

**Certificate Course in
Primary Care Dermoscopy
(7) Epiluminescence –The Underlying
Mechanisms**

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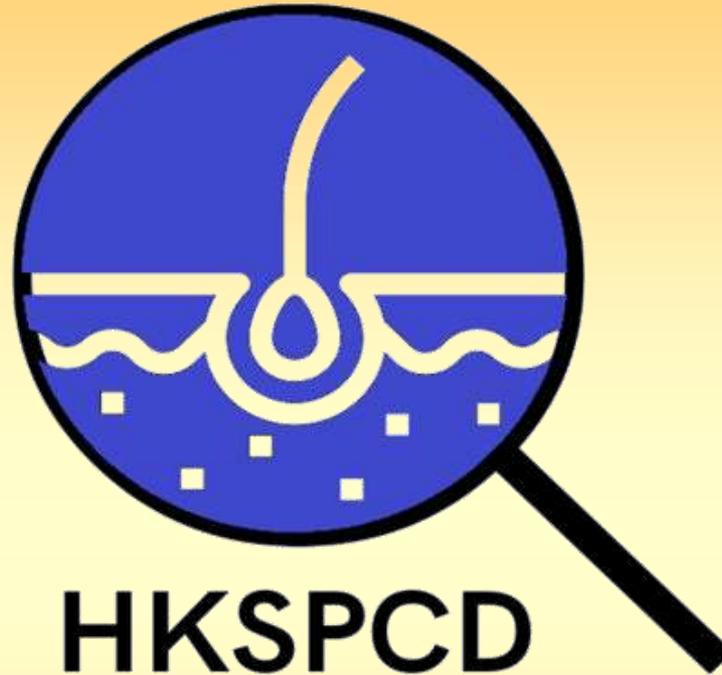
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**Hong Kong Society of
Primary Care Dermoscopy**

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Knowledge and the best practice in dermoscopy, dermatology, skin surgery, family medicine, and primary care medicine are constantly changing. As new research broadens our understanding, changes in research methods, practices, or clinical managements may become necessary.

Clinicians must always rely on their knowledge, skills, and experience in evaluating and using any method described in this presentation and the correlated materials. They should also be mindful for their own safety and safety to patients.

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Advantages of dermoscopy – Epiluminescence

Epiluminescence

- The removal of surface glare to that **deeper layers** of the skin can be visualised.

Epiluminescence – the underlying mechanisms

Three overlapping mechanisms:

1. Tyndall's effect
2. Tissue-specific colours
3. Cross-polarisation

Epiluminescence – the underlying mechanisms

Three overlapping mechanisms:

- 1. Tyndall's effect**
2. Tissue-specific colours
3. Cross-polarisation

Epiluminescence – the underlying mechanisms

Tyndall effect

- For light scattered by particles in colloid or suspension
- The intensity of **scattering** is directly proportional to **[Frequency]⁴**
- Thus, **blue** scattered more than **red**.

Epiluminescence – the underlying mechanisms

Tyndall effect

- For light scattered by particles in colloid or suspension
- The intensity of **scattering** is directly proportional to **[Frequency]⁴**
- Thus, **blue** scattered more than **red**.
- This leads to **different colours** for melanin in different depths.
- Deep dermis – **dark blue**

Epiluminescence – the underlying mechanisms

An illustration of the
Tyndall effect



Epiluminescence – the underlying mechanisms

Three overlapping mechanisms:

1. Tyndall's effect

2. Tissue-specific colours

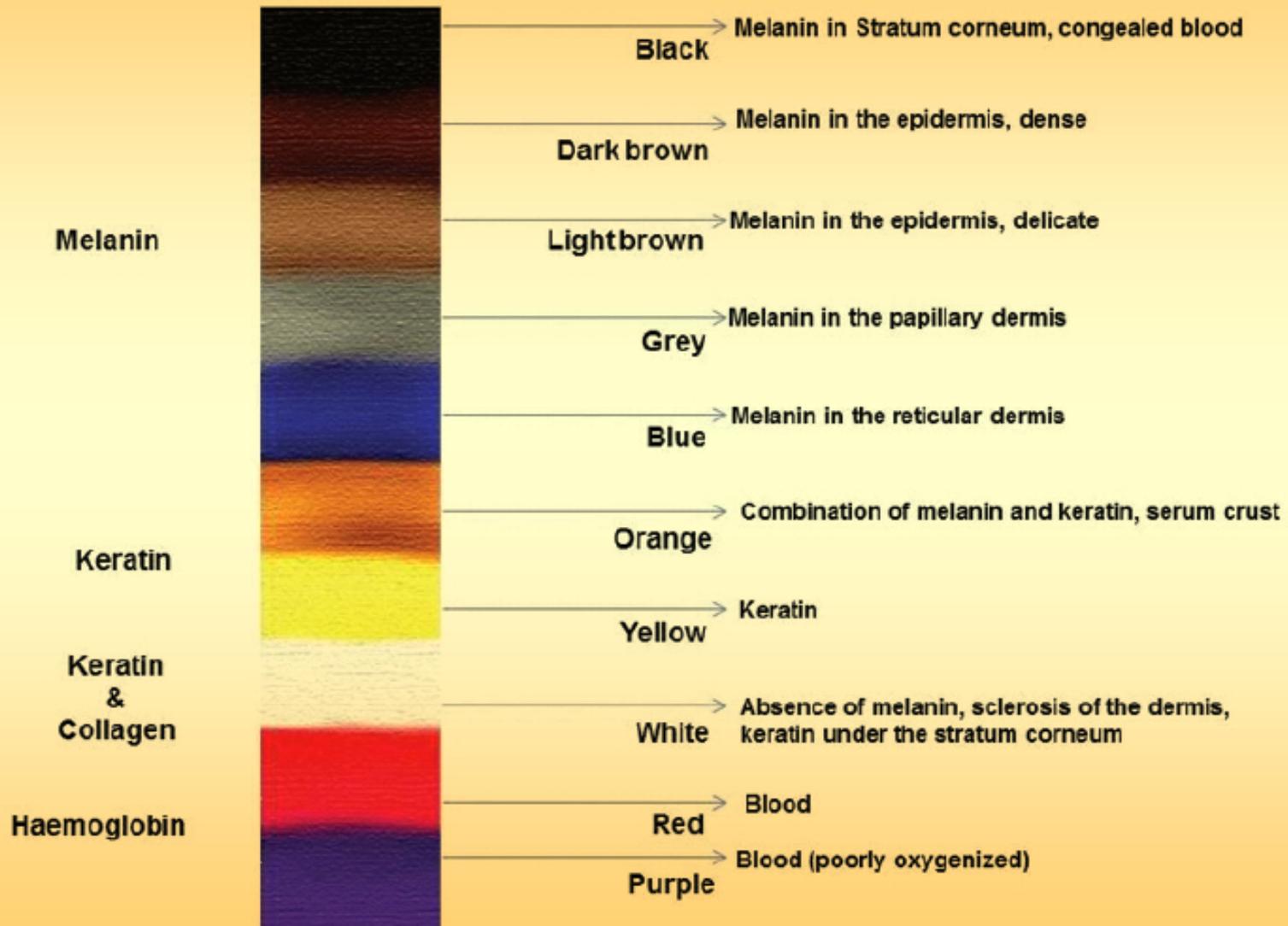
3. Cross-polarisation

Epiluminescence – the underlying mechanisms

For melanin **only**

Site of melanin	Mechanism	Colour seen in dermoscope with cross-polarisation
Epidermis	Melanin absorbs all the light	Black
Dermo-epidermal junction	Some light scattered by the epidermis	Brown
Superficial dermis	Light scattered by collagen fibrils in dermis	Grey
Deep dermis	Light further scattered by collagen fibrils in dermis	Blue

Epiluminescence – the underlying mechanisms

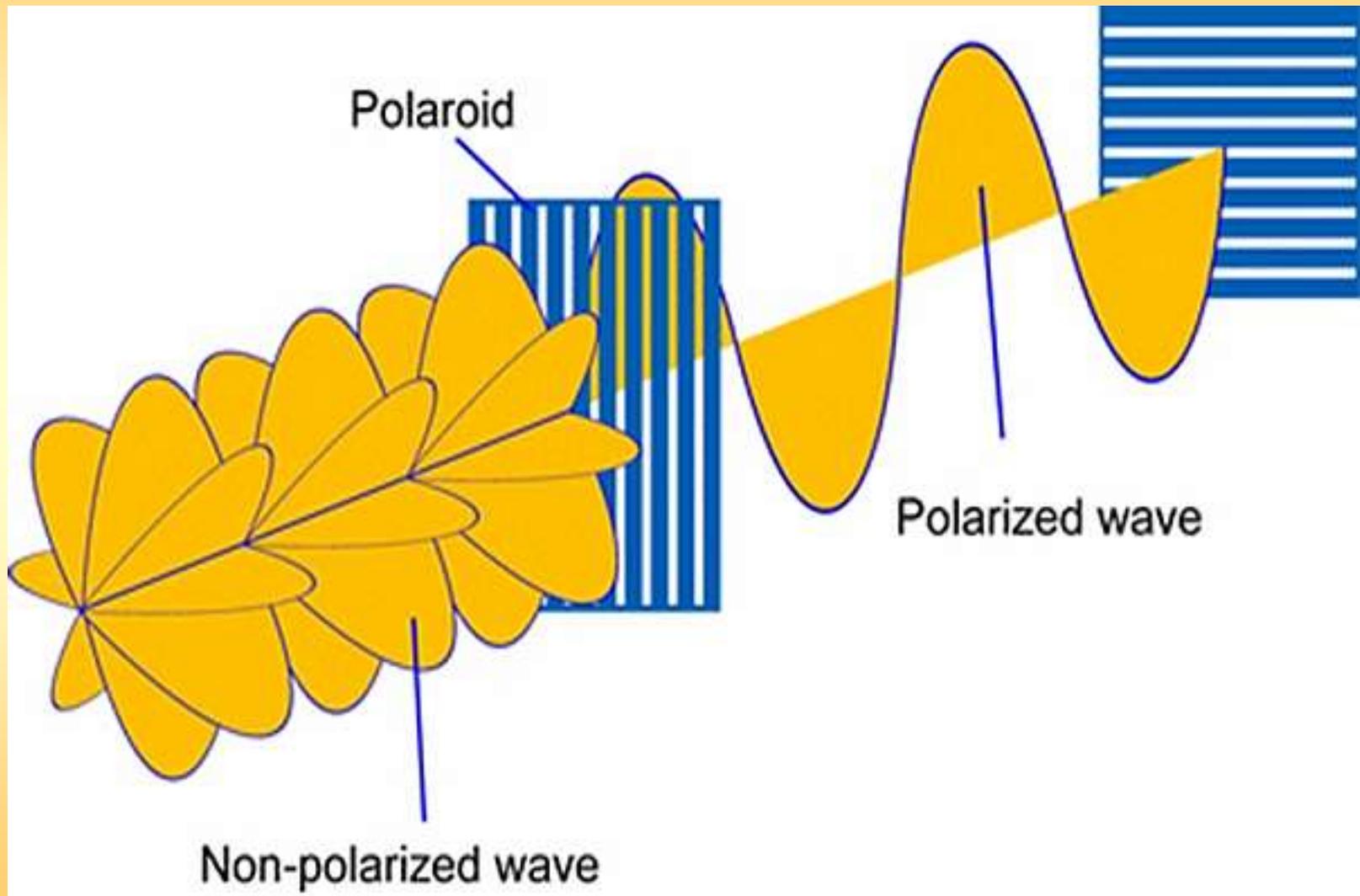


Epiluminescence – the underlying mechanisms

Three overlapping mechanisms:

1. Tyndall's effect
2. Tissue-specific colours
- 3. Cross-polarisation**

Epiluminescence – the underlying mechanisms



Epiluminescence – the underlying mechanisms

When **polarised light** reaches skin surface, there are three outcomes:

1. **Reflection** from the skin **surface** – **remains polarised**

Epiluminescence – the underlying mechanisms

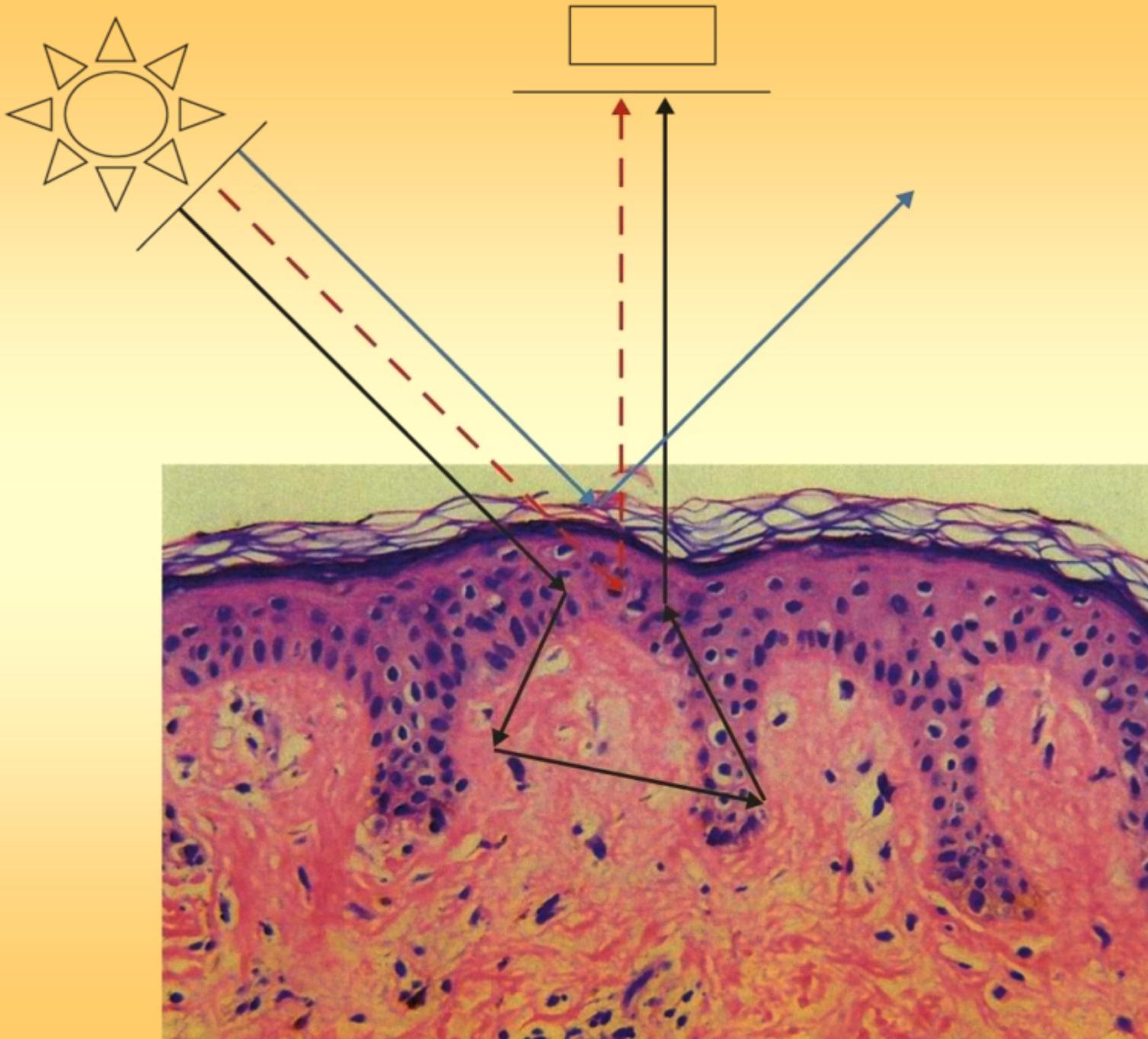
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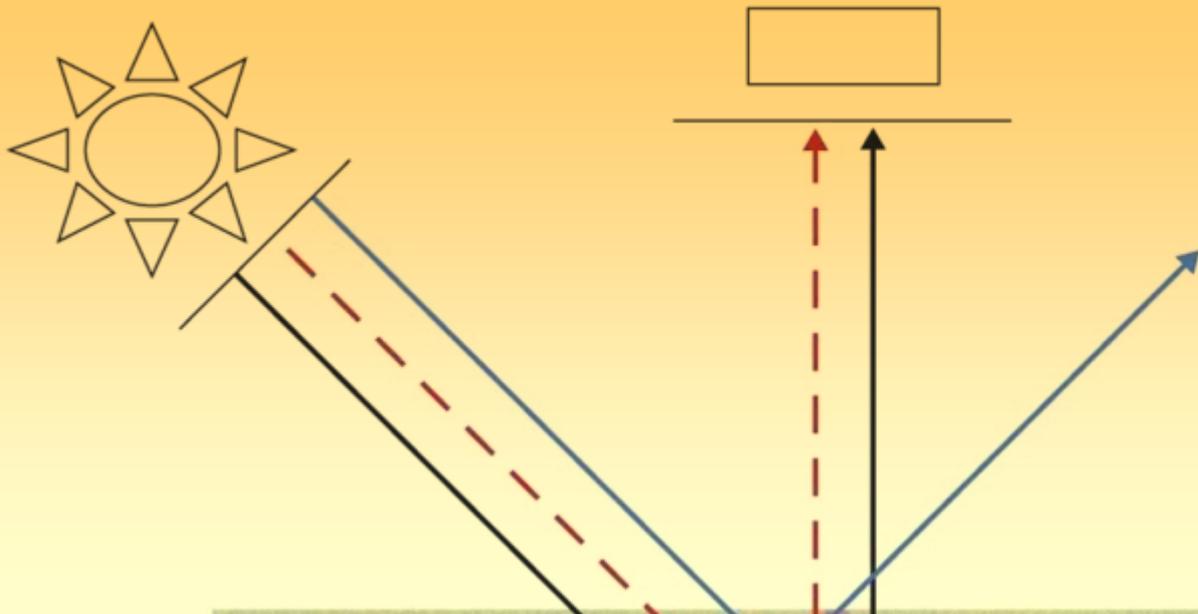
1. Reflection from the skin surface – remains polarised
2. **Refraction** at **superficial** layers of the skin – becomes **less polarised**

Epiluminescence – the underlying mechanisms

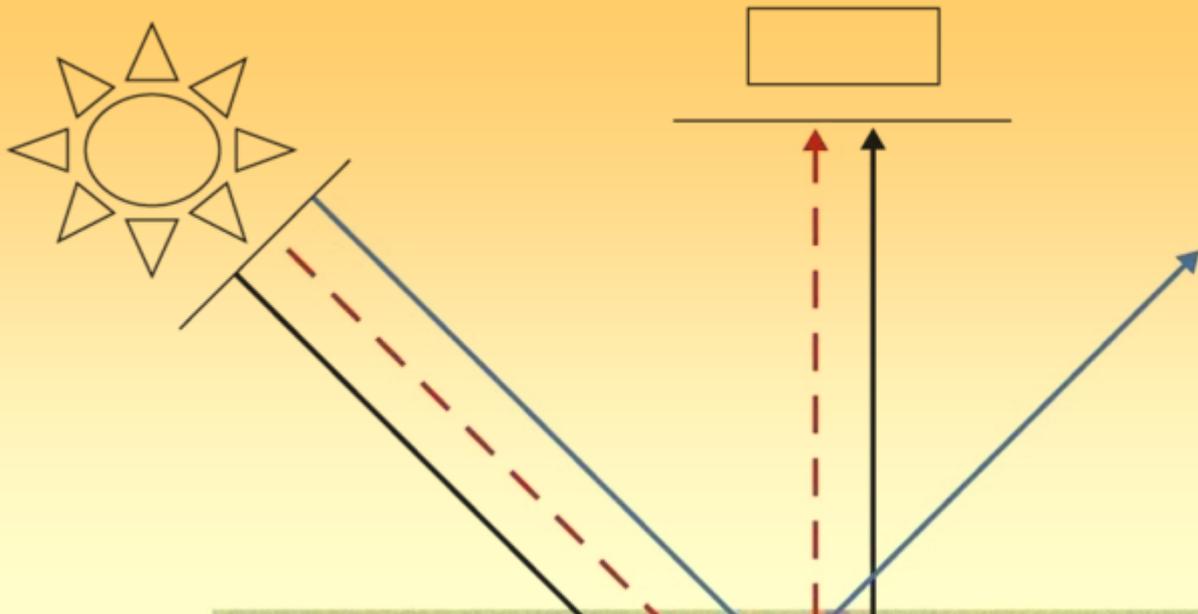
When **polarised light** reaches skin surface, there are three outcomes:

1. **Reflection** from the skin surface – remains polarised
2. **Refraction** at superficial layers of the skin – becomes less polarised
3. **Refraction** at deep layers of the skin – **not polarised**



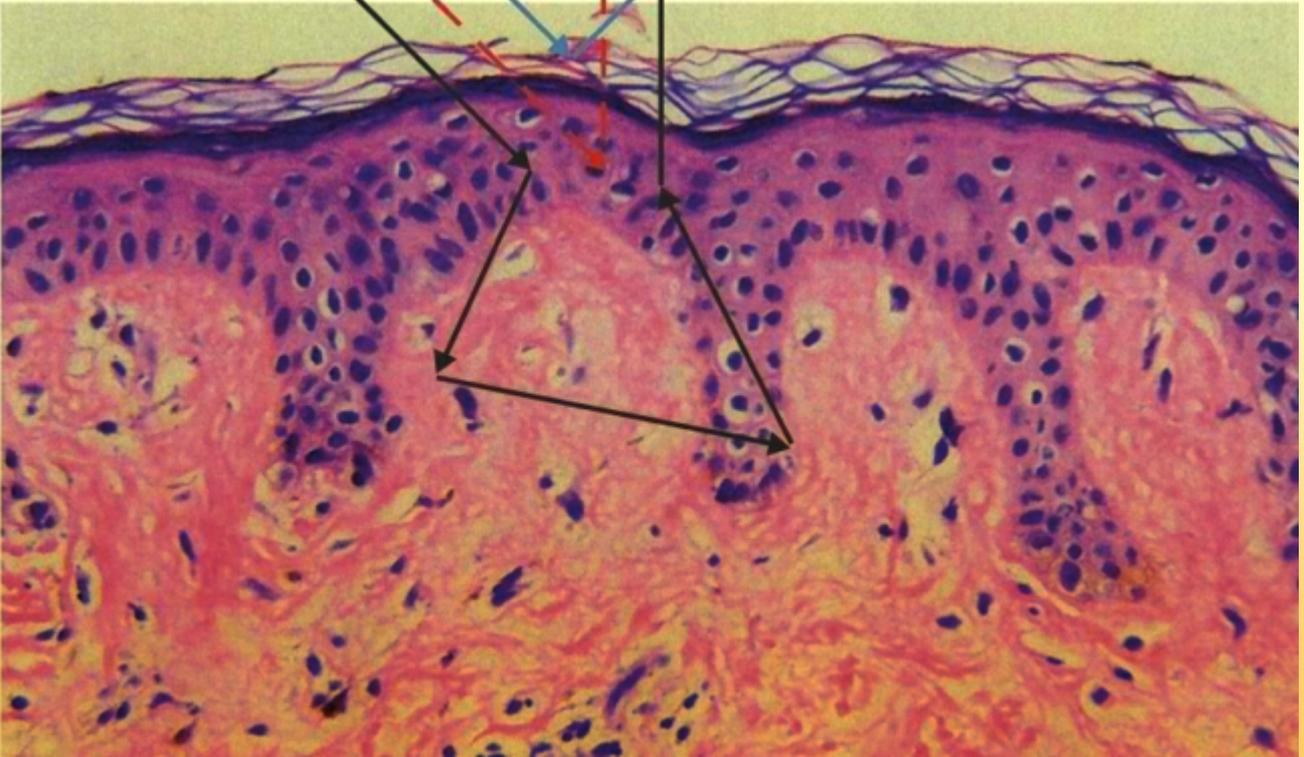
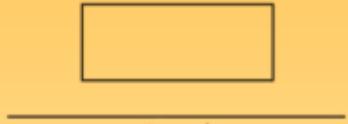
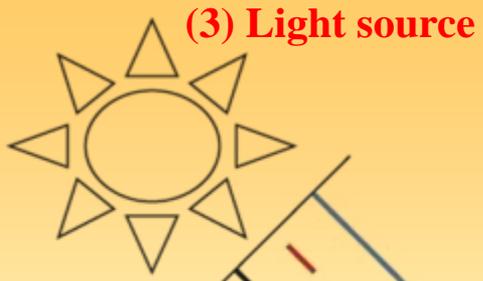


(1) Epidermis



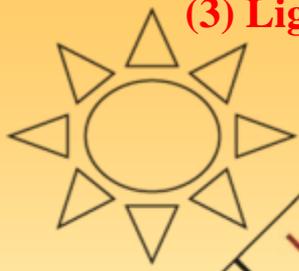
(1) Epidermis

(2) Dermis

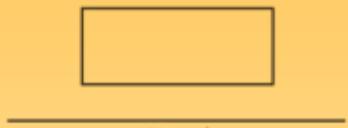


(1) Epidermis

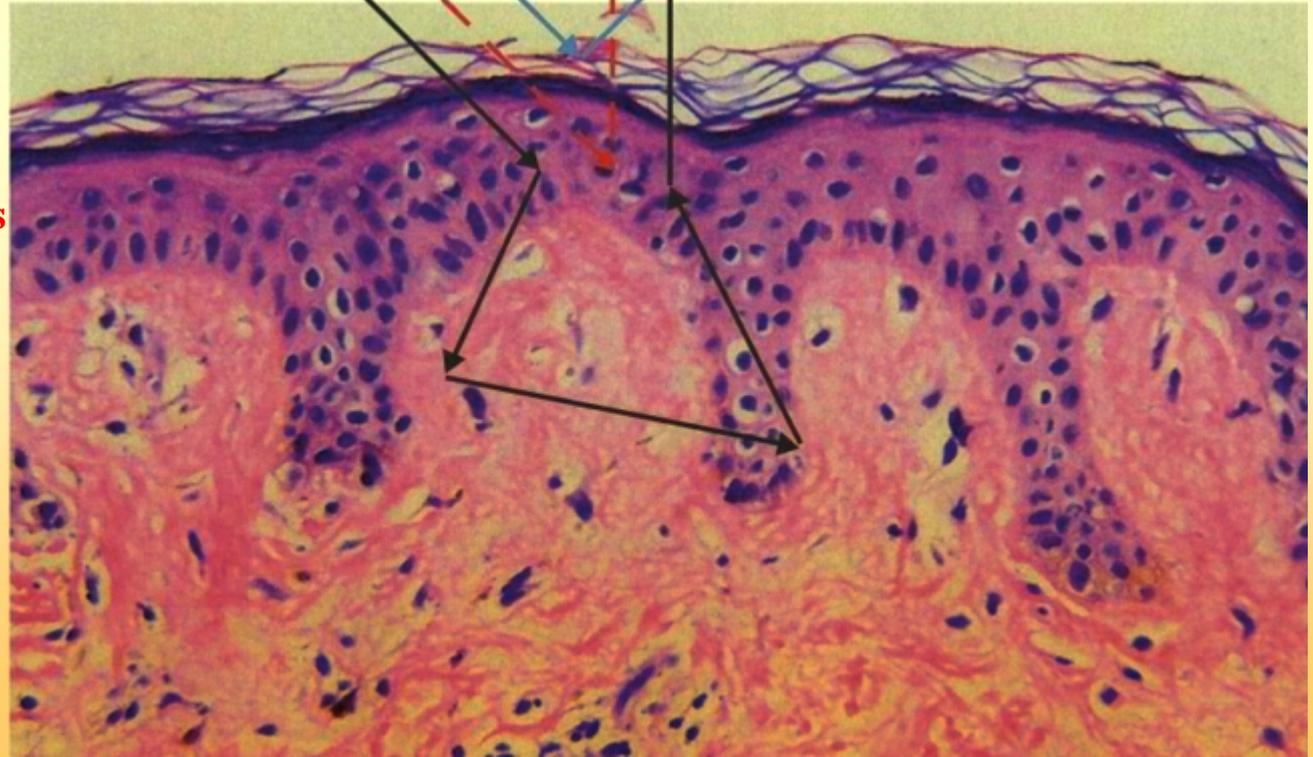
(2) Dermis



(3) Light source

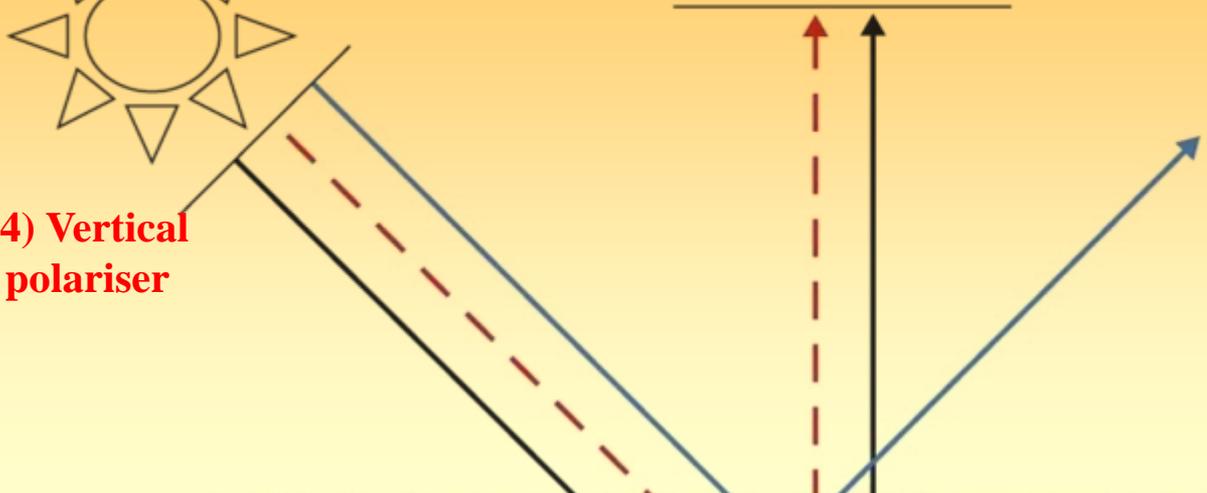


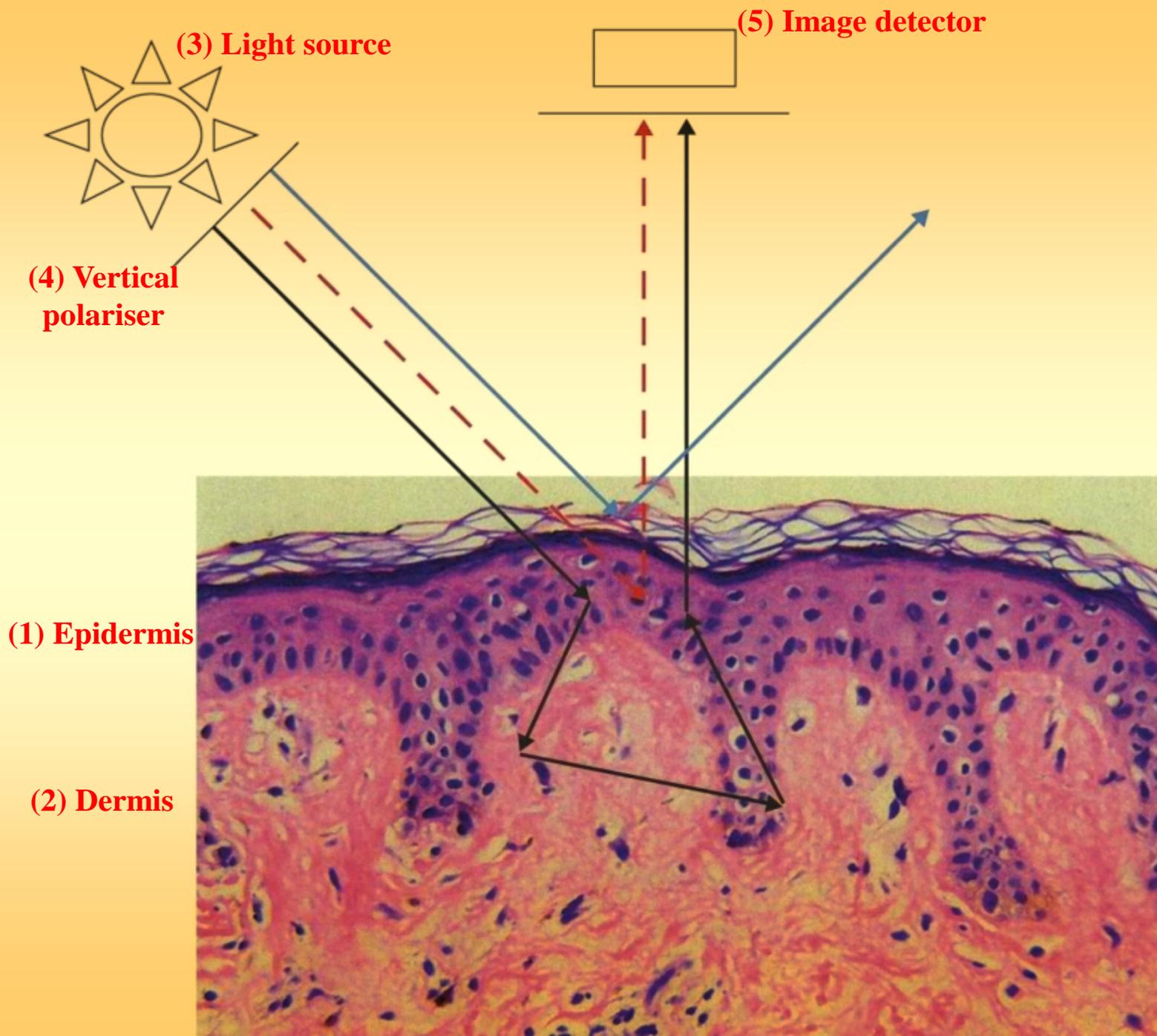
(4) Vertical polariser

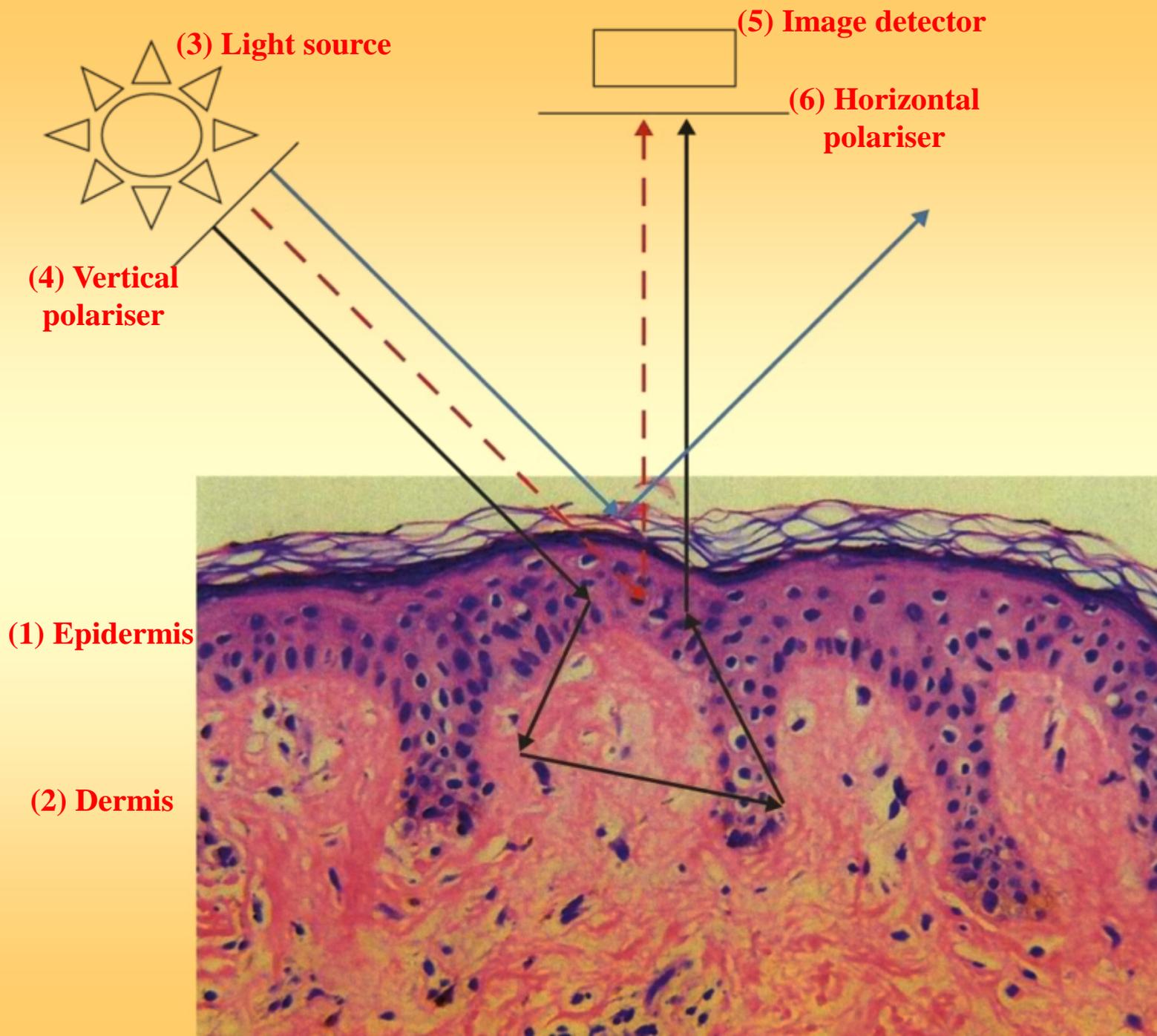


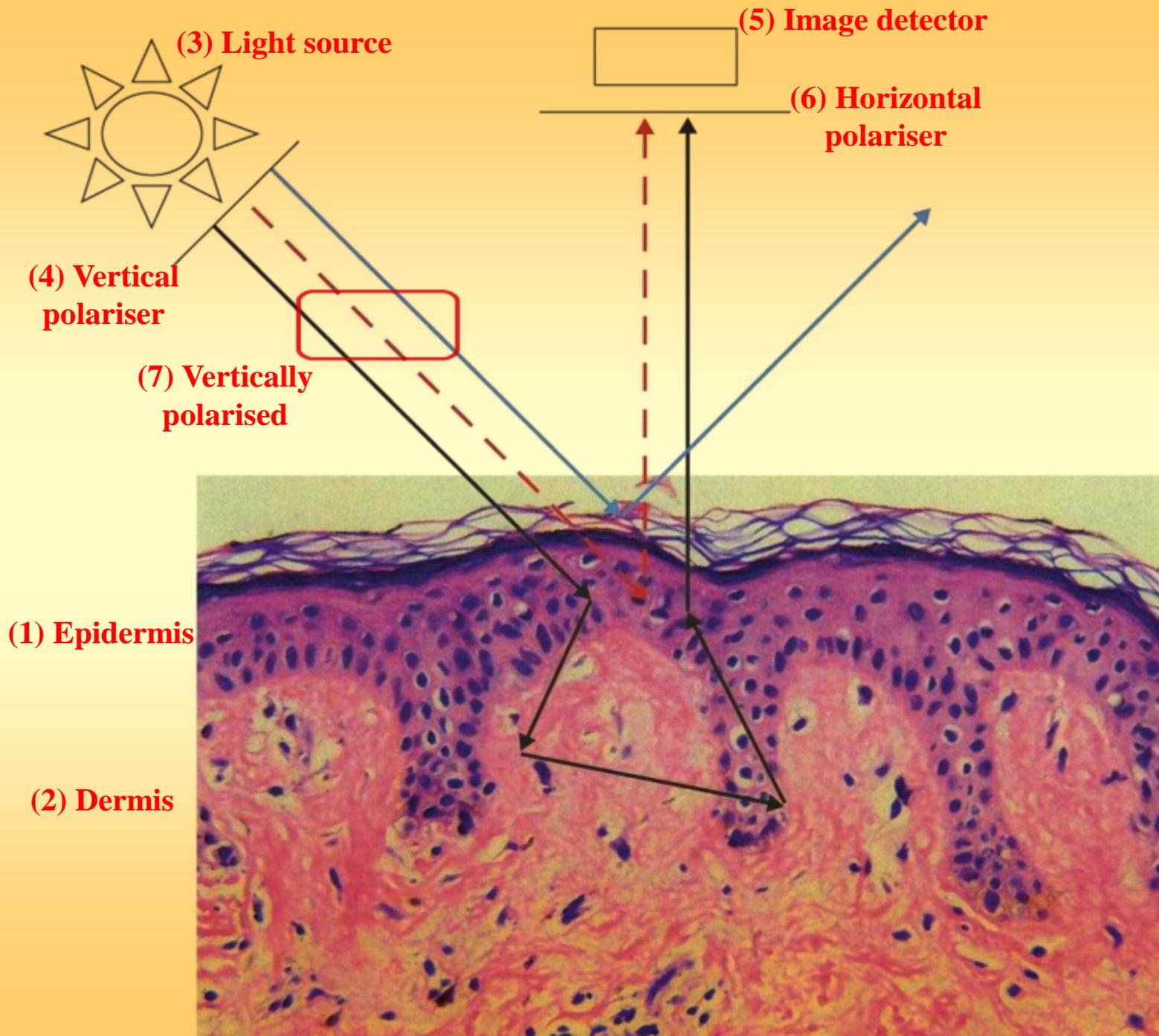
(1) Epidermis

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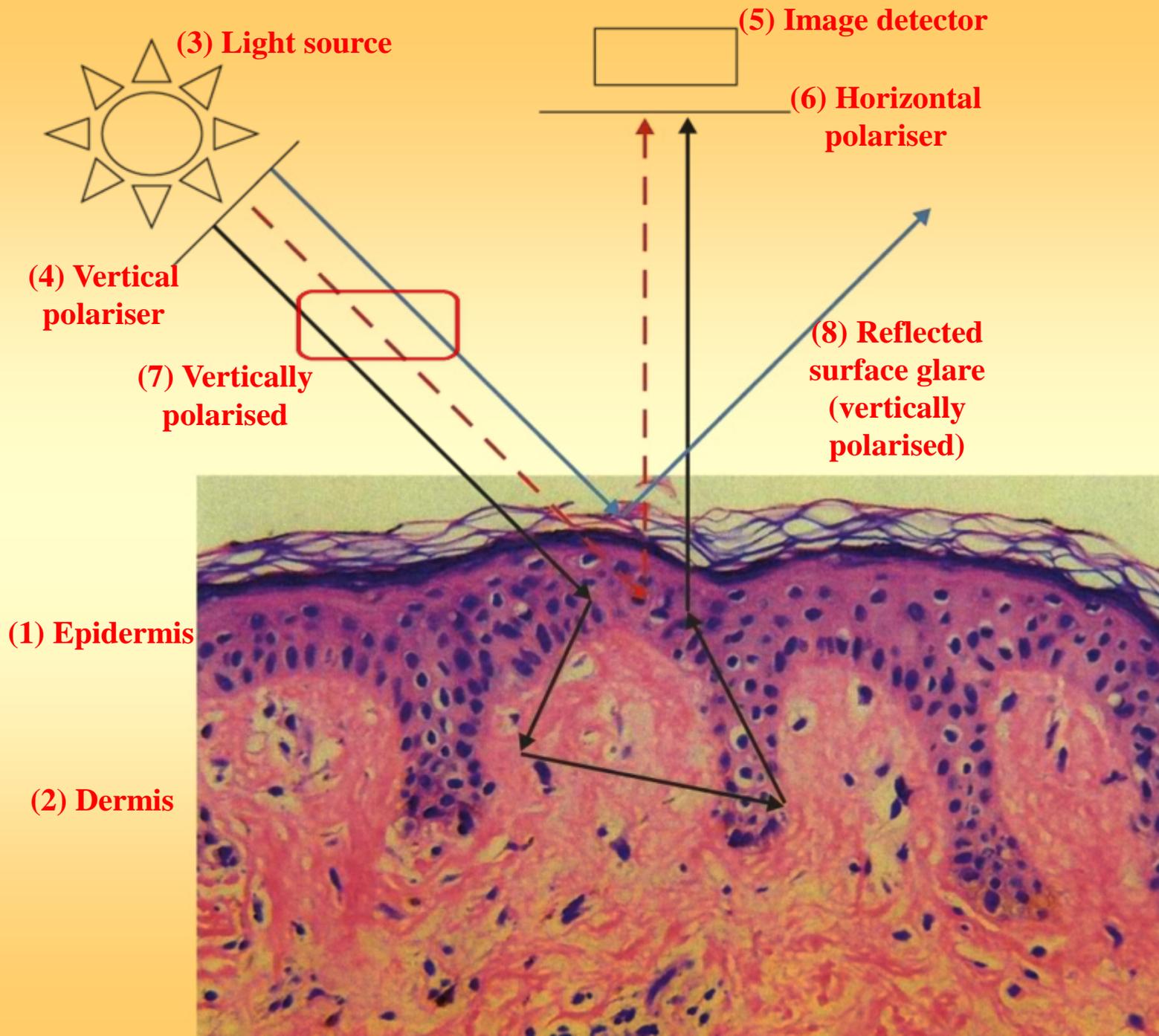




Epiluminescence – the underlying mechanisms

When **polarised light** reaches skin surface, there are three outcomes:

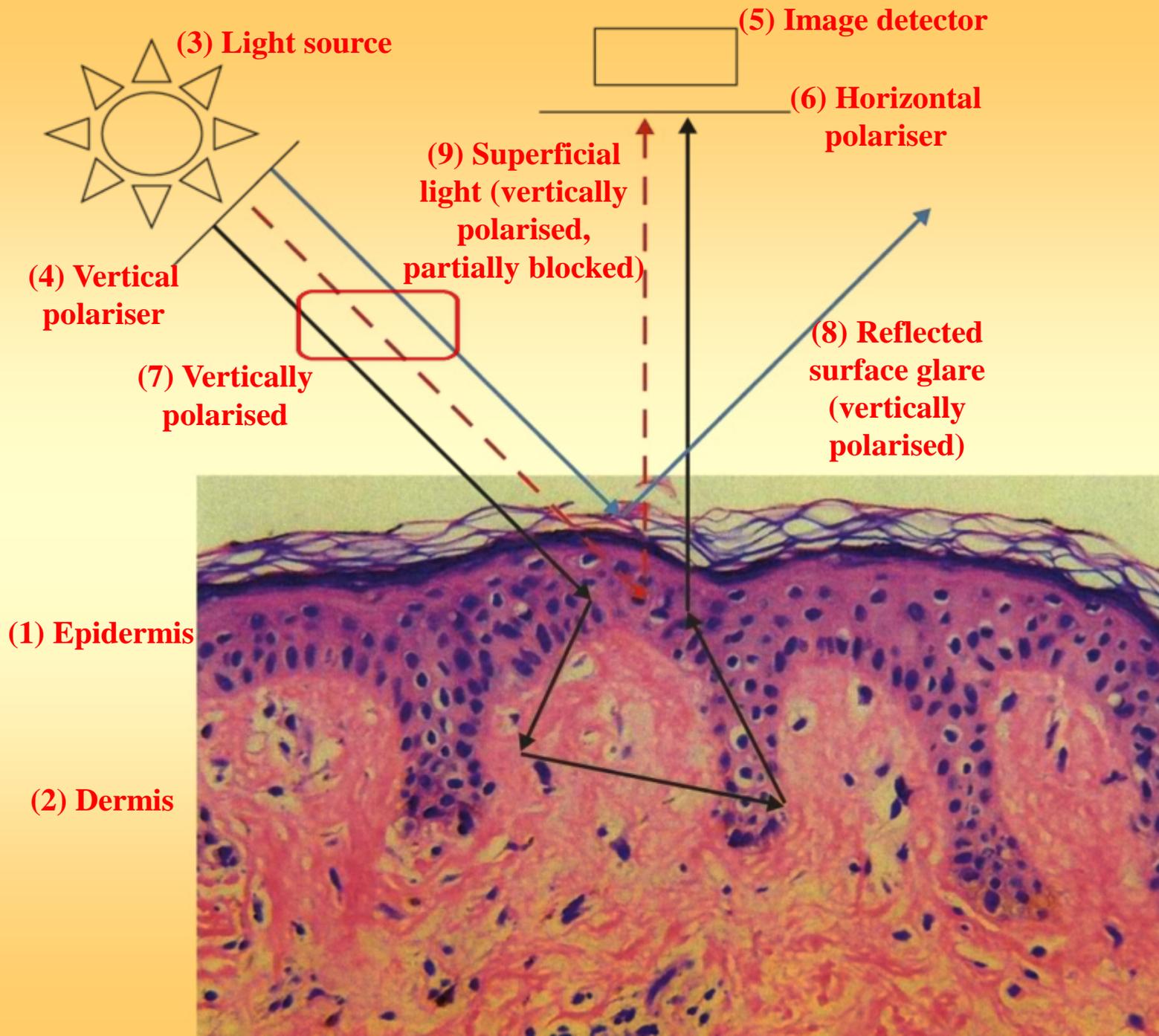
1. **Reflection** from the skin **surface** – **remains polarised** – **blue line** ———



Epiluminescence – the underlying mechanisms

When **polarised light** reaches skin surface, there are three outcomes:

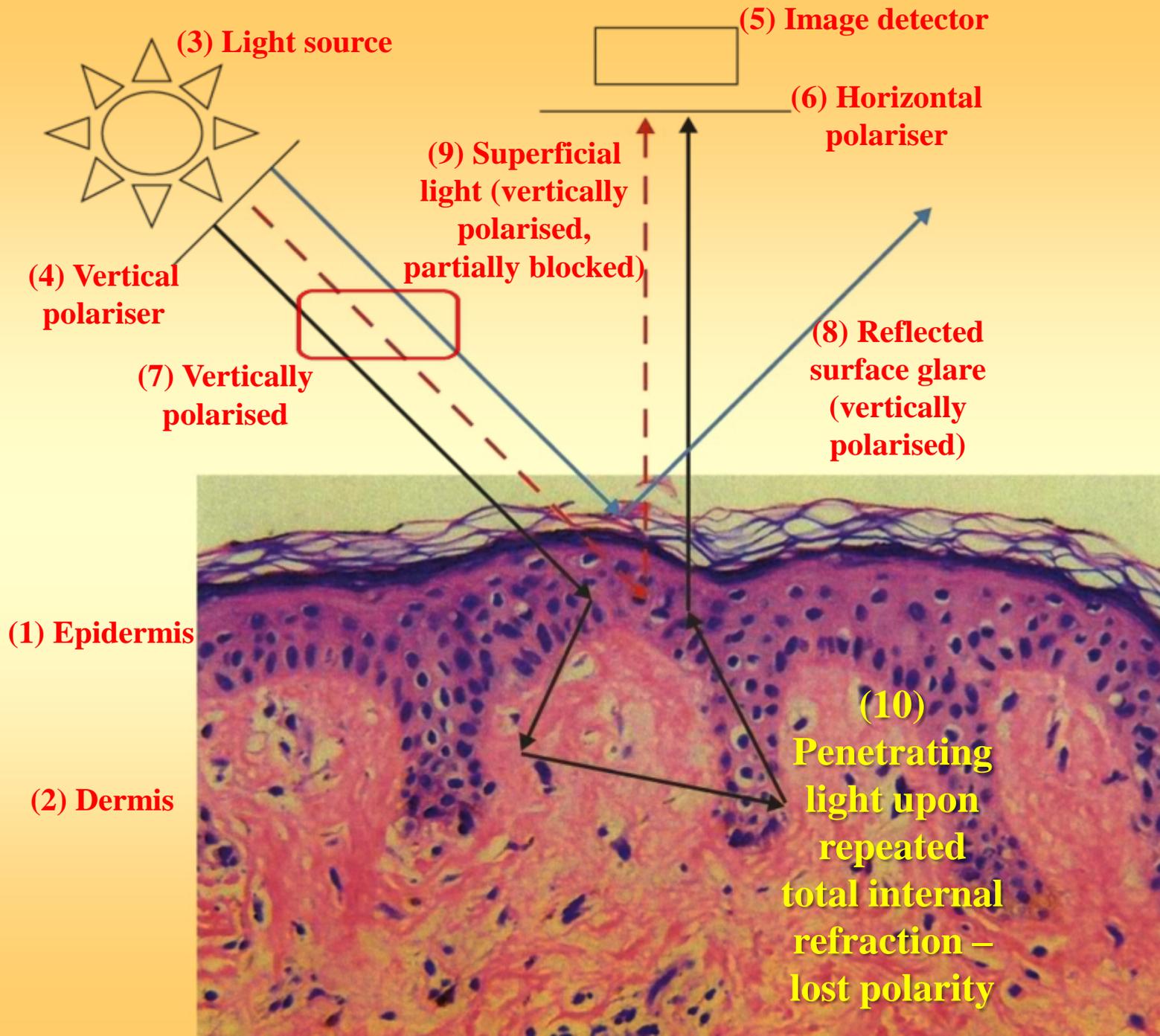
1. Reflection from the skin surface – remains polarised – blue line
2. **Refraction** at **superficial layers** of the skin – becomes **less polarised** – **red interrupted line - - - - -**

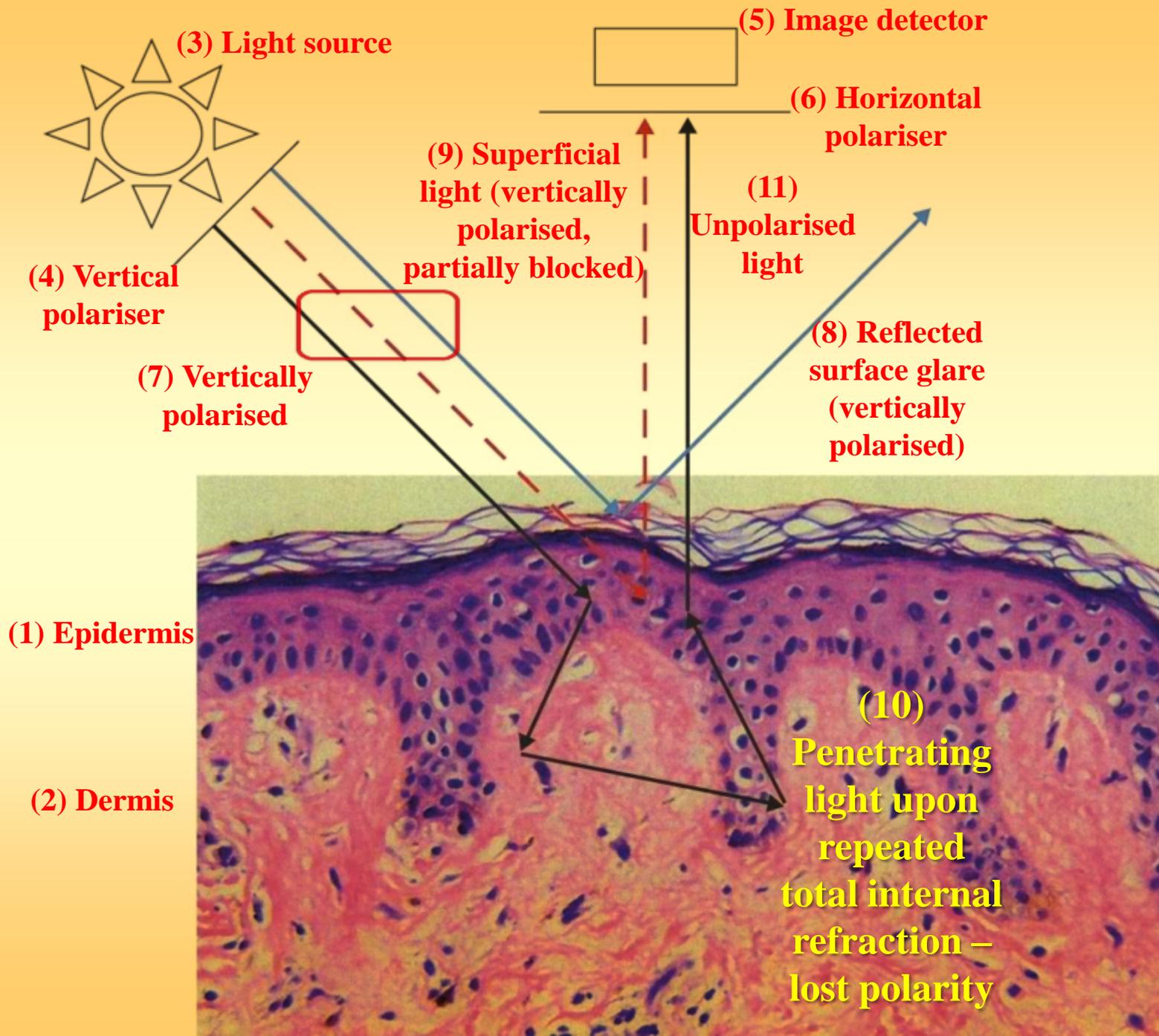


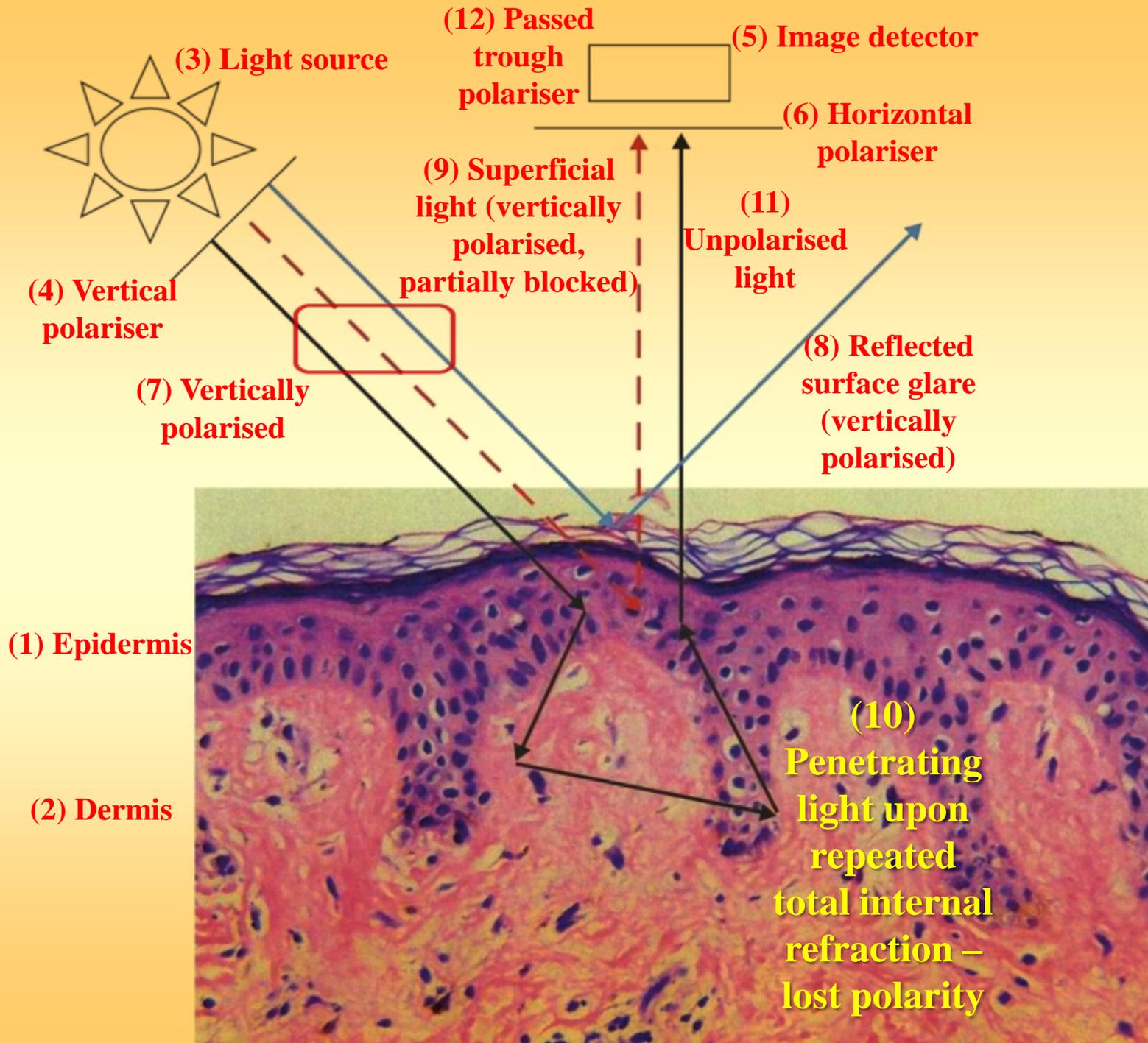
Epiluminescence – the underlying mechanisms

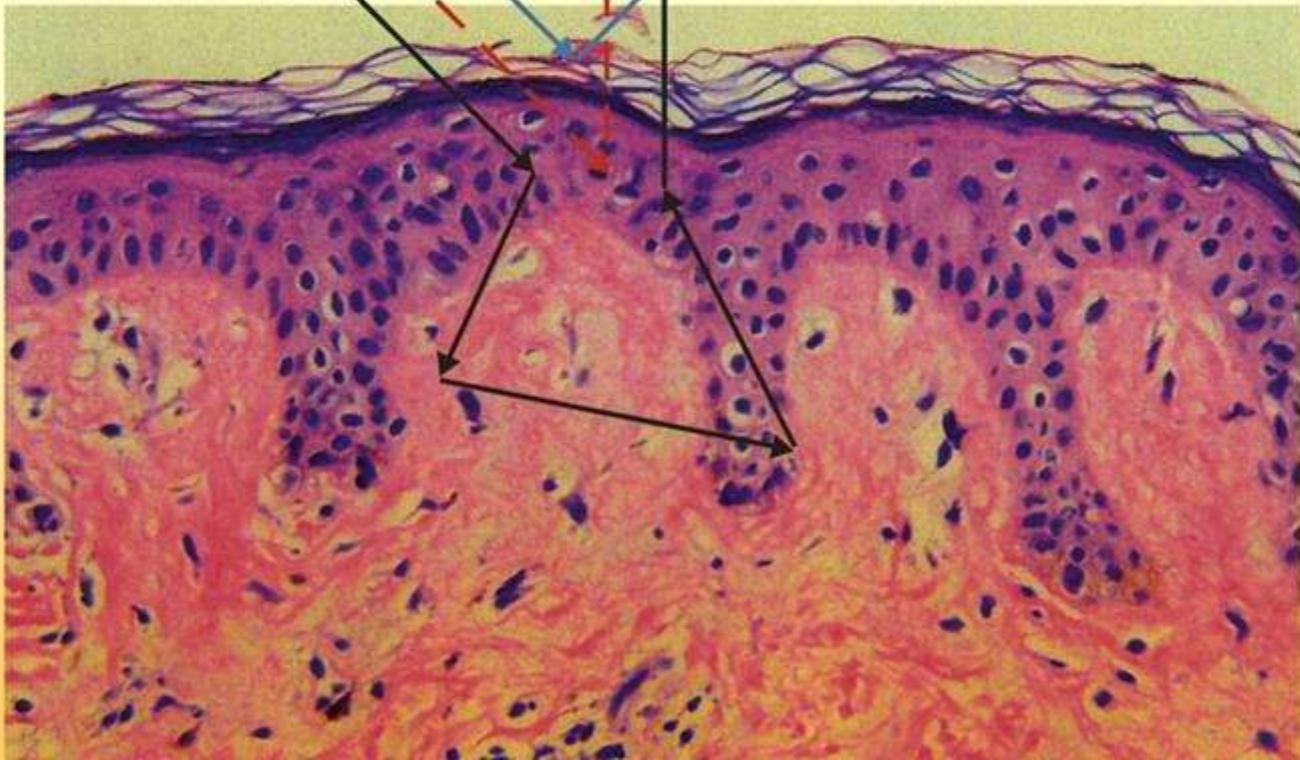
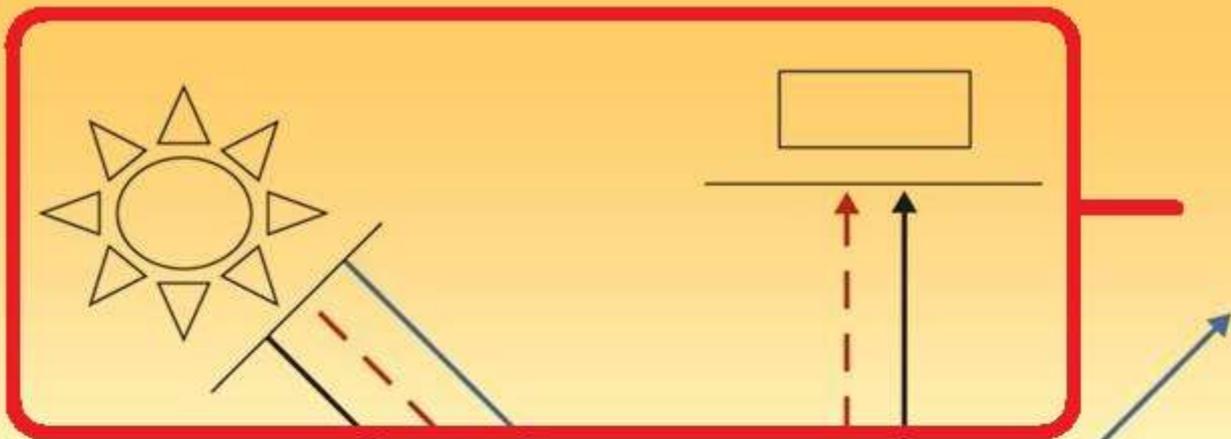
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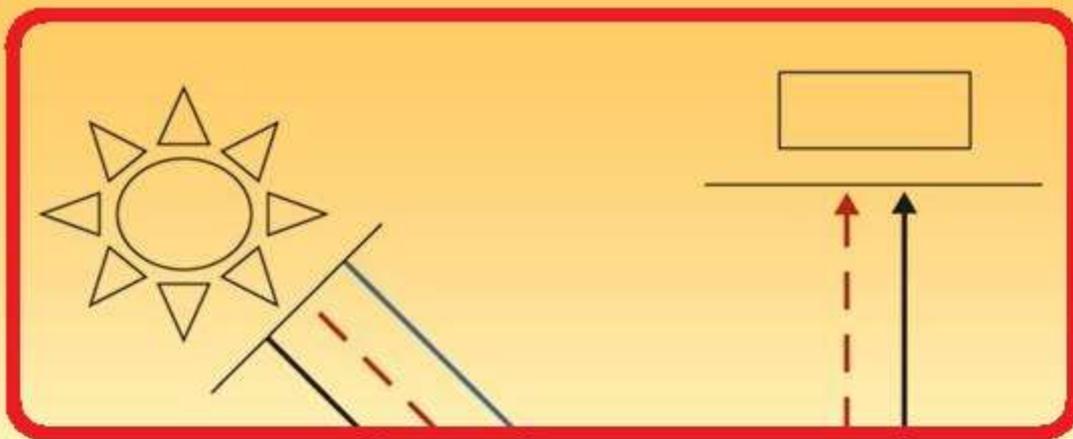
1. **Reflection** from the skin surface – remains polarised – blue line ———
2. **Refraction** at superficial layers of the skin – becomes less polarised – red interrupted line - - - - -
3. **Refraction** at **deep layers** of the skin – **not polarised** – black line ———



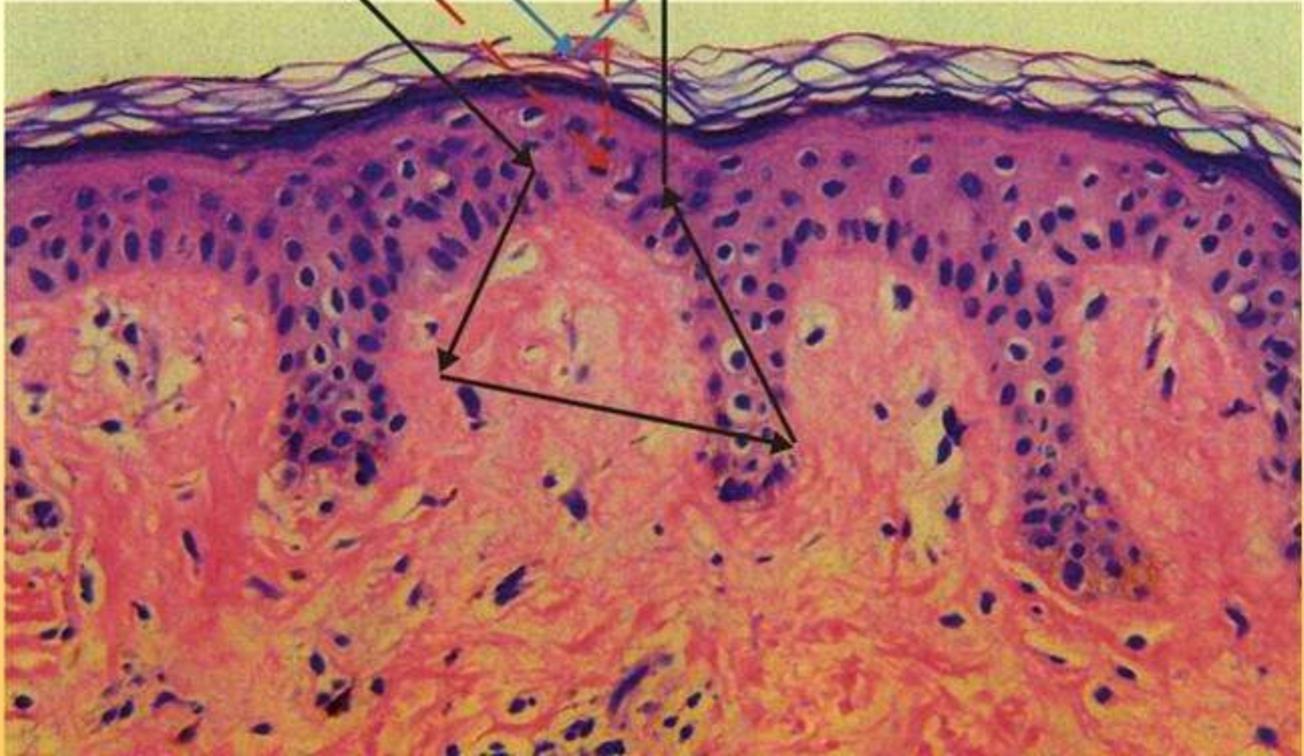








Dermoscope



Advantages of dermoscopy – Epiluminescence – Underlying mechanism

Cross-polarisation + Tyndall effect

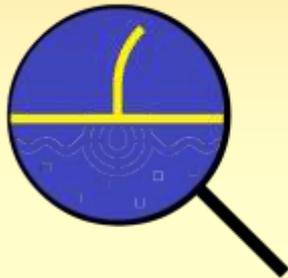


We can choose the **depths** of images

Colours of images reflect the **depths and amount of melanin.**



Naked eyes or
Clinical photography



Dermoscopy **without**
Cross-polarisation



Dermoscopy **with**
Cross-polarisation

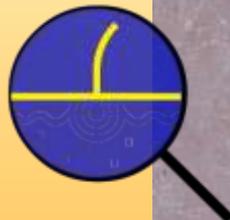


Histopathological
figures

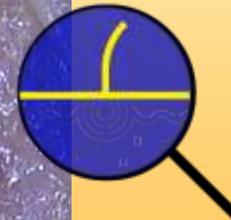
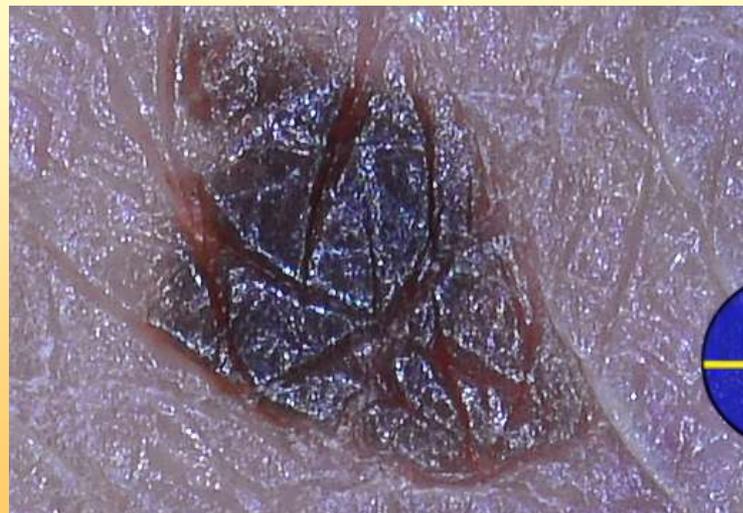
Epiluminescence – Example 1



Epiluminescence – Example 2



Epiluminescence – Example 3



Underlying mechanism of dermoscopy – How could we see a network?



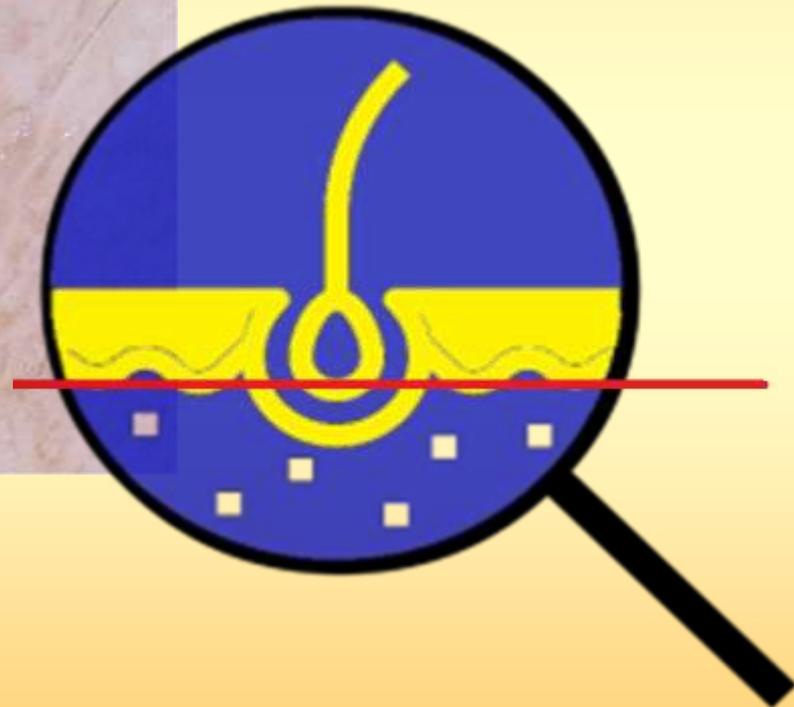
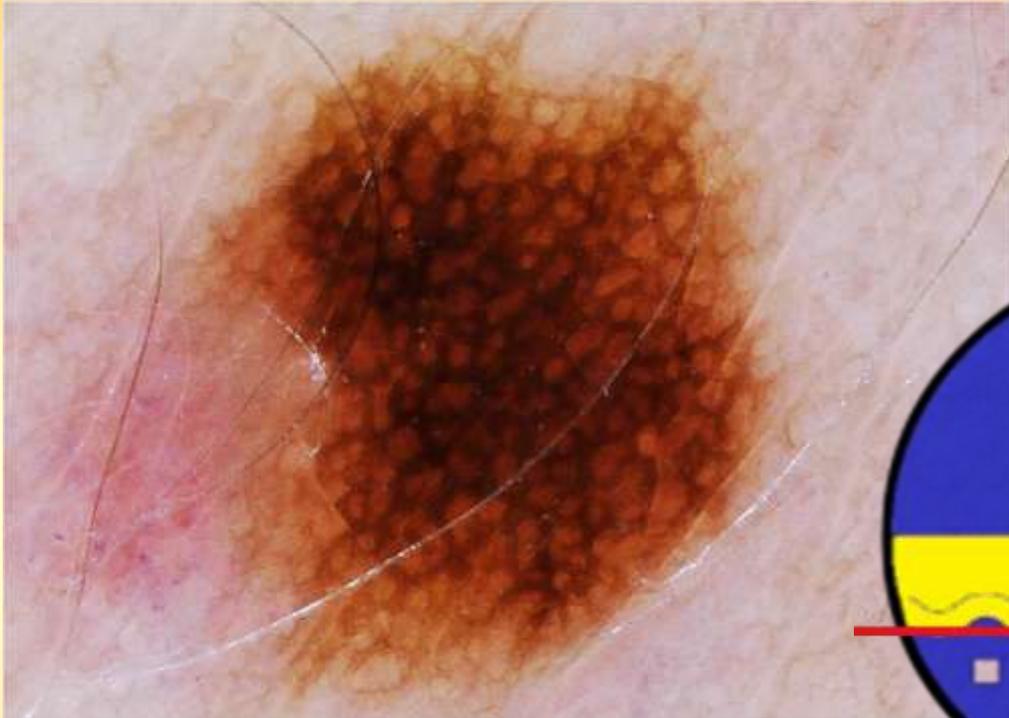
Underlying mechanism of dermoscopy – How could we see a network?



How can we
see the network?



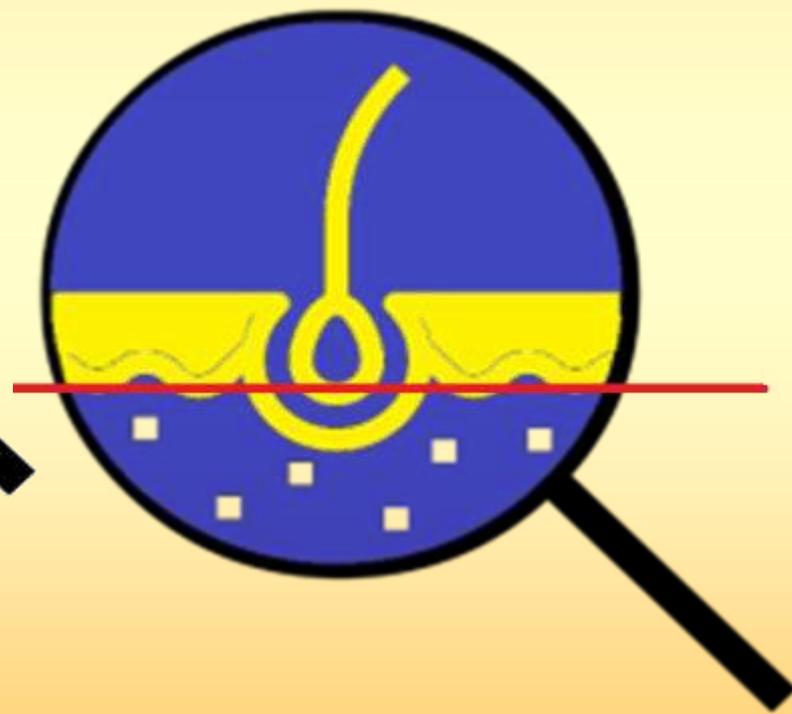
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Underlying mechanism of dermoscopy – How could we see a network?

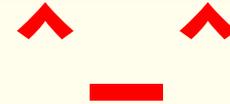


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THANK YOU!



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