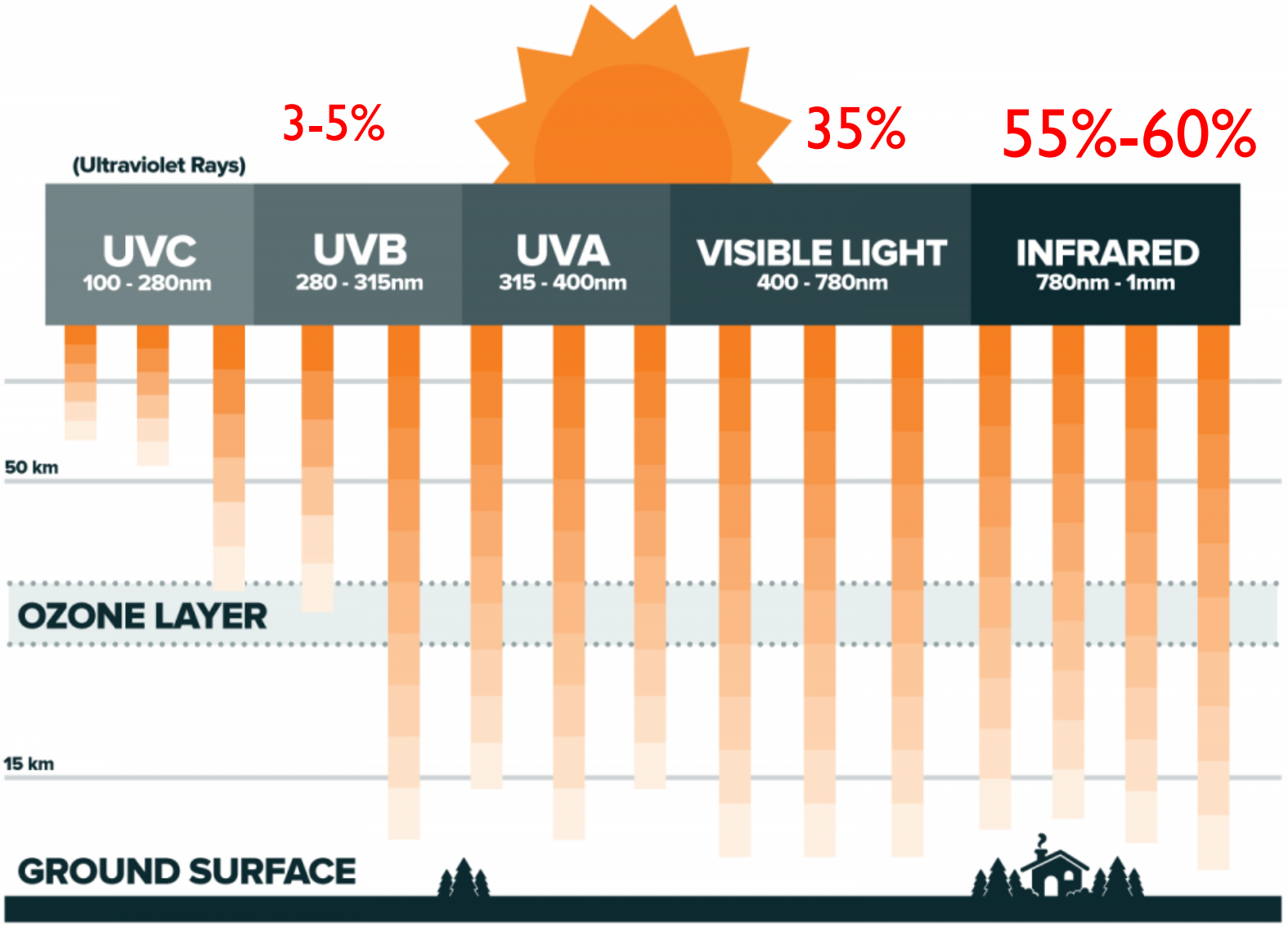
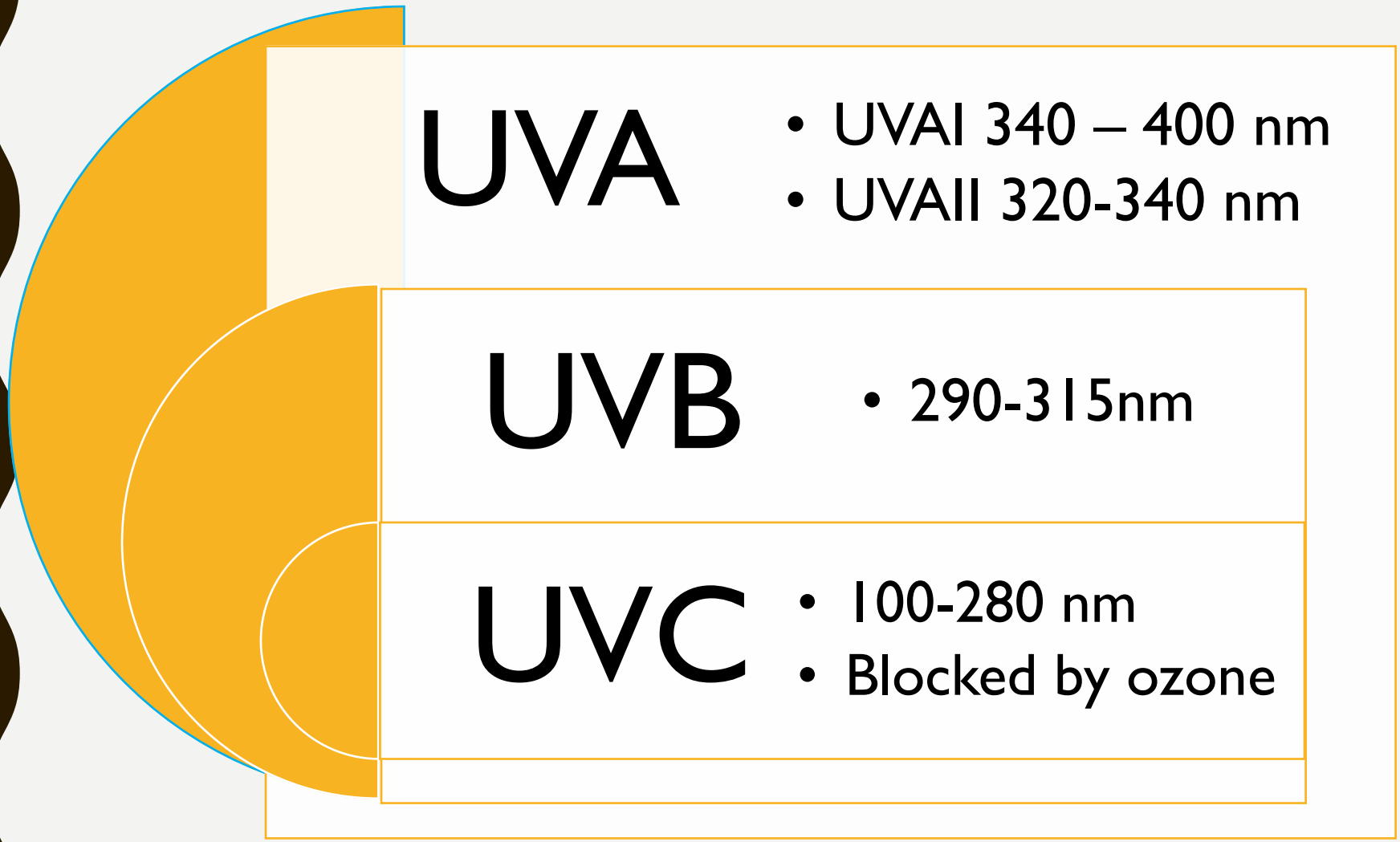
SUN PROTECTION PRODUCTS

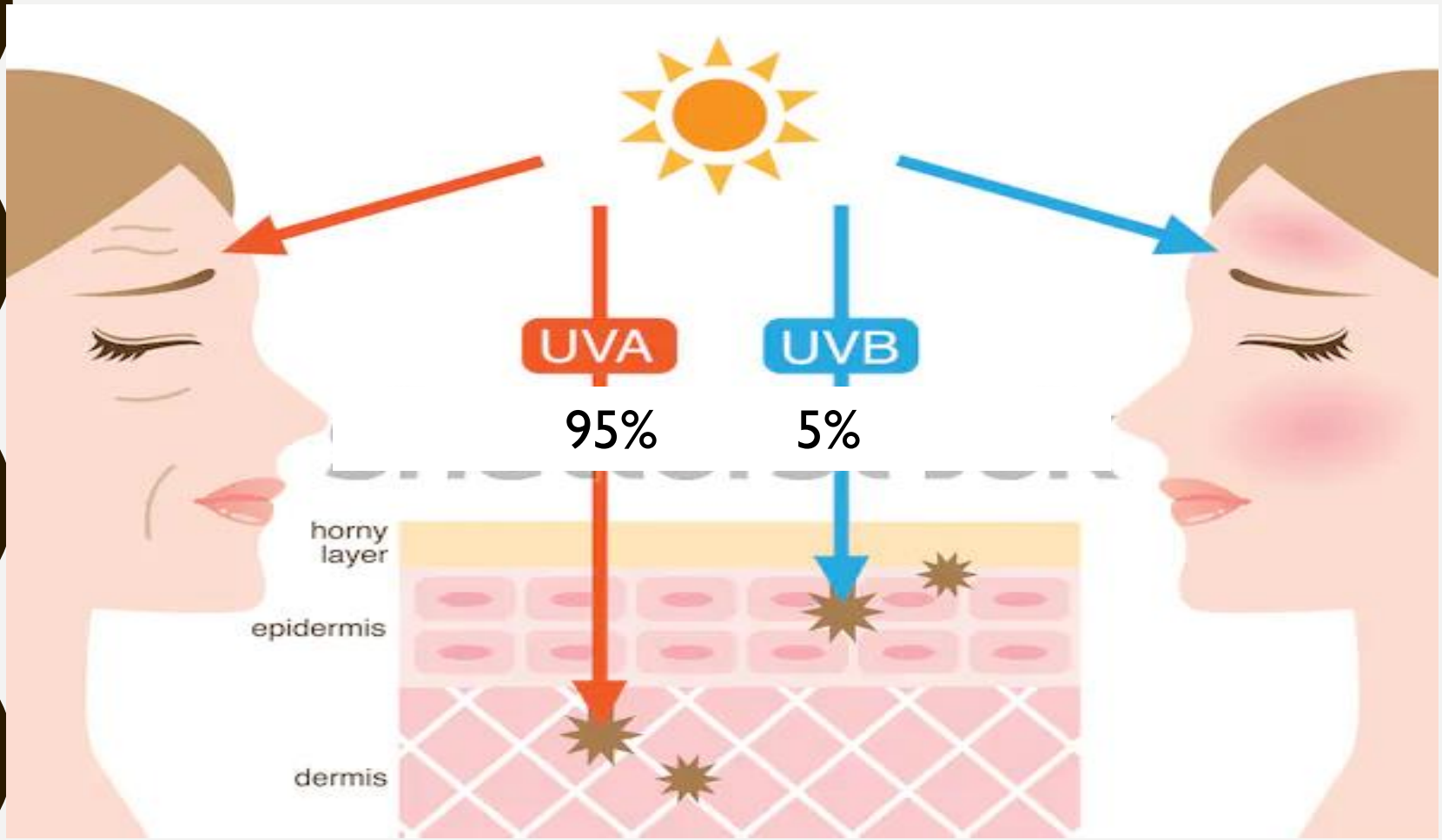
HANAN KASSAB

SOLAR UVA,UVB&UVC RAYS




UVA
• UVAI 340 – 400 nm
• UVAII 320-340 nm
UVB
• 290-315nm
UVC
• 100-280 nm
• Blocked by ozone

THE SUN'S RAYS AND EFFECTS ON SKIN

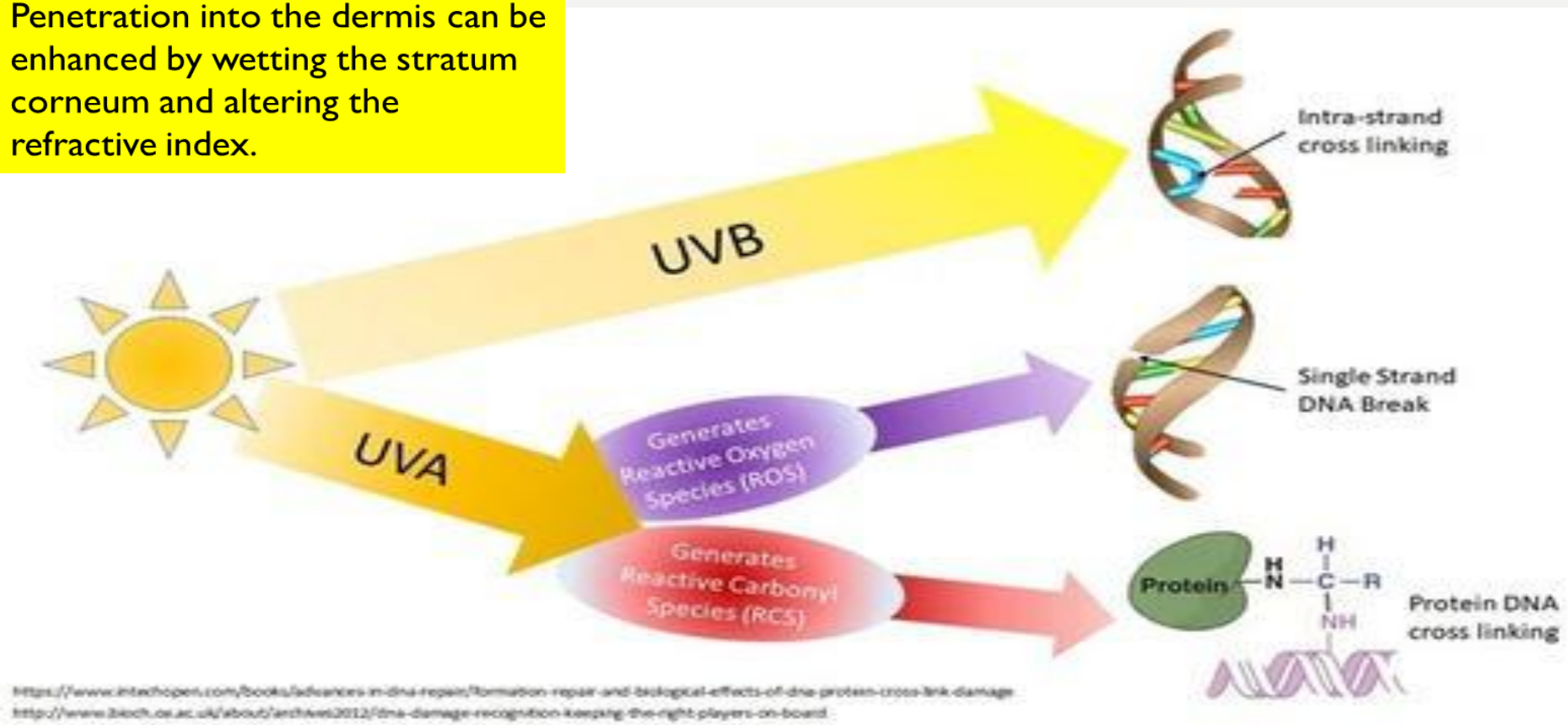


- UVA causes tanning & aging *(A = Aging)*
- UVA is responsible for sun allergy and most of drug-induced photosensitivity reactions
- UVA penetrates untreated glass, light clothes but does not produce vitamin D

- UVB is responsible for vitamin D synthesis
- UVB causes burning *(B=Burning)*

EFFECT OF SUN RADIATION

Penetration into the dermis can be enhanced by wetting the stratum corneum and altering the refractive index.



The target of UVA and UVB damage is DNA, cell membrane lipids, structural proteins, and enzymes. These breakdown products incite an inflammatory response designed to initiate skin repair but may result in further skin damage.

Both UVA and UVB can causes **skin cancer**

PERSONAL RISK FACTORS FOR SKIN CANCER

GENETICS (Who you are)

Lighter skin, hair and eyes
Family history of skin cancer

ENVIRONMENT (Where you live)

High Altitude
Low Latitude
Sunny Climate
Ground Reflection

GREATER RISK!

BEHAVIOR (What you do)

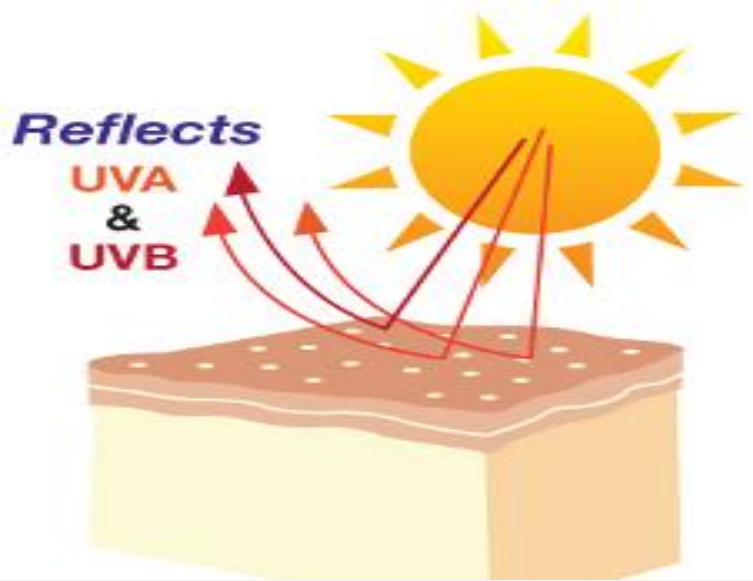
Unprotected time outdoors
Especially in midday peak sun intensity hours

IDENTIFY YOUR SKIN TYPE

	1	2	3	4	5	6
NATURAL SKIN COLOUR	Very fair, pale white, often freckled	Fair, white skin	Light brown	Moderate brown	Dark brown	Deeply pigmented dark brown to black
UV SENSITIVITY & TENDENCY TO BURN	Highly sensitive Always burns, never tans	Very sensitive Burns easily, tans minimally	Sensitive Burns moderately, usually tans	Less sensitive Burns minimally, tans well	Minimal sensitivity Rarely burns	Minimal sensitivity Never burns
SKIN CANCER RISK	Greatest risk of skin cancer	High risk of skin cancer	High risk of skin cancer	At risk of skin cancer	Skin cancers are relatively rare	Skin cancers are relatively rare

I. Always burns, never tans, sensitive to sun exposure
II. Burns easily, tans minimally
III. Burns moderately, tans gradually to light brown
IV. Burns minimally, always tans well to moderately brown
V. Rarely burns, tans profusely to dark
VI. Never burns, deeply pigmented, least sensitive

Physical Sunscreen VS Chemical Sunscreen



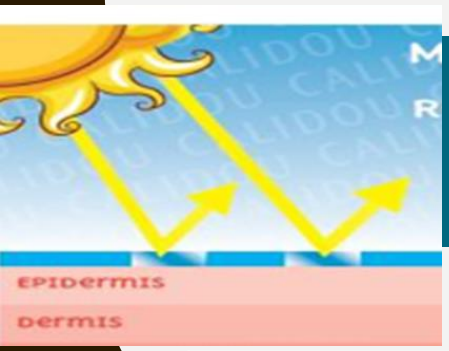
Sits on top of skin reflecting UV rays
like a shield

Penetrates the skin and absorbs UV rays like a sponge

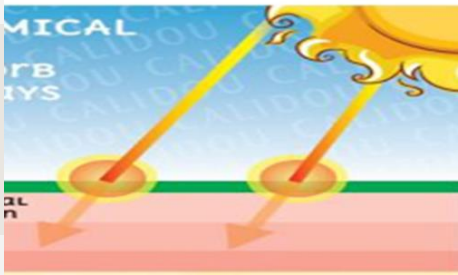
They change UV rays into heat then releases heat from the skin

contain active mineral ingredients, such as titanium dioxide or zinc oxide.

contain carbon-based compounds, such as oxybenzone, octinoxate, octisalate and avobenzone.



Physical Sunscreen VS Chemical Sunscreen



Advantages

Physical	Chemical
• Safe , broad spectrum and photostable	• Low concentrations can give good efficacy
• Once dispersed are easy to incorporate into finished product, Effective immediately	• Good skin feel with no powdery appearance

Disadvantages

Physical	Chemical
• Difficult to formulate with, if not pre-dispersed	• Most are narrow spectrum and some are not photostable
• Can leave skin with white appearance if not formulated carefully	• Questions over irritancy and impact on environment
	• Requires 20 minutes to be effective

Physical Sunscreen VS Chemical Sunscreen

- **Titanium Dioxide**
- **Zinc Oxide**

UVA absorbers 320 to 360 nm	**UVB absorbers 290 to 320 nm**
(benzophenones, avobenzone, and anthranilates)	(salicylates, and cinnamates]
Oxybenzone	Oxybenzone 8
	Octinoxate 5 (Octyl methoxycinnamate)
	Homosalate 4
	Octisalate 3
	Octocrylene 3

Drug name	Concentration (%)	Absorbance
Aminobenzoic acid	Up to 15	UVB (removed 2019)
Avobenzone	2–3	UVAI (may be removed)
Cinoxate	Up to 3	UVB (more studies)
Dioxybenzone	Up to 3	UVB, UVAII (more studies)
Ensulizole	Up to 4	UVB (more studies)
Homosalate	Up to 15	UVB (more studies)
Meradimate	Up to 5	UVAII (more studies)
Octocrylene	Up to 10	UVB (more studies)
Octinoxate	Up to 7.5	UVB (more studies)
Octisalate	Up to 5	UVB (more studies)
Oxybenzone	Up to 6	UVB, UVAII may be removed
Padimate O	Up to 8	UVB (more studies
Sulisobenzone	Up to 10	UVB, UVAII (more studies)
Trolamine salicylate	Up to 12 not safe	UVB (removed 2019)

UV FILTERS, SUNSCREENS

- Protection against the effects of UVR in the skin is achieved by specially designed molecules **(i.e., UV filters)**
- Polar oils, e.g., octinoxate, octisalate, homosalate, and octocrylene
- Oil soluble crystalline solids, e.g., avobenzone, and the benzophenones
- Water soluble salts, e.g., ensulizole
- Insoluble powders/particulates, e.g., zinc oxide and titanium dioxide

These filters when incorporated in suitable formulation(sunscreens)such as creams or lotions, oils, gels, sticks, etc.

FORMULATION CONSIDERATION

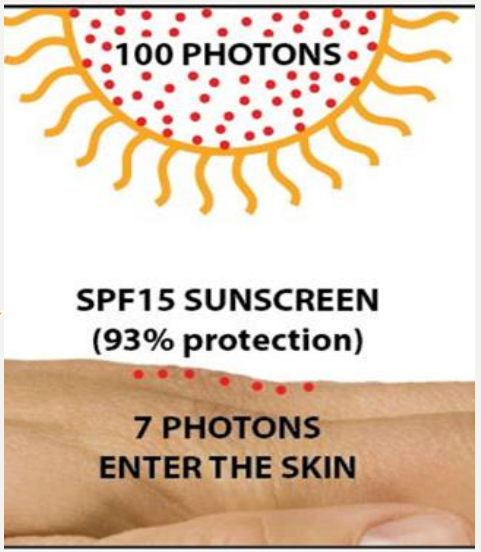
- Polar oils tend to make the product feel greasy and oily, especially at high concentrations.
- Oil soluble crystalline solids require high levels of oily solvents/emollients to dissolve them and keep them from crystallizing in the product over time, and hence make the product feel greasy and oily.
- Water soluble salts tend to reduce the capability of most aqueous polymeric thickeners. This, in turn, leads to the use of much higher polymer levels to achieve a target product thickness, and these high polymer levels make the product feel sticky and heavy on the skin.
- Insoluble powders/particulates can make the product feel dry and draggy, and often can lead to an undesirable white appearance on the skin.

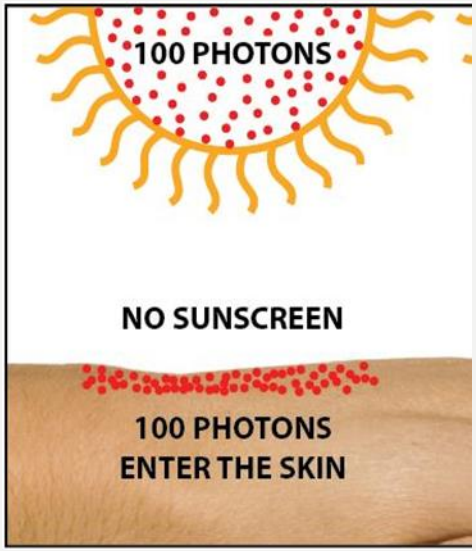
THE SUN PROTECTION FACTOR (SPF)

SPF

sunburn radiation dose with sunscreen

sunburn radiation dose without sunscreen



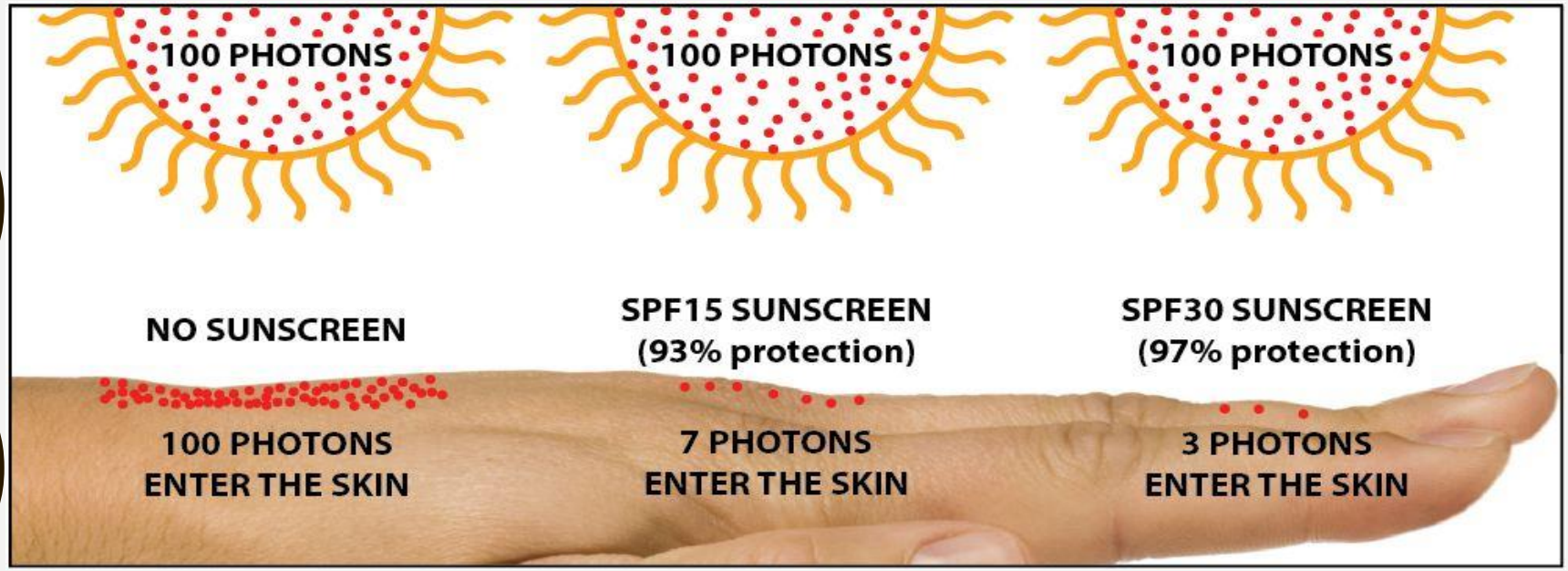


PERCENT BLOCKED SUN RAYS

- **The SPF can be represented as a percent of erythemally-weighted UV**

  transmitted, i.e., 1/SPF x 100,
- **or blocked, i.e.,[1- (1/SPF)x100]**
- **SPF 15 blocks 93.3% SPF 30, blocks 96.7%**

  SPF 100 blocks 99%



LENGTH OF PROTECTION

Your Time To Burn Without Protection x SPF number=___ minutes of sun protection

Examples (fair skin): if you stay out under the sun for 12 minutes

12 minutes x SPF 15 = 180 minutes (3 hours) until sunburn

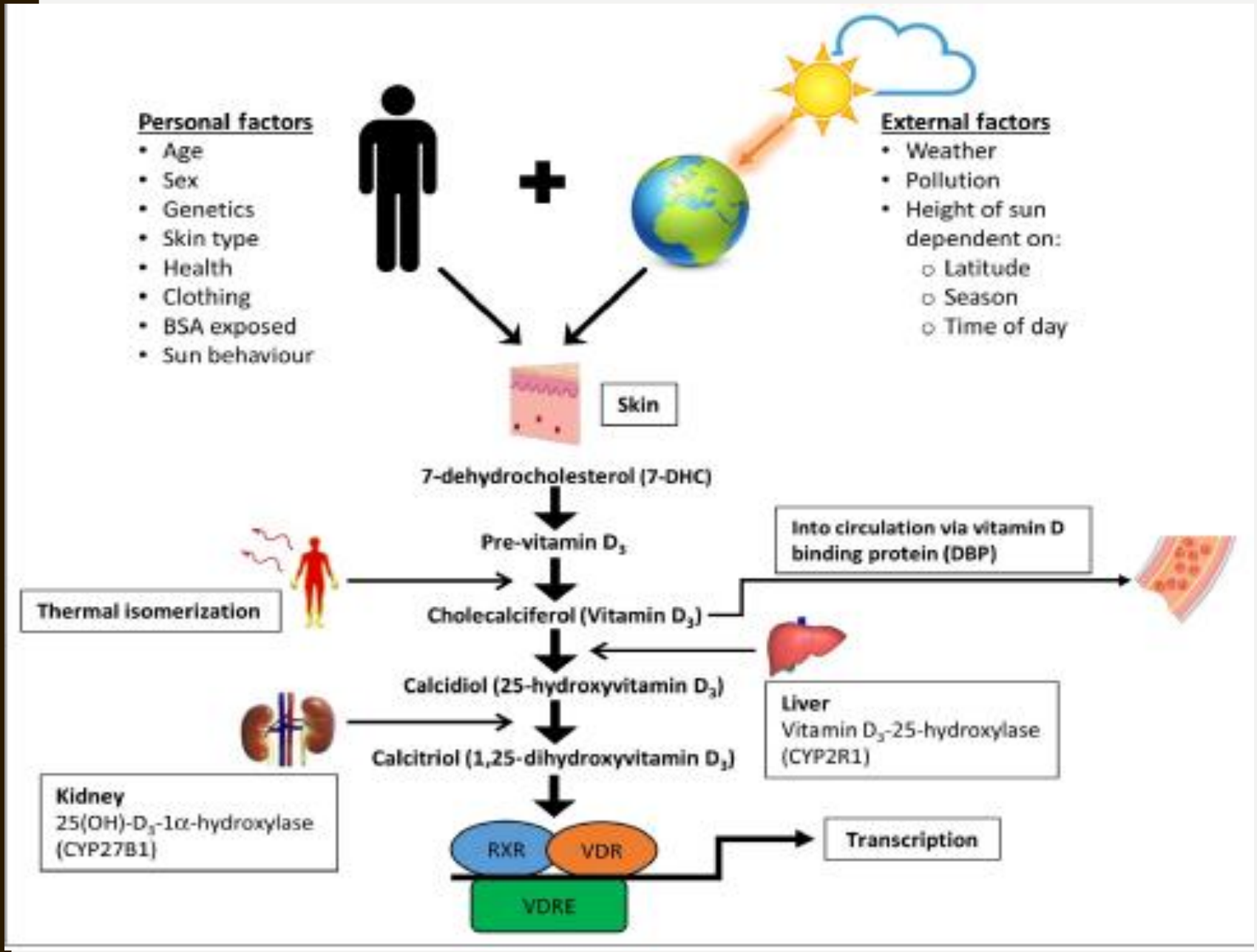
12 minutes x SPF 30 = 360 minutes (6 hours) until sunburn

12 minutes x SPF 45 = 540 minutes (9 hours) until sunburn

FDA SPF PRODUCT REQUIREMENTS FEB 2019

- Raise the maximum proposed labelled SPF from SPF 50+ to SPF 60+
- Require any sunscreen SPF 15 or higher to be broad spectrum
- Require sunscreens with SPF below 15 to include "See Skin Cancer/Skin Aging alert" on the front panel
- Require font and placement changes to ensure SPF, broad spectrum, and water resistance statements stand out

Vitamin D and Sun Protection Products



DOSAGE FORMS

Powder (not approved)
Lotion (topical emulsion), oils, Sprays
Paste, ointments, butter
Invisible Gel
Cream
Mossue
Lip balm

SUN PROTECTION IN SPECIAL CONDITIONS

- What is the best for
- Children ?
- Pregnant and lactating women ?
- Rosacea and sensitive skin conditions ?