A new breakthrough technology of targeted tunable wavelength phototherapy for vitiligo, psoriasis, atopic dermatitis and leukoderma

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Venue:	Sheraton Hotel, Hong Kong
Speaker:	Dr. Yoram Harth Senior Dermatologist and Director, Photodynamic Therapy Unit, Elisha Medical Center Haifa, Israel
Organiser:	The Hong Kong Society of Dermatology and Venereology

The speaker introduced a phototherapy machine which was tunable in its wavelength in three ranges, namely ultraviolet (UV) B, UVA1 and visible blue/violet light. The light is delivered through a flexible light guide delivery system to the diseased skin and thereby, limiting the exposure of light to the targeted area only. It can deliver both UVB and UVA1 in a single pulse and can also be used in the determination of minimal erythemogenic dose or minimal phototoxic dose. As a spectrum of wavelengths can be selected, it is potentially useful in a wide variety of skin diseases such as psoriasis, vitiligo, atopic dermatitis, localised scleroderma, keloid and solar keratosis.

Current phototherapy started off with the use of quartz lamp which delivered a mixture of UVC and UVB. It then evolved through stages from broad band source to narrow band source. Moreover, there was a trend towards the use of targeted therapy rather than full body phototherapy to reduce the amount of light received by the normal skin. The new machine can deliver light, of tunable wavelength, to a targeted area of skin.

Traditional treatment of psoriasis has its own advantages and disadvantages. For example, tar is messy and smelly. Topical vitamin derivatives have slow onset of action. Full body photo-chemotherapy increases the risk of skin cancer in normal skin. Topical steroid, systemic methotrexate, acitretin and cyclosporine carry their well recognised profile of side effects. The optimal therapeutic wavelength for psoriasis peaks at 304 nm and 313 nm as determined by previous studies. Targeted phototherapy adds to the list of armamentarium that can be considered in the management of mild to moderate psoriasis. The light delivered should be increased stepwise according to the erythema response in the treated skin area. The typical pulse duration is one to four seconds per site and a typical dose ranges from 300 to 700 mJ/cm^2.

A mixture of narrow band UVB and UVA1 can be delivered at the same time and be used in hypopigmented conditions such as vitiligo, stretch marks and postinflammatory hypopigmentation. For localised vitiligo, response to treatment can be observed as early as 10 to 12 weeks after treatment. UVA1 and UVB act synergistically to produce repigmentation. While UVA1 causes immediate darking of the non-coloured melanin precursors, UVB enhances the production of new melanin.

The UVA1 spectrum can be used in other skin diseases such as atopic dermatitis, keloid and localised scleroderma. Keloids are overgrowth of fibrous tissue whereas localised scleroderma represents thickening and induration of skin secondary to excessive collagen deposition. The rationale behind the use of UVA1 in these conditions is its ability to induce collagenase production by the fibroblast.

The visible blue/violet spectrum can be used in the photodynamic therapy of superficial skin cancers such as superficial basal cell carcinoma or other skin cancer precursors such as solar keratosis. The process requires pre-treatment of the skin site with aminolevulinic acid. Because the compound is concentrated more in the tumour site than in normal skin, photo-activation of its metabolite will result in preferential killing of tumour cells by the production of free oxygen radical. The same wavelength can be used in the treatment of acne vulgaris as well.

Learning points:

Targeted phototherapy with selectable wavelengths can be used in a wide variety of skin diseases.