Harmful effects of UVR exposure in childhood: epidemiological evidence

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Outline

1. Levels of UVR exposure in childhood
2. Childhood skin effects: Benign to cancer
3. Risk factors – genetic, solar UVR
4. Is childhood a susceptible window?
5. Primary prevention

Levels of UVR exposure in childhood

- Estimated mean summer ***sun exposure***

  2-4 hours/day: similar across studies

  -summer in Europe/Canada; year round in Australia

- Estimated average ***UV exposure***

  - 8 times greater in Australia than Denmark

- Estimated ***% of life-UVR*** (up to 60 y) received by children <20 y

  - 50%: Australia 25%: Denmark

Benign skin effects of UVR in childhood

- **Photoaging- prevalence in 13-15 yr olds** (assessed by skin surface microtopography)

-in Scotland: 33% with mild skin damage

-in Australia: 40-70% (Fritschi et al 1995)

- **Melanocytic naevi (moles)-** median counts

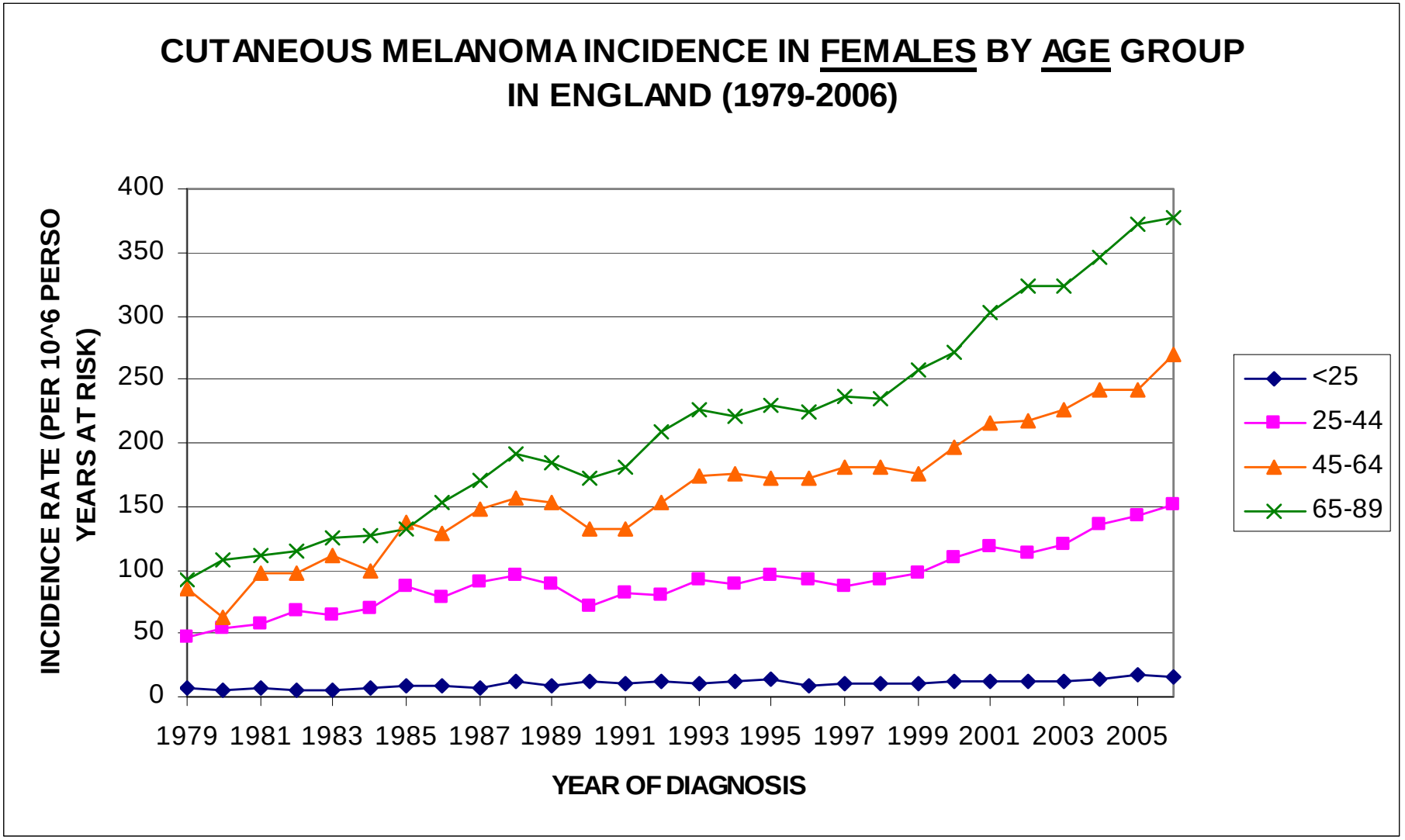
	Germany (Bauer et al 2005)	Tropical Queensland (Harrison et al 2005)
Age 2:	3	20
Age 5:	7	60
Age 6-7:	17	70

Skin cancer incidence in childhood

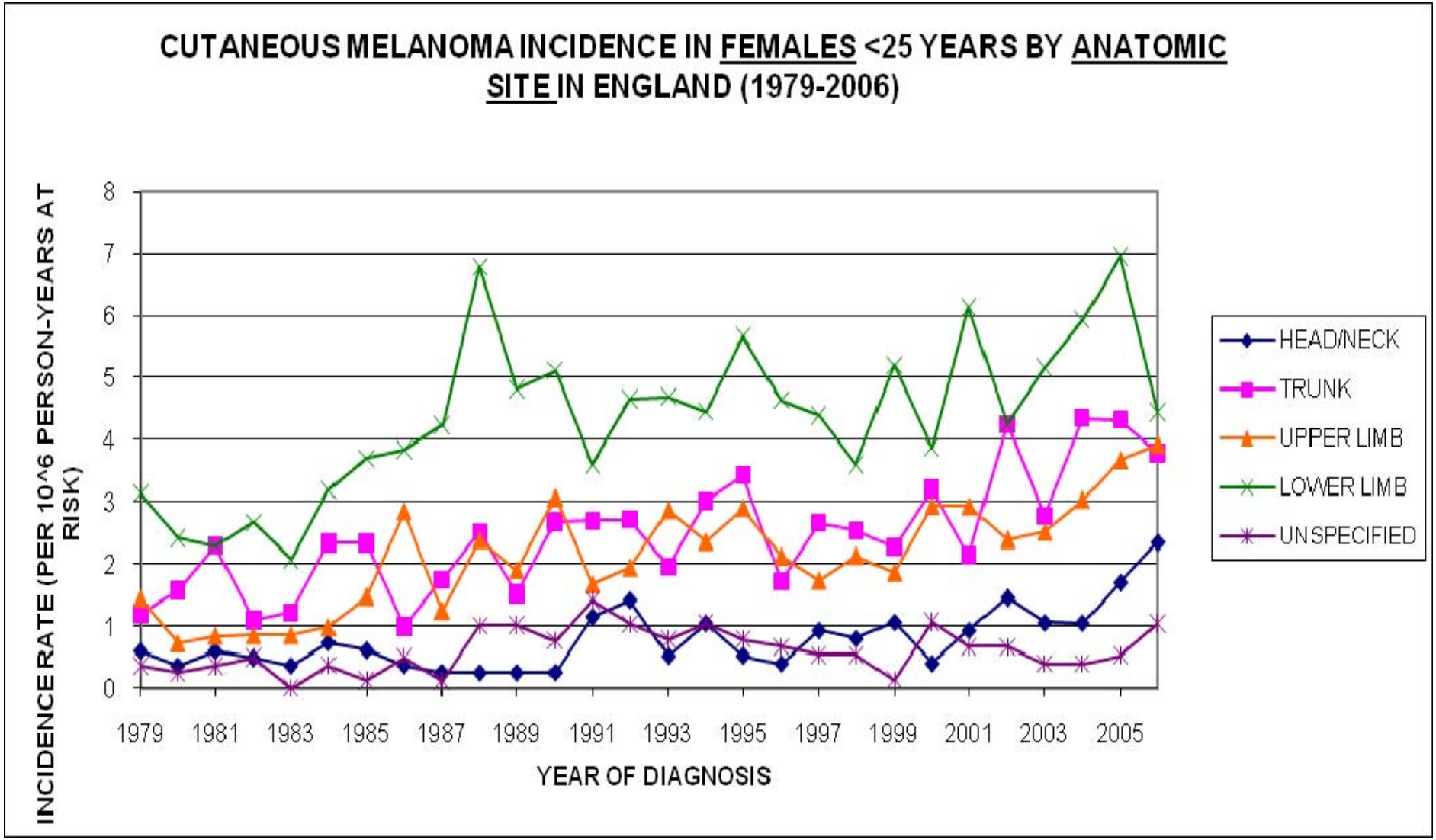
- Melanoma – rare < 20 years: accounts for 2% of all melanomas

- BCC, SCC – negligible sporadic

Melanoma in Females by Age in England



Melanoma in Females <25 Years by site



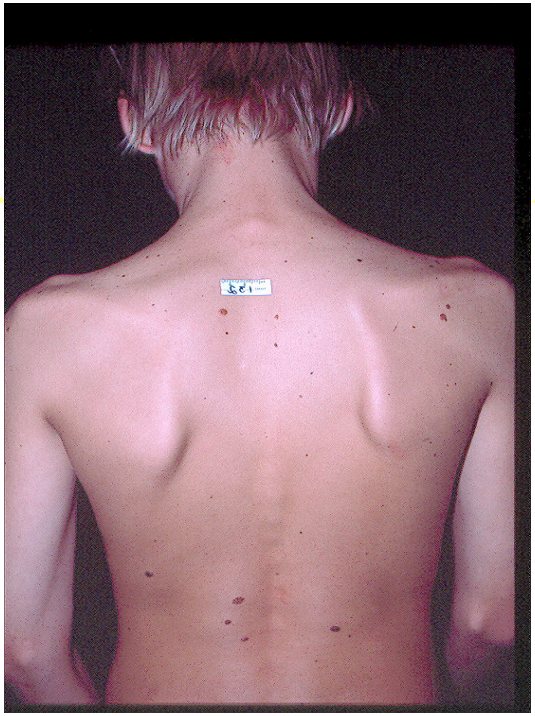
Melanoma at ages 10-24 years: England vs Australia

Annual incidence rates per million in 2006

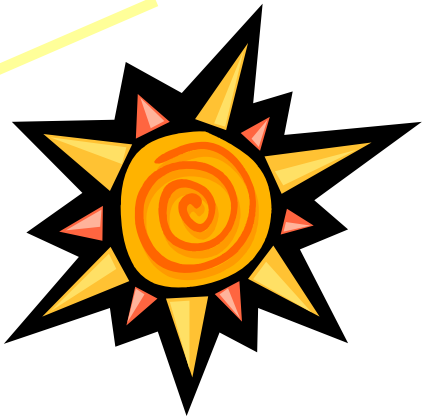
	England	Australia
Males	**15**	**43**
Females	**24**	**51**

Causal pathways to melanoma

Genes



Environment

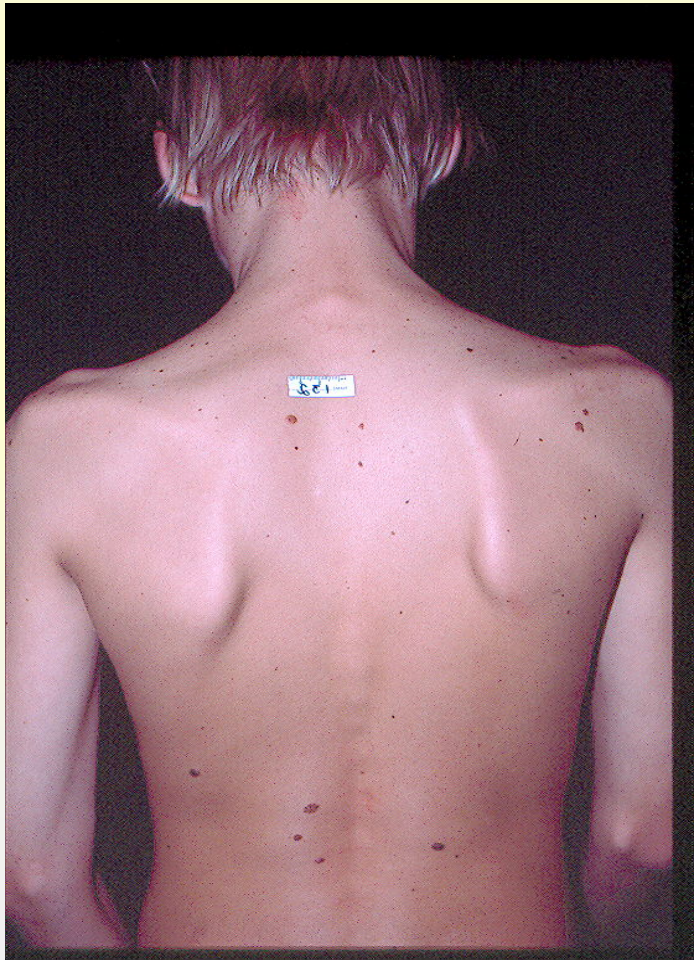


Genetic susceptibility

- Mutations in “direct effect” genes eg CDKN2A - *rare*

- **Multiple genes controlling pigmentation in skin, hair, eyes

- **Tendency to multiple naevi (moles)



Youth Melanoma -pigmentary risk factors

		OR	95% CI
Eye Colour	Brown	1.0	
	Hazel	**3.7**	1.0-13.5
	Green	**3.8**	0.9-16.5
	Blue	**4.5**	1.5-13.6
Hair Colour	Brown/Black	1.0	
	Blonde	**1.7**	*0.8-3.7*
	Red	**5.4**	*1.0-28.4*
Tanning Ability	Dark	1.0	
	Medium	3.4	0.7-16.5
	Mild	**3.9**	*1.0-16.0*
	No Tan	**4.7**	*0.9-24.6*

Youth Melanoma - freckling and family history

		OR	95% CI
Facial Freckling	None	1.0	
	Few	0.6	0.2-1.7
	Some	1.0	0.4-2.9
	Many	**3.2**	0.9-12.3
Relative with melanoma	No	1.0	
	Yes	**4.0**	0.8-18.9

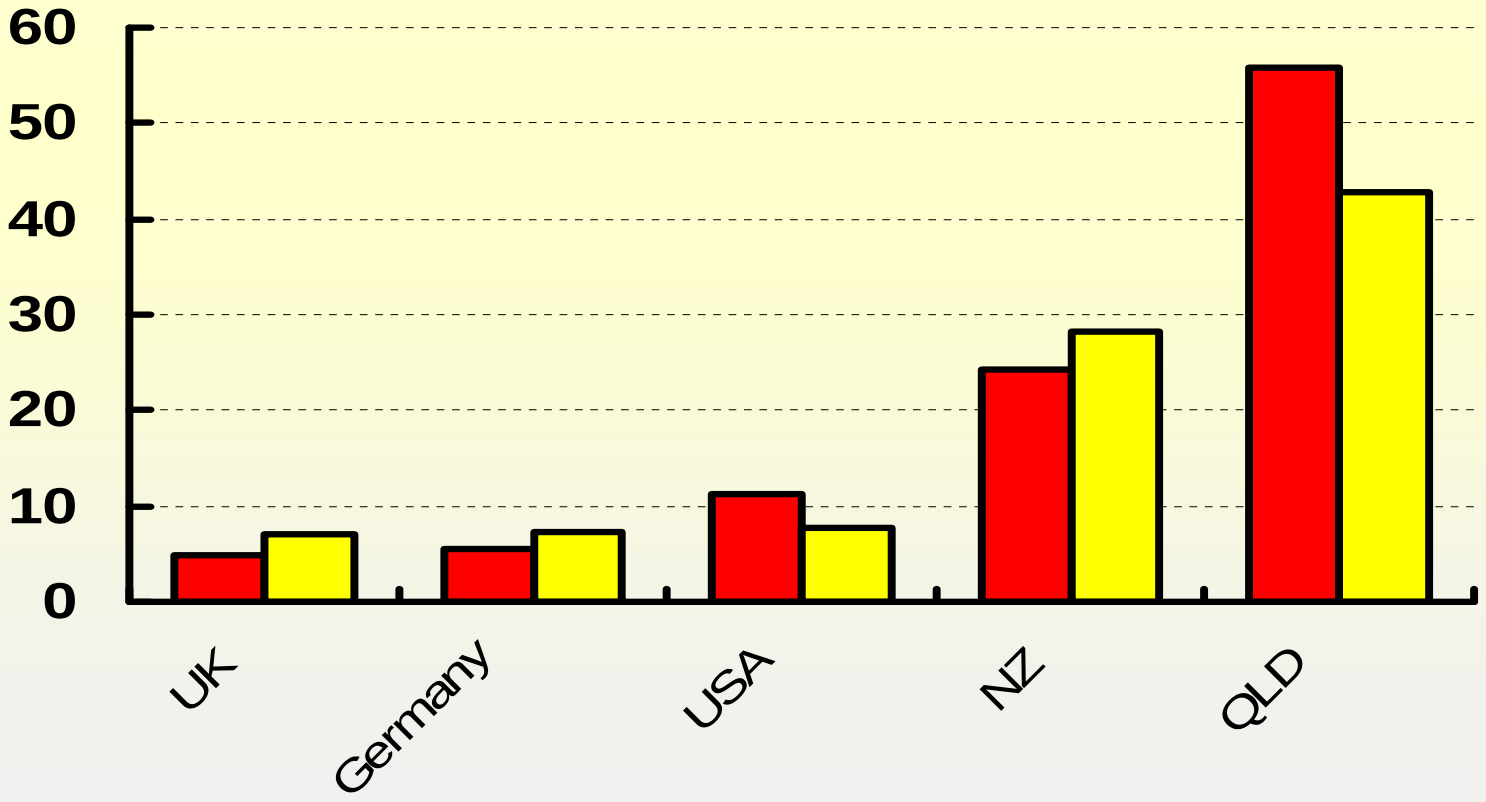
Youl et al, Int J Cancer 2002

UVR causes melanoma

- **Sun exposure**
- **Artificial tanning devices**

Class 1 carcinogens (IARC 2009)

Latitude gradient for (childhood)melanoma



Cohort study of melanocytic nevi in adolescents

Methods

- N= 110, aged 12-14 yr, followed 4 yrs
- All melanocytic nevi on body mapped photographed

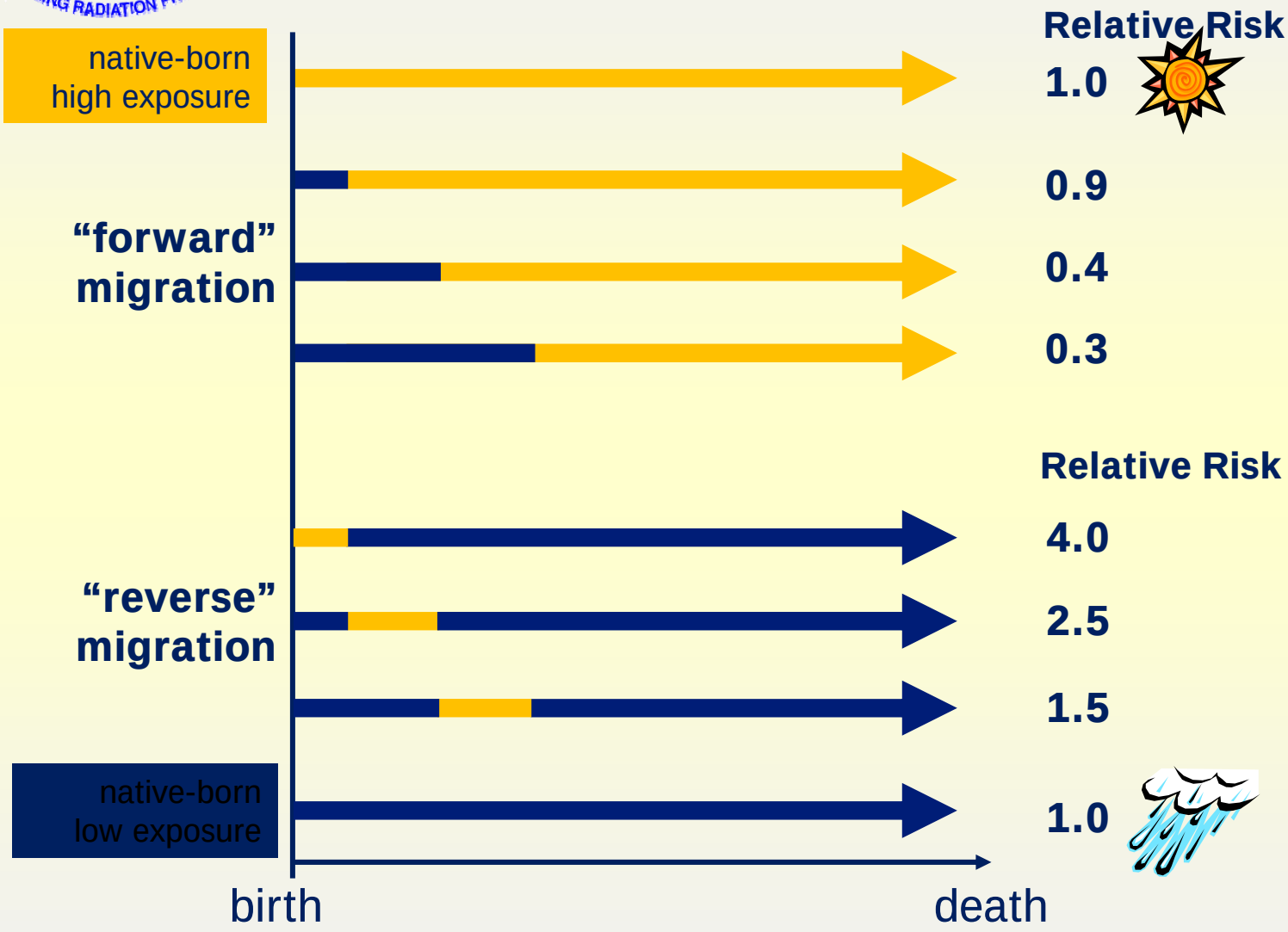
Results

Amount of school lunch time in sun	Naevi: Face & Neck		Shoulder & Back	
	OR	95%CI	OR	95%CI
Very little	1.0		1.0	
Some	**1.8**	1.2-2.6	**1.7**	1.1-2.5
All	**1.7**	1.2-2.6	**1.8**	1.2-2.8

Darlington et al, Arch Dermatol, 2002

Childhood a susceptible window?

Migration studies



UVR Protection campaigns in high-risk populations

Underlying trends in Melanoma awareness

Australia

- 1960s – Melanoma public and professional education
- 1980s – Prevention campaign "Slip, slop, slap"
- 1990s – "SunSmart" Campaign

  Emphasis on sun protection in children

INTERNATIONAL COMMISSION ON NON-IONIZING RADIATION PROTECTION

ICNIRP

Slip Slop Slap & Wrap

Lycra wear

T-Shirts

Sunscreen

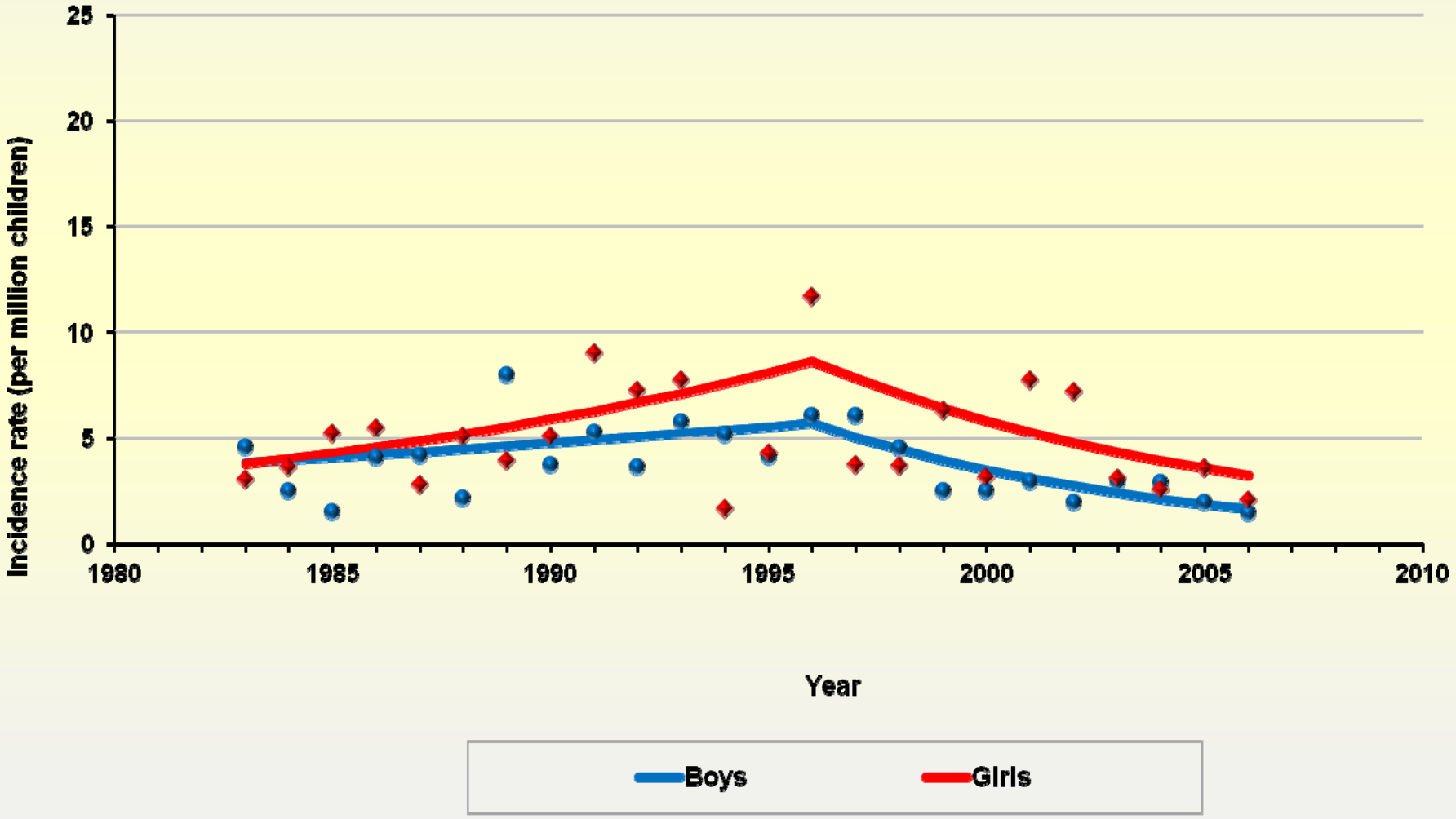
Hats and caps

Sun protection accessories

Sunglasses

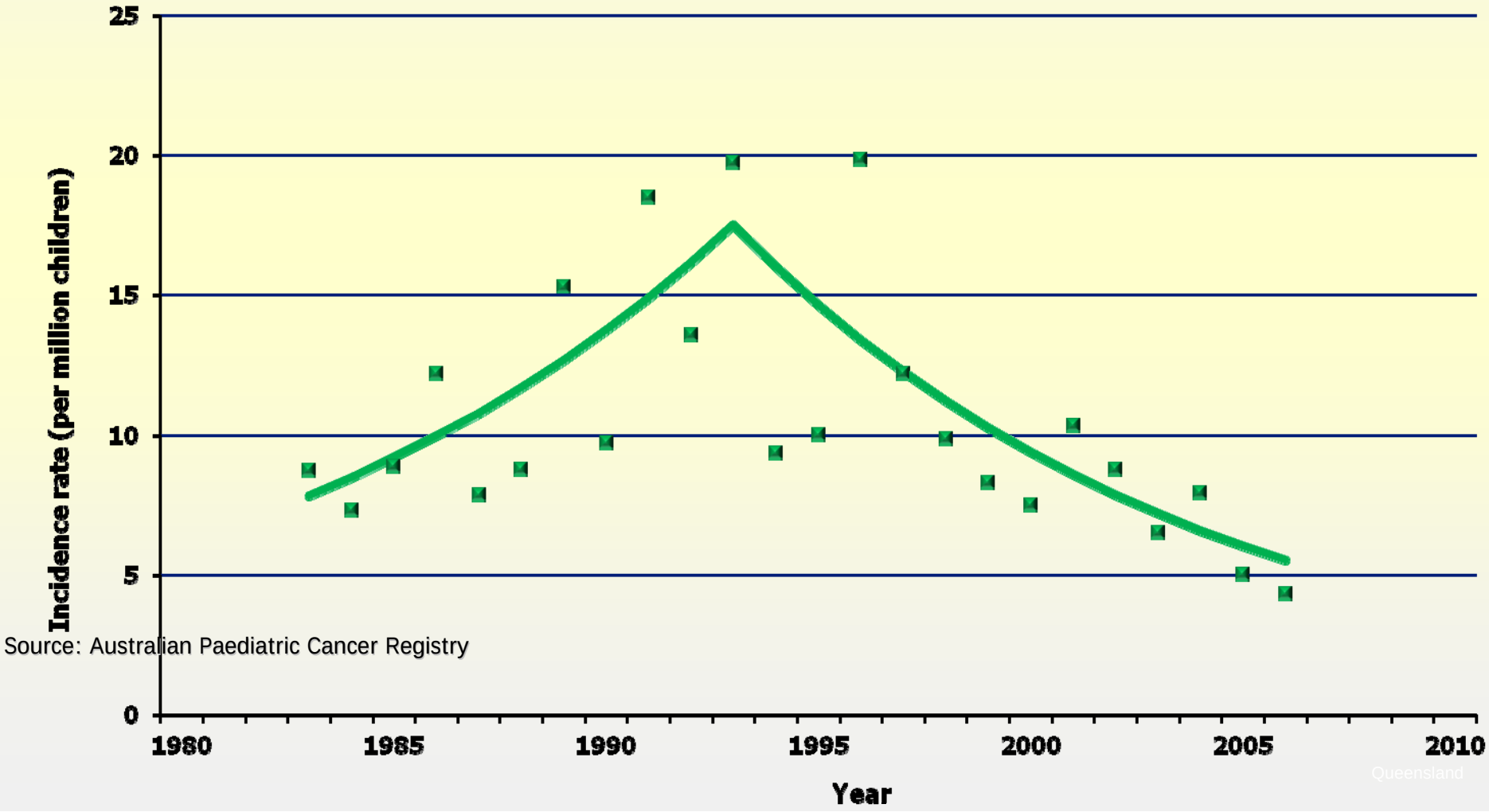
Melanoma incidence trends among children *aged 0-14 yrs*

in Australia, 1983-2006, by sex



Source: Australian Paediatric Cancer Registry

Melanoma incidence trends for children *10-14 yrs* in Australia, 1983-2006



Source: Australian Paediatric Cancer Registry

Trends in melanoma incidence among children in Australia (and Sweden)

Possible influence of sun protection programs

Since late 1980s/early 1990s:

- **community education programs on sun protection** (shirts, hats, sunscreen)
- **policy** emphasis *eg* **accreditation programs for pre- , primary schools**

From mid-1990s:

- melanoma incidence rates among children aged 10-14 years have decreased significantly by 8.5% per year

Baade et al 2011

Prevention of melanoma in young people

Increase Awareness-

Personal; Professional; Policymakers..

- ***Avoidance of intense sun,*** *including sunbeds*
- ***Use of clothes & Sunscreen in summer***

…in *childhood*