Topical Vitamins for the Skin - the Colours of the Rainbow

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It has been ten years since I wrote about "the skin care in the Millennium" in the Medical Diary. Ten years on, as I was preparing a review of the vitamins for the skin, I am reminded again why the cosmeceutical products gain such popularity to the consumers - the image of skin health is as rich as the colours of the rainbow. These colours are my association only. Nevertheless, it offers a colourful account of the key to skin health.

For example, RED is the colour of vitamin A, as it is derived from red fruits and vegetables. The parent compound of vitamin A is not absorbed by the skin. Its derivatives, retinoic acid is a lipid soluble molecule known to affect cell growth, differentiation, homeostasis, apoptosis and embryonic development. The third generation retinoids (such as adapalene) is less irritating and more photo-stable than the first and second generation retinoids of Retinol, Tretinoin and Isotretinoin. Their comedolytic properties and excellent follicular penetration enable them to be the mainstay for anti-acne treatment. They also increase epidermal turnover, stimulate new blood vessel formation and promote collagen remodelling, hence repair sun damage and reduce wrinkles of sun-exposed skin.

Vitamin B5 is COLOURLESS as water. The active form is Panthenol, the alcohol of pantothenic acid. Panthenol is a humectant, that it can hold and attract water. It is the only member in the vitamin B family for topical use in hydrating gels and shampoos. The other family members are B1 thiamine, B2 riboflavin, B6 pyridoxine and B 12 cyanocobaline, which are to be taken by the oral or parenteral route.

Vitamin C is ORANGE, as derived from orange coloured fruits. It is a potent antioxidant and mops up the free radicals released from cell damage by ultra violet rays. It protects the skin from UV induced erythema and sunburns, useful for wrinkle prevention and anti-ageing as well as skin cancer prevention. As Vitamin C is active only in the acidic pH of 3, it is slightly stinging and irritable to the skin. The second and third generations of Vitamin C have coupled with vitamin E, ferrulic acid and phloretin (a flavonoid derived from apples) to enhance its skin absorption and reduce irritability on application.

IVORY is the colour for vitamin D. Vitamin D₃ is synthesised from cholecalciferol which is present in abundance in the skin by the action of UV irradiation. It plays an important role in calcium metabolism in bone growth. D-calcipotriol is a topical treatment for psoriasis.

Vitamin E is a soothing colour of BLUE. Tocopherol is an important antioxidant. It protects the cell membrane in the skin from peroxidation, ameliorate wounds by reducing the damage induced by free oxygen radicals which are released by neutrophils in the inflammatory phase of the healing process. Scientists as well as laypersons alike have interpreted this to mean that topical vitamin E may improve wound healing. However this theory has not been substantiated in in-vivo studies, as this may be species-specific. However, it is agreed that the potency of vitamin E as an antioxidant can be increased through combination with other antioxidants like vitamin C and Coenzyme Q.

PURPLE is the colour of vitamin K, as many cosmetic companies claim that their vitamin K creams erase dark circles under the eyes, and also reduce erythema and flushing of rosacea. It is hard to prove that this works by scientific controlled studies as the cause of these dark orbital circles is multifactorial - blood flow, venous return or venous congestion, skin laxity as well as pigments are contributory factors.

Of course, the key to skin health does not stop at the spectrum of vitamins. The kaleidoscope of colours is never ending: Alpha hydroxyl acid (AHA) is a MULTIPLE COLOUR TONE, as it embraces the group of glycolic acid, lactic acid, citric acid etc., being useful for regenerating skin polarity and lightening pigments and skin tones; Beta hydroxyl acid (BHA) is GREEN, as derived from willow trees, used for skin exfoliation and treatment of acne; Iron of BROWN, its role as an adjunct to increase vitamin C absorption from the skin; Green tea, another compound rich in antioxidant is the soothing colour of PALE GREEN...

Last, but not least, the colour of physical sunscreen is WHITE, of titanium and zinc oxide which is important in photo-protection for antiaging and skin cancer protection.

At the end of the day, skin health, like the practice of medicine, becomes an Art. The dermatologist can use his brush to paint freely from his colourful palette. It is therefore not surprising that many medical practitioners are also artists of painters, photographers, writers and musicians!
**References**

**Vitamin A**
Kligman AM: The growing importance of topical retinol in clinical dermatology.  
Voorhees JJ: Photoaging therapy with topical tretinoin: An evidence and analysis.  

**Vitamin B**
Skinceuticals archive

**Vitamin C**
Murray et al. Sheldon Pinnell: A topical antioxidant solution containing vitamin C and E stabilized by ferrulic acid.  
Pinnell et al.: Topical L-ascorbic acid - percutaneous absorption studies.  
Dermatol surg 2001; 27:137-42

**Vitamin D**
Fraser DR (1974) Metabolism & Function of Vit. D  
London Biochemical Society

**Vitamin E**
Nachbar F et al.: The role of Vit. E in normal and damaged skin.  
Palmieri B et al: Vit E added silicone gel sheets for treatment of hypertrophic scar and keloids.  

**Vitamin K**
Elson M. Treatment of periorbital hyperpigmentataion with topical vitamin K / vitamin A  
Cosmetic Dermatol 12(12): 32, 1999

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**Annual General Meeting (2009) of the Hong Kong Surgical Laser Association**

**Joint Scientific Meeting of the Hong Kong Surgical Laser Association and**  
**The Hong Kong Medical Association**

**Advances in Fractional Lasers**

**Date:** 21st April 2009 (Tuesday)  
**Venue:** Gloucester Room II, 3/F, The Excelsior Hotel, Causeway Bay, Hong Kong

7:00 pm – 7:30 pm: AGM 2009 – Hong Kong Surgical Laser Association

7:30 pm – 8:45 pm: Scientific Meeting

**Chairman:** Dr. Walter WK King  
Specialist in Plastic Surgery, Director, Plastic & Reconstructive Surgery Centre,  
Hong Kong Sanatorium & Hospital

**Speakers:**

1. **Introduction to Fractional Lasers**  
Dr. Walter WK King  
Specialist in Plastic Surgery, Director, Plastic & Reconstructive Surgery Centre,  
Hong Kong Sanatorium & Hospital

2. **The Use of Fractional CO2 Laser Technology**  
Dr. Wong Wai Hong  
Specialist in Plastic Surgery, Hong Kong Plastic & Cosmetic Surgery Centre

3. **The Management Common Hyperpigmentary Disorders**  
Dr. Wong Mon Ching  
Specialist in Dermatology, Hon. Consultant, Dermatology and Laser Surgery Centre,  
Union Hospital

*CME will be applied for various Colleges of the Hong Kong Academy of Medicine and various institutions in Hong Kong for Specialists and Non-Specialists*

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