PHYSIOLOGICAL EFFECTS OF UVR
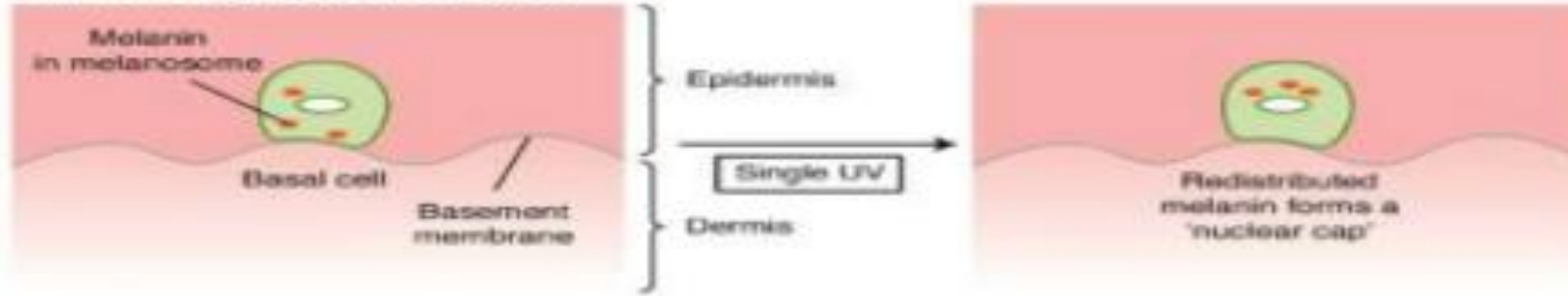
IMMEDIATE ACUTE EFFECTS OF UVR ON THE SKIN

ERYTHEMA

- UVR causes reddening of the skin
- UVB and UVC are largely absorbed in the skin
- Causes release of Histamine and prostaglandins and nitric oxide
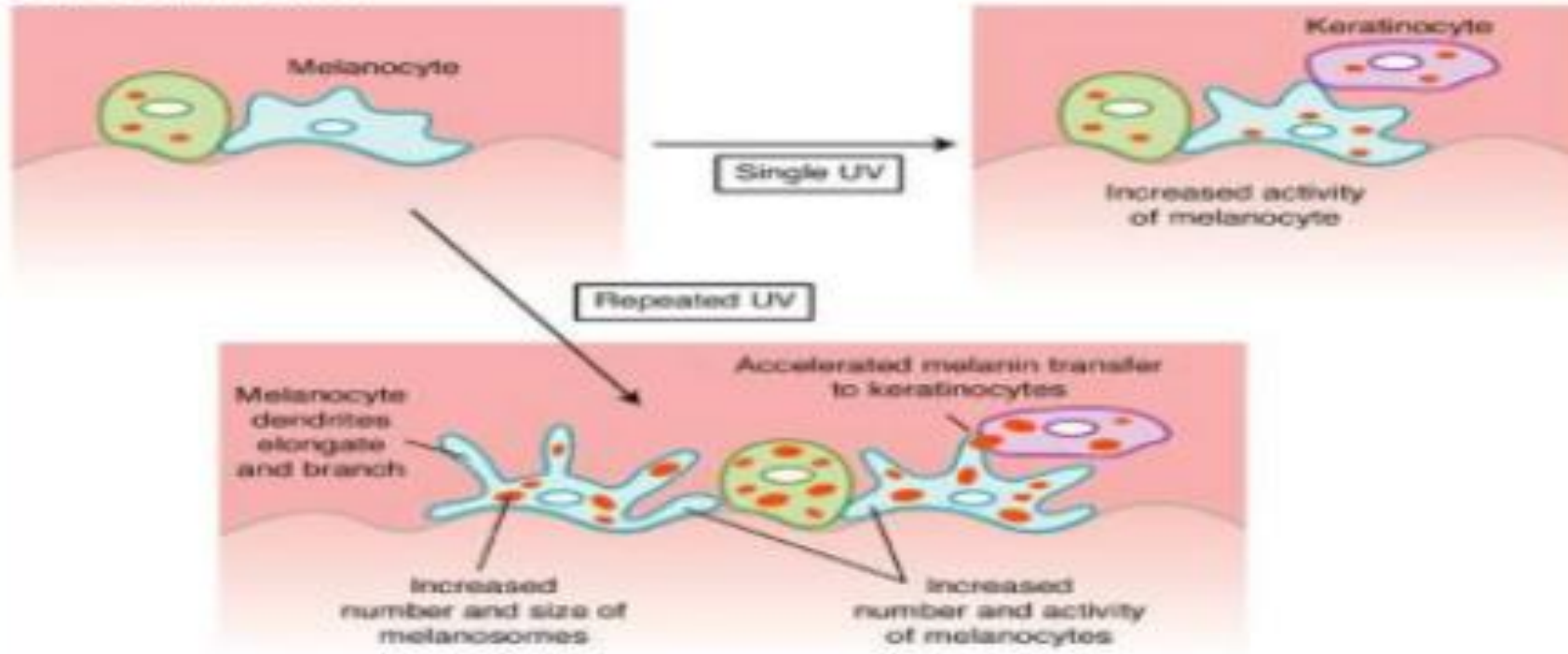- Accumulation of these substances around the blood vessels make them dilate
-

PIGMENTATION

- UVR stimulates melanocytes which produces melanin

- The melanin forms an umbrella over the nucleus of the cells to protect it from the UVR .

a Immediate pigment darkening (IPD)

Molanin in melanosome

Epidermis

Basal cell

Basement membrane

Dermis

Single UV

Redistributed melanin forms a 'nuclear cap'

b Delayed tanning (DT)

Melanocyte

Single UV

Keratinocyte

Increased activity of melanocyte

Repeated UV

Melanocyte dendrites elongate and branch

Accelerated melanin transfer to keratinocytes

Increased number and size of melanosomes

Increased number and activity of melanocytes

The mechanism of skin pigmentation after UV irradiation

Expert Reviews in Molecular Medicine © 2002 Cambridge University Press

THICKENINING OF EPIDERMIS OR INCREASED SKIN GROWTH

- UVR increases the activity of basal layer of epidermis causing a marked thickening of striatum corneum
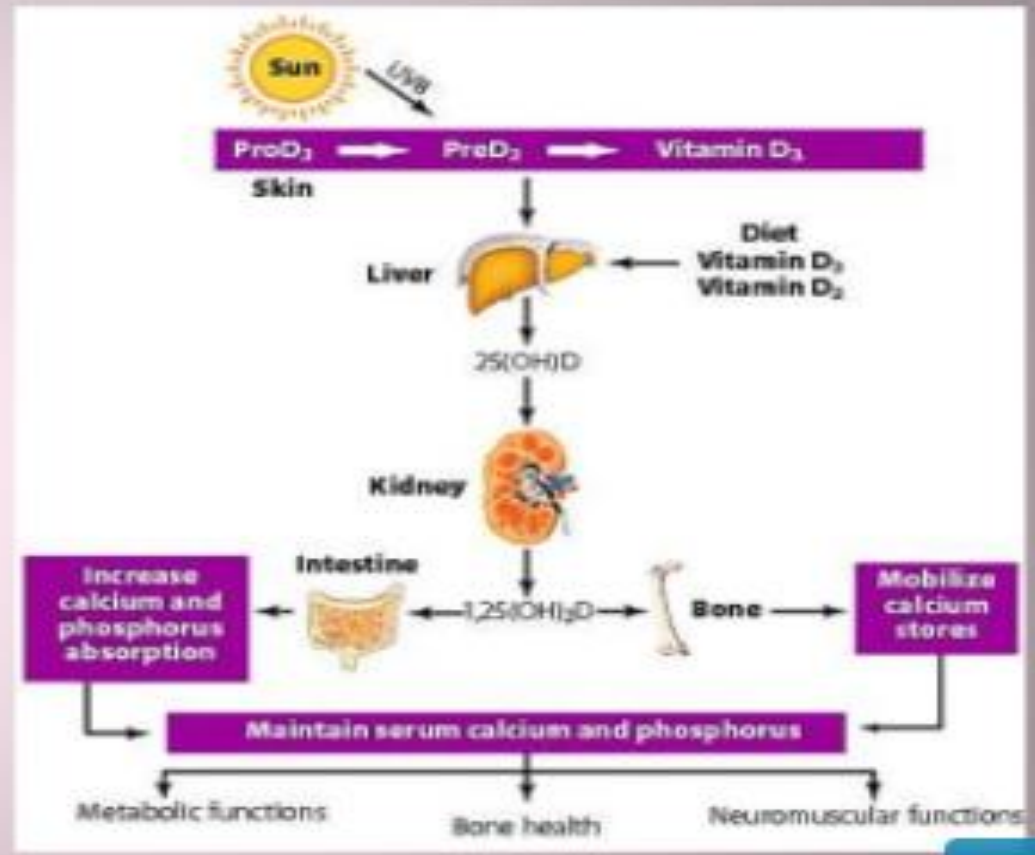
- The skin thickening gives protection from pigmentation.

PEELING OR DESQUAMATION

- The increased thickness of epidermis is eventually lost as desquamation.

- When this happens the resistance of skin to UVR is substantially lowered.

VITAMIN D PRODUCTION

VITAMIN D PRODUCTION

UVB irradiation quickly converts epidermal 7-dehydrocholesterol into previtamin D3; the latter then isomerizes to vitamin D3 (cholecalciferol), which is then converted in the *liver* to 25-hydroxyvitamin D3 and subsequently in the *kidneys* to 1,25-dihydroxyvitamin D3, its *active* form. UVR-induced vitamin D3 synthesis is maximal at suberythemogenic doses.

ON EYES

Strong dose of UVB and UVC radiation to the eyes can lead to

Conjunctivitis

Photokeratitis

This results in irritation , watery eyes and Photophobia.

SNOW BLINDNESS when it arises due to solar UVB and UVC reflection from snow.

UVA in strong dose may cause cataract.

PHYSIOLOGICAL EFFECTS OF UVR

LONG TERM TONIC EFFECT OF UVR ON THE SKIN

SOLAR ELASTOSIS AND AGEING

- Premature ageing of skin
- There is thinning of epidermis, loss of epidermal ridges, loss of melanocytes, dryness, poor function of sebaceous and sweat glands, wrinkling

CANCER

▶ Prolong exposure of UVB nad UVC can lead to carcinogenesis .

▶ The rays have an effect on DNA and thus on replication