

## ILT1700 Technical Paper Summaries / International Light Technologies

*This document contains a sampling of technical papers that cite the use of the ILT1700 Research Radiometer. In most cases, the full paper is available on the Web and a link is provided. Please use the PDF search function to find the paper(s) in this document related to your area of interest.*

*Please Note: The original IL1700 manufacturer, International Light, Newburyport, MA (USA), is now International Light Technologies, Peabody, MA (USA). The radiometer model number is now ILT1700.*

### **Model ILT1700 Research Radiometer Web Page:**

<http://www.intl-lighttech.com/products/ilt1700>

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### **Title:**

Reduction of the UV burden to indoor tanners through new exposure schedules: a pilot study

### **Authors:**

Sharon A. Miller, Sergio G. Coelho, Barbara Z. Zmudzka, Janusz Z. Beer

### **Organization:**

US Food and Drug Administration (FDA), Center for Devices and Radiological Health, Rockville, MD, USA

### **Abstract:**

*Background:* The development of new pigmentation (tan) in human skin after UV exposure requires several days. Once it is developed, the tan can last for weeks. Current recommendations for tanning exposure schedules in the USA (FDA Letter to Manufacturers: Policy on maximum timer interval and exposure schedule for sunlamps, August 21, 1986) allow exposures three times per week for the development of a tan, and one to two times per week for maintenance exposures. However, this policy is often interpreted in the indoor tanning industry as allowing three exposures per week on a continuous basis. We believe that the reduction of the recommended cumulative dose to indoor tanners should be explored. Two approaches for achieving this are (1) decreasing the number of exposures and (2) increasing the time interval between exposures. To explore such changes, we conducted a pilot study.

*Methods:* The pilot study involved three exposure schedules (evaluated on each of six subjects) that evolved throughout the course of the study. Digital photography, visual assessment and diffuse reflectance spectrometry were used to assess skin color changes.

The six pilot subjects were studied for 8–18 weeks. The changes in skin color obtained through the use of the different exposure schedules were compared with changes reported by Caswell (Caswell M, The kinetics of the tanning response to tanning bed exposures, Photodermatol Photoimmunol Photomed 2000; 16: 10–14) who used schedules based on current recommendations.

*Results:* Two out of the three experimental schedules produced tans comparable with those reported by Caswell. In these two schedules, cumulative doses were a factor of 2–3 below doses from current schedules.

*Conclusion:* The UV burden to indoor tanners can be substantially reduced without compromising the cosmetic effect. These results need to be confirmed in a larger study.

### **Keywords:**

indoor tanning; pigmentation; sunlamps; UV

### **Model ILT1700 Use:**

The spectroradiometer was calibrated with a 1000 W standard lamp that was traceable to the National Institute of Standards and Technology. **A low-profile detector (SSD 001A, International Light, Newburyport, MA, USA) coupled to a radiometer (ILT1700, International Light)** was used before each exposure to measure the intensity in each spot on the subjects' back and calculate the required exposure time. This detector had previously been calibrated using the measurements made with the spectroradiometer.

### **Link to Full Paper:**

<http://www.fda.gov/downloads/ScienceResearch/SpecialTopics/WomensHealthResearch/UCM248491.pdf>

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**Title:**

An Important Role of CD80/CD86-CTLA-4 Signaling during Photocarcinogenesis in Mice

**Authors:**

Karin Loser, Andrea Scherer, Mathias B. W. Krummen, Georg Varga, Tetsuya Higuchi, Thomas Schwarz, Arlene H. Sharpe, Stephan Grabbe, Jeffrey A. Bluestone, Stefan Beissert

**Organization:**

Department of Dermatology, University of Munster, Munster Germany; Department of Pathology, Harvard University, Boston, MA 02116; Diabetes Research Center, University of California, San Francisco, CA 94143; Department of Experimental Immunology, German Research Center for Biotechnology, Braunschweig, Germany; Department of Dermatology, University of Kiel, Kiel, Germany

**Abstract:**

Although previous studies have shown that altered B7 costimulation plays a critical role in UV irradiation-induced regulation of immunity, the individual roles of the B7 receptors (CD28 and CTLA-4) or the B7 family members (CD80 and CD86) have not been explored. Thus, we investigated CTLA-4 signaling during photocarcinogenesis of chronically UV-B-exposed mice using an antagonistic anti-CTLA-4 Ab. Anti-CTLA-4-treated mice developed significantly fewer UV-induced tumors. Moreover, anti-CTLA-4 treatment induced long-lasting protective immunity because progressively growing UV tumors inoculated into anti-CTLA-4- and UV-treated mice that had not developed tumors were rejected. Next, we used mice deficient for CD80, CD86, or both in photocarcinogenesis studies to assess the relative contributions of these CTLA-4 ligands. Double-deficient mice showed significantly reduced UV-induced skin tumor development, whereas CD86<sup>-/-</sup> mice produced skin cancer earlier compared with CD80<sup>-/-</sup> and control mice. The growth of UV-induced tumors appears to be controlled by UV-induced suppressor T cells, because CD80<sup>-/-</sup> / CD86<sup>-/-</sup> mice had strongly reduced numbers of UV-induced CD4<sup>+</sup>CD25<sup>+</sup> suppressor T cells. In vitro, CTLA-4 blockade inhibited the suppressor activity of UV-induced CD4<sup>+</sup>CD25<sup>+</sup> T cells, suggesting that reduced photocarcinogenesis might be due to decreased numbers or function of suppressor T cells. Together, these data indicate that blocking CD80/86-CTLA-4 signaling induced immune protection against the development of UV-induced skin tumors. Furthermore, CD86-mediated costimulation appears to play a more critical role in the protection against photocarcinogenesis than CD80.

**Model ILT1700 Use:**

"Within the solar spectrum, the UV-B range (290–320 nm) is responsible for carcinogenesis and immunosuppression. Therefore, a bank of four Philips UV-B TL40W/12 sunlamps was used, which have an emission spectrum from 280 to 350 nm, with a peak at 306 nm. These lamps deliver an average dose of 8 W/m<sup>2</sup>, as measured with an **IL-1700, UV detector and a SED 24 (no. 3124) filter (from International Light).**"

**Link to Full Paper:**

<http://www.jimmunol.org/content/174/9/5298.full.pdf>

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**Title:**

Protection from photodamage by topical application of caffeine after ultraviolet irradiation

**Authors:**

S-W. Koo, S. Hirakawa, S. Fujii, M. Kawasumi, P. Nghiem

**Organization:**

Cutaneous Biology Research Center, Massachusetts General Hospital, Harvard Medical School, 149 13th St, Charlestown, MA 02129, U.S.A.

**Abstract:**

*Background:* Characterization of mechanisms that can reverse residual damage from prior skin exposure to ultraviolet (UV) would be of considerable biological and therapeutic interest. Topical caffeine application to mouse skin that had previously been treated with UV has been shown to inhibit the subsequent development of squamous cell carcinomas.

*Objectives:* We used an established mouse photodamage model to investigate other possible effects of topical caffeine application after UV. Methods SKH-1 hairless mice were treated with ultraviolet B (UVB)

followed immediately by topical application of caffeine or vehicle three times weekly for 11 weeks.  
*Results:* Caffeine applied topically after UV treatment resulted in a significant decrease in UV-induced skin roughness/transverse rhytides as assessed by treatment-blinded examiners. Histologically, topical caffeine application after a single dose of UVB more than doubled the number of apoptotic keratinocytes as evaluated by sunburn cell formation, caspase 3 cleavage and terminal deoxynucleotidyl transferase-mediated dUTP-biotin nick-end labelling (TUNEL) staining. A trend towards decreased solar elastosis was noted in the caffeine-treated group although this was not statistically significant. Other histological parameters including epidermal hyperplasia, solar elastosis and angiogenesis were increased in mice treated with UV but topical application of caffeine did not alter these particular UV effects.  
*Conclusions:* These findings support the concept that topical application of caffeine to mouse skin after UV irradiation promotes the deletion of DNA-damaged keratinocytes and may partially diminish photodamage as well as photocarcinogenesis.

**Model ILT1700 Use:**

"The dose of UVB was quantified with a **model IL-1700 research radiometer/ photometer (International Light, Newburyport, MA, U.S.A.)** fitted with a UVB sensor."

**Link to Full Paper:**

<http://www.pnlab.org/publications/documents/f.pdf>

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**Title:**

Turbo-PUVA: Dihydroxyacetone-Enhanced Photochemotherapy for Psoriasis

**Authors:**

Charles R. Taylor, MD; Chartchai Kwangsukstith, MD; Joanne Wimberly, MPA; N. Kollias, PhD; R. Rox Anderson, MD

**Organization:**

Gange Photomedicine Research Center, Wellman Laboratories of Photomedicine, Department of Dermatology, Massachusetts General Hospital, Harvard University, Boston; and the Section of Dermatology, Department of Medicine, Chiang Mai University, Chiang Mai, Thailand

**Abstract:**

*Background:* Dihydroxyacetone (DHA), a colorless sugar in "sunless" tanning lotions, binds to stratum corneum to form a UV-A-protective brown pigment. Bound DHA polymer is shed faster from hyperproliferative skin sites such as psoriatic plaques. We tested the hypothesis that selective shedding of DHA pigment during psoralen-UV-A (PUVA) treatment of psoriasis may allow higher UV-A doses, thus accelerating clearing while protecting uninvolved skin. Concurrent use of lactic acid was investigated as an aid in removing scale and residual DHA from psoriatic plaques.

*Observations:* Thirty psoriatic patients with more than 20% body surface area involvement were recruited. The 6 PUVA study groups were (1) standard American style, (2) American style plus lactic acid, (3) DHA-PUVA or "topical ultraviolet-resisting barrier to optimize PUVA" (Turbo-PUVA), (4) Turbo-PUVA with lactic acid, (5) European style, and (6) European style plus DHA. Combinations of lactic acid and European-style treatment were not studied. Each subject received up to 30 oral PUVA treatments twice weekly 3 days apart. The DHA-PUVA groups used 15% DHA lotion twice weekly. Lactic acid groups used 7% lotion daily except on treatment days. Psoriasis area and severity index scores were recorded weekly. Turbo-PUVA allowed higher UV-A exposures with minimal burns, showed faster clearing, and required fewer treatments for 90% clearing (P,.001).

*Conclusions:* Protection of uninvolved skin byDHAduring PUVA treatment allows higher UV-A exposures to be tolerated, demonstrates faster clearing, and requires fewer treatments to clear psoriasis. By reducing the total body dose received, Turbo-PUVA may also reduce long-term risks.

**Model ILT1700 Use:**

"For all treatment groups, liquid 8-methoxypsoralen capsules were given at 0.5 mg/kg orally, 1 hour before light treatment with a UV-A light cabinet (model V4472-IV; Ultralite Enterprises, Lawrenceville, Ga) having 38 fluorescent light bulbs (F72T12-BL; National Biologic Corporation, Cleveland, Ohio). **Irradiance measured with a 325- to 385-nm UV-A detector (International Light IL-1700, Newburyport, Mass) was 14 mW/cm<sup>2</sup>.**"

**Link to Full Paper:**

<http://archderm.ama-assn.org/cgi/reprint/135/5/540.pdf>

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**Title:**

Scotopic threshold responses to infrared irradiation in cats

**Authors:**

Florian Gekeler, Kei Shinoda, Georgios Blatsios, Annette Werner, Eberhart Zrenner

**Organization:**

University-Eye-Hospital, Schleichstrasse 12-16, D-72076 Tübingen, Germany

**Abstract:**

Infrared (IR) irradiation is frequently used in ophthalmological diagnosis and treatment. It has been used to selectively stimulate photodiode-based retinal prostheses to prove their function. Data concerning the natural IR-sensitivity of the retina are contradictory. In our experiments in dark-adapted cats an IR-laser (826 nm) and IR emitting diodes (875 nm) elicited clear scotopic threshold responses. Comparison of the two lasers (IR and a visible laser at 670 nm) using Lambs template and our experimental data revealed very similar differences in retinal sensitivity ( $4.28$  and  $3.94 \pm 0.29$  log units, respectively). The fact that the cat retina is sensitive to IR-irradiation under certain conditions has important implications in interpreting the results from retinal prostheses and warrants further attention in its use in many ophthalmological applications.

**Keywords:**

Cat retina; Electroretinogram; Infrared; Scotopic threshold response; Sensitivity; Subretinal prosthesis

**Model ILT1700 Use:**

"Experiments were either performed in the dark-adapted state after keeping the animals in complete darkness for 60 min or in the light-adapted state with a diffuse background from room illumination (approximately 2000 lx; measured with an **IL 1700, international light, Newburyport, Massachusetts, USA**)."

**Link to Full Paper:**

<http://www.annettewerner.com/pdfs/pdf3.pdf>

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**Title:**

Identification of Genes Responsive to Solar Simulated UV Radiation in Human Monocyte-Derived Dendritic Cells

**Authors:**

Hortensia de la Fuente, Amalia Lamana, Maria Mittelbrunn, Silvia Perez-Gala, Salvador Gonzalez, Amaro Garcia-Diez, Miguel Vega, Francisco Sanchez-Madrid

**Organization:**

Servicio de Inmunología, Hospital de la Princesa, Universidad Autónoma de Madrid, Madrid, Spain; Fundación Centro Nacional de Investigaciones Cardiovasculares Carlos III (CNIC), Madrid, Spain; Servicio de Dermatología, Hospital de la Princesa, Universidad Autónoma de Madrid, Madrid, Spain; Dermatology Service, Memorial Sloan-Kettering Cancer Center, New York, New York, United States of America; Centro de Investigaciones Biológicas (CIB-CSIC), Madrid, Spain

**Abstract:**

Ultraviolet (UV) irradiation has profound effects on the skin and the systemic immune system. Several effects of UV radiation on Dendritic cells (DCs) functions have been described. However, gene expression changes induced by UV radiation in DCs have not been addressed before. In this report, we irradiated human monocyte-derived DCs with solar-simulated UVA/UVB and analyzed regulated genes on human whole genome arrays. Results were validated by RT-PCR and further analyzed by Gene Set Enrichment Analysis (GSEA). Solar-simulated UV radiation up-regulated expression of genes involved in cellular stress and inflammation, and down-regulated genes involved in chemotaxis, vesicular transport and RNA processing.

Twenty four genes were selected for comparison by RT-PCR with similarly treated human primary keratinocytes and human melanocytes. Several genes involved in the regulation of the immune response were differentially regulated in UVA/UVB irradiated human monocyte-derived DCs, such as protein tyrosine phosphatase, receptor type E (PTPRE), thrombospondin-1 (THBS1), inducible costimulator ligand (ICOSL), galectins, Src-like adapter protein (SLA), IL-10 and CCR7. These results indicate that UV-exposure triggers the regulation of a complex gene repertoire involved in human-DC-mediated immune responses.

**Model ILT1700 Use:**

"A 1000 watt xenon arc solar simulator (Oriel, USA) equipped with an Oriel 81017 filter ("Colipa") was used. UVB and UVA irradiance measurements were performed daily using an **IL-1700 radiometer (International Light, USA) equipped with SED240/ UVB-1/TD and SED033/UVA/TD photodetectors.**"

**Link to Full Paper (PDF Link on This page):**

<http://www.plosone.org/article/info:doi%2F10.1371%2Fjournal.pone.0006735>

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**Title:**

Functional Significance and Induction by Solar Radiation of Ultraviolet-Absorbing Sunscreens in Field-Grown Soybean Crops

**Authors:**

Carlos A. Mazza, Hernan E. Boccalandro, Carla V. Giordano, Daniela Battista, Ana L. Scopel, Carlos L. Ballare

**Organization:**

Agricultural Plant Physiology and Ecology Research Institute (IFEVA), University of Buenos Aires and Consejo Nacional de Investigaciones Cientificas y Tecnicas, Avenida San Martin 4453, 1417 Buenos Aires, Argentina

**Abstract:**

Colorless phenylpropanoid derivatives are known to protect plants from ultraviolet (UV) radiation, but their photoregulation and physiological roles under field conditions have not been investigated in detail. Here we describe a fast method to estimate the degree of UV penetration into photosynthetic tissue, which is based on chlorophyll fluorescence imaging. In Arabidopsis this technique clearly separated the UV-hypersensitive transparent testa (tt) tt5 and tt6 mutants from the wild type (WT) and tt3, tt4, and tt7 mutants. In field-grown soybean (*Glycine max*), we found significant differences in UV penetration among cultivars with different levels of leaf phenolics, and between plants grown under contrasting levels of solar UV-B. The reduction in UV penetration induced by ambient UV-B had direct implications for DNA integrity in the underlying leaf tissue; thus, the number of cyclobutane pyrimidine dimers caused by a short exposure to solar UV-B was much larger in leaves with high UV transmittance than in leaves pretreated with solar UV-B to increase the content phenylpropanoids. Most of the phenylpropanoid response to solar UV in field-grown soybeans was induced by the UV-B component ( $\lambda \leq 315$  nm). Our results indicate that phenolic sunscreens in soybean are highly responsive to the wavelengths that are most affected by variations in ozone levels, and that they play an important role in UV protection in the field.

**Model ILT1700 Use:**

"The level of UV-B attenuation at the center of the 2UV-B plots (measured with a broad-band UV-B detector SUD/240/W attached to a **IL-1700 research radiometer; International Light, Newburyport, MA**; peak spectral response at 290 nm; half-bandwidth 5 20 nm) was found to be consistently greater than 95%."

**Link to Full Paper:**

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC58850/pdf/pp000117.pdf>

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**Title:**

Colour Vision in Diurnal and Nocturnal Hawkmoths

**Authors:**

ALMUT KELBER, ANNA BALKENIUS, ERIC J. WARRANT

**Organization:**

Department of Cell and Organism Biology, Vision Group, Lund University, Helgonavagen 3, S-22362 Lund, Sweden

**Abstract:**

Diurnal and nocturnal hawkmoths (Sphingidae, Lepidoptera) have three spectral types of receptor sensitive to ultraviolet, blue and green light. As avid flower visitors and pollinators, they use olfactory and visual cues to find and recognise flowers. Moths of the diurnal species *Macroglossum stellatarum* and the nocturnal species *Deilephila elpenor*, *Hyles lineata* and *Hyles gallii* use and learn the colour of flowers. Nocturnal species can discriminate flowers at starlight intensities when humans and honeybees are colourblind. *M. stellatarum* can use achromatic, intensity-related cues if colour cues are absent, and this is probably also true for *D. elpenor*. Both species can recognise colours even under a changed illumination colour.

**Model ILT1700 Use:**

"Light reflected from stimuli was measured using an **International Light IL 1700 radiometer...**"

**Link to Full Paper:**

<http://icb.oxfordjournals.org/content/43/4/571.full.pdf>

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**Title:**

A comparison of DNA repair and survival of *Escherichia coli* O157:H7 following exposure to both low- and medium pressure UV irradiation

**Authors:**

J. L. Zimmer-Thomas, R. M. Slawson, P. M. Huck

**Organization:**

Department of Biology, University of Waterloo, Waterloo, Ontario N2L 3G1, Canada; Department of Biology, Wilfrid Laurier University, Waterloo, Ontario N2L 3C5, Canada; Department of Civil Engineering, University of Waterloo, Waterloo, Ontario N2L 3G1, Canada

**Abstract:**

DNA repair and survival of pathogenic *E. coli* O157:H7 was investigated following exposure to ultraviolet (UV) radiation from both low-pressure (LP) and medium-pressure (MP) lamps. This study included irradiation at UV doses used in drinking water treatment and lower doses indicative of potential treatment problems. Immediately following UV exposure, an average log inactivation of 4.5 or greater was observed following all tested doses of LP (5, 8, 20 and 40 mJ/cm<sup>2</sup>) or MP UV (5 and 8 mJ/cm<sup>2</sup>) indicating the sensitivity of *E. coli* O157:H7 to UV irradiation. Following conditions conducive to repair, maximum photo repair occurred rapidly within 30 minutes after low doses (5 and 8 mJ/cm<sup>2</sup>) of LP UV. The rate of repair was much higher than reported previously in non-pathogenic *E. coli* (which occurred within 2 hours). In contrast to LP UV, limited photo repair of *E. coli* O157:H7 was observed following MP UV exposure at reduced doses (5 and 8 mJ/cm<sup>2</sup>). At these lower doses, low levels of light independent repair were observed following LP UV, but not following exposure of MP UV irradiation. This study indicates that MP UV may enhance UV disinfection of *E. coli* O157:H7 by reducing the ability to repair following non-ideal treatment conditions. Following doses used in drinking water treatment (20 and 40 mJ/cm<sup>2</sup>), low levels of photo repair following LP UV were evident.

**Keywords:**

DNA repair, *E. coli* O157:H7, low-pressure UV, medium-pressure UV, photoreaction, UV irradiation

**Model ILT1700 Use:**

"Irradiance for both lamp types was measured using a **radiometer (International Light, Model IL 1700, equipped with a SED 240UV detector, Newburyport, MA).**"

**Link to Full Paper:**

<http://www.iwaponline.com/jwh/005/0407/0050407.pdf>

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**Title:**

Studies on effective protection against UVA-induced fibroblast collagenase expression

**Authors:**

J. Bergemann, H. Mielke, G. Stanke, U. Hoppe

**Organization:**

Paul Gerson Unna Skin Research Center, Beiersdorf AG, Unnastraße 48, 20245 Hamburg, Germany

**Abstract:**

UVA-induced damage of the extracellular matrix leads to serious dangers for the function of human skin. Such damage is clinically manifested as loss of recoil capacity, wrinkle formation, and impaired wound healing of the skin. The process of photoaging is correlated to the induction of matrix metalloproteinase (MMP) messenger RNAs, proteins, and activities in human skin by exposure to both ultraviolet-B and ultraviolet-A irradiation. Given the risks of MMPs, we need to study mechanisms that protect against the deregulation of such proteases. We report here our data on the nonradioactive in vitro assay for the detection of collagenase expression using the Lumi-Imager™ Workstation from Roche Molecular Biochemicals. The objective of these studies is to develop a system for quantitative detection of protective effects against photoaging. This should be done to support existing approaches such as MED (Minimal Erythmal Dose).

**Model ILT1700 Use:**

"The UVA irradiation was performed with a UVA Sol 500 light source (Dr. Hönle) with a UVB blocking filter. The UVA dose used for the irradiation procedure was determined with an **IL-1700 radiometer (International Light) equipped with a UVA detector (326–401 nm)**. The cells were irradiated at a distance of 40 cm."

**Link to Full Paper:**

[http://www.roche-applied-science.com/PROD\\_INF/BIOCHEMI/No.3\\_98/pgs22-25.pdf](http://www.roche-applied-science.com/PROD_INF/BIOCHEMI/No.3_98/pgs22-25.pdf)

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**Title:**

Recalcitrant Solar Urticaria Induced by UVA and Visible Light: A Case Report

**Authors:**

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**Organization:**

Department of Dermatology, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok, Thailand

**Abstract:**

A 41 year-old man presented with a ten-year history of recurrent erythema and swelling of skin that occurred following sun exposure even as little as ten minutes. The lesion affected only on the sun exposed area. A phototesting was carried out and revealed that urticaria was induced following ultraviolet A (UVA) and visible light exposure. Solar urticaria (SU) from UVA and visible light was diagnosed. Many treatment options including combination of oral antihistamines, psoralen plus UVA (PUVA) photochemotherapy, narrowband UVB (NBUVB, 311 nm) phototherapy, and plasmapheresis were tried in the presented patient without significant response. Although various treatments are available, managing SU remains a challenging problem in many patients.

**Keywords:**

Solar urticaria, Ultraviolet, UVA, Visible light, Recalcitrant

**Model ILT1700 Use:**

"**IL-1700 radiometer (International light Inc. Newburyport, MA, USA)** was used for measure light intensity. Results were observed during irradiation, immediately after, 10, 30 minutes, and 1 hour after testing."

**Link to Full Paper:**

[http://www.mat.or.th/journal/files/Vol93\\_No.10\\_1238\\_8181.pdf](http://www.mat.or.th/journal/files/Vol93_No.10_1238_8181.pdf)

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**Title:**

Magnetic compass orientation in European robins is dependent on both wavelength and intensity of light

**Authors:**

Rachel Muheim, Johan Bäckman, Susanne Akesson

**Organization:**

Bird Migration Group, Department of Animal Ecology, Lund University, Ecology Building, SE-223 62 Lund, Sweden

**Abstract:**

Magnetic compass orientation in birds has been shown to be light dependent. Results from behavioural studies indicate that magnetoreception capabilities are disrupted under light of peak wavelengths longer than 565 nm, and shifts in orientation have been observed at higher light intensities ( $43\text{--}44 \times 10^{15}$  quanta  $\text{s}^{-1} \text{m}^{-2}$ ). To investigate further the function of the avian magnetic compass with respect to wavelength and intensity of light, we carried out orientation cage experiments with juvenile European robins, caught during their first autumn migration, exposed to light of 560.5 nm (green), 567.5 nm (greenyellow) and 617 nm (red) wavelengths at three different intensities ( $1 \text{ mWm}^{-2}$ ,  $5 \text{ mWm}^{-2}$  and  $10 \text{ mWm}^{-2}$ ). We used monochromatic light of a narrow wavelength range (half bandwidth of 9–11 nm, compared with half bandwidths ranging between 30 nm and 70 nm used in other studies) and were thereby able to examine the magnetoreception mechanism in the expected transition zone between oriented and disoriented behaviour around 565 nm in more detail. We show (1) that European robins show seasonally appropriate migratory directions under 560.5 nm light, (2) that they are completely disoriented under 567.5 nm light under a broad range of intensities, (3) that they are able to orient under 617 nm light of lower intensities, although into a direction shifted relative to the expected migratory one, and (4) that magnetoreception is intensity dependent, leading to disorientation under higher intensities. Our results support the hypothesis that birds possess a light-dependent magnetoreception system based on magnetically sensitive, antagonistically interacting spectral mechanisms, with at least one high sensitive short-wavelength mechanism and one low sensitive long-wavelength mechanism.

**Keywords:**

migratory orientation, magnetoreception, magnetic compass, European robin, *Erithacus rubecula*

**Model ILT1700 Use:**

"An IL1700 Research Radiometer (International Light, Newburyport, MA, USA) with a detector SHD033 (range  $3 \times 10^{-8}$  to  $1 \times 10^{-2} \text{ Wm}^{-2}$ , spectrum 200–1100 nm) was used to measure overhead light intensity inside the orientation cages, at the level of the birds' head in the middle of the orientation cage at 65 mm height, under the same number of opaque Plexiglas sheets as used during the experiment."

**Link to Full Paper:**

<http://jeb.biologists.org/content/205/24/3845.full.pdf>

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**Title:**

Light adaptation and dark adaptation of human rod photoreceptors measured from the *a*-wave of the electroretinogram

**Authors:**

M. M. Thomas, T. D. Lamb

**Organization:**

Physiological Laboratory, University of Cambridge, Downing Street, Cambridge CB2 3EG, UK

**Abstract:**

1. We recorded the *a*-wave of the human electroretinogram from subjects with normal vision, using a corneal electrode and ganzfeld (full-field) light stimulation. From analysis of the rising phase of rod-isolated flash responses we determined the maximum size ( $a_{\text{max}}$ ) of the *a*-wave, a measure of the massed circulating current of the rods, and the amplification constant ( $A$ ) of transduction within the rod photoreceptors.
2. During light adaptation by steady backgrounds the maximal response was reduced, as reported previously.

$a_{\max}$  declined approximately as  $I_0/(I_0 + IB)$ , where  $IB$  is retinal illuminance and  $I_0$  is a constant. In different subjects  $I_0$  ranged from 40 to 100 trolands, with a mean of 70 trolands, corresponding to about 600 photoisomerizations  $s^{-1}$  per rod. (1 troland is the retinal illuminance that results when a surface luminance of  $1 \text{ cd m}^{-2}$  is viewed through a pupil area of  $1 \text{ mm}^2$ .) The amplification constant  $A$  decreased only slightly in the presence of steady backgrounds.

3. Following a full bleach  $a_{\max}$  recovered along an S-shaped curve over a period of 30 min. There was no detectable response for the first 5 min, and half-maximal recovery took 13–17 min.

4. The apparent amplification constant decreased at early times after large bleaches. However, upon correction for reduced light absorption due to loss of pigment, with regeneration of rhodopsin occurring with a time constant of 9–15 min in different subjects, it appeared that the true value of  $A$  was probably unchanged by bleaching.

5. The recovery of  $a_{\max}$  following a bleach could be converted into recovery of equivalent background intensity, using a 'Crawford transformation' derived from the light adaptation results. Following bleaches ranging from 10 to > 99%, the equivalent background intensity decayed approximately exponentially, with a time constant of about 3 min.

6. The time taken for  $a_{\max}$  to recover to a fixed proportion of its original level increased approximately linearly (rather than logarithmically) with fractional bleach, with a slope of about 12 min per 100% bleach. Similar behaviour has previously been seen in psychophysical dark adaptation experiments, for the dependence of the 'second component' of recovery on the level of bleaching.

#### **Model ILT1700 Use:**

"In our experiments rod isolation was achieved by averaging the response to blue flashes (i.e. rod + cone signals), and subtracting an estimate of the cone response elicited by that stimulus. In most cases the residual cone signal was estimated by presenting photopically matched red flashes. The intensity adjustment required to obtain a photopic match was determined using the **photopic filter of the photometer (IL-1700, International Light, Newburyport, MA, USA)**."

Link to Full Paper:

<http://jp.physoc.org/content/518/2/479.full.pdf>

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#### **Title:**

Inhibitory effect of black tea on the growth of established skin tumors in mice: effects on tumor size, apoptosis, mitosis and bromodeoxyuridine incorporation into DNA

#### **Authors:**

Yao-Ping Lu, You-Rong Lou, Jian-Guo Xie, Patricia Yen, Mou-Tuan Huang and Allan H. Conney

#### **Organization:**

Laboratory for Cancer Research, Department of Chemical Biology, College of Pharmacy, Rutgers, The State University of New Jersey, Piscataway, NJ 08855-0789, USA

#### **Abstract:**

Female CD-1 mice were initiated with a single topical application of 7,12-dimethylbenz[a]anthracene and promoted with 12-O-tetradecanoylphorbol-13-acetate. Mice with established papillomas were then treated with black tea or decaffeinated black tea (~ 4 mg tea solids/ml) as the sole source of drinking fluid for 11–15 weeks. In four separate experiments, oral administration of black tea inhibited the growth of papillomas (increase in tumor volume/mouse) by an average of 35%, 37%, 41% and 48%, respectively. Studies with decaffeinated black tea gave inconsistent results. In one experiment, administration of decaffeinated black tea inhibited papilloma growth (increase in tumor volume/mouse) by 27%, but in two additional experiments papilloma growth was stimulated by 14% and 193%, respectively. In a separate experiment, skin tumors were generated by treating SKH-1 female mice with ultraviolet B light (UVB; 30 mJ/cm<sup>2</sup>) twice weekly for 22 weeks, after which UVB administration was stopped. Tumors were allowed to develop during the following 13 weeks, and tumor-bearing mice were then treated with black tea (6 mg/ml tea solids) as the drinking fluid for 11 weeks. In this experiment, tumor growth (increase in tumor volume/mouse) was inhibited by 70%. Histological examination revealed that tea-treated mice had a 58% decrease in the number of nonmalignant tumors (primarily keratoacanthomas)/ mouse and a 54% decrease in the number of squamous cell carcinomas/mouse. In addition, administration of black tea decreased the volume per tumor by 60% for nonmalignant tumors and by 84% for carcinomas. Mechanistic studies with tumors from these mice revealed that administration of black tea decreased the bromodeoxyuridine labeling index in squamous cell

papillomas, keratoacanthomas and squamous cell carcinomas by 56%, 45% and 35%, respectively, and the apoptosis index was increased by 44%, 100% and 95%, respectively. Administration of black tea decreased the mitotic index in keratoacanthomas and squamous cell carcinomas by 42% and 16%, respectively. The results indicate that oral administration of black tea to tumor bearing mice inhibited proliferation and enhanced apoptosis in nonmalignant and malignant skin tumors.

**Model ILT1700 Use:**

"UV lamps (FS72T12-UVB-HO) that emit UVB (280–320 nm; 75–80% of total energy) and UVA (320–375 nm; 20–25% of total energy) were obtained from the Voltare Co. (Fairfield, CT). The dose of UVB was quantified with an UVB Spectra 305 Dosimeter obtained from the Daavlin Co. (Bryan, OH). The radiation was further calibrated with an **IL1700 Research Radiometer/Photometer from International Light, Inc. (Newburyport, MA).**"

**Link to Full Paper:**

<http://carcin.oxfordjournals.org/content/18/11/2163.full.pdf>

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**Title:**

Identification of Quenchers of Photoexcited States as Novel Agents for Skin Photoprotection

**Authors:**

Georg T. Wondrak, Myron K. Jacobson, and Elaine L. Jacobson

**Organization:**

Department of Pharmacology and Toxicology, College of Pharmacy, Arizona Cancer Center, University of Arizona, Tucson, Arizona

**Abstract:**

Photooxidative stress is a key mechanism in UVA-induced skin photodamage. Photoexcited states of endogenous UVA chromophores such as porphyrins, melanin precursors, and crosslink-fluorophores of skin collagen exert skin photodamage by direct reaction with substrate molecules (type I photosensitization) or molecular oxygen (type II), leading to formation of reactive oxygen species. Based on our previous research on the role of photoexcited states of endogenous skin chromophores as sensitizers of photooxidative stress, we describe here the identification of a novel class of chemopreventive agents for topical skin photoprotection: quenchers of photoexcited states (QPES). QPES compounds antagonize the harmful excited state chemistry of endogenous sensitizers by physical quenching, facilitating the harmless return of the sensitizer excited state to the electronic ground state by energy dissipation. To identify QPES compounds suitable for development, we designed a primary screening assay based on QPES suppression of photosensitized plasmid cleavage using conditions that exclude antioxidants. This screen is followed with a screen to test for nonsacrificial quenching of dye-sensitized singlet oxygen ( $^1O_2$ ) formation by electron paramagnetic resonance detection of 2,2,6,6-tetramethyl-piperidine-1-oxyl, a stable free radical indicative of  $^1O_2$  formation. These initial screens identified a pyrrolidine pharmacophore with pronounced QPES activity, and L-proline and other noncytotoxic proline derivatives containing this pharmacophore were then screened for efficacy in cellular models of sensitized photodamage. These compounds showed QPES protection against dye-sensitized and psoralen-UVA-induced apoptosis and suppression of proliferation in cultured human skin keratinocytes and fibroblasts. Furthermore, QPES photoprotection of reconstructed full thickness human skin exposed to solar simulated light has been demonstrated.

**Model ILT1700 Use:**

"Irradiation. A kilowatt large area light source solar simulator (Model 91293; Oriel Corporation, Stratford, CT) was used, equipped with a 1000-W Xenon arc lamp power supply (Model 68920) and a VIS-IR bandpass blocking filter plus either an atmospheric attenuation filter (output 290–400 nm plus residual 650–800 nm, for solar simulated light) or UVB and C blocking filter (output 320–400 nm plus residual 650–800 nm, for UVA), respectively. The output was quantified using a dosimeter (**Model IL1700; International Light Inc., Newburyport, MA**), with an SED240 detector for UVB (range 265–310 nm, peak 285 nm) or an SED033 detector for UVA (range 315–390 nm, peak 365 nm) at a distance of 365 mm from the source, which was used for all experiments."

**Link to Full Paper:**

<http://jpet.aspetjournals.org/content/312/2/482.full.pdf>

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**Title:**

The Effects of Excess Irradiance on Photosynthesis in the Marine Diatom *Phaeodactylum tricornutum*

**Authors:**

Claire S. Ting and Thomas C. Owens

**Organization:**

Section of Plant Biology, Cornell University, Ithaca, New York 14853-5908

**Abstract:**

The response of *Phaeodactylum tricornutum* to excess light was remarkably similar to that observed in higher plants and green algae and was characterized by complex changes in minimal fluorescence yields of fully dark-adapted samples and declines in maximum variable fluorescence levels and oxygen evolution rates. In our study the parallel decreases in the effective rate constant for photosystem II (PSII) photochemistry, the variable fluorescence yield of a dark-adapted sample, and light-limited  $O_2$  evolution rates after short (0-10 min) exposures to photoinhibitory conditions could not be attributed to damage or down-regulation of PSII reaction centers. Instead, these changes were consistent with the presence of nonphotochemical quenching of PSII excitation energy in the antennae. This quenching was analogous to that component of nonphotochemical quenching studied in higher plants that is associated with photoinhibition of photosynthesis and/or processes protecting against photoinhibition in that it did not relax readily in the dark and persisted in the absence of a bulk transthylakoid proton gradient. The quenching was most likely associated with photoprotective processes in the PSII antenna that reduced the extent of photoinhibitory damage, particularly after longer exposures. Our results suggest that a large population of damaged, slowly recovering PSII centers did not form in *Phaeodactylum* even after 60 min of exposure to excess actinic light.

**Model ILT1700 Use:**

"Illumination was provided by a 150-W tungsten-halogen lamp, the intensity of which (1500 pmol photons  $m^{-1} s^{-1}$ , maximum) was adjusted using neutral-density filters. Photon flux densities were measured 1 mm away from the end of the fiber optics cable using a **calibrated IL1700 Research Radiometer/Photometer (International Light, Newburyport, MA)**."

**Link to Full Paper:**

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC159585/pdf/1060763.pdf>

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**Title:**

Dissolved organic carbon cycling in a subtropical seagrass-dominated lagoon

**Authors:**

Susan Ziegler, Ronald Benner

**Organization:**

Marine Science Institute, University of Texas at Austin, 750 Channelview Drive, Port Aransas, Texas 78373, USA

**Abstract:**

The cycling of dissolved organic matter (DOM) and its significance to ecosystem metabolism was studied over a 16 mo period in a *Thalassia testudinum* dominated meadow. The benthos was usually net autotrophic (annual gross primary production to respiration ratio [P:R] = 1.3) while water column respiration (R) exceeded gross primary production (annual P:R = 0.3). Net fluxes of dissolved organic carbon (DOC) from the benthos primarily occurred in the light (0 to 18 mmol C  $m^{-2} d^{-1}$ ) and from seagrass-dominated areas, suggesting that release of DOC was mainly due to seagrass exudation. Net benthic DOC fluxes measured in the light were significantly correlated ( $p < 0.0001$ ,  $n = 61$ ) with benthic net primary production (NPP). Average daily benthic NPP was significantly correlated to water column R ( $p < 0.002$ ,  $n = 7$ ) and appeared to explain about 88% of the variability in daily water column R. Estimates of bacterioplankton growth efficiencies ranged from 21 to 38 %, with peaks corresponding to maximal benthic DOC fluxes in spring and

summer. Bacterioplankton were responsible for the remineralization of most (>50%) of the DOC released from the benthos on a daily basis. Annual estimates of bacterioplankton C demand, based on water column R (~8 mol C m<sup>-2</sup> yr<sup>-1</sup>), represented >50% of the benthic NPP (-14 mol C m<sup>-2</sup> yr<sup>-1</sup>). These measurements indicate a stronger linkage between benthic and water column processes than previously believed, and it appears that water column heterotrophic processes are largely dependent upon seagrass exudation.

**Keywords:**

Seagrass, Carbon cycling, Exudation, DOC

**Model ILT1700 Use:**

"Light measurements. Photosynthetically active radiation (PAR) measurements were collected at our site using an **IL1700 radiometer (International Light Inc., Newburyport, MA, USA)** with a flat broadband submersible detector (constant spectral response for 400 to 700 nm; SUL033; International Light Inc.)."

**Link to Full Paper:**

<http://www.int-res.com/articles/meps/180/m180p149.pdf>

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**Title:**

Effects of nitrate, phosphate and iron on the growth of macroalgae and benthic cyanobacteria from Cocos Lagoon, Guam

**Authors:**

Ilsa B. Kuffner, Valerie J. Paul

**Organization:**

University of Guam Marine Laboratory, UOG Station, Mangilao, Guam 96923, USA

**Abstract:**

The observed high abundance of algae and cyanobacteria on Guam's coral reefs raises concern regarding a possible shift from coral- to algal-dominated communities. Possible increased nutrient supply to macroalgae and cyanobacteria via the watershed due to anthropogenic disturbance could be a partial cause. In this study, 2 outdoor microcosm experiments are used to test the effects of iron, nitrate and phosphate on 3 species of algae (*Halimeda incrassata*, *Padina tenuis* and *Dictyota bartayresiana*) and 3 species of cyanobacteria (*Tolypothrix* sp., *Schizothrix* sp. and *Lyngbya majuscula*) from Cocos Lagoon, Guam. The 6 species were cultured together sewn to an artificial substrate for 9 d with either nitrate- (~6 μM), phosphate- (~1 μM), iron- (~0.5 μM) enriched or control (ambient nutrients) conditions. Overall gram-specific growth was greatest for *L. majuscula*, which grew at 9 times the rate of the other species. Algae did not show statistically significant nutrient limitation, although results with *D. bartayresiana* and *P. tenuis* suggested iron and nitrate limited growth in the first and second experiment, respectively. Two species of cyanobacteria showed phosphate limitation. The growth of *L. majuscula* was enhanced with phosphate enrichment, whereas the release of hormogonia by *Tolypothrix* sp., not the growth of the colonies themselves, may also have been enhanced. Patterns of *Tolypothrix* sp. hormogonia release also suggested possible direct competition between algae and cyanobacteria; the hormogonia aggregated upon some species but not others. The results of this study suggest that *L. majuscula* may have more efficient growth and/or nutrient uptake mechanisms compared to the other species, and that it is capable of increased growth in response to phosphate in the water column.

**Keywords:**

Algae, Cyanobacteria, Iron, Nutrients, Phase shift

**Model ILT1700 Use:**

"The screening + rain cover resulted in a 55% reduction in the intensity of ambient photosynthetically active radiation (PAR), and a 51% reduction in ambient UVA intensity. Light measurements were made with an **IL1700 Research Radiometer (International Light Inc., Newburyport, MA)** alternately fitted with a PAR sensor (410 to 770 nm) and a UVA sensor (330 to 375 nm).

**Link to Full Paper:**

<http://www.int-res.com/articles/meps/222/m222p063.pdf>

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**Title:**

Photostability of Quercetin under Exposure to UV irradiation

**Authors:**

Fabiana T.M.C. VICENTINI, Sandra R. GEORGETTI, José R. JABOR, Juciene A. CARIS, M. Vitória L.B. BENTLEY & Maria J.V. FONSECA

**Organization:**

Faculdade de Ciências Farmacêuticas de Ribeirão Preto, Universidade de São Paulo. Av. do Café s/n, CEP 14040-903, Ribeirão Preto, SP, Brasil

**Abstract:**

Recently, it was demonstrated that topical formulations containing quercetin were able to inhibit the UVB-induced cutaneous oxidative stress and inflammation. Nevertheless, the photostability of this flavonoid under exposure to UV irradiation have not been investigated and it is well-known that the photochemical stability of this substance is essential for its activity. Therefore, in the present work was investigated the photostability of a propylene glycol solution of quercetin under forced exposure to UVB irradiation. The content of quercetin in each solution was determined quantitatively by HPLC, its ultraviolet spectra (UV-vis) and its antioxidant activity by DPPH•. The HPLC and DPPH• methods were validated and the results demonstrated that these methodologies are adequate and reliable to quantify quercetin and to determine its antioxidant activity, respectively. The photostability study showed that quercetin is resistant of degradation caused by UVB radiation exposure.

**Model ILT1700 Use:**

"The UVB source of irradiation consisted of a Philips TL40W/12 RS lamp (Medical Holand) emitting a continuous spectrum between 270 and 400 nm with a peak emission at 313 nm. The UVB output was measured using a **model IL-1700 Research Radiometer (International Light, USA; calibrated by IL service staff)** with a radiometer sensor for UV (SED005) and UVB (SED240), which detected that UVB was 73% of the total UV irradiation in the present experimental conditions. The UVB irradiation rate was 0.26 mW/ cm<sup>2</sup>."

**Link to Full Paper:**

[http://www.latamjpharm.org/trabajos/26/1/LAJOP\\_26\\_1\\_3\\_4\\_41KHS061JH.pdf](http://www.latamjpharm.org/trabajos/26/1/LAJOP_26_1_3_4_41KHS061JH.pdf)

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**Title:**

The Effect of Bright Light on Lens Compensation in Chicks

**Authors:**

Regan S. Ashby, Frank Schaeffel

**Organization:**

Institute for Ophthalmic Research, Section of Neuro-biology of the Eye, University of Tübingen, Tübingen, Germany

**Abstract:**

It has been shown that sunlight or bright indoor light can inhibit the development of deprivation myopia in chicks. It remains unclear whether light merely acts on deprivation myopia or, more generally, modulates the rate of emmetropization and its set point. This study was conducted to test how bright light interacts with compensation for imposed optical defocus. Furthermore, a dopamine antagonist was applied to test whether the protective effect of light is mediated by dopamine.

**Model ILT1700 Use:**

"The light sources currently used have been described in detail. Briefly, the chicks were kept in an illuminance of 500 lux at cage level, as measured with a **radiometer (IL1700 Research Radiometer; International Light, Inc., Newburyport, MA)**, under conventional ceiling-mounted fluorescent lights (400–800nm, peaking at 530 and 620nm), referred to as normal laboratory illuminance."

**Link to Full Paper:**

<http://www.iovs.org/content/51/10/5247.full.pdf>

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**Title:**

Photocarcinogenesis and inhibition of intercellular adhesion molecule 1 expression in cells of DNA-repair-defective individuals

**Authors:**

CONSTANZE AHRENS, MARKUS GREWE, MARK BERNEBURG, SUSANNE GREYER-BECK, XAVIER QUILLIET, MAURO MEZZINA, ALAIN SARASIN, ALAN R. LEHMANN, COLIN F. ARLETT, AND JEAN KRUTMANN

**Organization:**

Clinical and Experimental Photodermatology, Department of Dermatology, Heinrich Heine University, Moorenstrasse 5, D-40225 Dusseldorf, Germany; Laboratory of Molecular Genetics, Institut de Recherches sur le Cancer, Unite Propre de Recherche 42 Centre National de la Recherche Scientifique, Boite Postale 8, F-94801 Villejuif, France; and Medical Research Council Cell Mutation Unit, University of Sussex, Falmer Brighton, BN1 9RR, United Kingdom

**Abstract:**

Cells from patients with xeroderma pigmentosum complementation group D (XP-D) and most patients with trichothiodystrophy (TTD) are deficient in excision repair of ultraviolet (UV) radiation-induced DNA damage. Although in both syndromes this defect is based on mutations in the same gene, XPD, only XP-D, not TTD, individuals have an increased risk of skin cancer. Since the reduction in DNA repair capacity is similar in XP-D and TTD patients, it cannot account for the difference in skin cancer risk. The features of XP-D and TTD might therefore be attributable to differences in the immune response following UV-irradiation, a factor which is presumed to be important for photocarcinogenesis. We have measured the capacity of UVB radiation to inhibit expression of the immunological key molecule intercellular adhesion molecule 1 (ICAM-1) in cells from three healthy individuals in comparison to cells from three XP-D and three TTD patients. Cells from XP-D patients, but not from TTD patients, exhibited an increased susceptibility to UVB radiation-induced inhibition of ICAM-1 expression. Transfection of XP-D cells with the wild-type XPD cDNA, but not with XPC cDNA, corrected this abnormal phenotype. Thus, the skin cancer risk in DNA repair-defective individuals correlated with the susceptibility of their cells to UVB radiation-induced inhibition of ICAM-1 expression, rather than with their defect in DNA repair. The XPD protein has dual roles: in DNA repair and transcription. The transcriptional role might be important for the control of expression of immunologically relevant genes and thereby contribute to the skin cancer risk of a DNA-repair-deficient individual.

**Model ILT1700 Use:**

"The UVB output was monitored by means of an **ILT1700 research radiometer and SEE 240 UVB photodetector (International Light, Newburyport, MA)** and was approximately 2.4 W/m<sup>2</sup> at a tube-to-target distance of 22 cm."

**Link to Full Paper:**

<http://www.pnas.org/content/94/13/6837.full.pdf>

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**Title:**

High-resolution organic polymer light-emitting pixels fabricated by imprinting technique

**Authors:**

Xing Cheng, Yongtaek Hong, Jerzy Kanicki, and L. Jay Guoa

**Organization:**

Solid-State Electronics Laboratory, Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, Michigan 48109-2122

**Abstract:**

We have developed an approach to fabricate pixelated organic polymer light-emitting devices (OPLED) using an imprinting technique. The pixel array pattern was first defined in an insulating polymer layer on indium tin

oxide glass by direct imprinting, followed by the spin-coating of OLED polymers and cathode metal deposition. We demonstrated successful fabrication and operation of OLED pixels of sizes from 50 mm down to 2 mm. Optoelectronic characterization is performed on these devices, and measured results show comparable device performance with OLED pixels patterned by other methods. This fabrication scheme holds many merits such as easy to process, low-cost, high yield, expandable to flexible substrate, capable of repeated imprinting for large area arrays, and the potential to pattern submicron and nanoscale organic polymer light emitters. © 2002 American Vacuum Society.

**Model ILT1700 Use:**

"The luminous flux and current versus voltage characteristics were measured in air with a programmable voltage source (Keithley 230), an electrometer (Keithley 617), and an **IL1700 Research Radiometer from International Light.**"

**Link to Full Paper (Download Full PDF):**

<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.164.8599&rep=rep1&type=pdf>

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**Title:**

Assessment of a Novel, High-Resolution, Color, AMLCD for Diagnostic Medical Image Display: Luminance Performance and DICOM Calibration

**Authors:**

Alice N. Averbukh, M.S., David S. Channin, M.D., and Michael J. Flynn, Ph.D.

**Organization:**

Northwestern University Medical School, 448 E. Ontario Suite 300 Chicago, IL 60611, USA; Henry Ford Health System, 1 Ford Place, Detroit, MI 48202, USA.

**Abstract:**

This article documents the results of the first in a series of experiments designed to evaluate the suitability of a novel, high resolution, color, digital, liquid crystal display (LCD) panel for diagnostic quality, gray scale image display. The goal of this experiment was to measure the performance of the display, especially with respect to luminance. The panel evaluated was the IBM T221 22.2" backlit active matrix liquid crystal display (AMLCD) with native resolution of 3840 x 2400 pixels. Taking advantage of the color capabilities of the workstation, we were able to create a 256-entry grayscale calibration look-up table derived from a palette of 1786 nearly gray luminance values. We also constructed a 256-entry grayscale calibration look-up table derived from a palette of 256 true gray values for which the red, green, and blue values were equal. These calibrations will now be used in our evaluation of human contrast-detail perception on this LCD panel.

**Keywords:**

PACS, image display, AMLCD evaluation, DICOM Part 14 calibration

**Model ILT1700 Use:**

"To measure the luminance response, we followed AAPM2 and VESA FPDM guidelines. We used software and spreadsheets developed at Henry Ford Health Systems to create DICOM calibration look-up tables based on the measured luminance response of the monitor. The luminance measurements were made with an **IL1700 research radiometer (International Light, Inc., Newburyport, MA) with an SHD033 High Grain Silicon detector with a Y-photopic filter, a 62.5-mm long x 42-mm diameter barrel hood, and a 9-mm aperture cone.**"

**Link to Full Paper:**

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3045256/?tool=pubmed>

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**Title:**

Photostability of J-aggregates adsorbed on TiO<sub>2</sub> nanoparticles and AFM imaging of J-aggregates on a glass surface

**Authors:**

Mohamed M. S. Abdel-Mottaleb, Mark Van der Auweraer, Mohamed S. A. Abdel-Mottaleb

**Organization:**

Molecular Dynamics and Spectroscopy, Department of Chemistry, Katholic University of Leuven, Celestijnenlaan 200F, B3001-Heverlee, Belgium; Photoenergy Center, Faculty of Science, Ain Shams University, Abbassia, Cairo, Egypt

**Abstract:**

Spectral properties and photostability of the 5,5'-6,6'-tetrachloro-1,1'-dioctyl-3,3'-bis-(3-carboxypropyl)-benzimidacarbocyanine (Dye 1) J-aggregate was investigated in solution and upon adsorption on TiO<sub>2</sub> nanoparticles. Dye 1 was found to photodegrade on the surface of TiO<sub>2</sub>. Additionally, the self-assembly of Dye 1 was studied on a glass surface by non-contact atomic force microscopy (NCAFM). The dye molecules form a well-defined fiber like structure that extends for tens of micrometers. The internal structure of the fibers was clearly resolved and showed a number of small tubes wrapped around each other to form a helical structure.

**Model ILT1700 Use:**

"Dye 1 was adsorbed on TiO<sub>2</sub> nanoparticles suspended in the solution then centrifuged to obtain a dry solid sample for the reflectance spectra. 75W Xenon arc lamp (PTI-LPS-220 Photon Technology International) was operated at 70 W. The light intensity was measured using a **radiometer (IL 1700 International Light)** and was found to be 13.2W/cm<sup>2</sup>·min."

**Link to Full Paper (Download Full PDF):**

<http://downloads.hindawi.com/journals/ijp/2004/208496.pdf>

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**Title:**

DISCOVERY OF AN ALTERNATIVE OXYGEN SENSITIVITY IN ALGAL PHOTOSYNTHETIC H<sub>2</sub> PRODUCTION

**Authors:**

James Lee, Elias Greenbaum

**Organization:**

Oak Ridge National Laboratory, Chemical Technology Division, Oak Ridge, TN

**Abstract:**

Characterization of O<sub>2</sub>-tolerance in H<sub>2</sub>-producing photosynthetic organisms is essential to the development of this renewable energy source, since application of green algae for H<sub>2</sub> production is confronted with the problem of oxygen sensitivity. During current reporting period, we observed a new oxygen sensitivity in *Chlamydomonas reinhardtii* that is clearly distinct from the oxygen sensitivity of the hydrogenase. This distinct O<sub>2</sub> sensitivity indicates that there is an alternative electron transport pathway that can take electrons away from the hydrogenase-catalyzed H<sub>2</sub> production pathway to O<sub>2</sub>. Our experiments demonstrated that this alternative mechanism is more sensitive to O<sub>2</sub> than the oxygen sensitivity of the hydrogenase. These findings redefine the meaning of "oxygen tolerance" in algal H<sub>2</sub> production. Future work will focus on mapping this alternative electron transport pathway and on developing a technique to control this pathway to enhance the production of H<sub>2</sub>.

**Model ILT1700 Use:**

"The actinic intensity was measured with a IL-1700 light meter. Both the rate of H<sub>2</sub> production and the actinic intensity were recorded simultaneously by a PC computer."

**Link to Full Paper:**

<http://www1.eere.energy.gov/hydrogenandfuelcells//pdfs/28890n.pdf>

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**Title:**

Short Wavelength Light-Induced Retinal Damage in Rats

**Authors:**

Koji Masuda, Ikuo Watanabe

**Organization:**

Department of Ophthalmology, Hamamatsu University School of Medicine, Hamamatsu, Shizuoka, Japan

**Abstract:**

*Purpose:* To evaluate short wavelength light-induced retinal damage in rats.

*Methods:* Pigmented rats were exposed to 300–500 nm wavelength light for 30 seconds, 1, 3, 10, 20, 60, or 90 minutes. Electroretinogram a-, b-, and c-waves were recorded 48 hours after the exposure.

*Results:* While the a- and b-wave amplitudes were reduced significantly after exposures of 60 minutes and longer, the c-wave amplitude was reduced after only 3 minutes of exposure.

*Conclusions:* Rat retinal pigment epithelium is more sensitive to damage by exposure to 300–500 nm wavelength light than the neural retina.

**Keywords:**

C-wave, electroretinogram, pigmented rat, retinal light damage, short wavelength light

**Model ILT1700 Use:**

"The light intensity at the level of the cornea was 40 mW/cm<sup>2</sup> (**IL1700 Radiometer/Photometer; International Light, Newburyport, MA, USA**)."

**Link to Full Paper:**

<http://www.nichigan.or.jp/jjo-oj/pdf/04406/044060615.pdf>

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**Title:**

Sanuvox Saber Smart Laboratory Testing

**Authors:**

None Listed

**Organization:**

Department of Architectural Engineering Indoor Environment Center, Penn State University, State College, Pennsylvania.

**Abstract:**

On July 2, 2008, irradiance testing was conducted on a Sanuvox Saber Smart (Sanuvox Technologies Inc., Quebec, Canada) UVGI fixture submitted by the manufacturer. Irradiance testing was conducted in a UV lamp testing rig in the Penn State Department of Architectural Engineering Indoor Environment Center located in State College, Pennsylvania.

**Model ILT1700 Use:**

"The UV irradiance was measured using an **IL 1700 Research Radiometer equipped with a SED033/NS254/TD Narrowband 254 nm Sensor (International Light Technologies, Peabody, Massachusetts)**."

**Link to Full Paper:**

[http://www.sanuvox.com/testing/Penn\\_State\\_Sanuvox\\_Testing.pdf](http://www.sanuvox.com/testing/Penn_State_Sanuvox_Testing.pdf)

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**Title:**

Development of Scotopic Visual Thresholds in Retinopathy of Prematurity

**Authors:**

Amber M. Barnaby, Ronald M. Hansen, Anne Moskowitz, and Anne B. Fulton

**Organization:**

Department of Ophthalmology, Children’s Hospital, Harvard Medical School, Boston, Massachusetts.

**Abstract:**

*PURPOSE.* To test the hypothesis that the late-maturing parafoveal rod photoreceptors are more vulnerable than peripheral rods to the effects of retinopathy of prematurity (ROP).

*METHODS.* Twenty-four infants with a history of preterm birth (gestational age at birth <31 weeks) participated in a longitudinal study: 12 had mild ROP that resolved without treatment, and 12 had never had ROP. Thresholds for detecting stimuli (2°

diameter, 50 ms duration) presented 10° (parafoveal) and 30° (peripheral) from a central fixation target were estimated by using a preferential-looking method. At each visit, thresholds at both sites were obtained in random order. Thresholds of the preterm subjects were compared with those of previously reported term infants.

*RESULTS.* The course of threshold maturation in subjects with ROP was significantly prolonged ( $P < 0.01$ ) compared with those who had never had ROP and with term-born control subjects. On average, parafoveal thresholds in subjects with ROP reached the adult level at a median age of 12 (range, 6–18) months, and peripheral thresholds reached the adult level at 9 (range, 5–12) months. Median thresholds in subjects who had never had ROP reached adult levels at both sites by approximately 7 months.

*CONCLUSIONS.* The slower development of parafoveal compared with peripheral thresholds in subjects with a history of ROP is evidence that the late-maturing parafoveal rods are more affected by the ROP disease process.

**Model ILT1700 Use:**

"Calculation of the retinal illuminance produced by the stimuli was based on luminance measurements made with a calibrated photodiode and scotopic filter (**IL 1700; International Light, Newburyport, MA**) placed at the position of the subject's eyes. Retinal illuminance varies directly with pupillary diameter and transmissivity of the ocular media and inversely with the square of the posterior nodal distance."

**Link to Full Paper:**

<http://www.iovs.org/content/48/10/4854.full.pdf>

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**Title:**

UV-B-induced damage and photoreactivation in three species of Boeckella (Copepoda, Calanoida)

**Authors:**

Horacio E.Zagarese, Margarita Feldman, Craig E.Williamson

**Organization:**

Centro Regional Universitario Bariloche, Universidad Nacional del Comahue, Unidad Postal UNC-CRUB, (8400) S.C. de Bariloche, Argentina; Department of Earth and Environmental Sciences, 31 Williams Drive, Lehigh University, Bethlehem, PA 18015-3188, USA

**Abstract:**

Solar ultraviolet (UV) radiation poses a threat to most living organisms. Aquatic organisms have evolved three basic mechanisms to cope with harmful levels of radiation. Two mechanisms, avoidance (e.g. vertical migration) and photoprotection (e.g. production of photoprotective compounds that act as filters, antioxidants, etc.), serve to minimize the dose of UV radiation that reaches the organism's vital structures (DNA, membranes, etc.). The third mechanism, repair (e.g. dark repair mechanisms, such as nucleotide excision repair; or photoreactivation mechanisms, such as photoenzymatic repair), serves to repair the damage following UV exposure. Here, we compare the vulnerability to UV-B radiation of three copepod species (*Boeckella brevicaudata*, *Boeckella gibbosa*, and *Boeckella gracilipes*) that occur in lakes that differ in UV-B penetration and depth. Our aim was to gain insight into the significance of each of the three mechanisms in different UV-B environments. Results from a 3-day 'in situ' incubation in ultra-oligotrophic Lake Toncek showed that *B.gracilipes* is highly vulnerable to UVB and UV-A radiation. In contrast, virtually no mortality was observed in *B.gibbosa* and *B.brevicaudata* during the same period. In order to discriminate the contribution of photoprotection and photoreactivation, the three species were subsequently exposed in the laboratory to an artificial source of UV-B radiation, both in the presence and absence of visible radiation (recovery radiation). The photoprotection potential (i.e. resistance to UV-B in the absence of recovery radiation) of *B.gracilipes* and *B.gibbosa* was lower than that of *B.brevicaudata*. On the other hand, photoreactivation (higher resistance to UV-B in the presence of recovery radiation) was observed in *B.brevicaudata* and *B.gibbosa*, but not in *B.gracilipes*. To cope with damaging UV-B levels in nature, *B.gracilipes* depends exclusively on the attenuation by the external media (i.e. avoidance). Although

B.gibbosa tends to avoid the surface waters of lakes, it also occurs in shallow transparent pools. Most likely its ability to survive in these shallow, high UV environments is due to its photoreactivation potential. Finally, despite its occurrence in highly turbid lakes, B.brevicaudata seems extremely well suited to cope with UV-B radiation thanks to a combination of photoreactivation and photoprotection.

**Model ILT1700 Use:**

"Visible and UV radiation were measured with an **International Light, Inc. IL 1700 radiometer** equipped with interchangeable UV-B, UV-A, and PAR detectors. These measurements provided UV-B estimates that allowed us to compare the results from different experiments using the same lamp."

**Link to Full Paper:**

[http://www.users.muohio.edu/willia85/Publications/Zagarese1997\\_JPR.pdf](http://www.users.muohio.edu/willia85/Publications/Zagarese1997_JPR.pdf)

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**Title:**

Soot temperature and concentration measurements from colour charge coupled device camera images using a three-colour method

**Authors:**

S Simonini, S J Elston and C R Stone

**Organization:**

Department of Engineering Science, University of Oxford, UK

**Abstract:**

The three-colour method has been developed in order to turn chromatic information in charge coupled device (CCD) camera images of combustion into flame temperature and soot concentration measurements. The method showed the following advantages over the two-colour method from which it is derived: only one camera is needed; no further calibration is required once the response curve of the camera is known; it does not rely on light intensity but on ratios between colour components, making it easy to adapt to different operating points with different flame brightness. The results on temperature evaluation were compared with a thermodynamic model, and better agreement was found in the late stages of the cycle, when the radiation from chemical reactions becomes negligible. The error analysis showed that the calculations for soot concentration are ill-conditioned, but when the results are integrated to give a soot loading the accuracy is improved and there is clear evidence of soot evolution and destruction during combustion.

**Keywords:**

soot temperature, soot concentration, charge coupled device (CCD) imaging, two-colour method, three-colour method

**Model ILT1700 Use:**

"Once all the pictures were grabbed, a photometer (**International Light IL1700 Research Radiometer, calibrated at the factory**) replaced the camera, and the monochromator was cycled through the 31 wavelengths again; at each wavelength the incident light intensity was measured in terms of mW/m2."

**Link to Full Paper (Abstract Only):**

<http://pic.sagepub.com/content/215/9/1041.abstract>

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**Title:**

Measuring non-coherent optical radiation at work places

**Authors:**

Andrzej Pawlak

**Organization:**

National Research Institute, Central Institute for Labour Protection

**Abstract:**

This paper presents the requirements for the method and extent of testing of non-coherent optical radiation at work places, as well as the meters used for tests. The requirements are based on the current standards in the field of optical radiation. The scope of the exposure measurements are presented in conjunction with the current values of MDE. There is a description of the method of determining the angular dimension of radiation source alpha and how to calculate the effective source radiance from the measured effective irradiance. At the end, the paper presents the recommended frequency of testing and suggestions concerning the content of the study.

**Keywords:**

ultra-violet, visible and infra-red radiation, irradiance. radiance

**Model ILT1700 Use:**

“An example of such a wideband meter is the radiometer ILT 1700 manufactured by International Light, USA, which has been available for some time in our market. One of the advantages of this meter is the possibility of equipping it with a large number of measurement probes offered by the manufacturer. Among all of the available probes, it is possible to select ones enabling almost all measurements of optical radiation discussed before.”

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**NOTE:** *Additional ILT1700 Technical Paper Summaries Will Continue To Be Added To This Document – Please Check Back Frequently*