**Phototherapy with blue (415 nm) and red (660 nm) light in the treatment of acne vulgaris**

P. Papageorgiou, A. Katsambas* andA. Chu

In this study we have evaluated the use of blue light (peak at 415 nm) and a mixed blue and red light (peaks at 415 and 660 nm) in the treatment of acne vulgaris. One hundred and seven patients with mild to moderate acne vulgaris were randomized into four treatment groups: blue light, mixed blue and red light, cool white light and 5% benzoyl peroxide cream. Subjects in the phototherapy groups used portable light sources and irradiation was carried out daily for 15 min. Comparative assessment between the three light sources was made in an observer-blinded fashion, but this could not be achieved for the use of benzoyl peroxide. Assessments were performed every 4 weeks. After 12 weeks of active treatment a mean improvement of 76% (95% confidence interval 66–87) in inflammatory lesions was achieved by the combined blue–red light phototherapy; this was significantly superior to that achieved by blue light (at weeks 4 and 8 but not week 12), benzoyl peroxide (at weeks 8 and 12) or white light (at each assessment). The final mean improvement in comedones by using blue–red light was 58% (95% confidence interval 45–71), again better than that achieved by the other active treatments used, although the differences did not reach significant levels. We have found that phototherapy with mixed blue–red light, probably by combining antibacterial and anti-inflammatory action, is an effective means of treating acne vulgaris of mild to moderate severity, with no significant short-term adverse effects.

## A multicenter clinical evaluation of the treatment of mild to moderate inflammatory acne vulgaris of the face with visible blue light in comparison to topical 1% clindamycin antibiotic solution.

**Gold MH, Rao J, Goldman MP, Bridges TM, Bradshaw VL, Boring MM, Guider AN.**

Gold Skin Care Center, Tennessee Clinical Research Center Nashville, TN 37215, USA. drgold@goldskincare.com

BACKGROUND: Blue light sources have been shown to be effective in the treatment of mild to moderate inflammatory acne vulgaris lesions. OBJECTIVE: We evaluated the safety and efficacy of a new blue light source in the treatment of mild to moderate inflammatory acne vulgaris in comparison to topical 1% clindamycin solution. RESULTS: Blue light therapy reduced inflammatory acne vulgaris lesions by an average of 34%, as compared to 14% for topical 1% clindamycin solution. CONCLUSIONS: The blue light source presented in this report is a safe and effective treatment option available to our patients with mild to moderate inflammatory acne lesions.

## Photodynamic therapy for the treatment of acne: a pilot study.

**Taub AF.**

Advanced Dermatology, 275 Parkway Drive, Suite 521, Lincolnshire, IL 60069, USA. drtaub@skinfo.com

Photodynamic therapy (PDT) with use of topical 5-aminolevulinic acid (ALA, Levulan Kerastick, Dusa Pharmaceuticals, Inc., Wilmington, MA) photosensitizing agent is a new modality for the treatment of acne. Eighteen patients (aged 15 to 63) with moderate to severe inflammatory acne received ALA-PDT. ALA remained in contact with skin for 15 to 30 minutes before exposure to blue light (ClearLight [Lumenis] or BLU-U [Dusa Pharmaceuticals, Inc.]) or the Aurora DSR (Syneron Medical Ltd.), which uses Electro-Optical Synergy (ELOS), a unique combination of optical and radiofrequency (RF) energy. Patients received two to four ALA-PDT treatments over four to eight weeks or two cycles of ALA-PDT (weeks 2, 4) preceded by salicylic acid peel (weeks 1, 3) over four weeks. The average follow-up time was four months. On a scale of 0.0 to 4.0, the average acne grade improvement was 1.75. Among the 12 patients who said their acne had improved, 11 had at least 50% improvement and five had more than 75% improvement. Adverse effects were limited to erythema and peeling for up to five days after treatment and one episode of impetiginization of the affected area. Patients with moderate to severe acne can achieve durable improvement with short-contact ALA-PDT.

## The effective treatment of acne vulgaris by a high-intensity, narrow band 405-420 nm light source.

**Elman M, Slatkine M, Harth Y.**

Beit Harofim Holon, Israel.

BACKGROUND: Available topical treatments are slow and frequently irritating. Oral therapies may be associated with increased bacterial resistance (antibiotics) or possible severe side effects (oral isotretinoin). In vitro and in vivo exposure of acne bacteria to 405-420 nm ultraviolet (UV) free blue light results in the photo-destruction of these bacteria through the effects on the porphyrins produced naturally by Propionibacterium acnes. A novel, high-intensity, narrow band 420 nm UV free blue light has been shown to decrease inflammatory acne lesions after eight bi-weekly treatments. OBJECTIVES: To examine the effects of high-intensity, narrow band 420 nm UV free blue light (ClearLight) on inflammatory acne lesions. METHODS: Three studies were carried out to examine the clinical effects of high-intensity, narrow band blue light on papulo-pustular acne: the split-face dose-response study, the full-face open trial and the split-face, double-blind controlled study. The studies enrolled 10, 13 and 23 patients respectively. RESULTS: The data show more than an 80% response to 420 nm acne phototherapy with a significant reduction of 59-67% of inflammatory acne lesions after only eight treatments of 8-15 minutes. The reduction in lesions was steady in the follow-ups at 2, 4 and 8 weeks after the end of therapy. Prolonged remission was evident in the 8 weeks after the

end of therapy. No adverse effects or patient discomfort were noted in any of the patients. CONCLUSIONS: Acne phototherapy by high intensity, narrow band 405-420 nm light is proven to be an attractive, fast, effective, non-invasive alternative to current topical and parenteral anti-acne remedies.

## Eradication of Propionibacterium acnes by its endogenic porphyrins after illumination with high intensity blue light.

**Ashkenazi H, Malik Z, Harth Y, Nitzan Y.**

Health Sciences Research Center, Faculty of Life Sciences, Bar-Ilan University, Ramat-Gan 52900, Israel.

Propionibacterium acnes is a Gram-positive, microaerophilic bacterium that causes skin wounds. It is known to naturally produce high amounts of intracellular porphyrins. The results of the present study confirm that the investigated strain of P. acnes is capable of producing endogenic porphyrins with no need for any trigger molecules. Extracts from growing cultures have demonstrated emission peaks around 612 nm when excited at 405 nm, which are characteristic for porphyrins. Endogenic porphyrins were determined and quantified after their extraction from the bacterial cells by fluorescence intensity and by elution retention time on high-performance liquid chromatography (HPLC). The porphyrins produced by P. acnes are mostly coproporphyrin, as shown by the HPLC elution patterns. Addition of delta-aminolevulinic acid (ALA) enhanced intracellular porphyrin synthesis and higher amounts of coproporphyrin have been found. Eradication of P. acnes by its endogenic porphyrins was examined after illumination with intense blue light at 407-420 nm. The viability of 24 h cultures grown anaerobically in liquid medium was reduced by less than two orders of magnitude when illuminated once with a light dose of 75 J cm(-2). Better photodynamic effects were obtained when cultures were illuminated twice or three times consecutively with a light dose of 75 J cm(-2) and an interval of 24 h between illuminations. The viability of the culture under these conditions decreased by four orders of magnitude after two illuminations and by five orders of magnitude after three illuminations. When ALA-triggered cultures were illuminated with intense blue light at a light dose of 75 J cm(-2) the viability of the treated cultures decreased by seven orders of magnitude. This decrease in viability can occur even after a single exposure of illumination for the indicated light intensity. X-ray microanalysis and transmission electron microscopy revealed structural damages to membranes in the illuminated P. acnes. Illumination of the endogenous coproporphyrin with blue light (407-420 nm) apparently plays a major role in P. acnes photoinactivation. A treatment protocol with a series of several illuminations or illumination after application of ALA may be suitable for curing acne. Treatment by both pathways may overcome the resistance of P. acnes to antibiotic treatment.