can damage nearby cells. In cancer treatment, PDT damages both tumor cells and their blood supply, directly killing some tumor cells and starving those that remain of nutrients. However PDT can also stimulate molecular signaling pathways that support tumor survival.



3D rendering of a photoactivable multi-inhibitor nanolipsome encapsulating a nanoparticle from a cryoelectron microscopy tomogram.

The nanomedicine developed by Hasan's lab comprised photoactivable multi-inhibitor nanoliposomes (PMILs) enclosing a polymer nanoparticle that was loaded with a targeted molecular therapy drug. The lipid membrane of the PMILs contained a FDA-approved photosensitizer, BPD or benzoporphyrin derivative, and the nanoparticles were loaded with a molecular therapy drug called XL184 or cabozantinib.

XL184 inhibits two important treatment escape pathways, referred to VEGF and MET, but while it has FDA approval to treat thyroid cancer and is being tested against pancreatic cancer and several other tumors, it is quite toxic, which requires dose restrictions or treatment interruption, the researchers said. Since XL184 is delivered to every part of the body and not just to the tumor when administered orally, enclosing it in the PMIL could reduce toxicity by confining its action to the area of the tumor.

The investigators first confirmed in laboratory experiments that exposing PMILs to near-infrared (NIR) light both activated the antitumor action of BPD and, by disrupting the lipid membrane envelope, released the XL184-containing nanoparticles. In two mouse models of pancreatic cancer, a single treatment consisting of intravenous delivery of the PMILs followed by localized delivery of NIR light to the tumor site via optical fibers resulted in significantly greater reduction in tumor size than did either treatment with XL184 or PDT with BPD alone.

PMIL treatment also was significantly more effective than treatment with both XL184 and BPD-PDT given as separate agents. Along with prolonged tumor reduction, PMIL treatment also almost completely suppressed metastasis in the mouse models, the researchers reported.

While the VEGF treatment escape pathway is known to be induced and sensitized by PDT, the team found that PDT also induces signaling via the MET pathway. The ability to deliver XL184 and PDT almost simultaneously allowed the two therapeutics to cut off the rapid initiation of escape signaling that usually follows PDT. This was reflected in how much more efficient PMIL-delivered treatment was in the animal models compared to either treatment alone, since PDT simultaneously sensitized the tumor to the second therapy.

Delivery of XL184 directly to the tumor site produced these promising results at a dosage level less than one thousandth of what is used in oral therapy, with little or no toxicity, the researchers said.

"Right now we can say this approach has tremendous potential for patients with locally advanced pancreatic cancer, for whom surgery is not possible," said researcher Tayyaba Hasan. "In our Phase I/II clinical studies with PDT alone, tumor destruction was achieved in all cases, and we've seen at least one case where PDT alone induced enough tumor shrinkage to enable follow-up surgery.”

The team said they will continue to validate their nanoconstructs with the goal of clinical adoption of the treatment.

The study was published in Nature Nanotechnology (doi: 10.1038/nnano.2015.311).

-source: photonics.com

Synchronized Leaf Aging in the Amazon Responsible for Seasonal Increases in Photosynthesis

One hundred and fifty feet above the ground in the Amazonian rainforest, a vast ocean of green spreads out in every direction. The rainforest canopy is made up of mostly tropical evergreen trees, which take in enormous amounts of carbon from Earth's atmosphere. Understanding the carbon cycle in these forests – how carbon is stored in plants and soil and then returned to the atmosphere – is crucial to creating accurate models that predict how global climate will change in the future. Key to that puzzle is understanding photosynthesis in tropical forests.

"We want to understand whether photosynthesis in tropical evergreen forests is driven primarily by seasonal climate or by the internal dynamics of the rainforest," said Jin Wu, a post-doctoral research associate at the U.S. Department of Energy's (DOE) Brookhaven National Laboratory. Wu is the lead author on a study completed while he was a Ph.D. student with senior author Scott Saleska, Associate Professor of Ecology and Evolutionary Biology at the University of Arizona, published online in the February 26 issue of Science.

Wu, together with other members of Scott Saleska's lab and international collaborators from Brazil, Australia, and Japan found that new leaf growth is synchronized with old leaf loss in the dry-season of the Amazon rainforest. This shifts the makeup of the tree canopy towards younger leaves, which display higher photosynthetic capacity, and explains the large observed seasonal increases in photosynthesis throughout the ecosystem.

Climate models have long represented the tropics in an overly simplistic way, often due to the lack of data from these hard to reach regions. That view assumed that tropical forests have consistent canopy greenness throughout the year—unlike the dramatic seasonal changes in temperate forests, heralded by vibrant reds and yellows.

"At the landscape level, it always looks evergreen," Wu said. But broad-scale images—for example, those taken by satellites—often can't discern the ground level subtleties that have a large impact on the level of photosynthesis. "Evergreen doesn't mean there are no internal dynamics," Wu said.

To better examine the impact of these internal dynamics on photosynthesis, Wu and his colleagues used all available data from four sites in the Amazon with a wide range of tree species, rainfall gradients, and soil types: three spots near the equator along the Amazon River, and one water-limited site on the southern side of the Amazon.

At these sites, the researchers measured variables that allowed them to calculate the aggregated photosynthesis rate across the whole forest. They found that the derived photosynthetic capacity from these measurements is seasonal. That is, though the forest is evergreen, the internal photosynthetic machinery changes throughout the year.

Pictures like this one, taken from special cameras installed on towers above the rainforest canopy, recorded the changes in hundreds of individual tree crowns over the seasons in three different forests across the central Amazon.

To determine what caused these changes, they used tower-mounted cameras perched over the treetops to survey a plot about a third of a mile square, observing the changing quantities and qualities of leaves in the canopy crowns. They found that leaf area increased significantly during the dry season, but these increases precede photosynthetic capacity by at least 1 month, which is increased twice as much as would have been expected from the increase in leaf area alone.

"It's not just the quantity of leaves that makes a difference. In tropical evergreen forests, the overall quantity of leaves doesn't change that much, so the quality of leaves is an important driver in photosynthesis," Wu said.

To investigate the quality of the leaves, expert tree climbers accompanied the researchers as they trekked into the jungle, scaling the trees to tag individual leaves from the time they emerge and take photographs weekly and then monthly. This work revealed important changes in leaf biophysical and physiological properties through their lifecycles.

"Photosynthesis is like a metabolism," Wu said. "As human beings, our metabolic rates are strongly age-dependent. Leaves are similar. During their first two months, leaves expand and acquire more chlorophyll, becoming greener." But Wu and his team found that leaves don't reach their photosynthetic peak until they are fully expanded at two to five months old. At that point, they are more efficient in absorbing light and more efficient in converting light to food — that is, stored carbon. After six months, their photosynthetic rates decline as they enter 'old' age.

The effect of leaf age on physiology explained the surprisingly high seasonal changes in photosynthetic capacity.

Wu said that incorporating these details about tropical evergreen leaves into earth system models will allow for more accurate predictors of carbon exchange and, ultimately, their feedbacks to climate.

-source: bnl.gov

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www.photobiology.org

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Upcoming Photobiology Events

ASP 38: May 21-25, 2016, Tampa Bay

The time and place has been set! Mark your calendar and plan on joining ASP for the next conference. We will highlight the upcoming meeting and the destination in the newsletter.

Conference details are available online:

http://photobiology.org/2016minisite/

March 30- April 3, 2016
American Society for Lasers, Medicine & Surgery 36th Annual Meeting
Boston, MA
http://www.aslms.org

April 26-29, 2016
European Networks Conference on Algal and Plant Photosynthesis
Qawra, Malta
http://encapp2016.eu/home/

May 29 – June 2, 2016
19th International Symposium on Bioluminescence and Chemiluminescence
Tsukuba, Japan
http://isbc2016.com

September 1-4, 2016
7th International Conference on Oxidative Stress in Skin Medicine and Biology
Andros, Greece
http://oxstress.pharm.uoa.gr/

October 24-28, 2016
Photodynamic Therapy and Photodiagnosis