Work Place Carcinogens
Solar Radiation and Skin Cancer

November 2013 – Dr Mark Foley

cphr CENTRE FOR PUBLIC HEALTH RESEARCH

Cancer Society
Te Kāhui Matepukupuku o Aotearoa




Overview

- Work place carcinogens and skin cancer
- Who is a risk?
- Screening and Self skin exam
- Common skin cancers

Many work place hazards that cause Skin Cancer

- Solar radiation
- UV radiation from welders
- Tar (coal, soot, mineral oils)
- Arsenic

Sun exposure is a work place carcinogen

Who is at risk?

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  - Especially fair skin and poor protection

Office worker on lunch break

Office worker on lunch break
Fair skin and poor protection !

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- Potentially every **indoor** worker
  - Pattern of sun exposure – work and home
  - ? UVA

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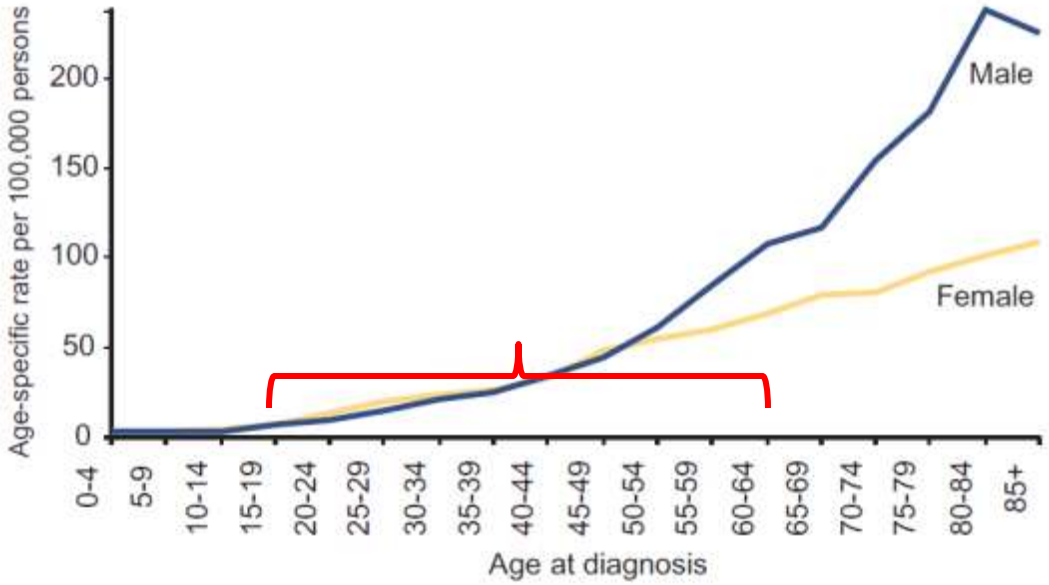
  - Pattern of sun exposure – work and home
  - ? UVA
- **Retired** out door workers
  - Lag time from exposure to development

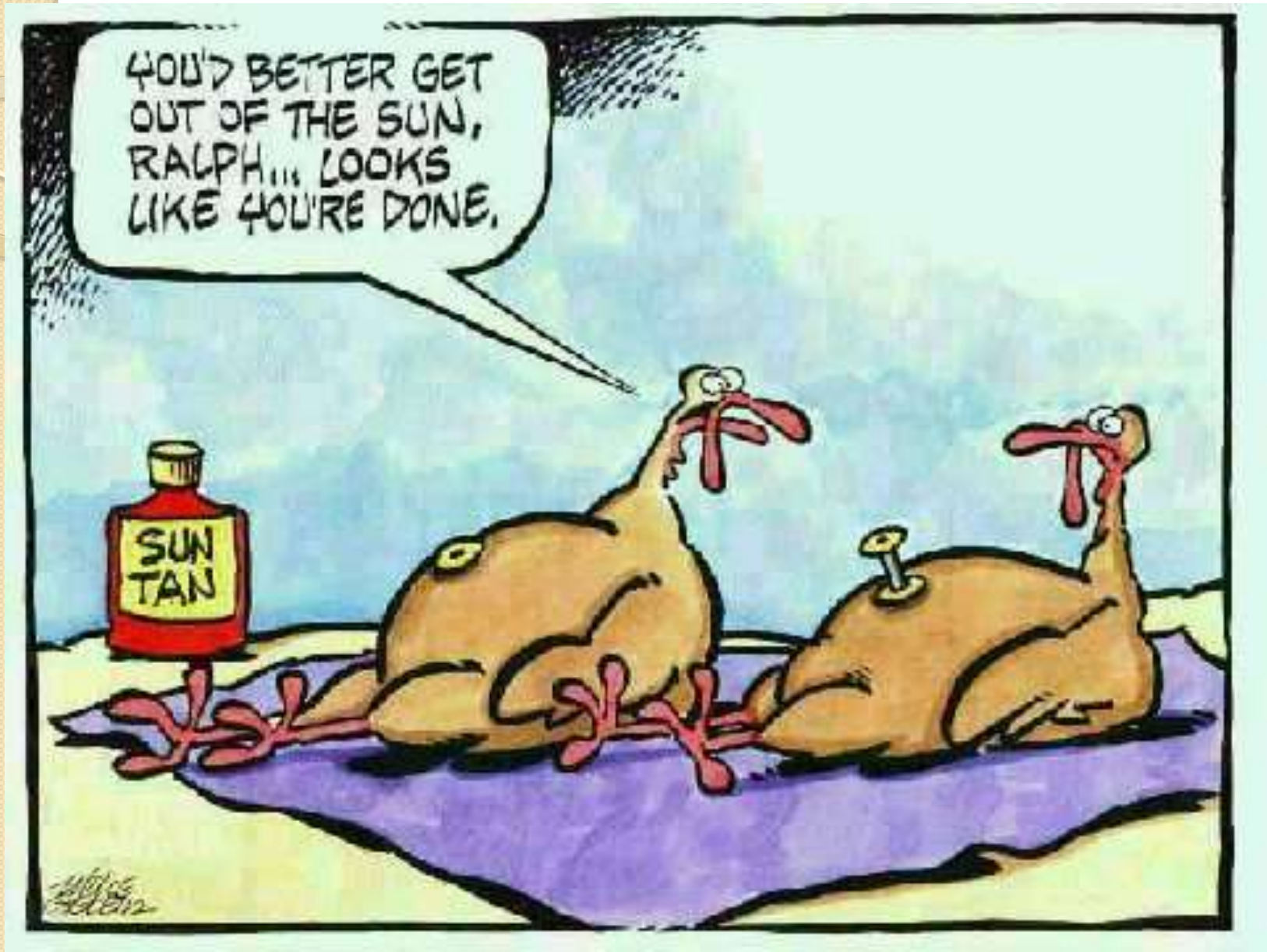
- So every worker with poor UV protection is at risk …..not just during their working life but a life-long risk which becomes greater in later life..



Skin checks

- **Every worker** should be taught and preform regular self examination
- Regular skin checks for outdoor workers, especially those with fair skin and or poor protection.

- **Clinician:** Knowledge of vast variation in skin cancer presentation.
- Check head to toe, not just sun exposed skin. Ideally with dermatoscopy.


YOU'D BETTER GET OUT OF THE SUN, RALPH... LOOKS LIKE YOU'RE DONE.
SUN TAN

Why is sun exposure a work place carcinogen ?

- **Chronic sun exposure**
  - Sun damage – Actinic Keratosis
  - SCC
  - Lentigo maligna

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- **Intermittent sun exposure**
  - Melanomas
  - BCC

One face, but two sides of a story

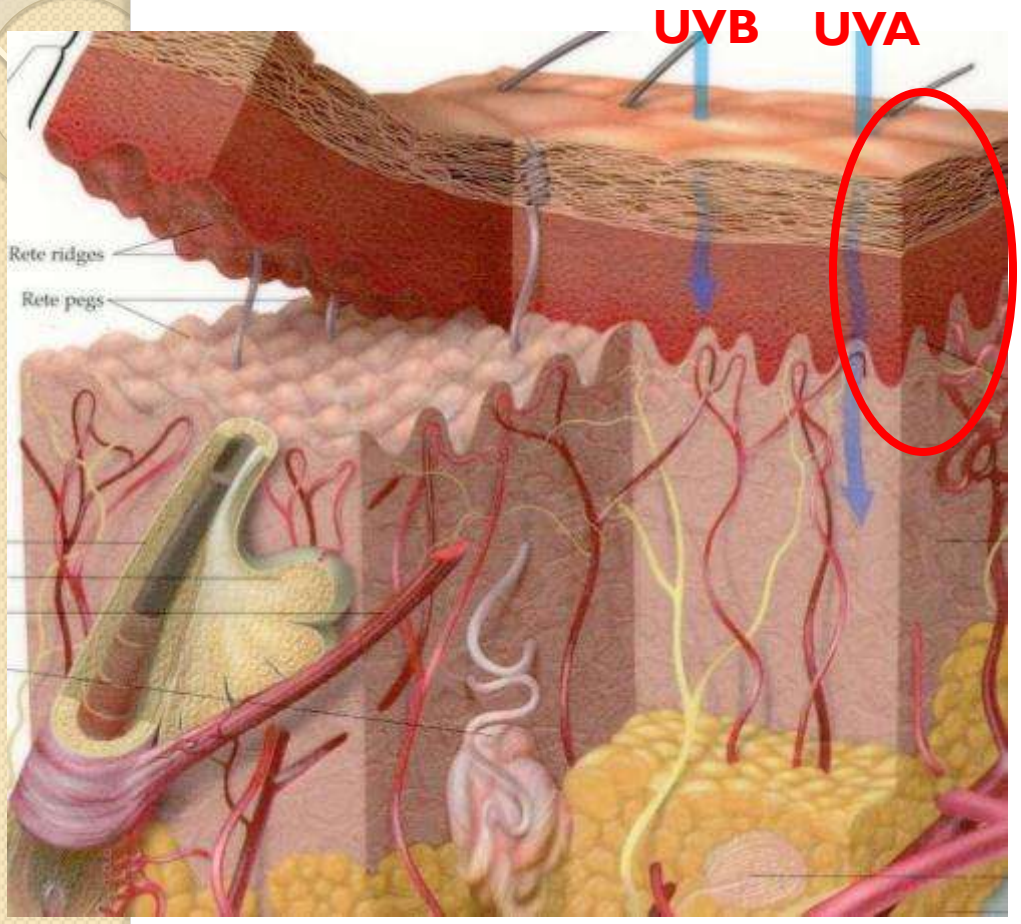
Truck driver William McElligott's face is a graphic illustration of the damaging effects of the sun

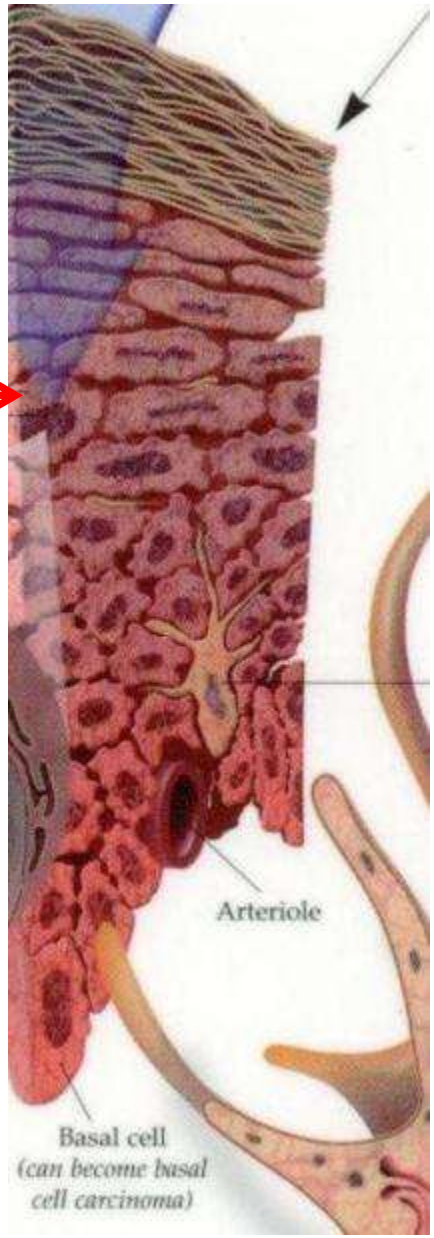
William McElligott: the left-hand side of the truck driver's face was exposed to the sun, the other shaded in the cab. Photograph: The New England Journal of Medicine

Common Skin Cancers

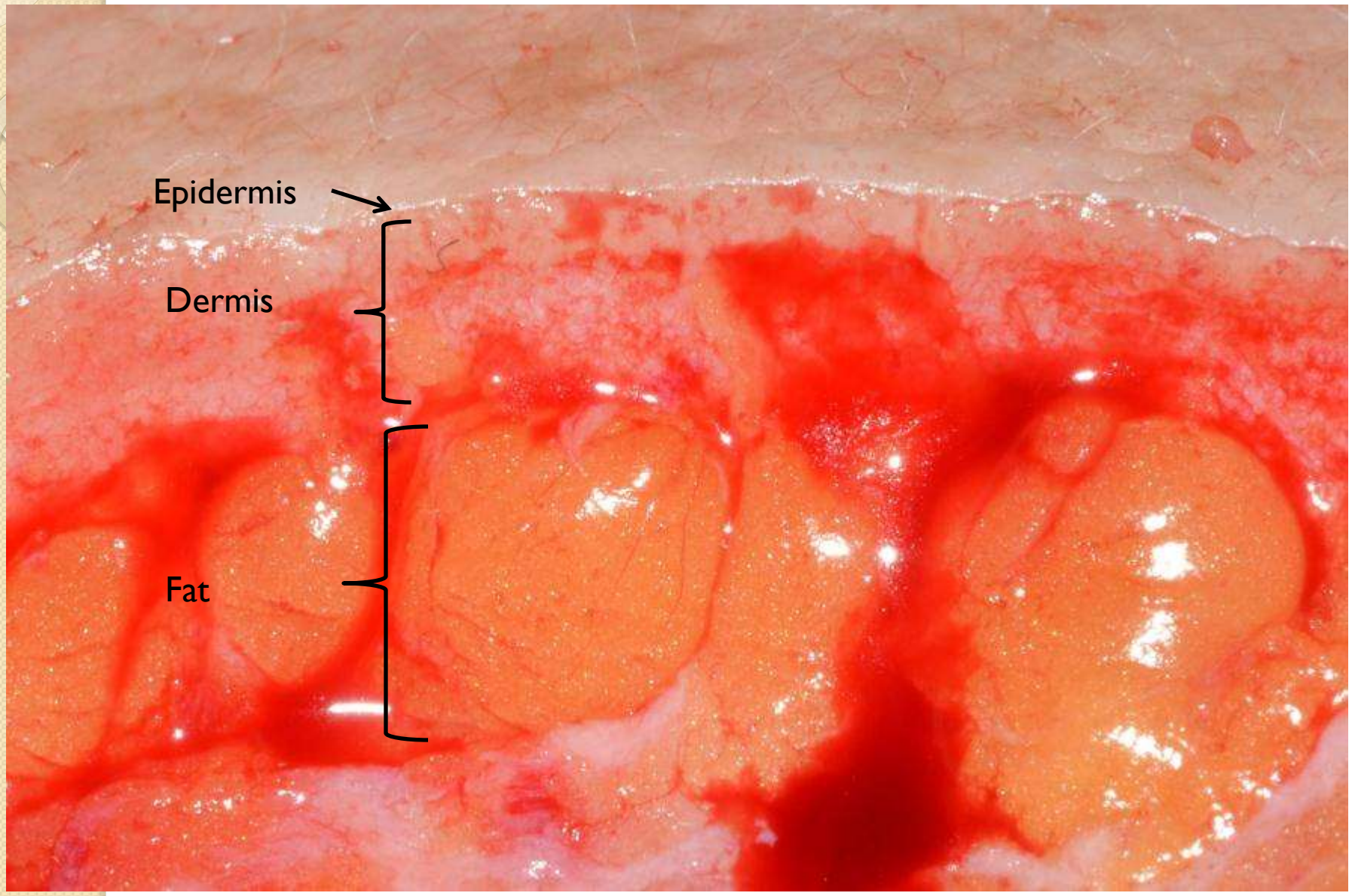
The Skin Clinic Marlborough

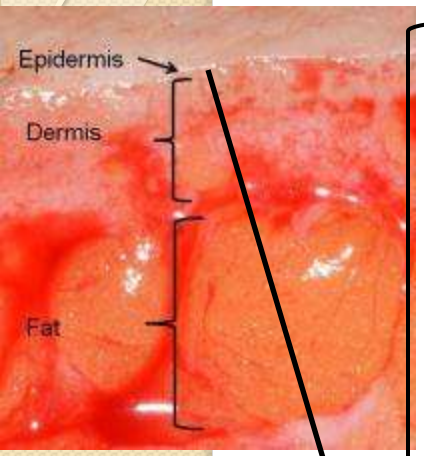
Reminder of epidermal structure





The Skin Clinic Marlborough


Epidermis
Dermis
Fat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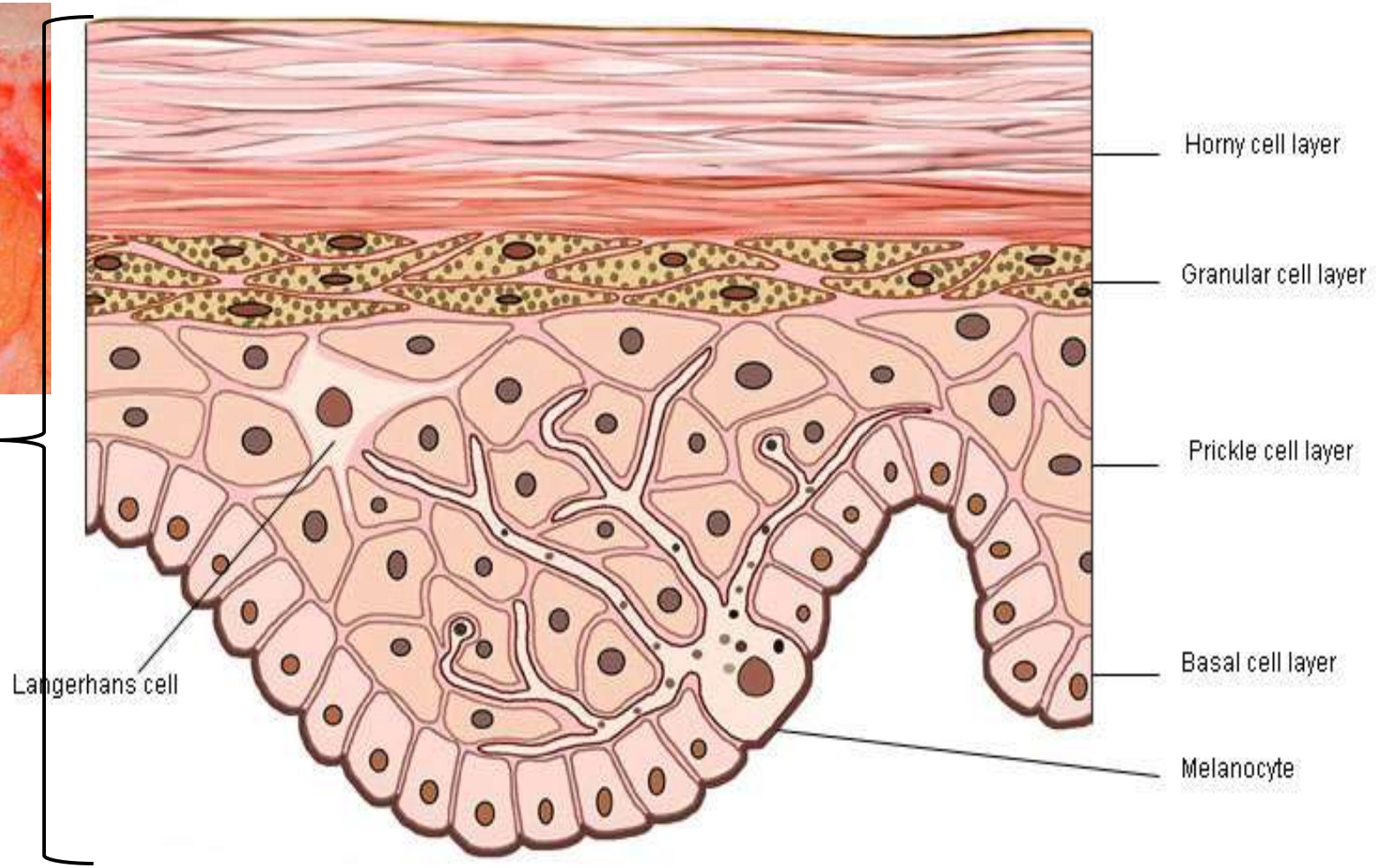
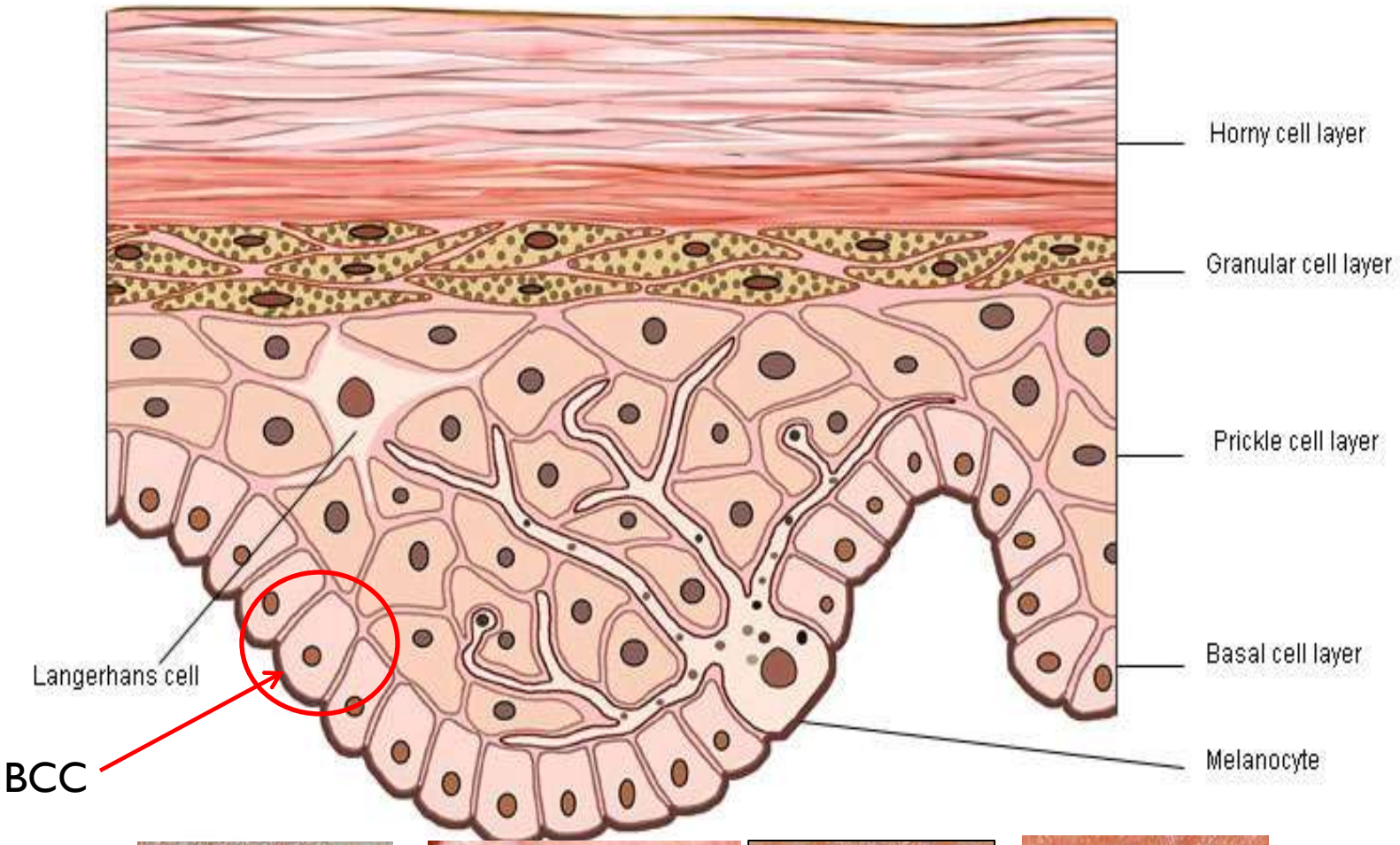

Horny cell layer
Granular cell layer
Prickle cell layer
Basal cell layer
Melanocyte
Langerhans cell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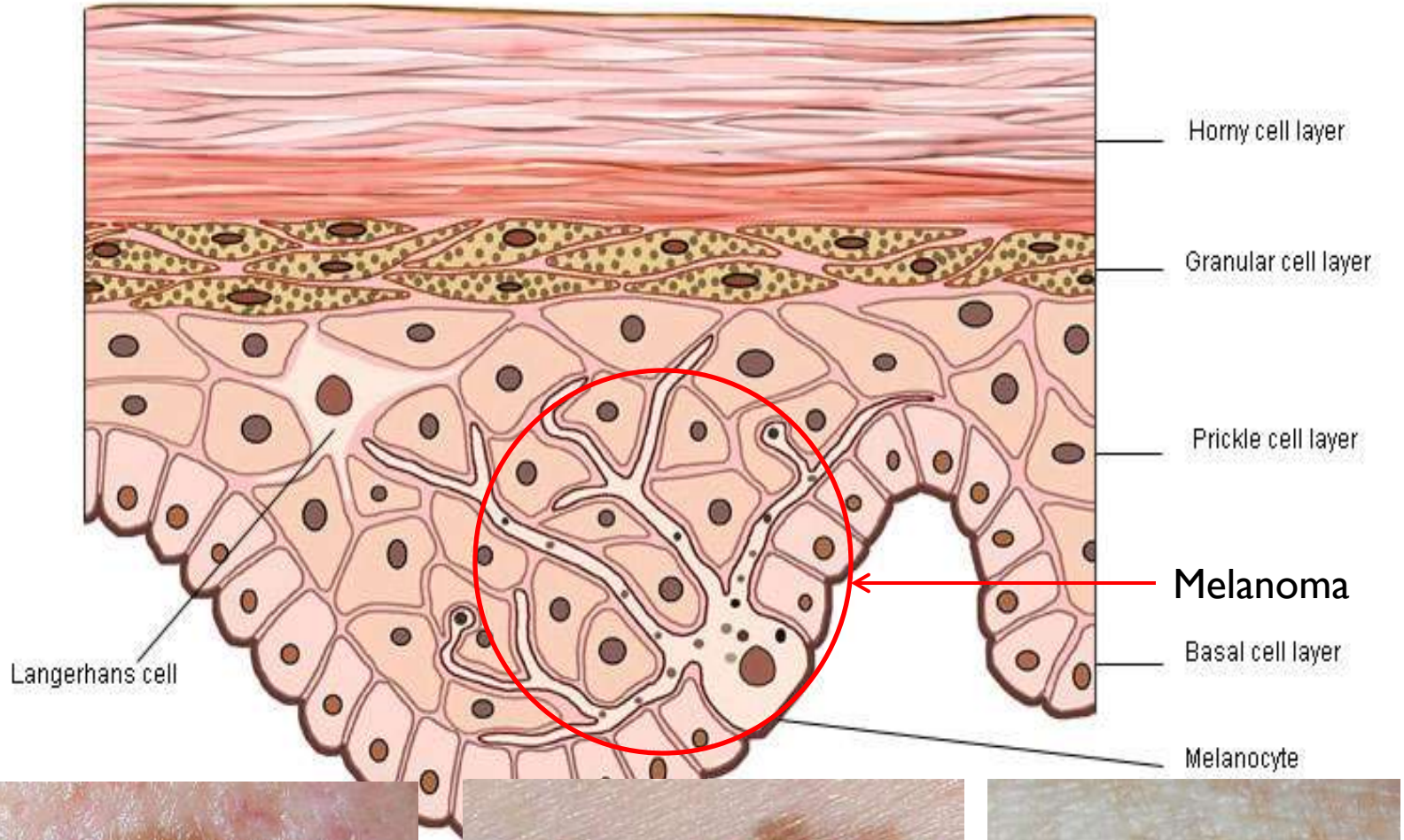
BCC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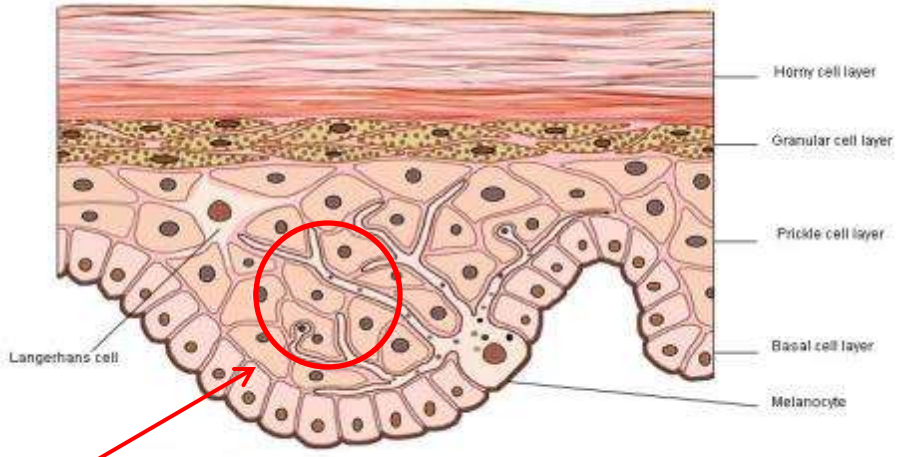
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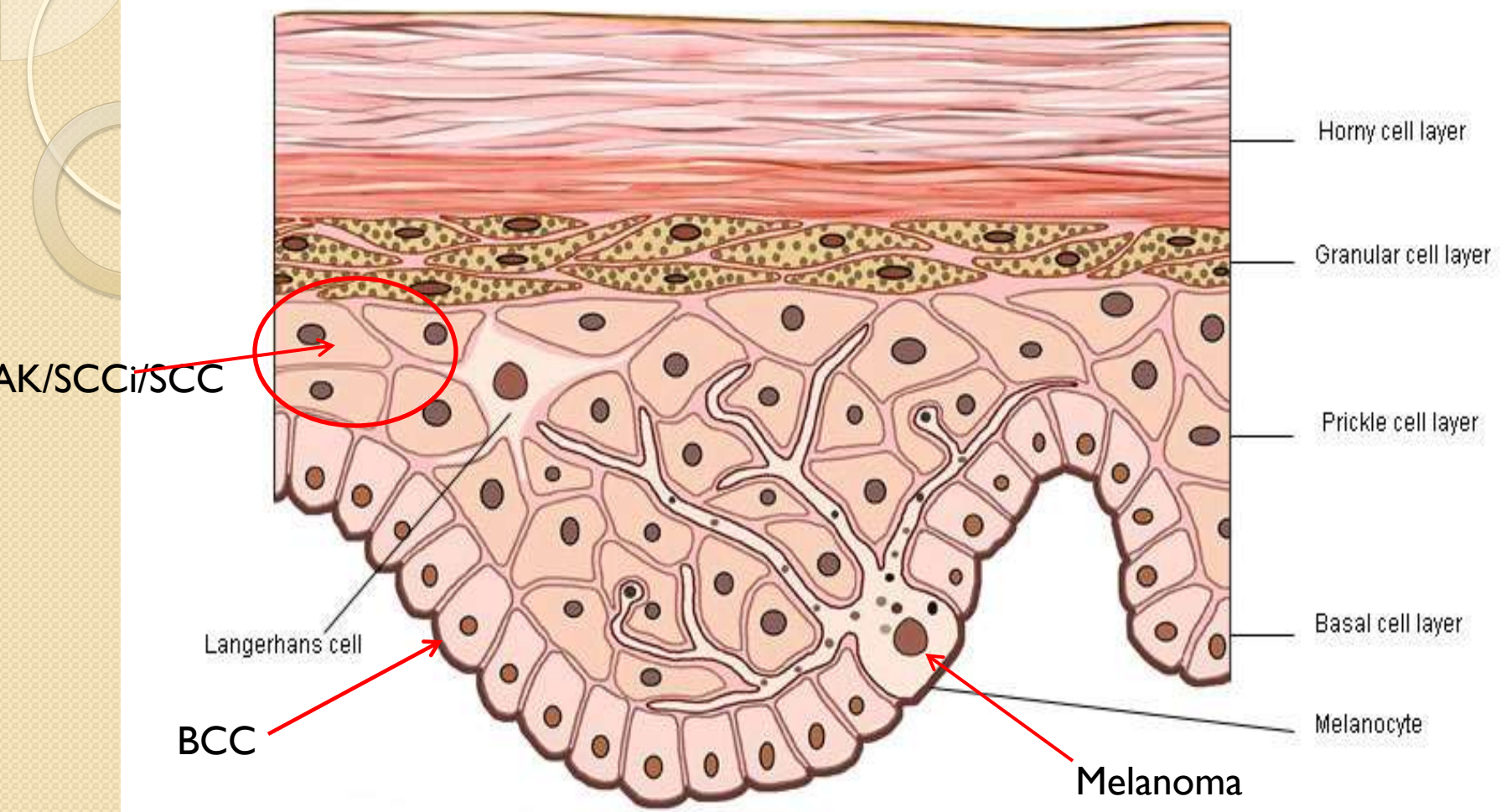
AK/SCCi/SCC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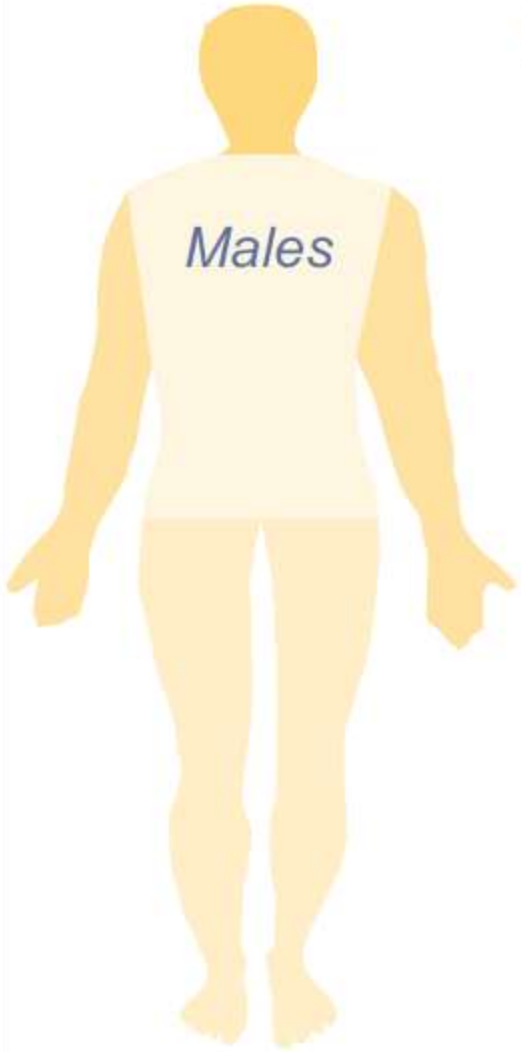
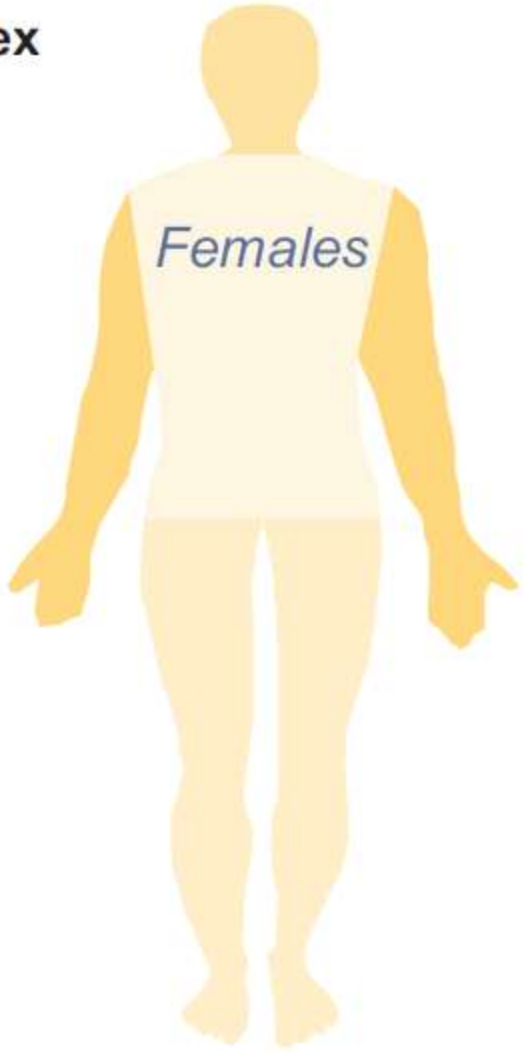
Where do they occur

% of SCC by body site and sex



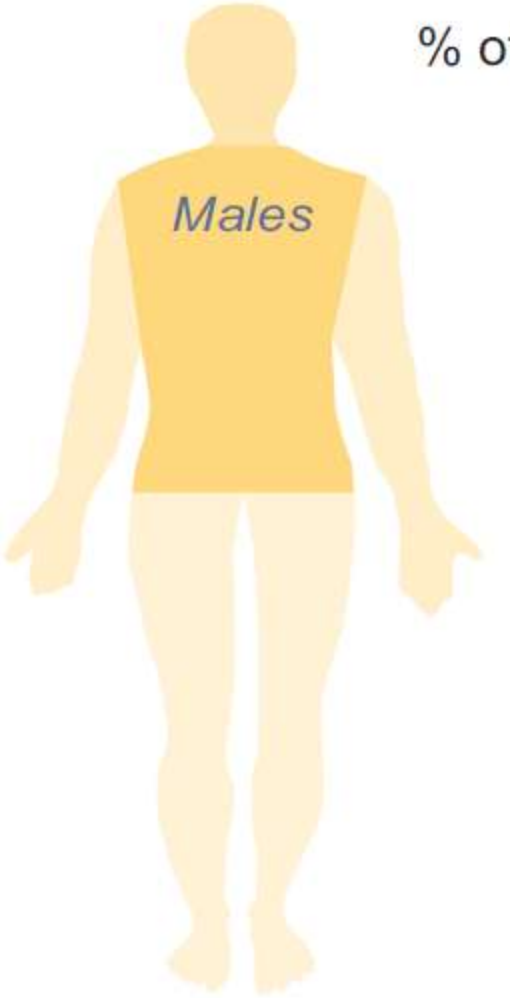
Males		Females
49%	Head & Neck	33%
10%	Trunk	5%
25%	Arms	37%
16%	Legs	25%



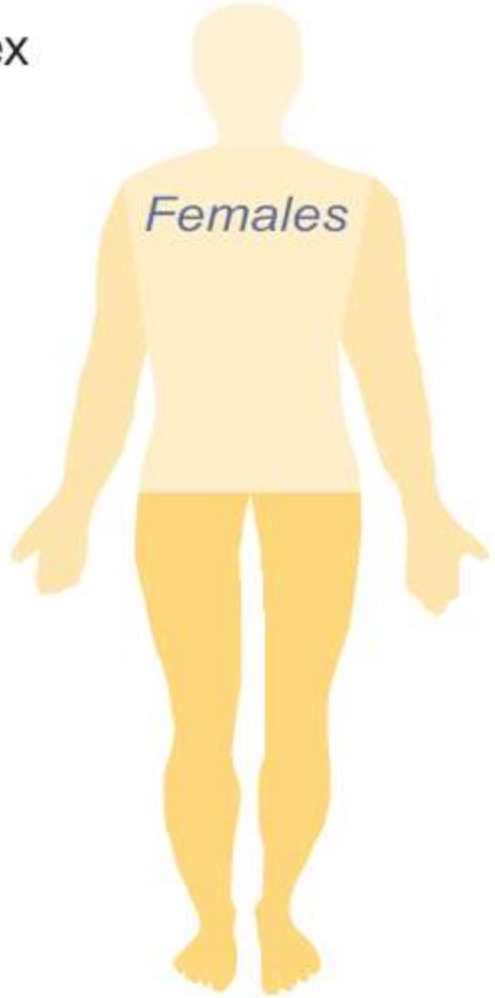
% of BCC by body site and sex

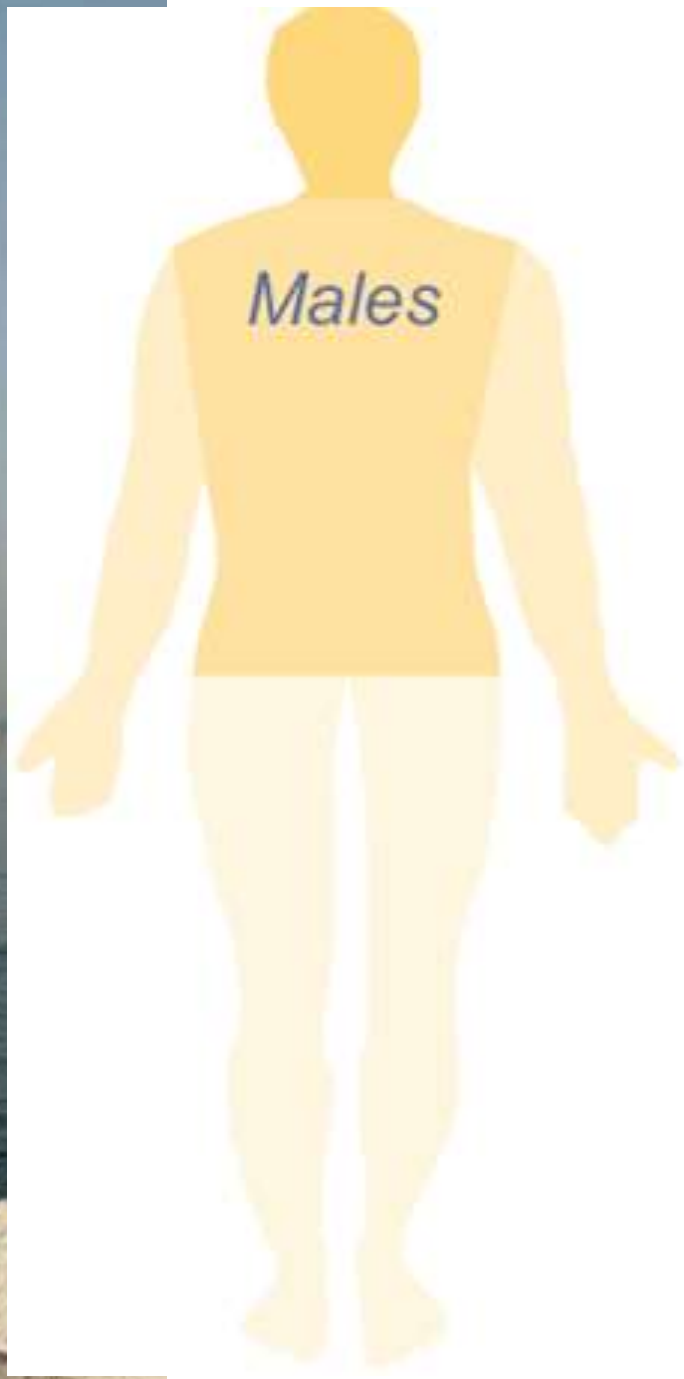
Males		Females
52%	Head & Neck	51%
31%	Trunk	22%
11%	Arms	16%
7%	Legs	10%

% of Melanoma by body site and sex



Males		Females
23%	Head & Neck	16%
38%	Trunk	19%
19%	Arms	25%
14%	Legs	35%
6%	Unknown	4%




Males

When do they occur?

- BCC's, SCC's and Melanoma risk all increases with age

- Different onset ages.

Melanoma – Age specific rates

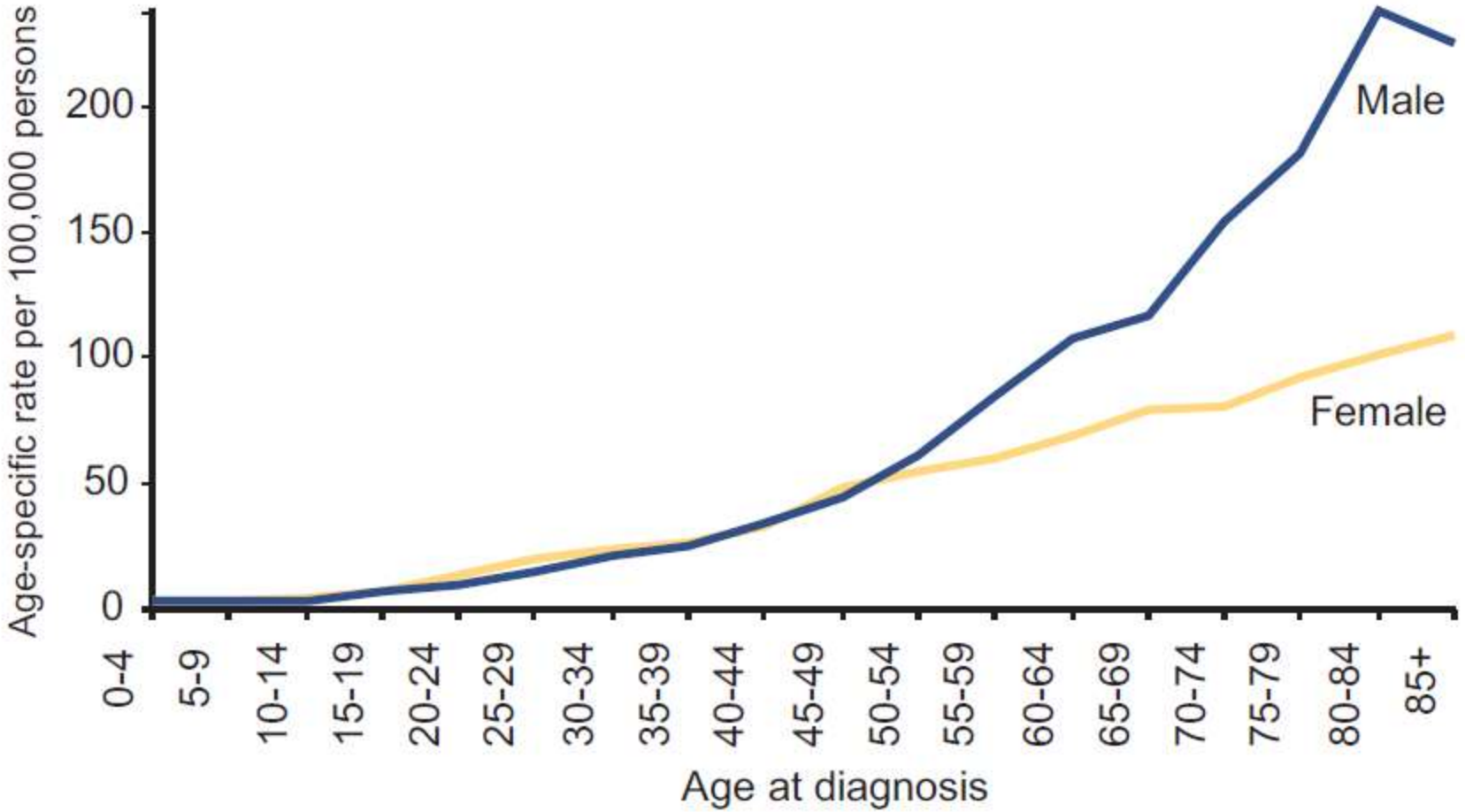


Table 1.1: Estimated age-specific incidence rates of basal and squamous cell carcinomas of the skin: Australia, 2002

	Basal cell carcinoma			Squamous cell carcinoma			Total		
Age (years)	Males	Females	Persons	Males	Females	Persons	Males	Females	Persons
0–19	0	0	0	0	0	0	0	0	0
20–24	89	0	43	0	0	0	89	0	43
25–29	83	141	114	0	0	0	83	141	114
30–34	150	231	195	0	0	0	150	231	195
35–39	491	742	629	0	57	31	491	800	661
40–44	688	1,058	893	482	223	339	1,170	1,281	1,231
45–49	1,493	1,602	1,553	597	431	506	2,090	2,033	2,059
50–54	1,987	2,113	2,055	1,104	808	943	3,090	2,921	2,999
55–59	3,293	2,014	2,602	1,857	647	1,204	5,150	2,661	3,806
60–64	5,496	2,224	3,780	1,963	979	1,447	7,458	3,203	5,226
65–69	4,165	2,849	3,486	2,251	1,900	2,070	6,416	4,749	5,556
70+	7,051	3,880	5,308	3,979	2,146	2,972	11,030	6,027	8,280
ASR (A)	**1,538**	**1,068**	**1,286**	**771**	**441**	**592**	**2,309**	**1,510**	**1,878**
ASR (W)	**1,151**	**825**	**977**	**561**	**323**	**432**	**1,712**	**1,148**	**1,409**

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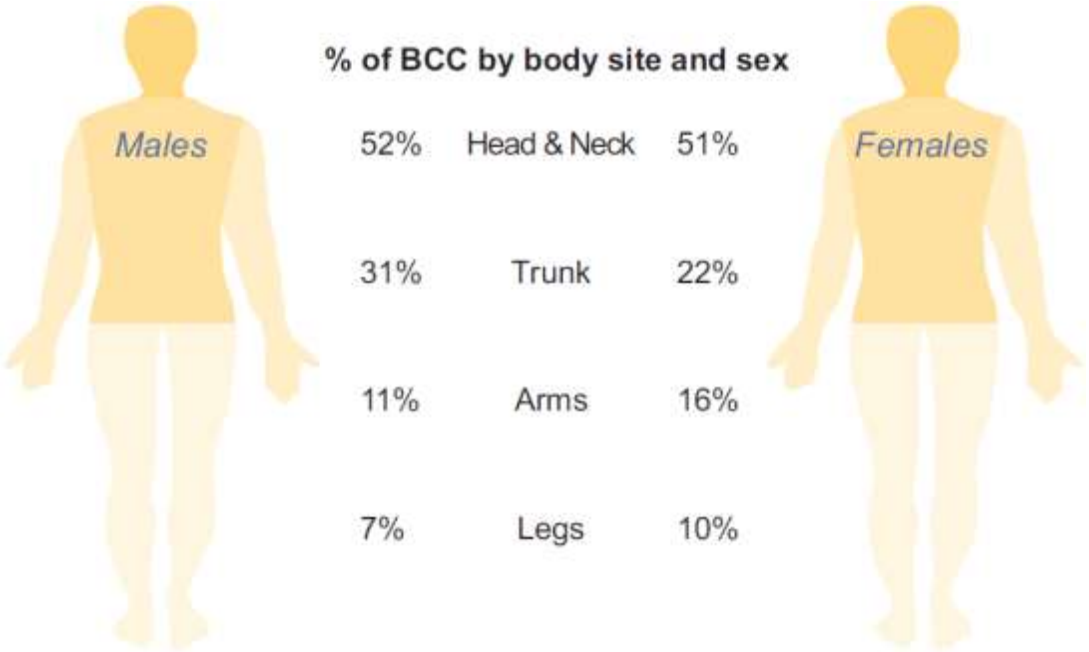
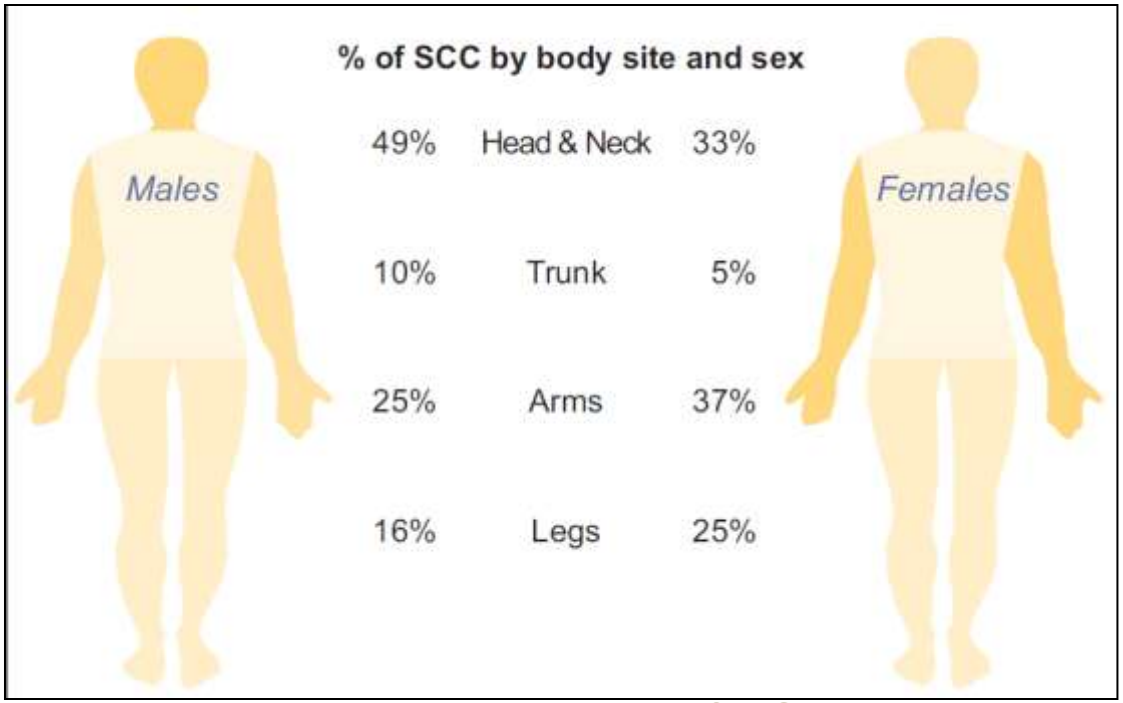
70+	7,051	3,880	5,308	3,979	2,146	2,972

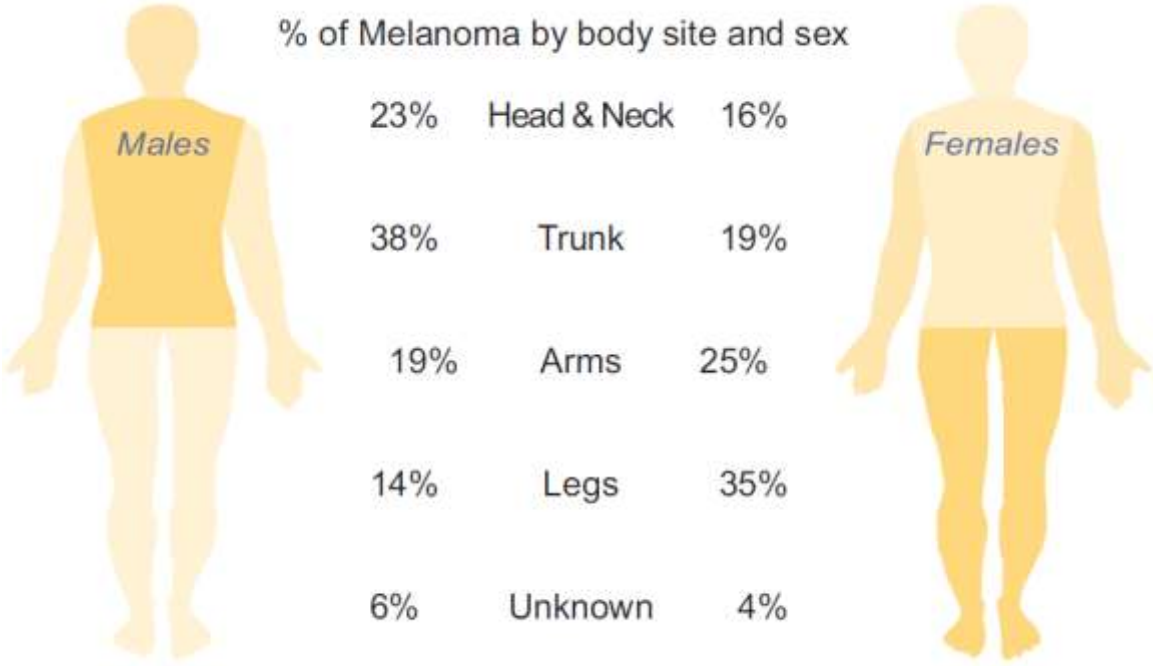
- **BCC's**
  - common in under 35
  - Dramatic increased rate 35+
  - Intermittent sun exposure
  - Mainly sun exposed sites



- **SCC's**
  - Uncommon under 40
  - Dramatic increase in 50's
  - Chronic sun exposure
  - Sun exposed sites



- **Melanoma**
  - Rare under 14 yrs age
  - Dramatic increase 50's
  - Intermittent sun exposure
  - Sun protected sites



So Far

- UV light **damages DNA**, if not repaired this is one factor in causing skin cancer
- Different **age and body site** profiles
- Work sun exposure is a significant **risk factor.**
- **Long lead time** from exposure to development of sun damage and skin cancer.

Solar induced DNA damage & gene suppression

- **Implications for prevention**
  - Minimisation of sun exposure to reduce life time accumulation of UV radiation.

- **Implications for surveillance**
  - Risk extends well beyond leaving a job or retiring

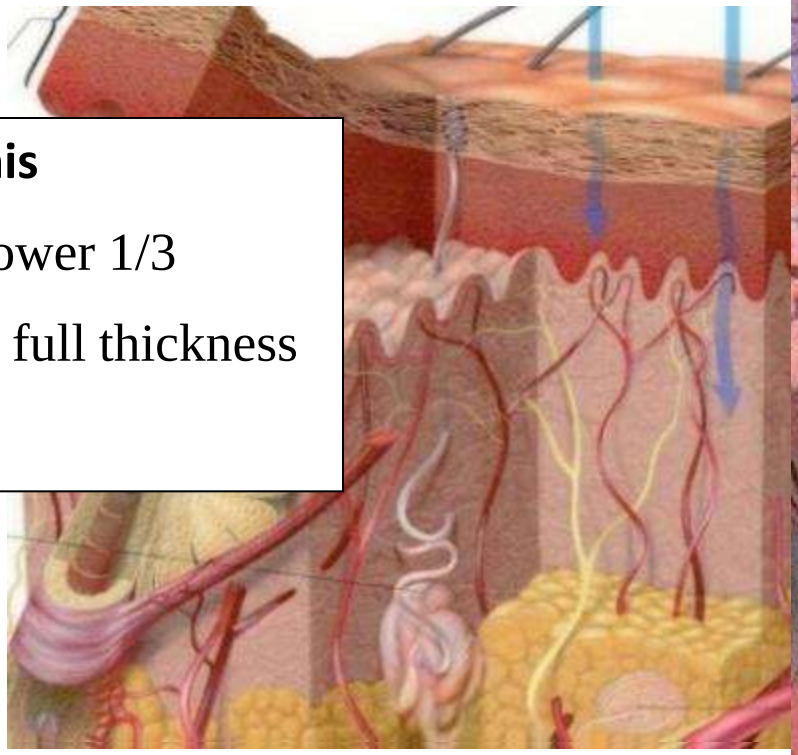
Skin Cancers - clinical

Solar Keratosis / Actinic Keratosis

- Sun damage, "sun spots"
- Considered Pre-malignant

Epidermis

- AK – lower 1/3
- SCCi – full thickness



SCCi

AK

- AK and SCCi therefore have similar naked eye features

- Different dermatoscopy features