Different Light Sources in Photodynamic Therapy for Use in Photorejuvenation

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Abstract: Photodynamic therapy (PDT) has recently emerged as a treatment modality for photorejuvenation of the skin. This study is a preliminary investigation into the effect of different light sources to activate hypericin, a plant-derived photosensitizer in primary human dermal fibroblast cells.

1. Introduction

Photodynamic therapy (PDT) is a well-established treatment modality in dermatology. It is often used to treat skin conditions such as acne (pimples) and psoriasis (itching skin) [1], [2]. Recently, it has been proposed as a therapy for photorejuvenation applications in human skin[3]. As the basis of PDT is the addition of a photosensitizer (PS) which is activated with different wavelengths of light, it becomes important to study not only the characteristics of the PS used, but also the wavelengths of light used to activate it [3]. Currently a number of PS with different light sources are being used with a strong focus on PDT activation by red light to induce sub-dermal skin changes, as red light can penetrate to the dermal layer [4].

2. Methodology

Experiments were conducted using two different light sources – UVA lamp, 320-400nm with a maximal output peak of 365nm, and laser light (Red - 635nm). The fibroblasts were exposed to hypericin over a period of 16 hours and then activated using the light source. After a 24 hour recovery time the viable cells were measured using a cell viability assay kit (XTT, Roche, USA). Different hypericin concentrations (0.25µM – 1µM) and light doses (1J/cm² - 5J/cm²) were used.

3. Results

Preliminary results indicate that with 1J/cm² of UVA light cell viability was increased at the lower concentrations of hypericin and significantly decreased at the higher concentrations of hypericin. However, when 2.5J/cm² of red laser light was used with low concentrations of hypericin an increase in cell viability was seen with no significant decrease in viability even at higher concentrations. These novel results suggest that both UV and red laser light can activate hypericin over a range of concentrations and that the reactive oxygen species produced contribute in a beneficial way to stimulate proliferation of human dermal fibroblasts [5]. Although these studies are ongoing, the results imply that low concentration hypericin-PDT may be an ideal clinical treatment modality to activate/rejuvenate aging skin. UVA is more effective than the laser light, which is expected, due to the differences in the absorption coefficient.

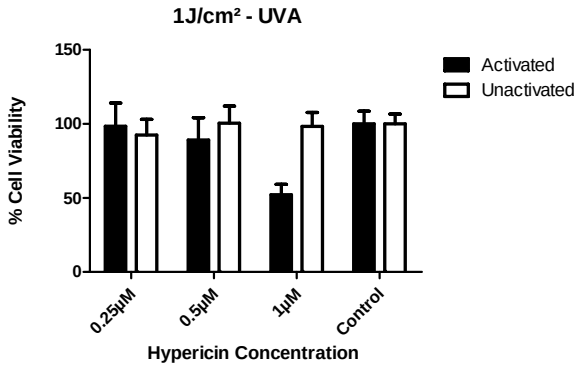

Fig 1. Percentage of viable cells after hypericin treatment and using UVA light for activation. All concentrations were normalised to the control (0µM)

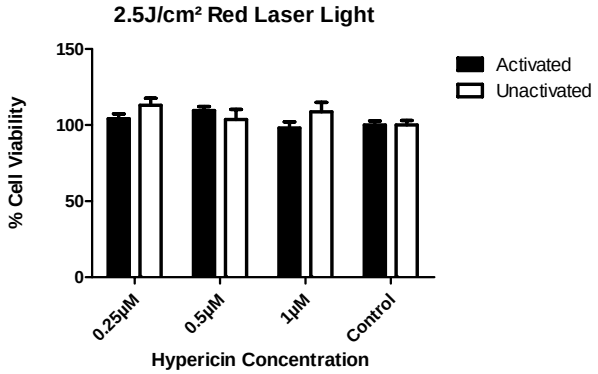

Fig 2. Percentage of viable cells after hypericin treatment and using laser light for activations. All concentrations were normalised to the control (0µM)

4. References

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