

Dermatological Lamps as a Source of Vitamin D

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Abstract. Dermatological lamps emitting UV-B or UV-A radiation have been used at our surgery in the treatments of a wide variety of skin conditions. The use of UVR in the treatment of skin cancer, autoimmune and chronic inflammatory diseases of the skin is discussed. Additionally, the equipment has been used, as part of research efforts in collaboration with the University of Auckland, to better understand the relationships between exposure to UV radiation and health effects such as heart disease and vitamin D status. Some recent results are highlighted.

Clinical Trial

A trial comparing the effects of narrowband UV-B or UV-A on blood pressure and Serum Vitamin D levels was performed between 2006 and 2007 in the winter months. 123 patients were treated. They all had levels under 50 nmol/litre. A total of 24 exposures were given over a 12 week period. Serum Vitamin D increased from 43.2 to 92.6 in the UV-B arm and from 45.5 to 64.9 in the UV-A arm of the study. The latter group was designed to be the placebo arm. This was significant (the P Value being less than 0.0001.). It indicates that patients undergoing phototherapy have significant Vitamin D increases. Whether this is related to therapeutic response is currently unknown, although it may well be so. The blood pressure did not change. Results of these studies have been reported elsewhere (Scragg et al. 2010, submitted, Wishart & Scragg 2009). Other results coming from these clinical trials include independent measurements of the spectral output from these chambers (Johnston & McKenzie 2010), and an assessment relating UV exposures in the UV-A and UV-B chambers to changes in vitamin D status among a range of skin types (McKenzie et al. 2010).

Photodynamic Therapy

Metvix is the antineoplastic agent we use when performing Photodynamic Therapy. The active substance is methyl aminolevulinate (as Hydrochloride). We use a red LED light which has an average wavelength of 630nm and requires a total dose of $37J/cm^2$ to activate the cream. It is used to treat actinic keratoses on the face and the scalp. It can be used to treat primary superficial and nodular forms of Basal Cell Carcinoma (BCC) when surgery is considered inappropriate. We have used Photodynamic Therapy also for Mycosis Fungoides (T Cell Lymphoma) and we have also treated lesions on the face of a patient with Lupus Pernio.

Treatment consists of application of the cream, followed by light exposure (Photodynamic Therapy) three hours later. The lesions absorb the methyl aminolevulinate from the cream. By subsequent exposure to light, the lesion cells are destroyed while normal skin will not be affected.

At three hours, if the room is darkened and a Wood's Light held to the area of the lesion, there will be an uptake by the cancer cells and this is demonstrated as pink fluorescence before light exposure (see Figure 1). Fluorescence is quenched by LED.



Figure 1. Pink fluorescence in cancer cells can be seen using a Wood's Light prior to exposure from a red LED.

Treatment of Vitiligo

Here we discuss a case study of vitiligo treatment with a variety of wave lengths of light.

Before the year 2000 the patient started intermittent treatment PUVA Sol in India, Egypt and Germany. This was followed by treatment in India from 2000 to 2003 using PUVA, starting with Oxsoralen Pills and then changing over to topical Psoralen.

Treatments involving exposures to light began in Dunedin in 2004. For one year, PUVA treatments were administered– 46 exposures up to 3.5 Joules, giving a total of 143 Joules cm^2 .

In March 2005 the patient started narrowband UV-B treatment at Dr John Wishart's Clinic. In total she received 29 treatments of Narrowband UVB

She then started using Oxsoralen (20 mg) and exposures in whole body. She received 8 exposures to UV-A bed. She then changed to Oxsoralen Gel and starting at 0.2 of a Joule with gradual weekly increases, she received a further 39 whole body UV-A exposures.

Then she changed to TUV (High Dose Targeted Phototherapy) of UV-B to the left and right side face, gel to left side face only and then UV-A to left superimposed on top of a UV-B dose. In total she received 24 exposures.

Then she received UV-A treatment only on both sides with Gel 48 exposures up to 11.7.2007.

Finally, the patient received 102 further treatments of High Dose Targeted Phototherapy – using UV-A radiation. The photographs in Figure 2 demonstrate her response to these final series of treatments over the period 11 July 2007 to 25 March 2010.

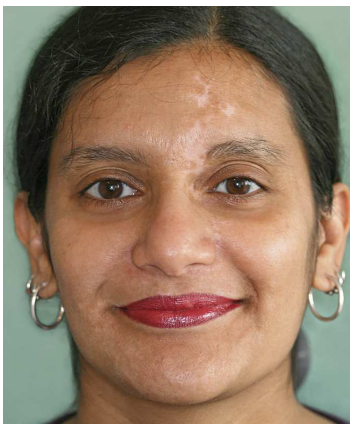
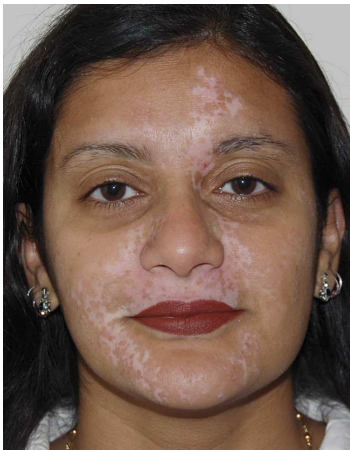
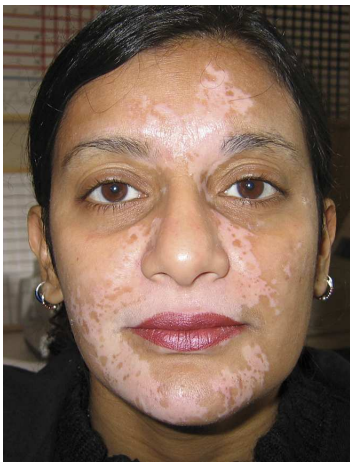
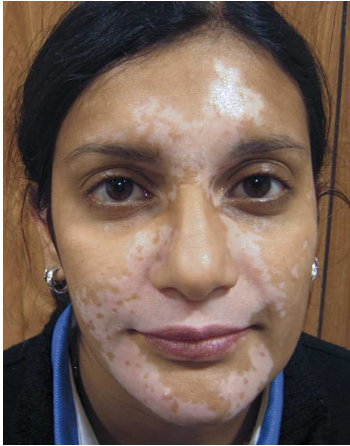


Figure 2. Images of the patient before, during and after 102 treatments of High Dose Targeted UV-A Phototherapy.

References

- Johnston, P.V., McKenzie, R.L. 2010. Calibration of solarium. Paper 14 at NIWA UV Workshop, Queenstown, 7-9 April.
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- Wishart, J., Scragg, R. 2009. A double-blind randomised controlled clinical trial comparing the effects of narrow band ultraviolet (UV)B (TL-01) or UVA on vitamin D levels, blood pressure, insulin sensitivity, and ventricular volume. *British Journal of Dermatology* 161: 129.