

# ASP NEWS



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## Note from the Editorial Committee

ASP 37 has come and gone and I hope that all those who attended had a good experience. The Hard Rock Hotel was an unforgettable venue. The conference size was just right to allow both exposure to a wide range of exciting science and also getting to know new people. The food and weather were so fantastic that many conference-goers like myself may be questioning themselves as to why they have not yet moved to San Diego! With the announcement of ASP 38 in Tampa in 2016 (p. 8), which seems eons away but will roll around soon enough, we can start looking forward to more sunny scientific meetings ahead.

There has also been significant change within the ASP. We thank Beth Gaillard for her completing her term as president and now welcome our new president Keith Cengel to the helm.

-Jonathan Lovell

## Meet a Photobiologist:

*Douglas Learn, PhD*



Director, Charles River Center for Photobiology  
ASP Member since 1989  
New Editor, Photobiological Sciences Online

## Questions & Answers

**Q:** *What has been your career path so far?*

**A:** In a word, varied. I have a Ph.D. in medical microbiology and did my post-doctoral work at St. Jude Children's Research Hospital in Memphis in neutrophil enzymology and cell killing. The closest I got to photobiology was the photoconversion of pyoverdinin to pyocyanin, a toxic compound produced by *Pseudomonas aeruginosa* that was part of my dissertation. When I finished my post-doc I joined the Skin Biology Research Group of Schering-Plough HealthCare Products in Memphis, turning myself into a photobiologist by necessity, not by training. There I worked in supporting the Coppertone Suncare Line with work on the mechanisms of both acute and chronic effects of ultraviolet radiation in the skin, amongst other things like jellyfish sting prevention. After being there for 10 years, I moved to Charles River where

I have been since 1990 and now am the director of their Center for Photobiology and am also a Study Director and a member of our site's management.

*Q: Can you tell me more about the Charles River Center for Photobiology?*

**A:** The Center primarily carries out regulated (meaning required for drug approval) research for the pharmaceutical industry. We carry on the legacy of photobiological investigation that was initiated at the Temple University Skin and Cancer Hospital under the direction of Frederick Urbach, MD, in the 1960's. The Center is now the leader in regulatory phototoxicology. In that area, our scientists, as a contract service provider, are responsible, by US FDA and ICH guidelines and Good Laboratory regulations, to evaluate the safety of compounds that absorb between 290-700 nm, locate to or applied on the skin or eyes and generate a radical based on photochemical reactions. But that is a whole article in itself.

*Q: What type of customers come to you?*

**A:** Primarily pharmaceutical companies from all over the world, although there is a growing requirement for evaluation of chemicals for photosafety, so work from chemical companies is beginning to be seen. We also interact with regulatory agencies regarding photosafety policy, primarily because of our expertise and experience.

*Q: What about photosensitizers for photodynamic therapy?*

**A:** That is a whole different story – since for those compounds you actually want phototoxicity and the regulatory agencies understand that there will be this response. The challenge is then understanding the biology of the molecule and the potential risk of that molecule in the patient, usually to environmental or surgical lighting conditions. For a long time, there were none of these molecules being commercialized, but now, both for PDT and also for fluorescent markers of tumor locations, these are again being tested for safety. This is one of the services we provide and the challenge to be sure that the balance between function and safety is clearly identified to allow the company and ultimately a physician to understand any risk to the patient.

*Q: How will you handle the responsibility of maintaining Photobiological sciences online?*

**A:** I will work with the ASP Board to take the work of Kendric Smith and make the PSO a prominent feature on the website, maintain and update the current content on the site, reach to the membership and industry for support and make PSO more known to our community and the community at large. This is a source of information and assistance for the membership, and I will need their help in making it a success. In addition, industry has a large amount of technical expertise and experience, and this can be built into the site for the benefit of all, not just the membership. We need to continue and expand this as an extremely valuable resource for photobiologists worldwide. I also want to make sure that applied and instructional knowledge is available that will be helpful to others. For example, photobiologists may not know how to accurately measure light sources and calculate intensity and dose – we can make that practical information available. Also, we need to modernize the website and also start keeping track of digital web metrics to better understand who our audience really is and how they are using the site, then use that information to design a better PSO and make sure that we maintain the current audience but expand it.

*Q: Do you have any career tips to share with photobiologists looking for industry positions?*

**A:** Regardless of where you want to continue your career, start looking for a job years before you need one. Also, it is a good idea to build up skill sections on your CV. Consider professional development courses. There are lots out there, like NIH Biotechnology Training courses (link: [BioTrac](#)) When you go to meetings, seek out the posters and presenters from industry along with academia. Ask them how they got where they are today, and if they have any internships, work studies, or other opportunities to learn this part of the science. Take a business course or two; understanding budget and finance concepts is critical regardless if you are working in industry or writing grants; you will be handling money and personnel. And take advantage of what your University's career service can provide.

**-We caught up with Douglas Learn in San Diego at ASP 37.**



**We need YOU!**

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

### **Historian's Corner: ASP 37**

Since the 2014 ASP meeting has just come to an end, it seemed appropriate to provide a bit of 'history' of that event rather than delving into the dimmer past. The Hard Rock Hotel had a more modern decor than, e.g., more traditional hotels. In Figure A, the HR registration desk is shown; a stark contrast to the more traditional lobby of the nearby Hyatt (B).

In spite of this difference, the meeting itself contained the usual elements: presentation of poster awards (C), entertainment by the new President (D), a reception (E, H), a meeting with the Editor and Asst (F), all within the historic heart of San Diego (G).



The obligatory Dinner was held at the Harbor House (I), one of the better restaurants in Seaport Village. This is a vast collection of shops, eateries, displays, impromptu demonstrations and a view of assorted shipping ranging from sailboats to aircraft carriers. San Diego is one of the more popular meeting sites and with good weather year-round, an obvious choice for ASP 2014.

-David Kessel





## Sunlight physiology: Sunlight Might be Addictive

Why has it been so hard to discourage people from spending time in the sun when the dangers of ultraviolet light exposure are so well recognized? A new study from Harvard Medical School investigators at Massachusetts General Hospital adds important support to the theory that ultraviolet (UV) light can actually be addictive.

The scientists found that chronic UV exposure raises circulating levels of beta-endorphin in mice and that UV-habituated mice exhibit withdrawal symptoms if beta-endorphin activity is blocked. Their report appears in the June 19 issue of *Cell*.

Several studies—particularly those enrolling people who use indoor tanning facilities—have found evidence of addiction-like behavior in frequent tanners. For example, frequent tanners were somehow able to tell the difference between tanning beds using UV radiation and those delivering non-UV light.

Other studies have found that administration of an opioid blocker produced withdrawal-like symptoms in frequent tanners, implying but not proving that something had been regularly activating opioid pathways.

Part of the skin's natural response to UV light is production of a protein called POMC, which is then clipped into several smaller fragments, one of which induces production of the pigment melanin. Processing of another segment of POMC leads to generation of beta-endorphin in the skin. The current study was designed to investigate whether this UV-induced beta-endorphin produces opioid-like effects such as pain relief and dependency. The study also examined whether the pathway mediating these effects is initiated by the production of endorphin in the skin.

The investigators delivered a daily dose of UV light—equivalent to the exposure of fair-skinned humans to 20 to 30 minutes of midday Florida sun—on the shaved backs of a group of mice for 6 weeks. The dose was calculated to induce tanning but not burning of the animals' skin.

Within a week of the first UV exposure, levels of beta-endorphin in the animals' blood rose significantly, remaining elevated during the study period and gradually returned to normal after UV exposure was discontinued. Tests conducted at regular intervals during the study period showed that the UV-treated animals were less responsive to light touch or temperature changes than a control group with no UV exposure. The higher the animals' beta-endorphin levels, the less sensitive they became. But administration of naloxone, which would broadly block opioid-pathway activity, returned skin sensation back to normal in the UV-treated animals.

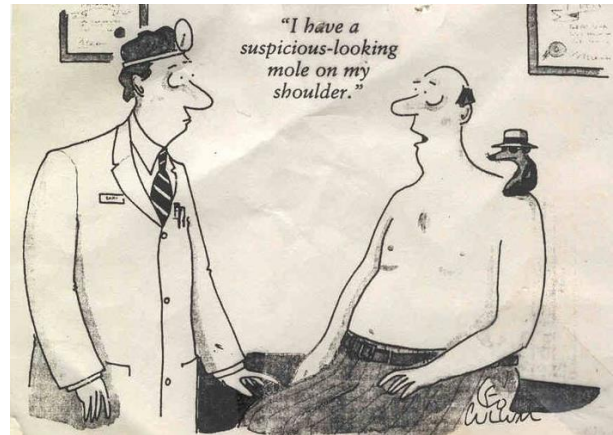
In UV-habituated animals, naloxone treatment also produced classic symptoms of opioid withdrawal, such as trembling, shaking and teeth chattering. And mice trained to associate the effects of naloxone with an environment they would naturally prefer—a dark box instead of a light box—invariably chose to enter the area where they had not experienced naloxone-produced symptoms. In contrast, a strain of mice in which production of POMC was selectively blocked in skin or which lacked the beta-endorphin gene altogether exhibited none of the responses or symptoms seen in normal mice after UV treatment, confirming the presence of a UV-activated opioid pathway in the skin.

"It is possible that a natural mechanism reinforcing UV-seeking behavior may have developed at certain stages of mammalian evolution through its contribution to the synthesis of vitamin D," said Fisher, who is also chair of dermatology and director of the Cutaneous Biology Research Center at Mass General. "But such behavioral effects would also carry the carcinogenic risks of UV light that we now recognize. Today's alternative sources of vitamin D, such as inexpensive oral supplements, are both safer and more accurate in maintaining healthy vitamin D levels.

"Our finding that persistent UV seeking really does appear to be an addiction-related behavior suggests that reducing an individual's skin cancer risk may require actively confronting factors that influence this hazardous behavior—like the promotion of indoor tanning—instead of the more passive risk

messages that have been relied on," he added. "We also wonder whether this interaction of sun, skin and endorphins might be involved in other behaviors or disorders and whether this may represent one of the earliest behavioral responses that can be considered addictive."

source: Sue McGreevey, Harvard Medical School



## UV Carcinogenesis: New clues to skin cancer development show sunscreen is not enough

Scientists have shown that sunscreen cannot be relied upon alone to prevent malignant melanoma, the most deadly form of skin cancer, according to research published online on June 11, in *Nature*.

"This research adds important evidence showing that sunscreen has a role, but that you shouldn't just rely on this to protect your skin." - Dr Julie Sharp, Cancer Research UK

The work supports the approach taken by public health campaigns that call for people to use a combination of shade and clothing to protect their skin, applying sunscreen to the areas you can't cover.

The research explains more about the mechanism by which UV light leads to melanoma and also explores the extent to which sunscreen is able to prevent UV light from damaging healthy cells.

In the study, carried out at Cancer Research UK's Manchester Institute, based at the University of

Manchester, and at The Institute of Cancer Research, London, scientists examined the molecular effects of UV light on the skin of mice at risk of melanoma and whether disease development was blocked by sunscreen.

UV light directly damages the DNA in the skin's pigment cells, increasing the chances of developing melanoma. Crucially, the researchers show that it causes faults in the p53 gene, which normally helps protect from the effects of DNA damage caused by UV light.

The study also showed that sunscreen can greatly reduce the amount of DNA damage caused by UV, delaying the development of melanoma in the mice. But, importantly, the study also found that sunscreen did not offer complete protection and UV light could still target p53 to induce melanoma, albeit at a reduced rate.

Professor Richard Marais, study author and Cancer Research UK scientist, based at the University of Manchester, said: "UV light has long been known to cause melanoma skin cancer, but exactly how this happens has not been clear. These studies allow us to begin to understand how UV light causes melanoma.

"UV light targets the very genes protecting us from its own damaging effects, showing how dangerous this cancer-causing agent is. Very importantly, this study provides proof that sunscreen does not offer complete protection from the damaging effects of UV light.

"This work highlights the importance of combining sunscreen with other strategies to protect our skin, including wearing hats and loose fitting clothing, and seeking shade when the sun is at its strongest."

"This research adds important evidence showing that sunscreen has a role, but that you shouldn't just rely on this to protect your skin. It's essential to get into good sun safety habits, whether at home or abroad, and take care not to burn – sunburn is a clear sign that the DNA in your skin cells has been damaged and, over time, this can lead to skin cancer.

"When the sun is strong, pop on a t-shirt, spend some time in the shade and use a sunscreen with at least SPF15 and good UVA protection."

Professor Nic Jones, Cancer Research UK's chief scientist and director of the Manchester Cancer Research Centre, said: "Malignant melanoma is now the fifth most common cancer in the UK, with more than 13,000 people being diagnosed with the disease every year. With the number of cases increasing, we urgently need to understand more about the disease and find new and better treatments. And this is why we're making skin cancer research one of the key focuses of the Manchester Cancer Research Centre."

-source: Greg Jones, Cancer Research UK

### **ASP 37: Poster Prizes**

There were several well-deserved poster prizes at ASP 37. The following were award-winners.

#### **Posters of Distinction:**

- Srivalleesha Mallidi,  
Massachusetts General Hospital, Boston  
*Photoacoustic monitoring of photosensitizer photobleaching rate to predict photodynamic therapy response*

- Imran Rizvi  
Massachusetts General Hospital, Boston  
*Impact of Physical Forces on 3D Ovarian Cancer Biology: Targeting Epithelial-Mesenchymal Transition, Cellular Heterogeneity and Biomarker Modulation Induced by Flow*

#### **Posters of Excellence:**

- Abegail Tadle  
Cal State University, Los Angeles  
*Sequential [4+2] Diels Alder Reaction of 3,4',5 Trimethoxy-Trans-Stilbene with Singlet Oxygen*

- Ashwini Ghogare  
City University of New York, Brooklyn College  
*"Pointsource" Delivery of a Photosensitizer Drug and Singlet Oxygen: Eradication of Glioma Cells in Vitro*

- Hai Li  
University of Texas Health Science Center at Houston  
*Role of a Helix B Lysine Residue in the Photoactive Site in Channelrhodopsins*



### Poster of Merit:

- Emilia Della Pietra  
University of Udine, Italy  
*DRPDT2: A New Compound to Improve Photodynamic Therapy*
- Gwendolyn Cramer  
University of Massachusetts Boston  
*Evaluation of growth, biomarker expression and matrix remodeling in 3D cultures of drug-resistant pancreatic cancer cells reveals elevated invasiveness and increased sensitivity to PDT*
- Ramya Raghunathan  
North Dakota State University  
*Degradation of bio-based oligomer/polymers from sustainable materials.*
- Mai Thao  
Northern Illinois University  
*The Effects of Modified Fibronectin on ARPE-19 Cells as Model Systems for Ageing and Inflammation in Human Bruch's Membrane*
- Huang Chiao Huang  
Massachusetts General Hospital, Boston  
*Treating pancreatic cancer with Nano-PDT and liposomal irinotecan*

### Poster Highlight: Activatable Photoimmunotherapy

One poster stood out for the ACS Bioconjugate Chemistry Poster prize at ASP 37, and remarkably was selected, independently, by all 6 judges as the top poster in that category:

*Selective destruction and longitudinal monitoring of disseminated microscopic metastases* by Bryan Q Spring of Massachusetts General Hospital.

This poster introduced preclinical studies using a cancer cell-targeted antibody loaded with self-quenching photocytotoxic chromophores that is activated by tumor cells for both fluorescence imaging and photodynamic therapy. The significance of this approach, termed “tumor-targeted, activatable photoimmunotherapy”, is that it minimizes toxicity to vital tissues during photo-irradiation of entire anatomical sites to destroy small deposits of drug-resistant tumor cells left behind by surgery and chemotherapy. This new

platform for visualizing and destroying occult cancer micrometastases may ultimately prove valuable for palliation, with real potential for extending patient survival. Additional information is available in a recent publication: PNAS 111, E933–42 (2014).

### In memorandum: Janet Morgan

It is with sadness that we learned of the unexpected passing of Janet Morgan of Roswell Park Cancer Institute. After obtaining an MSc in endocrinology from University of Leeds, she spent time spent 3 years as a lecturer at Arab College of Medical Professions in Al-Bireh in the West Bank of Palestine. She then went on to obtain her PhD in 1990 from University College, London where she studied immunoliposomes and photosensitizers. She moved to Roswell Park in 1992 where she has been in the department of dermatology. Over her career, Janet made numerous contributions to our understanding photodynamic therapy. For those who have met Janet, her intense passion for science was palpable. She will be missed dearly by the research community, friends and family. A service was held for her at Masjid Al-Eiman in Buffalo on June 26<sup>th</sup>.



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#### Contact

Jonathan F Lovell  
201 Bonner Hall  
University at Buffalo  
Buffalo, NY, 14260  
716-645-1020  
E-mail: [jflovel@buffalo.edu](mailto:jflovel@buffalo.edu)

## ASP 38: May 21-25, 2016 Tampa Marriott Waterside

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 each newsletter.



*Authentic people and places make Tampa Bay a treasure to discover. Feel the warmth of the sun as you explore a region sizzling with adventure – from stimulating attractions to inspiring arts and culture. This exciting city offers events and celebrations for every season. Pirates invade every January as part of the annual Gasparilla celebration. Known as the “Winter Strawberry Capital of the World,” locals and visitors enjoy the annual Strawberry Festival. Travel to Tampa and enjoy the scene – thriving nightlife, world-class shopping and unique boutiques, delicious restaurants and waterfront experiences. Mark your calendar and start planning your adventure at [VisitTampaBay.com](http://VisitTampaBay.com)*

## Other Upcoming Photobiology Events

**Aug 10-14, 2014**  
22<sup>nd</sup> IUPAC International Conference on Physical Organic Chemistry

Ottawa (Canada)  
<http://events.science.uottawa.ca/icpoc22/welcome.html>

**Sep 8-12, 2014**  
Cordoba, Argentina  
16<sup>th</sup> International Congress on Photobiology  
<http://www.photobiology2014.com.ar>



**September 9-12, 2014**  
Arlington, VA,  
NAALT (N. American Association for Light Therapy) & WALT (World Association for Laser Therapy) Biennial Congress.  
*Photobiomodulation and beyond*  
<http://www.naalt.org/>

**June 28-July 3, 2015**  
Jeju, Korea  
The 27<sup>th</sup> International Conference on Photochemistry(ICP2015)  
<http://www.icp2015.org/>



**Other Event Calendars**  
SPIE Events: <http://spie.org/x1375.xml>  
Plant Biology Events: <http://aspb.org/calendar>  
Chemistry Events: <http://www.chemistry.org>  
Gordon Research Conferences: <http://www.grc.org>  
Nature Events Directory:  
[www.nature.com/natureevents/science](http://www.nature.com/natureevents/science)