State/National Statistics: Basic Epidemiology of Skin Cancer

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Skin Cancer and Management of Treatment-Related Fatigue
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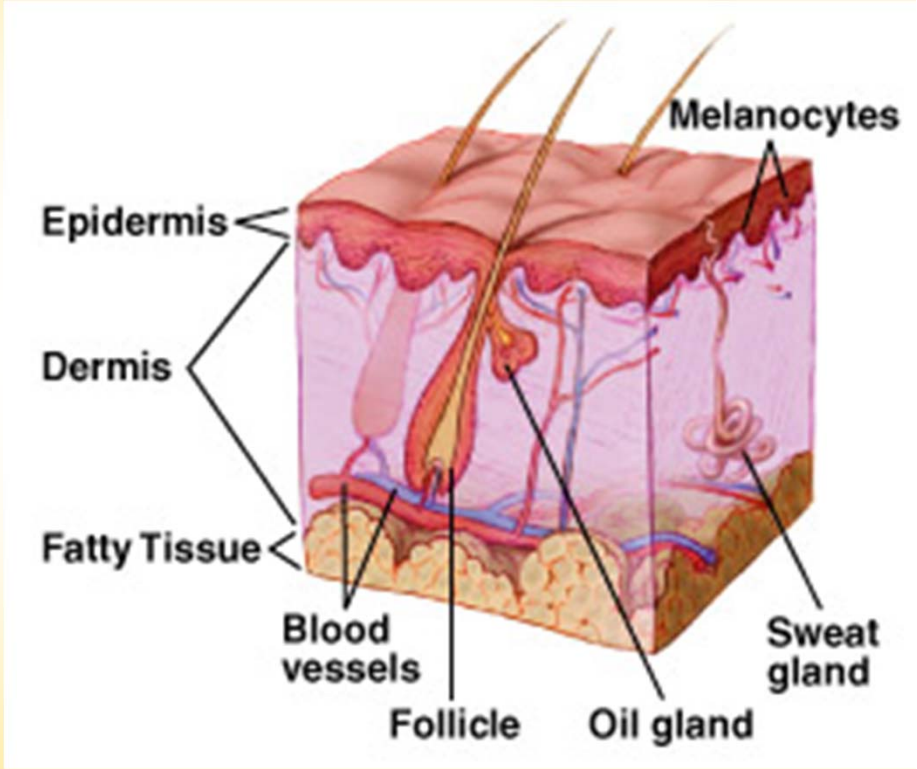
Outline

- **Skin**
- **Skin Cancer**
  - SCC and BCC
  - Melanoma
- **Melanoma**
  - Risk Factors
  - Incidence
  - Stage
  - Survival
  - Mortality
  - Lifetime Risks
  - Prevention

The Skin

- The skin is the body's largest organ. It protects against heat, sunlight, injury, and infection. It helps regulate body temperature, stores water and fat, and produces vitamin D.
- The skin has two main layers: the outer *epidermis* and the inner *dermis*.



The Skin

- The epidermis is mostly made up of flat, scale-like cells called *squamous cells*. Round cells called *basal cells* lie under the squamous cells in the epidermis. The lower part of the epidermis also contains melanocytes.
- Melanocytes produce melanin, the pigment that gives skin its natural color. When skin is exposed to the sun, melanocytes produce more pigment, causing the skin to tan, or darken.

Skin Cancer

- Cancer may develop in any of the cell types:
  - Squamous Cell Carcinoma (SCC)
  - Basal Cell Carcinoma (BCC)
  - Melanoma
- Skin cancer is the most common form of cancer in the United States.

Squamous and Basal Cell Carcinomas

- The American Cancer Society estimates that approximately 1.3 million new cases of basal cell and squamous cell carcinomas will be detected this year. This is roughly equivalent to the total of all other cancer sites.
- Death rates from basal cell and squamous cell carcinomas are low.
  - When detected early, approximately 95% of these carcinomas can be cured.
  - However, these cancers can cause considerable damage and disfigurement if they are untreated.
- Basal cell and squamous cell carcinomas are more than 10 times as common as melanoma but account for less morbidity and mortality.
  - SCC may account for 20% of all deaths from skin cancer.
- SCC and BCC are not reportable to CDRI unless regional or distant stage or on a mucous membrane.
  - There were 11 reportable SCC and BCC skin cases in 2002.
- We do not know how many total cases of SCC and BCC there are per year in Idaho, but estimate it to be over 5,000.

Melanoma

- Melanoma occurs when melanocytes (pigment cells) become malignant.
- Most melanocyte cells are in the skin; when melanoma starts in the skin, the disease is called *cutaneous melanoma*.
  - Melanoma may also occur in the eye (*ocular melanoma* or *intraocular melanoma*).
  - Rarely, melanoma may arise in the *meninges*, the *digestive tract*, *lymph nodes*, or other areas where melanocytes are found.

- Skin melanoma usually begins in a mole.
- It can occur on any skin surface.
  - In men, melanoma is often found on the trunk or the head and neck.
  - In women, it often develops on the lower legs.

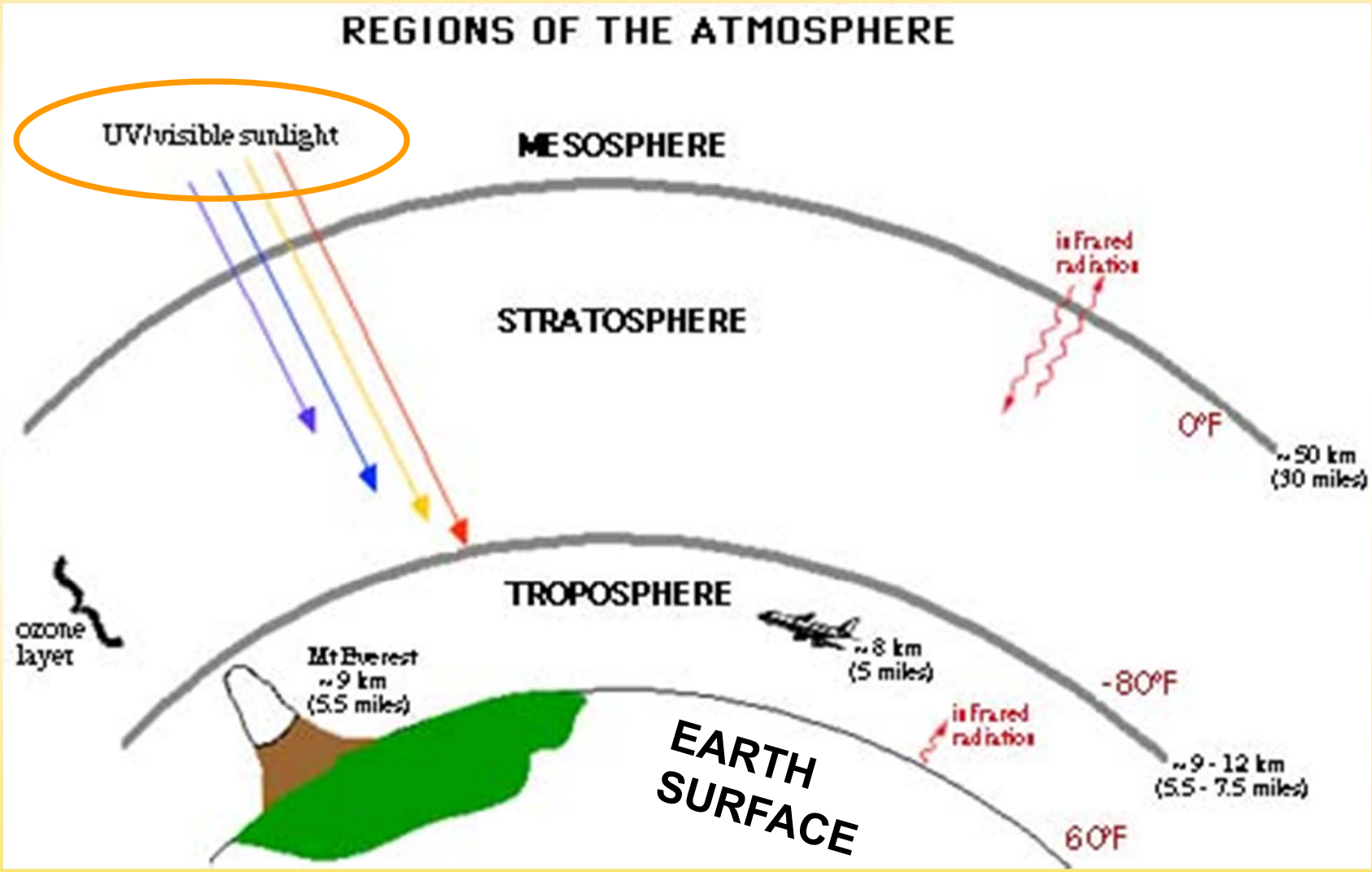
Melanoma of the Skin

- Melanoma is one of the most common cancers and the most serious type of cancer of the skin.
- The American Cancer Society estimates that about 54,200 new cases of malignant melanoma will be diagnosed this year, and 7,600 will die from the disease in the US.
- In some parts of the world, especially among Western countries, melanoma incidence is on the rise.
  - In the United States, melanoma incidence has more than doubled in the past 30 years.
- All in situ and invasive melanoma cases are reportable to CDRI.

Risk Factors

- Light skin color, hair color, or eye color.
- Family history of skin cancer.
- Personal history of skin cancer.
- Chronic exposure to the sun.
- History of sunburns early in life.
- Certain types of moles, or a large number of moles.
- Freckles, which indicate sun sensitivity and sun damage.

Ultraviolet Radiation

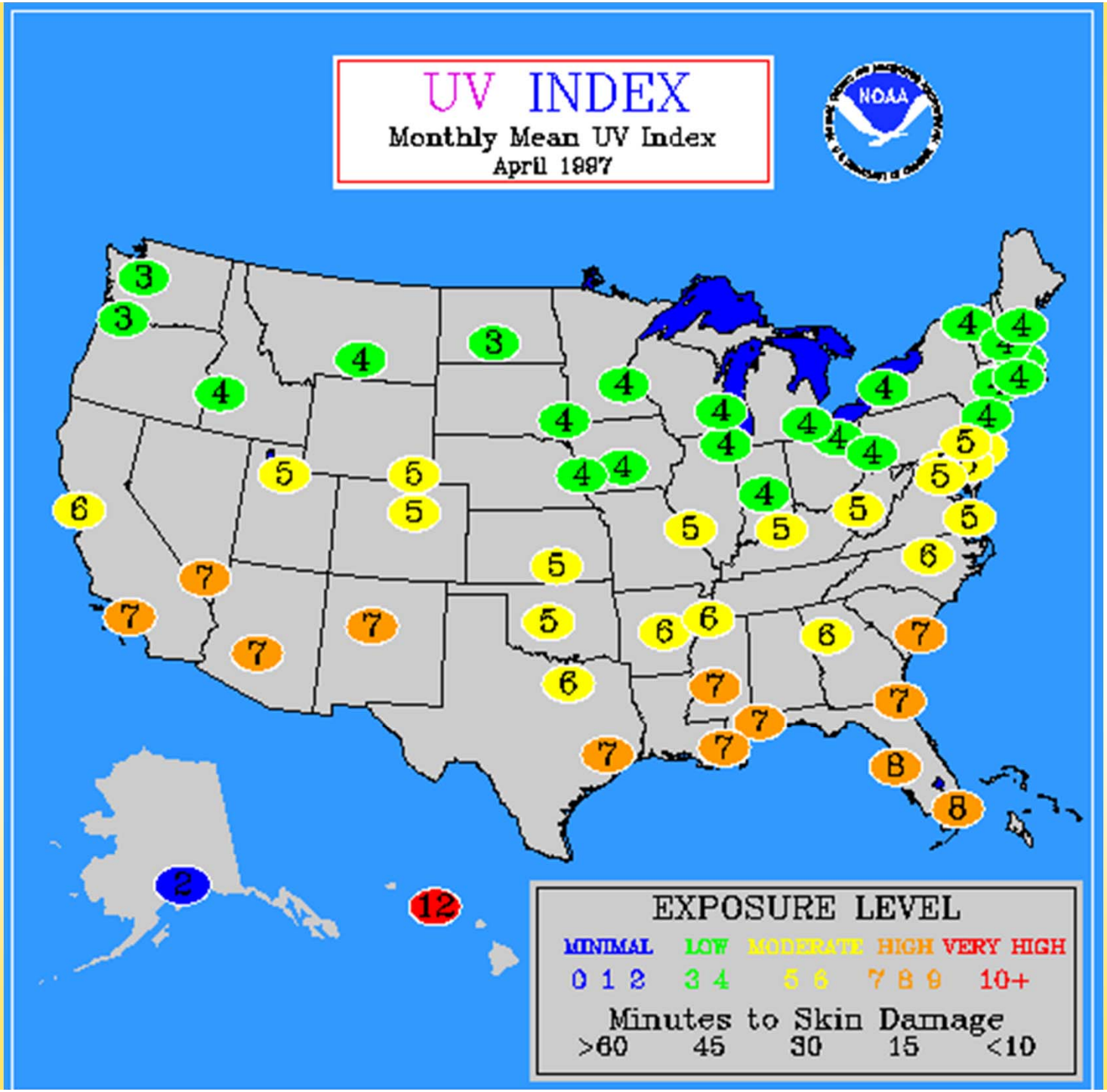


UV Radiation Wavelengths

- Ultraviolet radiation (or UV radiation)— Electromagnetic radiation with wavelengths between 100 and 400 nanometers. These rays are emitted from the sun and are not visible. They inflict increasingly more damage upon a recipient as the wavelength decreases. Based on its effects, UV radiation is subdivided into three wavelength ranges named UV-A, UV-B and UV-C:
  - UV-A covers the wavelength range 320-400 nm. UV-A is not absorbed by the ozone layer and is the least harmful UV radiation (tanning beds).
  - UV-B covers the wavelength range 280-320 nm. UV-B is more energetic than UV-A, and is partially absorbed by the ozone layer. **UV-B rays that are not filtered out cause sunburn and other harmful effects to humans.**
  - UV-C covers the wavelength range 100-280 nm. UV-C is the most dangerous form of UV radiation, but is completely absorbed by the ozone layer. Artificial UV-C (for example emitted by electric discharges) is a threat for certain occupational group, like welders.

UV Exposure

- More than 90% of skin cancers in the US are attributed to UV-B exposure.
  - Other causes of skin cancer include arsenic, other chemical exposures.
- Human exposure to UV-B depends upon an individual's
  - location (latitude and altitude)
  - the duration and timing of outdoor activities (time of day, season of the year = angle of the sun)
  - and precautionary behavior (use of sunscreen, sunglasses, or protective clothing).


UV INDEX
Monthly Mean UV Index
April 1987
NOAA
EXPOSURE LEVEL
MINIMAL LOW MODERATE HIGH VERY HIGH
0 1 2 3 4 5 6 7 8 9 10+
Minutes to Skin Damage
>60 45 30 15 <10

Ozone Layer Depletion

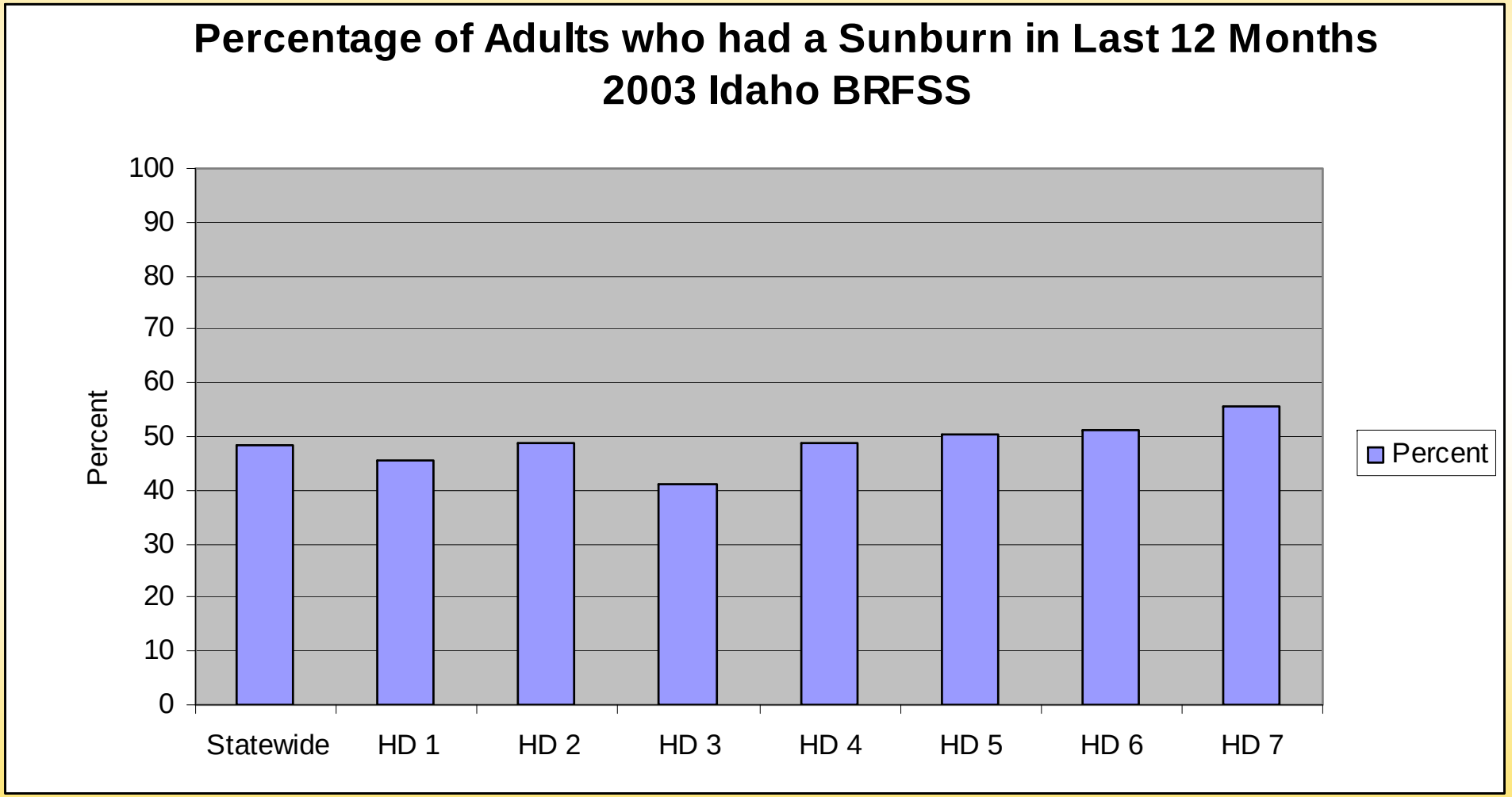
- Is ozone loss to blame for the melanoma upsurge in the US and Europe?
  - Unlikely:
    - UV-B has not yet increased much in the US and Europe
    - Melanoma takes 10-20 years to develop. There hasn't been enough time for ozone depletion to play a significant role.

- **Current and future increases in UV radiation exposure due to ozone depletion will exacerbate the trend toward higher incidence of melanoma.**

UV-B Exposure - Sunburn

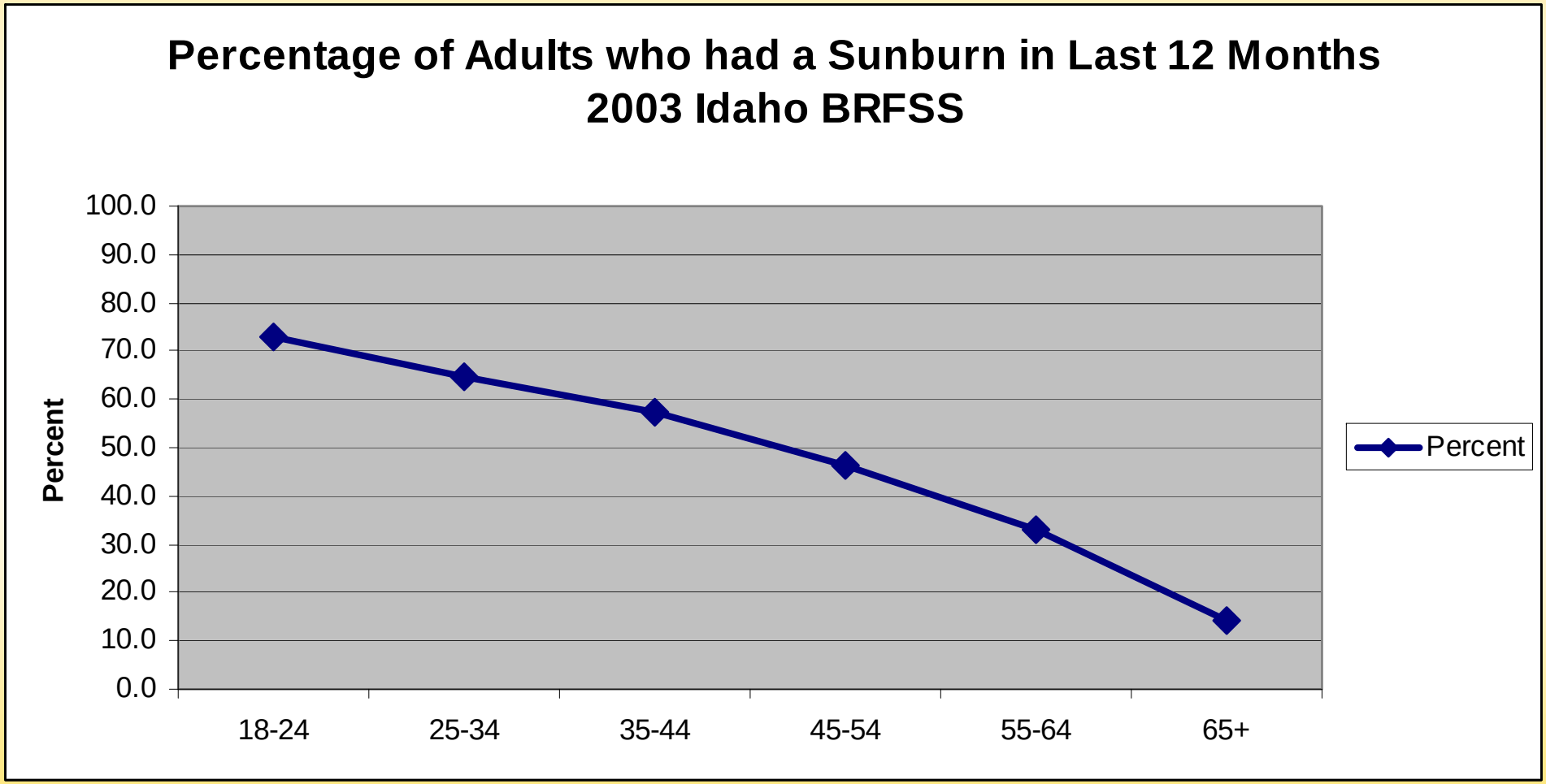
- 32% of U.S. adults report having had a sunburn in the past year
- Parents or caregivers reported that 72% of adolescents aged 11--18 years have had at least one sunburn, and 43% of white children aged <11 years experienced a sunburn in the past year.

Sunburn



(Preliminary Data)

Sunburn



(Preliminary Data)

Synopsis of Melanoma in Idaho

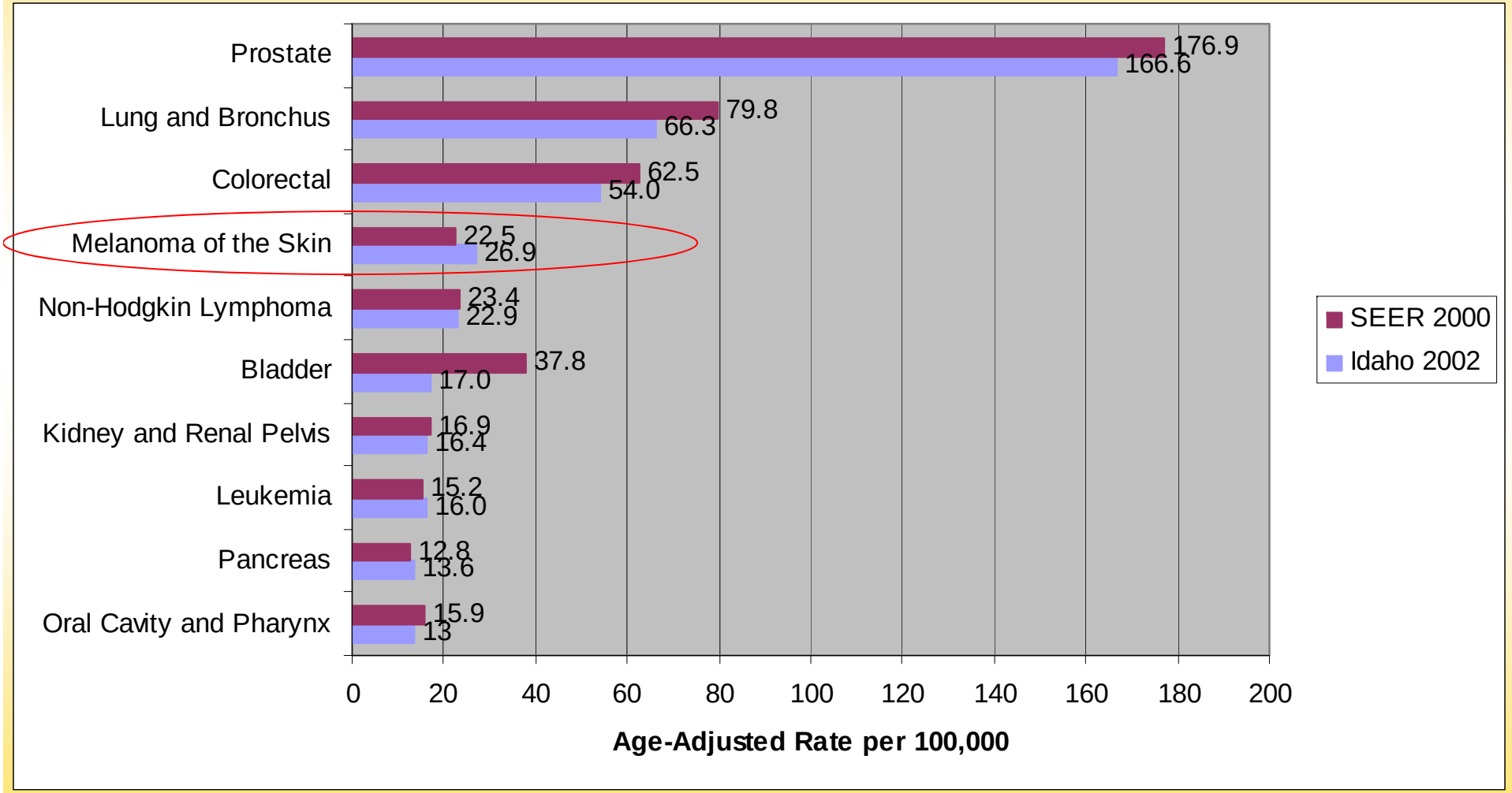
- In 2002, there were 263 invasive cases of melanoma and 41 melanoma deaths among Idaho residents.
- Melanoma is the 5th most common cancer in Idaho in terms of incidence and 15th most common cause of cancer death.

Melanoma Incidence 2002

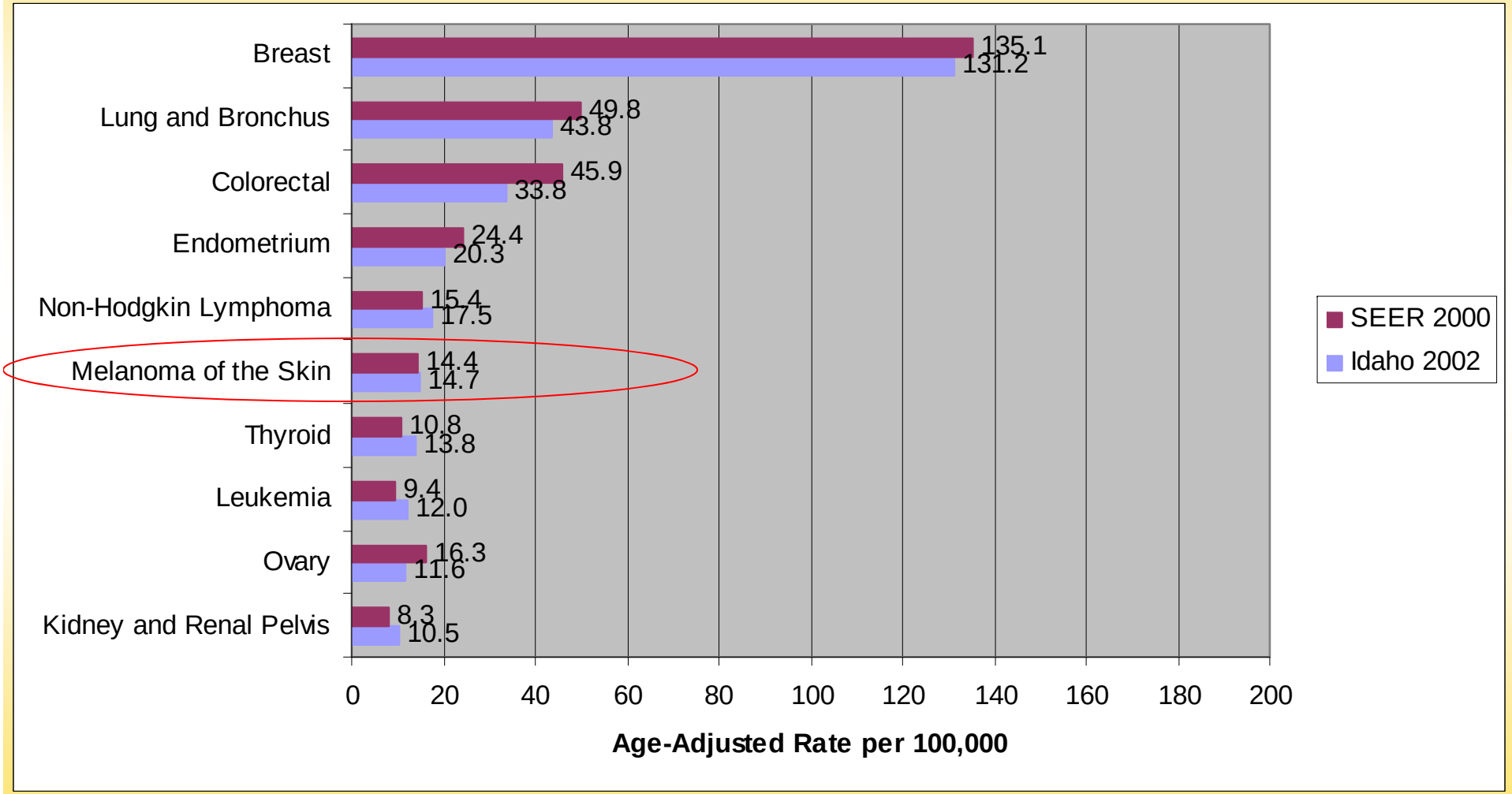
Geography	Rate	Count	Population
Health District 1	19.3	40	184,327
Health District 2	12.2	13	99,799
Health District 3	17.4	34	205,719
Health District 4	21.5	68	363,761
Health District 5	14.7	24	165,289
Health District 6	19.0	27	158,040
Health District 7	26.3	38	164,196
State of Idaho	20.5	263	1,341,131
SEER Whites 2000	20.9	4,366	20,536,218
SEER All Races 2000	17.7	4,591	26,723,142

Rates are per 100,000 and age-adjusted to the 2000 U.S. (18 age groups) standard.

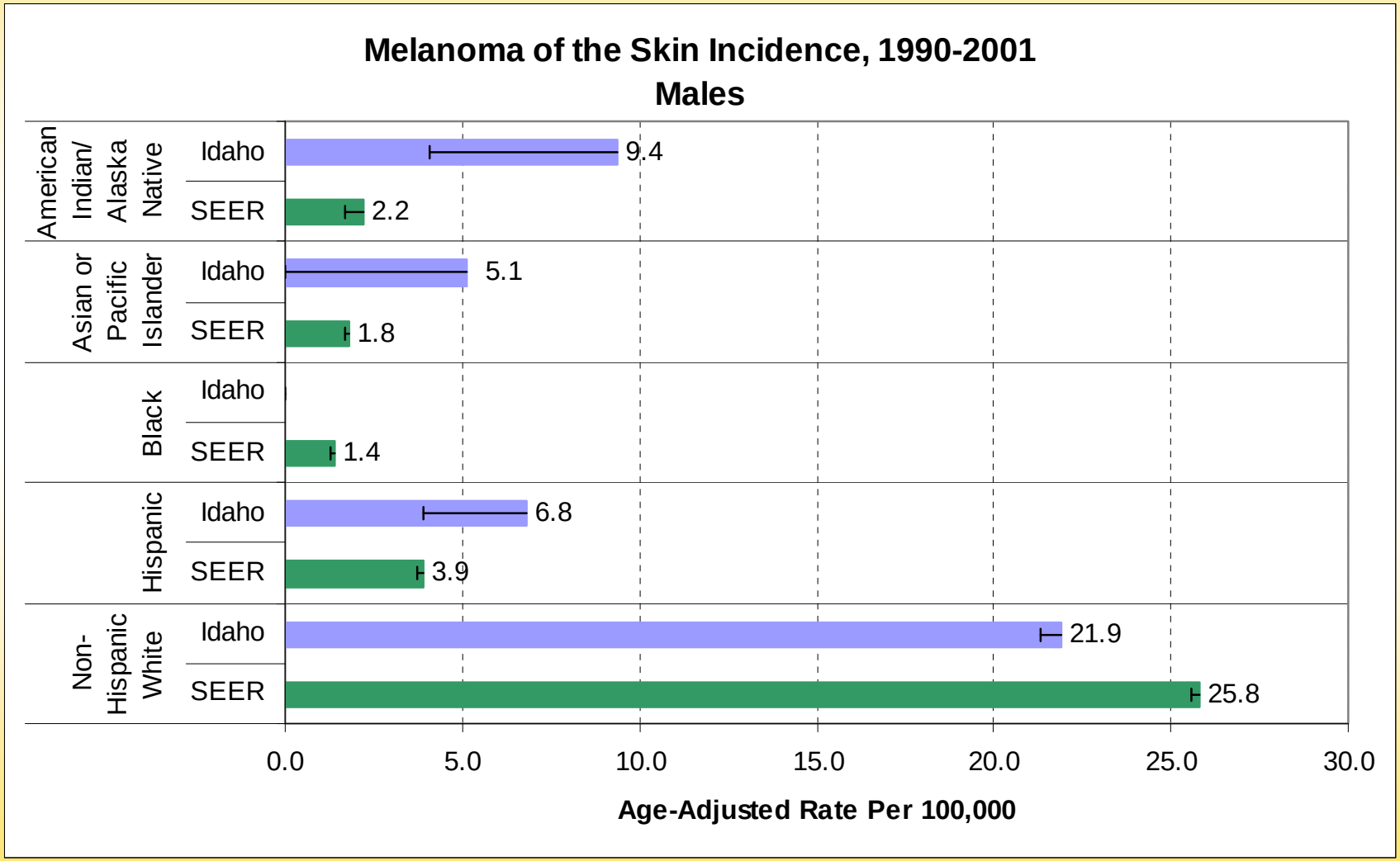
Top 10 Cancer Incidence - Males



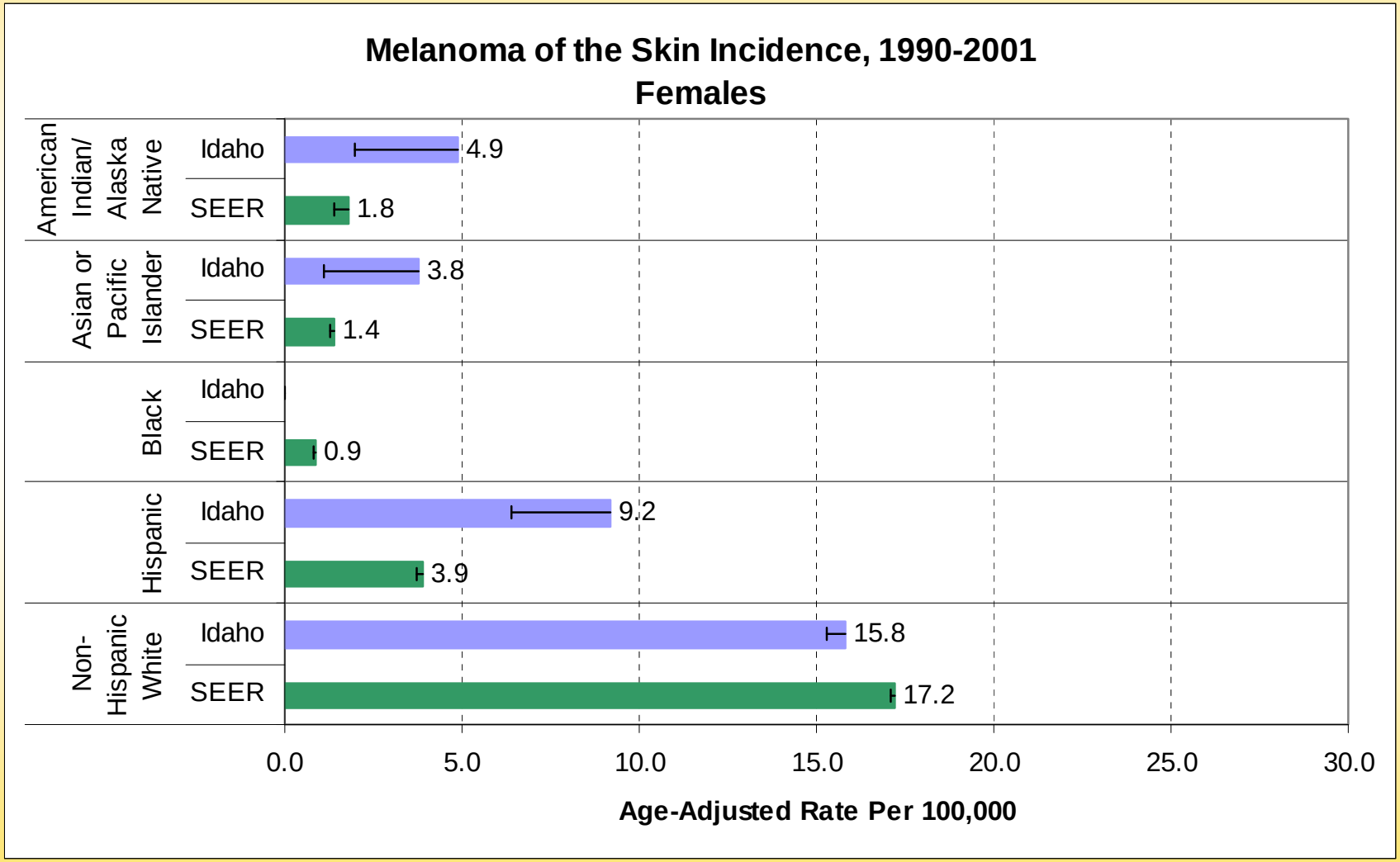
Top 10 Cancer Incidence -Females



Incidence


Melanoma of the Skin Incidence, 1990-2001
Males
American Indian/ Alaska Native
Idaho
SEER
9.4
2.2
Asian or Pacific Islander
Idaho
SEER
5.1
1.8
Black
Idaho
SEER
1.4
Hispanic
Idaho
SEER
6.8
3.9
Non-Hispanic White
Idaho
SEER
21.9
25.8
0.0
5.0
10.0
15.0
20.0
25.0
30.0
Age-Adjusted Rate Per 100,000

Incidence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Females
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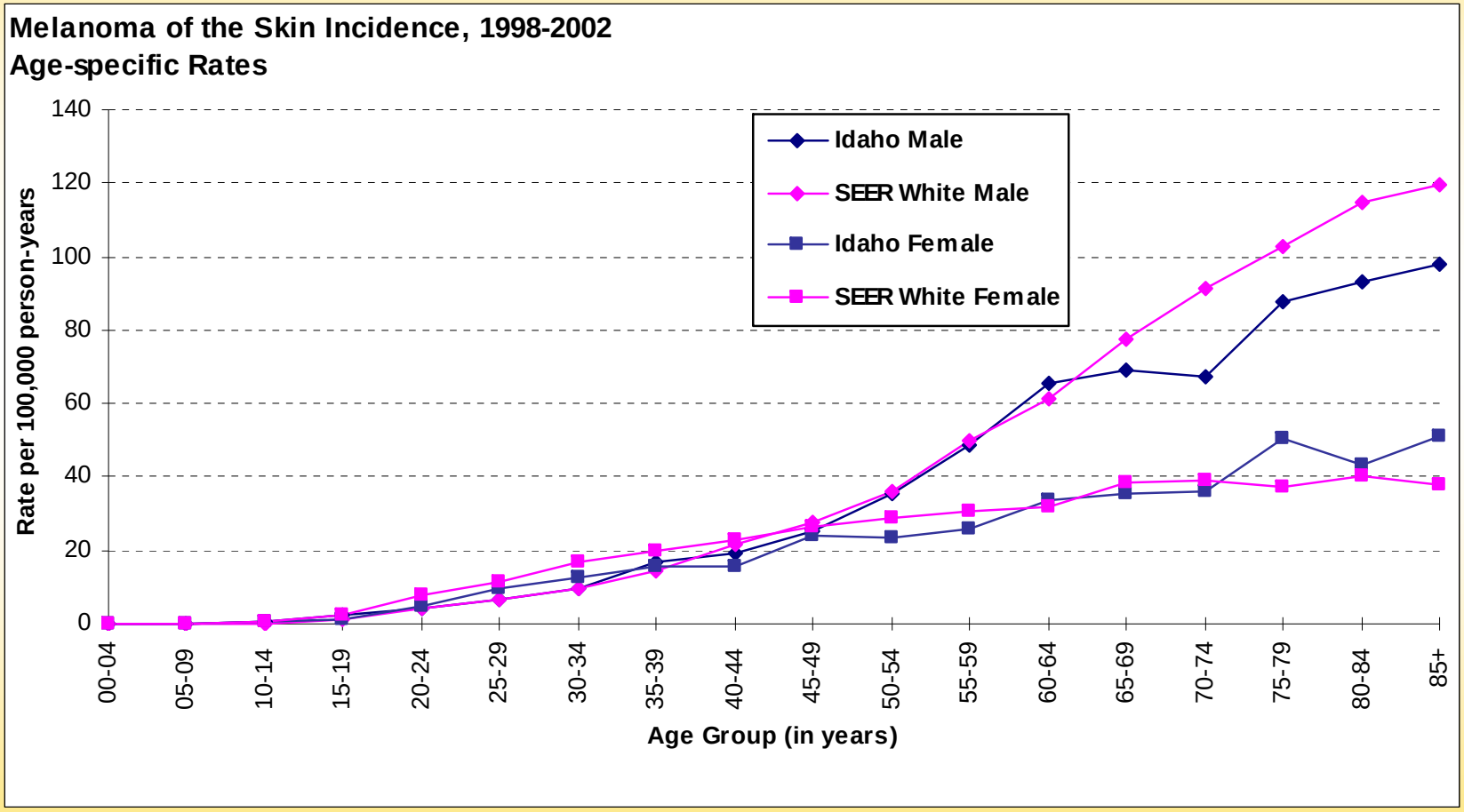
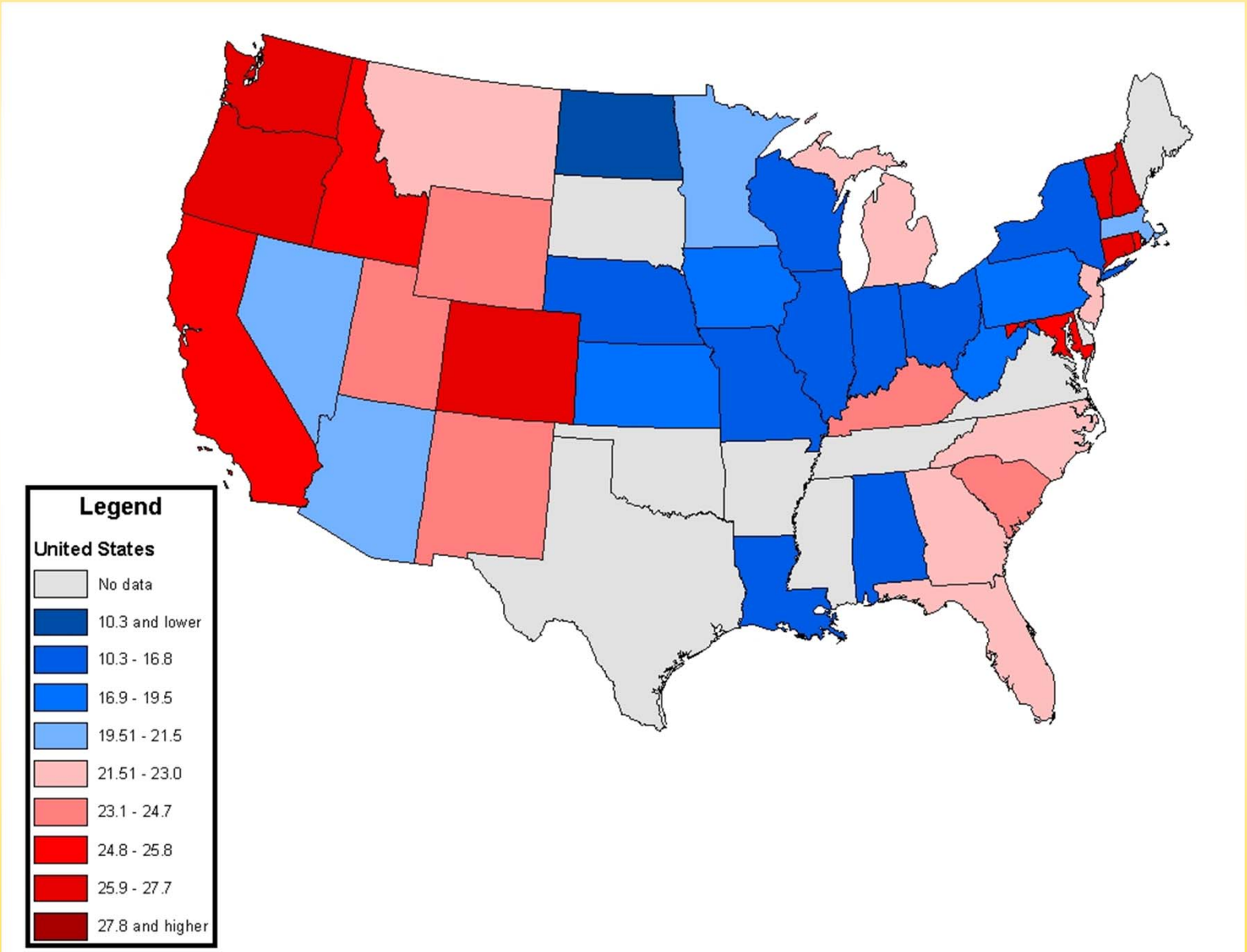
SEER
0.9
Hispanic
Idaho
SEER
9.2
3.9
Non-Hispanic White
Idaho
SEER
15.8
17.2
0.0
5.0
10.0
15.0
20.0
25.0
30.0
Age-Adjusted Rate Per 100,000

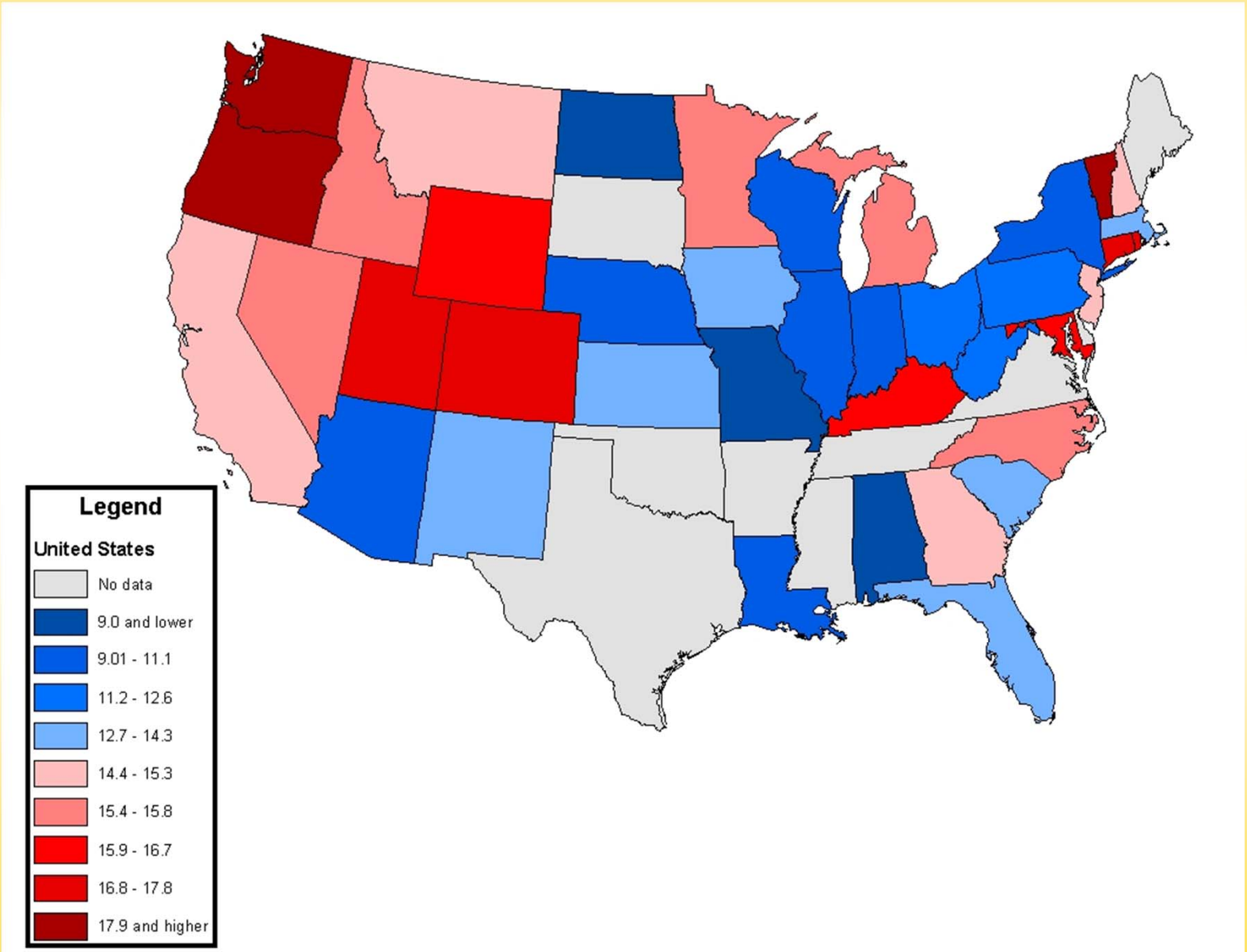
Incidence by Age



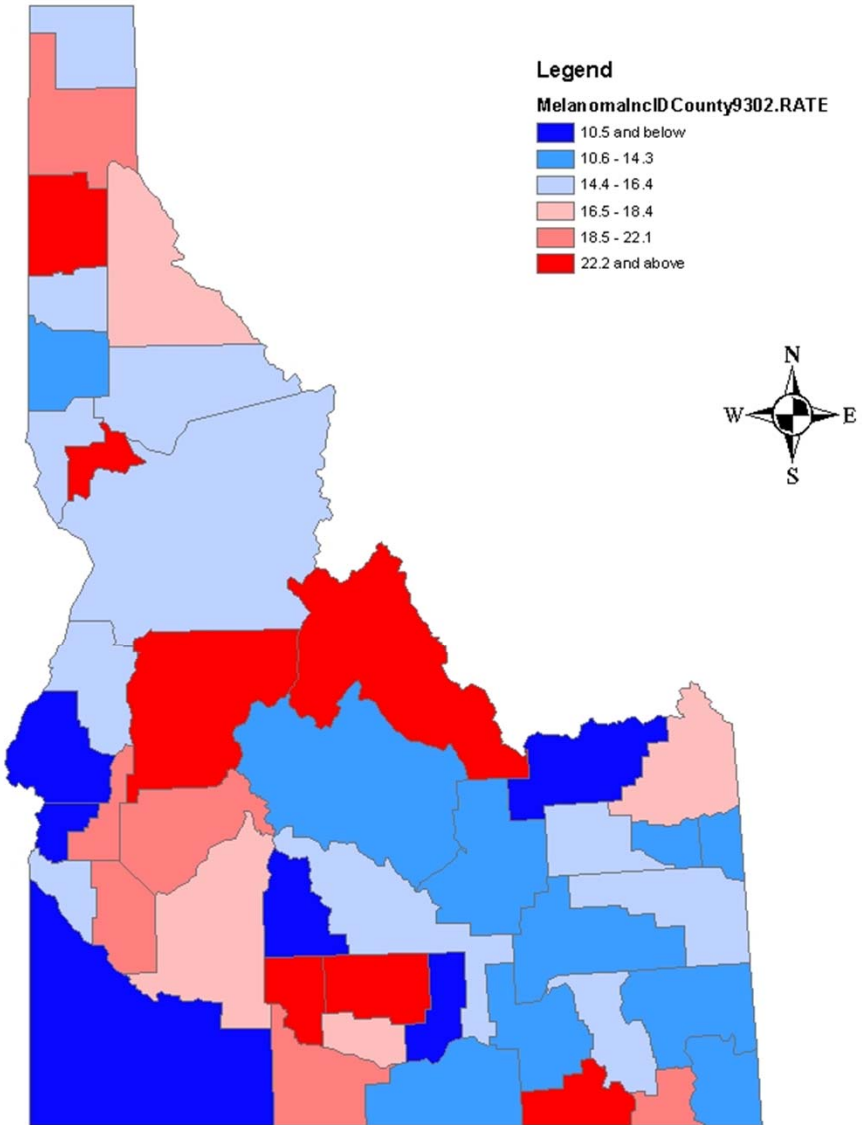
Incidence 2000 White Males



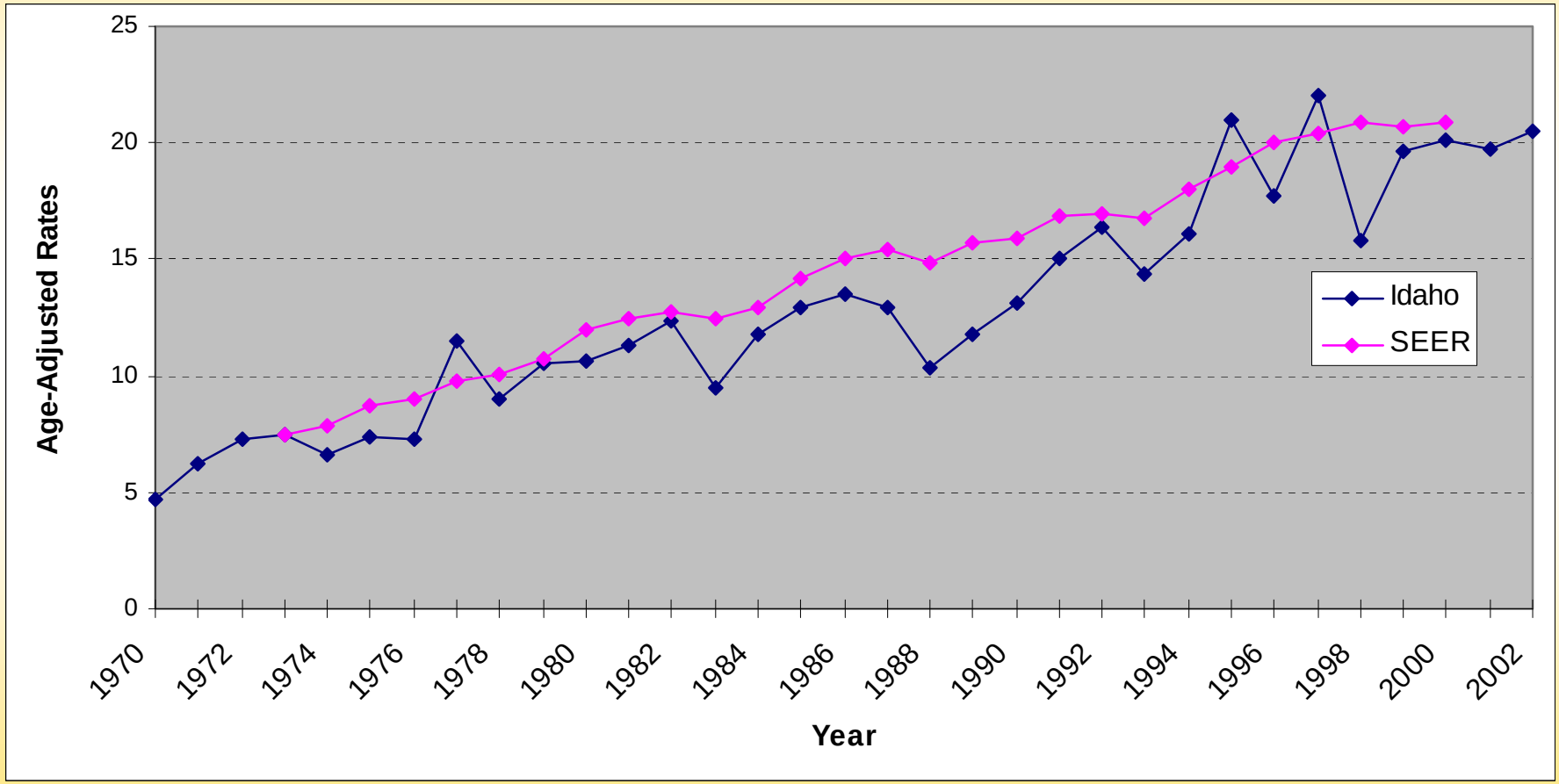
Incidence 2000 White Females



Idaho Melanoma Incidence
1993 - 2002



Incidence Trends



Trends

- Some experts say the rise in incidence reflects a true increase in the disease, while others contend it is an artifact of more intensive recent surveillance. Some experts suggest that the rise in melanoma incidence may in part reflect longer life expectancy as well as efforts to detect melanoma earlier.

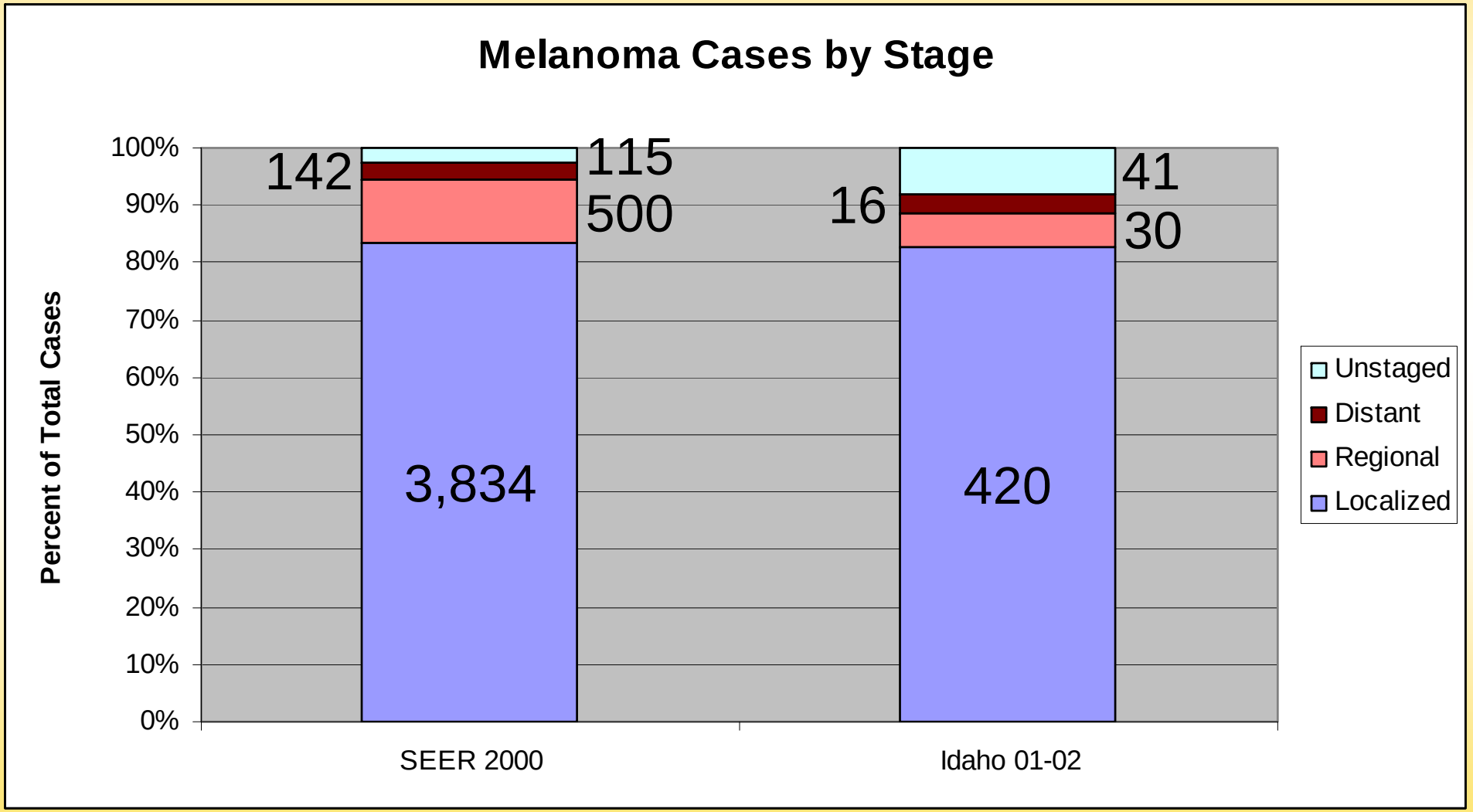
- The incidence of thin invasive lesions is increasing faster than that of thick ones, which reflects earlier detection by physicians and greater public awareness of warning signs of skin cancer.

- The incidence and mortality rates of melanoma have increased during the past several decades in the United States. Among the reasons for these trends, increased exposure to UV radiation as a result of lifestyle changes is generally recognized as an important factor.

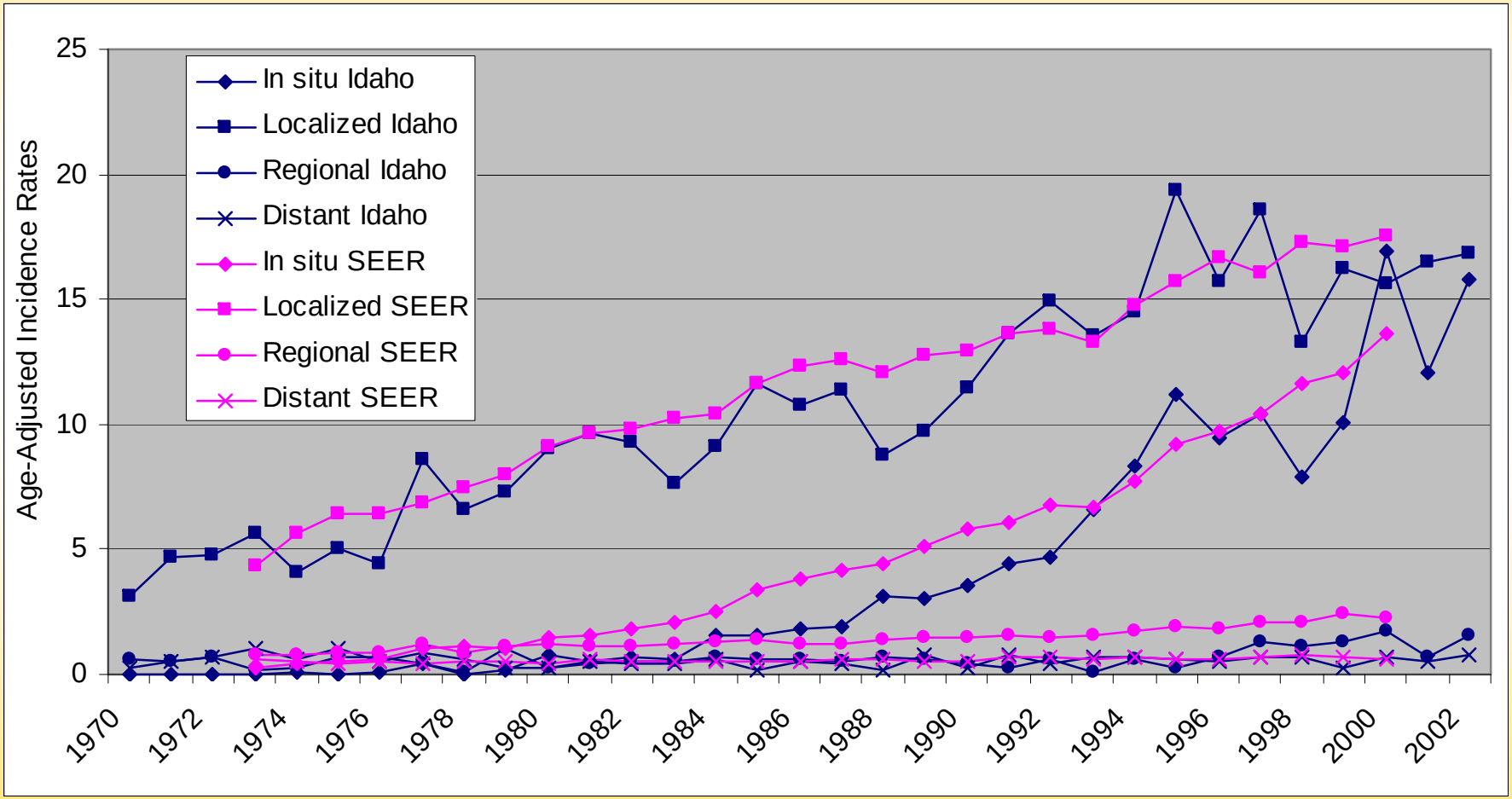
SEER Summary Staging 2000

- Cancer staging is the process of describing the extent of the disease or the spread of the cancer from the site of origin.
  - In situ – noninvasive; basement membrane of epidermis is intact (Clark's level I)
  - Localized – papillary/reticular dermis invaded (Clark's level II-IV)
  - Regional – subcutaneous tissue invaded (Clark's level V), satellite nodules <= 2 cm from primary tumor, regional lymph nodes involved
  - Distant – extension to underlying cartilage, bone, skeletal muscle, metastasis to skin or subcutaneous tissue beyond regional lymph nodes or visceral metastasis

Incident Cases by Stage



Melanoma Trends by SEER Summary Stage

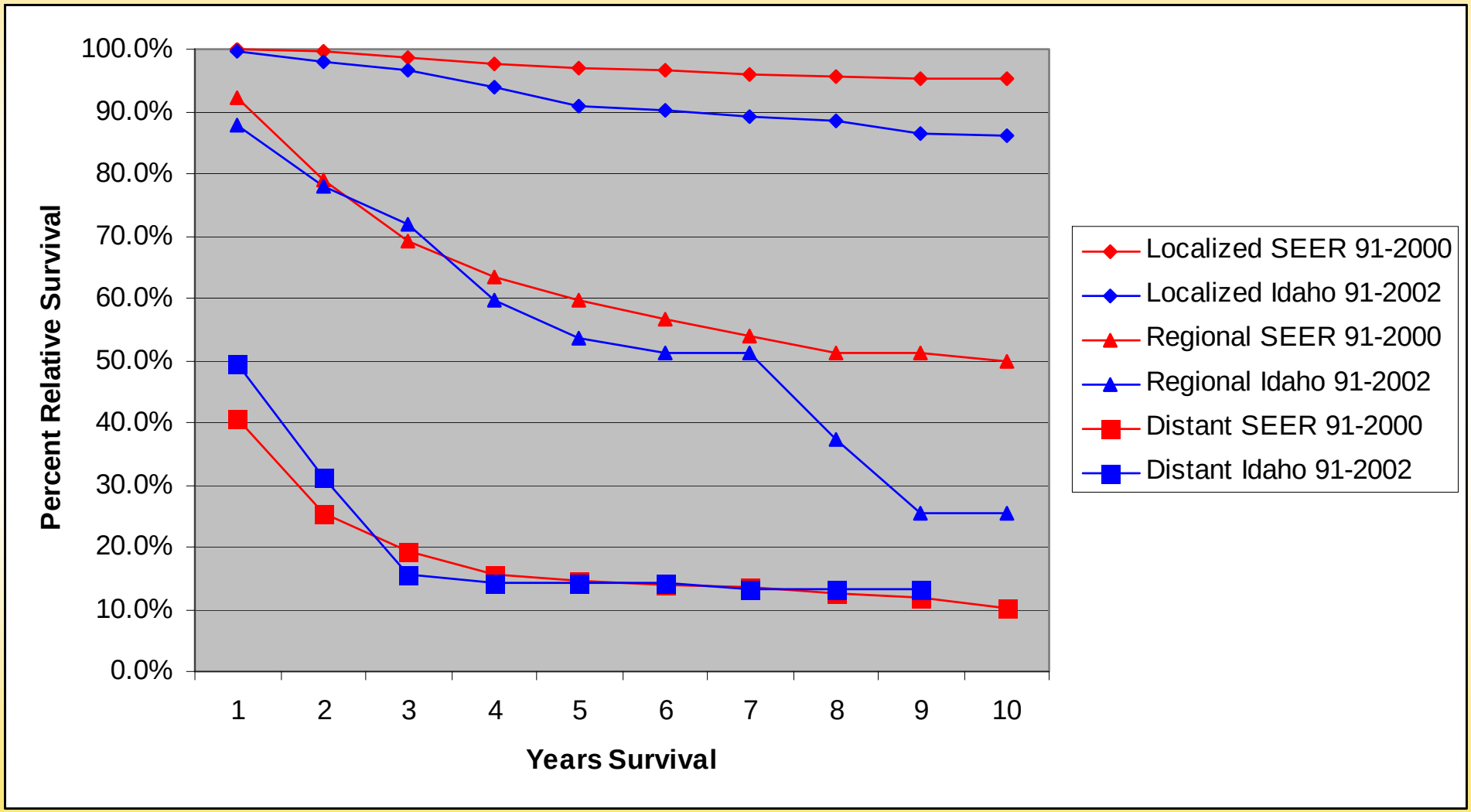


Cancer Survival

5-Year Relative Cancer Survival, 1991-2000 Idaho Cases

Site	% Survival	Site	% Survival
Thyroid	96%	Colon	60%
Prostate	94%	Kidney and Renal Pelvis	60%
Testis	91%	Non Hodgkins Lymphoma	57%
Breast	86%	Leukemia	46%
Melanoma of the Skin	85%	Ovary	42%
Endometrium	84%	Brain	29%
Hodgkins Lymphoma	79%	Multiple Myeloma	28%
Oral Cavity and Pharynx	68%	Stomach	20%
Larynx	65%	Lung and Bronchus	12%
Cervix	65%	Esophagus	10%
Rectum & Rectosigmoid	63%	Liver	8%
Bladder	62%	Pancreas	4%

Melanoma Survival by Stage



Melanoma Mortality 2002

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US Whites 2000	3.0	7,245	230,019,590
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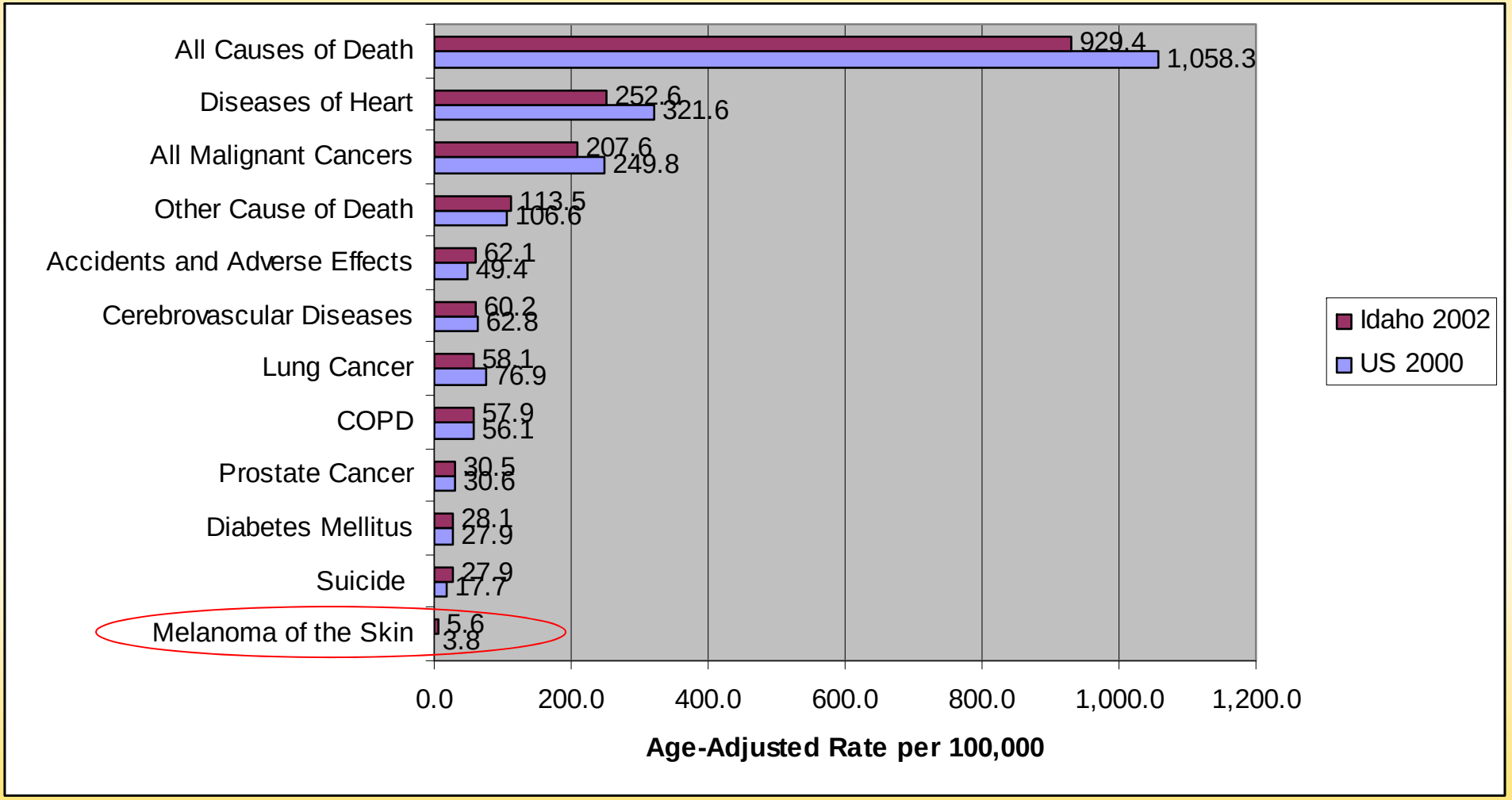
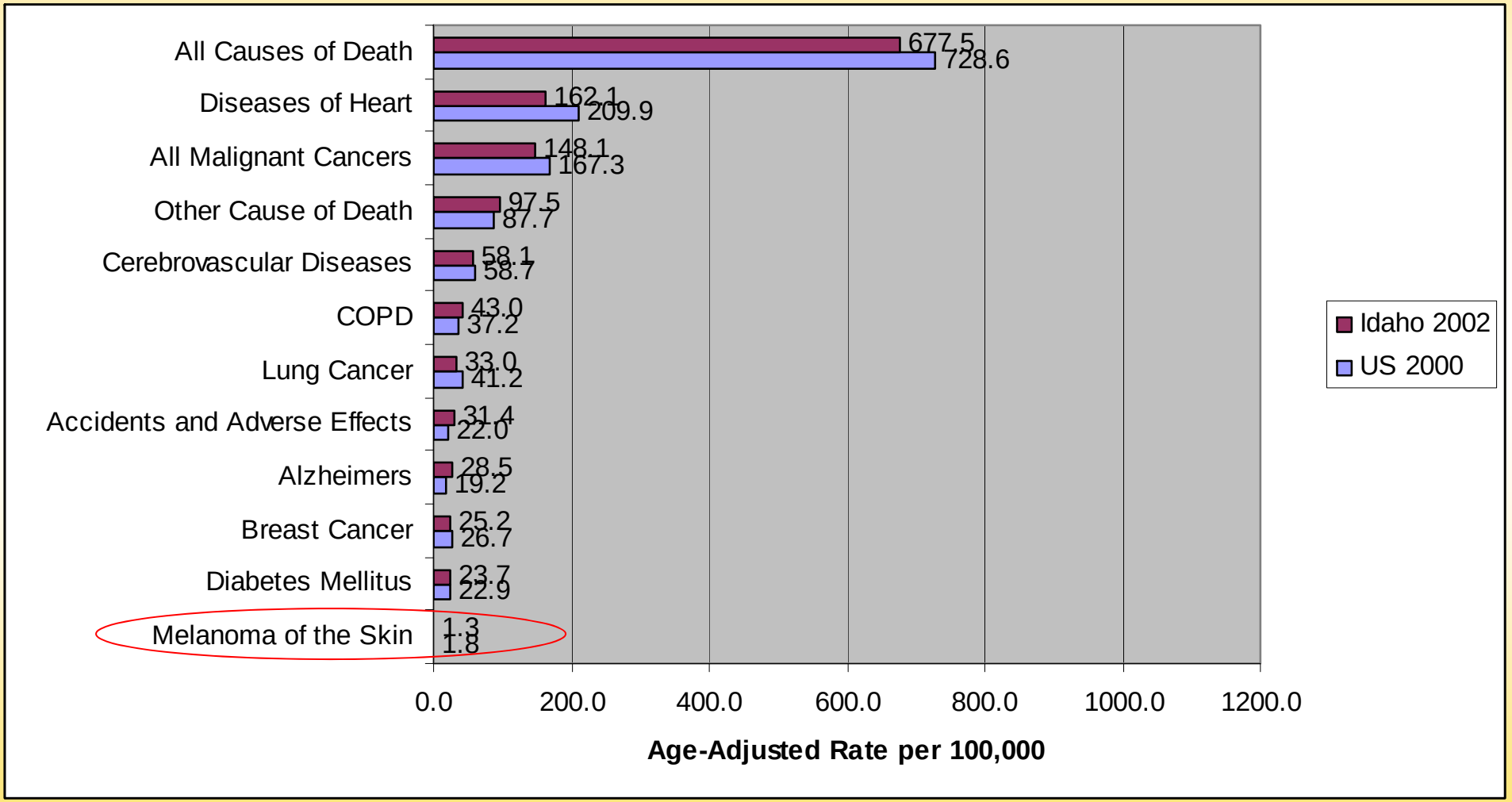
Rates are per 100,000 and age-adjusted to the 2000 U.S. (18 age groups) standard.

Leading Causes of Mortality and Melanoma - Males



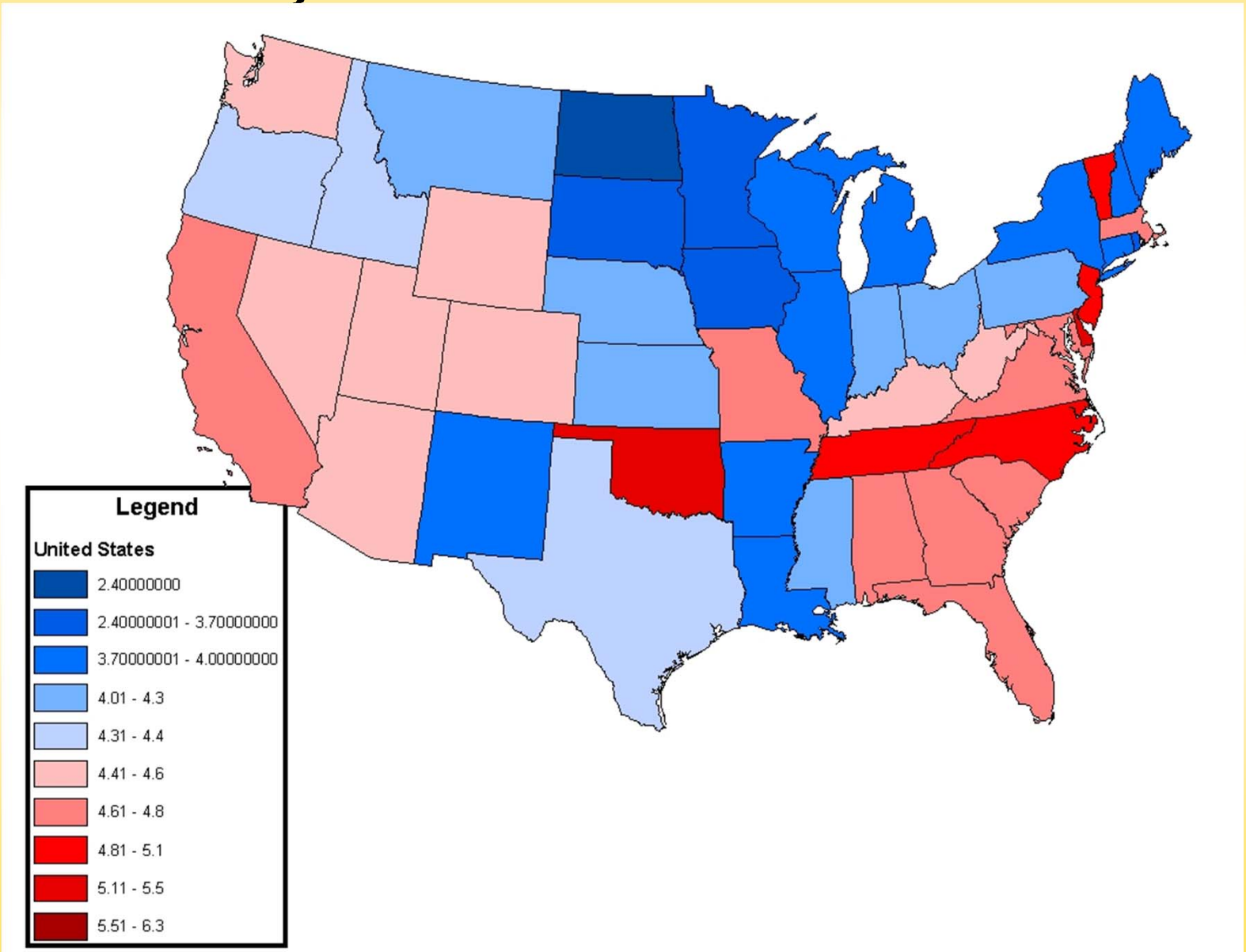
Leading Causes of Mortality and Melanoma - Females



Patterns in Melanoma Mortality

- Melanoma mortality in the US reflects the relationship between UV radiation levels in each geographic region, the sun-protection behaviors of each generation of males and females in each age group, the geographic mobility of the population, and risk awareness and early detection.

Mortality 1996-2000 White Males



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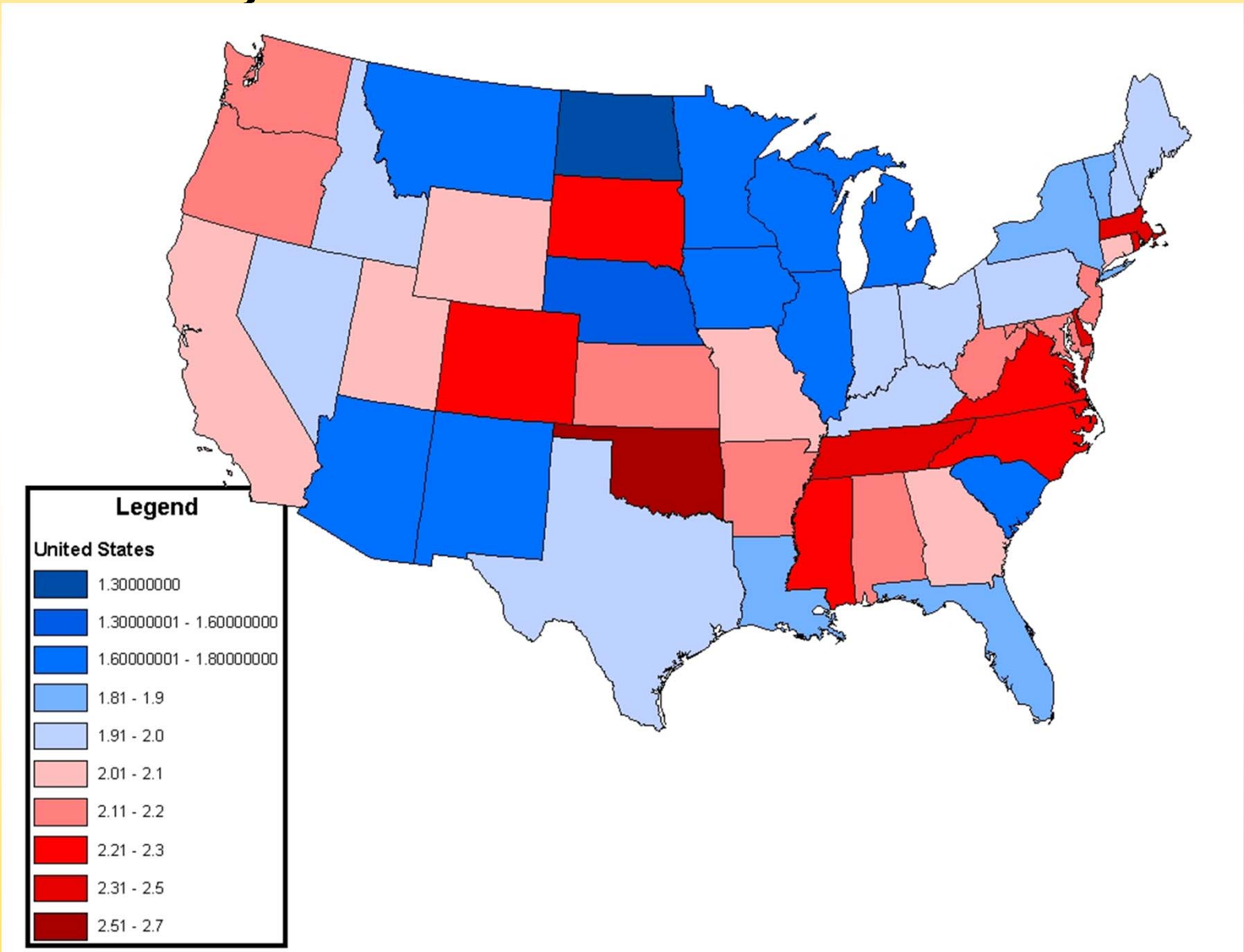
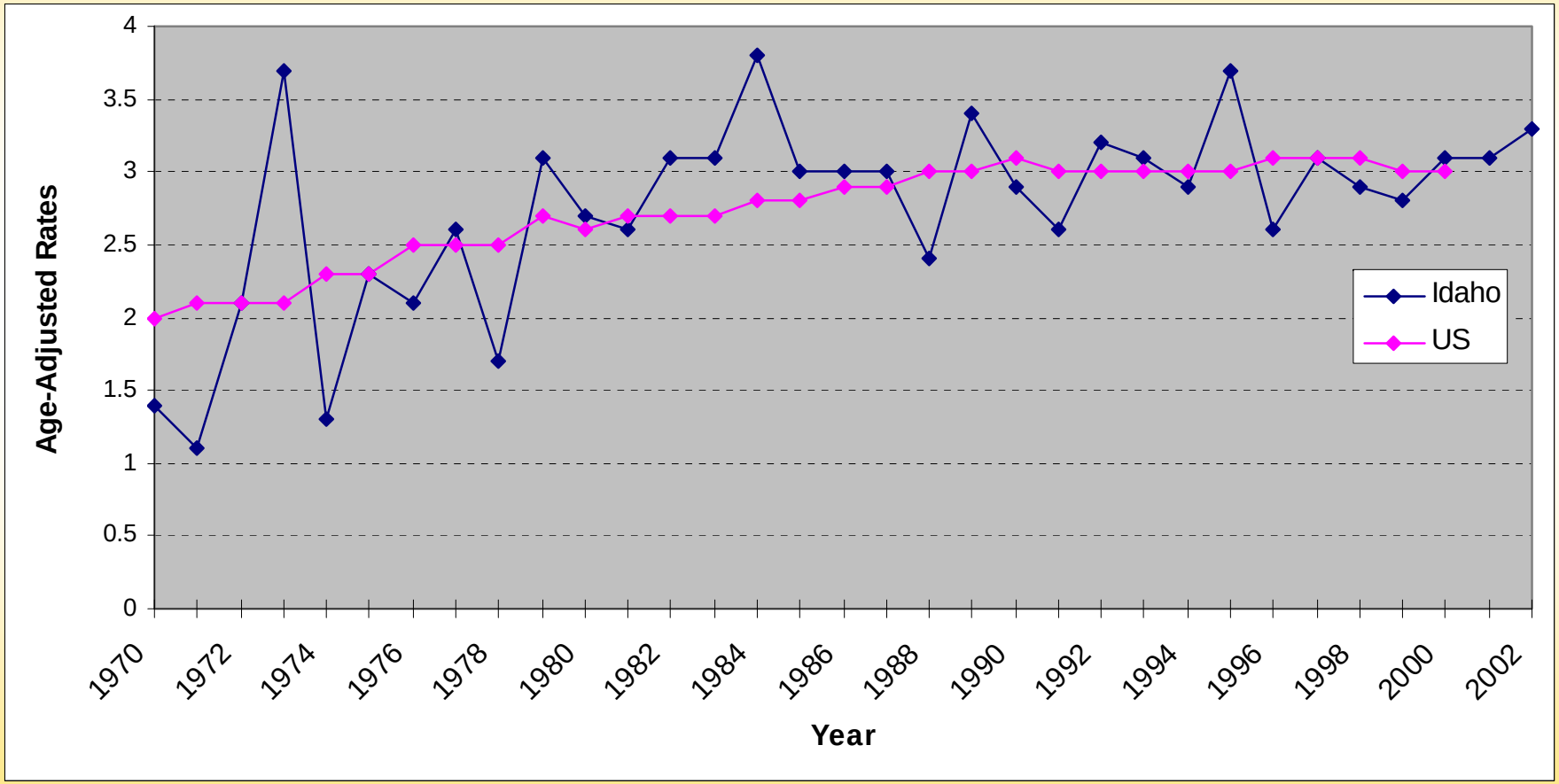


Mortality Trends



Risks of Developing and Dying from Melanoma

Melanoma in Males

If your current age is:	Then your risk of developing melanoma by a particular age is:					
	By age 40	By age 50	By age 60	By age 70	By age 80	Ever
30	1 in 758	1 in 287	1 in 135	1 in 77	1 in 56	1 in 46
40		1 in 456	1 in 162	1 in 84	1 in 60	1 in 49
50			1 in 244	1 in 100	1 in 66	1 in 53
60				1 in 159	1 in 85	1 in 63
70					1 in 155	1 in 87
80						1 in 130*

If your current age is:	Then your risk of dying from melanoma by a particular age is:					
	By age 40	By age 50	By age 60	By age 70	By age 80	Ever
30	1 in 5272	1 in 1674	1 in 894	1 in 440	1 in 285	1 in 217
40		1 in 2418	1 in 1062	1 in 474	1 in 297	1 in 223
50			1 in 1840	1 in 573	1 in 329	1 in 239
60				1 in 780	1 in 376	1 in 258
70					1 in 616	1 in 326
80						1 in 451*

Note: * Risks are not precise - best estimates are shown.

Risks of Developing and Dying from Melanoma

Melanoma in Females

If your current age is:	Then your risk of developing melanoma by a particular age is:					
	By age 40	By age 50	By age 60	By age 70	By age 80	Ever
30	1 in 716	1 in 296	1 in 174	1 in 113	1 in 84	1 in 68
40		1 in 501	1 in 227	1 in 133	1 in 94	1 in 74
50			1 in 408	1 in 178	1 in 113	1 in 85
60				1 in 303	1 in 150	1 in 103
70					1 in 263	1 in 138
80						1 in 219*

If your current age is:	Then your risk of dying from melanoma by a particular age is:					
	By age 40	By age 50	By age 60	By age 70	By age 80	Ever
30	1 in 23414	1 in 7968	1 in 2551	1 in 1517	1 in 740	1 in 497
40		1 in 11980	1 in 2840	1 in 1609	1 in 758	1 in 504
50			1 in 3657	1 in 1826	1 in 795	1 in 516
60				1 in 3498	1 in 975	1 in 577
70					1 in 1206	1 in 616
80						1 in 948*

Note: * Risks are not precise - best estimates are shown.

Prevention of Melanoma

- Primary Prevention
  - Avoiding the disease in the first place
- Secondary Prevention
  - Screening
  - Early diagnosis and treatment

HP 2010 Objectives

- Objective 3-9: Increase to 75% the proportion of persons who use at least one of the following protective measures that may reduce the risk of skin cancer:
  - avoid the sun between 10 a.m. and 4 p.m.
  - wear sun-protective clothing when exposed to sunlight
  - use sunscreen with a sun-protection factor (SPF) of 15 or higher
  - and avoid artificial sources of ultraviolet light
- Objective 3-8: Reduce melanoma deaths to 2.5 per 100,000 population

Primary Prevention

- Skin cancer is largely preventable when sun protection measures against UV rays are used consistently.
- Preventing sunburn, especially in childhood, may reduce the lifetime risk for melanoma.

Recommendations:

- Avoid exposure to the midday sun (from 10 a.m. to 4 p.m.) whenever possible. When your shadow is shorter than you are, remember to protect yourself from the sun.
- If you must be outside, wear long sleeves, long pants, and a hat with a wide brim.
- Protect yourself from UV radiation that can penetrate light clothing, windshields, and windows.
- Protect yourself from UV radiation reflected by sand, water, snow, and ice.

Primary Prevention

- Only one third of adults reported that they use sunscreen, seek shade, or wear protective clothing when out in the sun.
- Adolescents aged 11--18 years were found to routinely practice sun-protective behaviors slightly less than adults (using sunscreen (31%), seeking shade (22%), and wearing long pants (21%).
- Among children aged <11 years, sunscreen use (62%) and shade seeking (26.5%) were the most frequently reported sun-protective behaviors.
- Young people have moderate to high awareness of skin cancer but are unaware of the connection between severe sunburns and skin cancer; sunburns, although considered painful and embarrassing, are not perceived as a health threat.

Findings of the Task Force on Community Preventive Services on Reducing Exposure to Ultraviolet Light

- The Task Force recommends two interventions:
  - educational and policy approaches in primary schools --- changing children's covering-up behavior (wearing protective clothing); and
  - educational and policy approaches in recreational or tourism settings --- changing adults' covering-up behaviors.
- The recommended interventions had small to moderate behavior change scores in studies:
  - In primary schools, the median net relative increase was 25% (interquartile range: 1%--40%, six studies).
  - In recreational settings, the median net relative increase was 11.2% (interquartile range: 5.1%--12.9%, five studies).

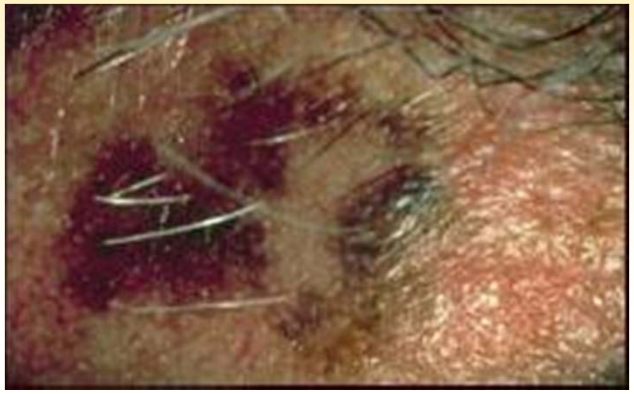
Sunscreen

- Sunscreen's role in preventing skin cancer has been demonstrated to be complex.
- Using sunscreen has been shown to prevent squamous cell skin cancer. Sunscreens that block both ultraviolet A (UV-A) and ultraviolet B (UV-B) light may be more effective in preventing squamous cell cancer and its precursors than those that block only UV-B light.
- The evidence for the effect of sunscreen use in preventing melanoma, however, is mixed.
  - The conflicting results may reflect the fact that sunscreen use is more common among fair-skinned people, who are at higher risk for melanoma;
  - or, this finding may reflect the fact that sunscreen use could be harmful if it encourages longer stays in the sun without protecting completely against cancer-causing radiation.

Secondary Prevention

- Self Skin Examinations
- Medical Skin Examinations

Signs and Symptoms: ABCD



Asymmetry

Border

Color

Diameter

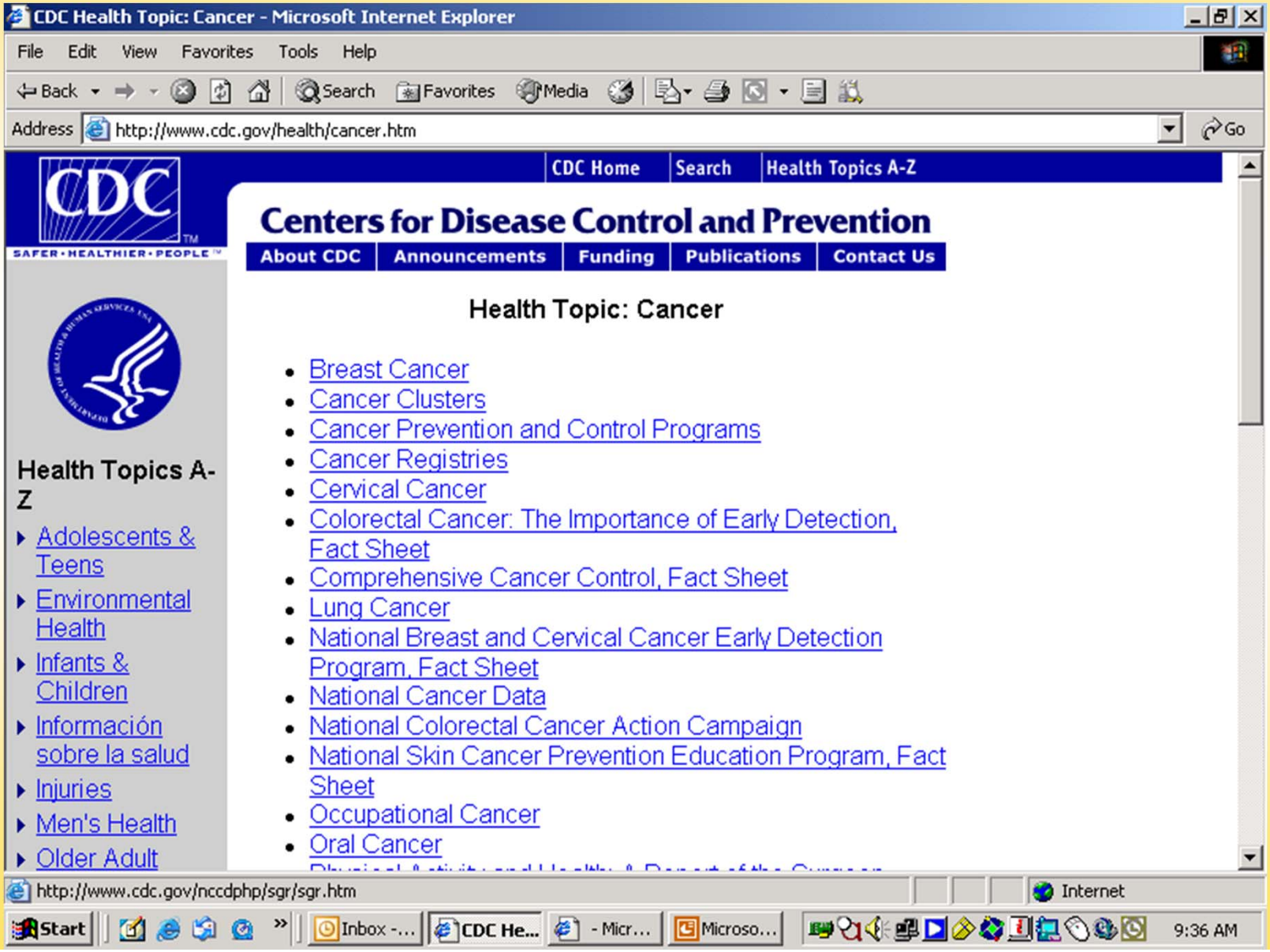
Cost-Effectiveness of Screening for Malignant Melanoma

- Journal of the American Academy of Dermatology. 41(5, Part 1):738-745, November 1999.
- The cost-effectiveness ratio for a screening program of adults older than age 20 who were at high risk for skin cancer was about $30,000 per year of life saved.
- This is reasonably cost-effective compared with other accepted cancer screening strategies.

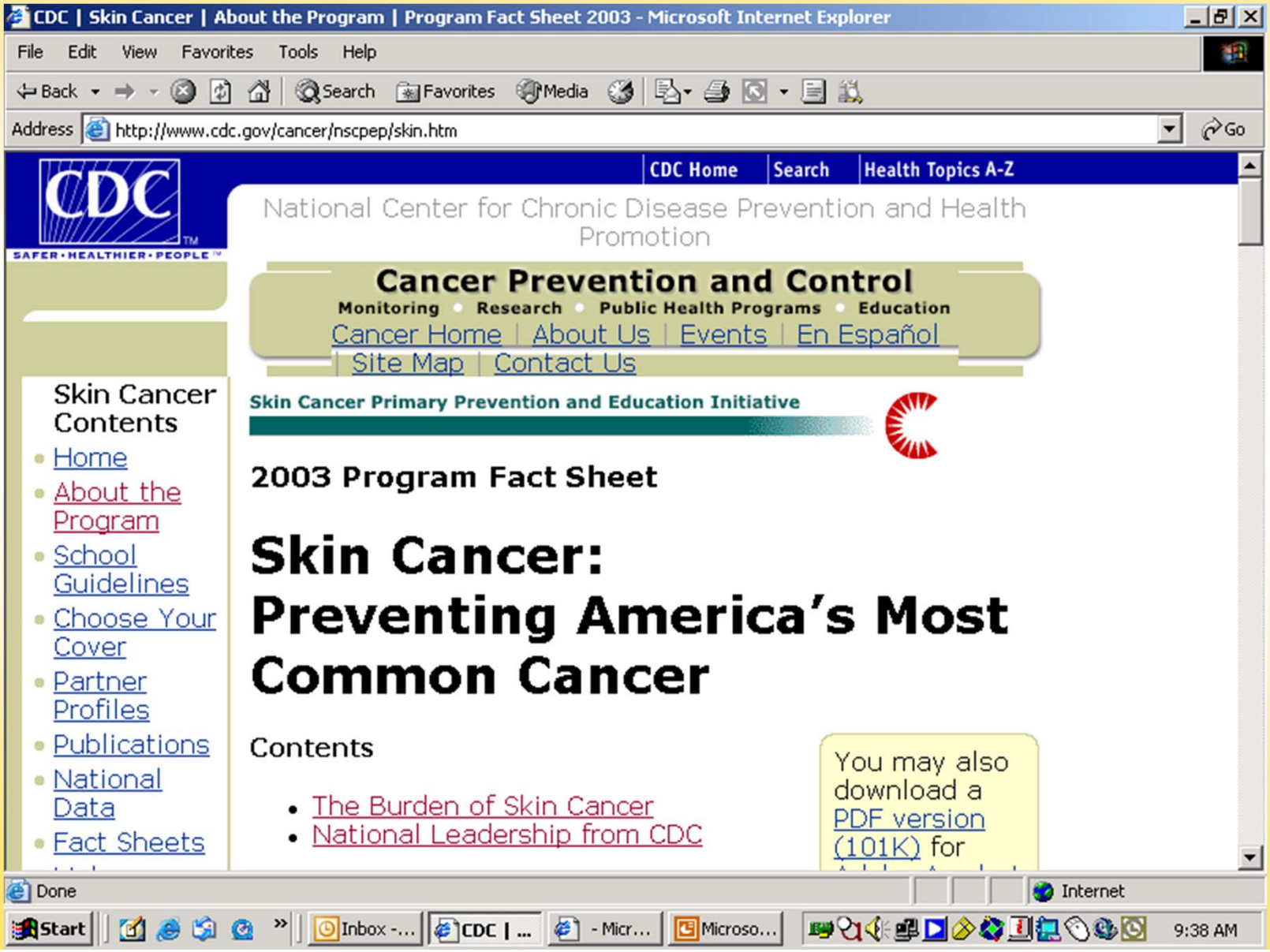
National Melanoma/Skin Cancer Detection and Prevention Month

- May is National Melanoma/Skin Cancer Detection and Prevention Month. This month is dedicated to increasing public awareness of the importance of skin cancer prevention, early detection, and treatment, including basal cell, squamous cell, and melanoma.

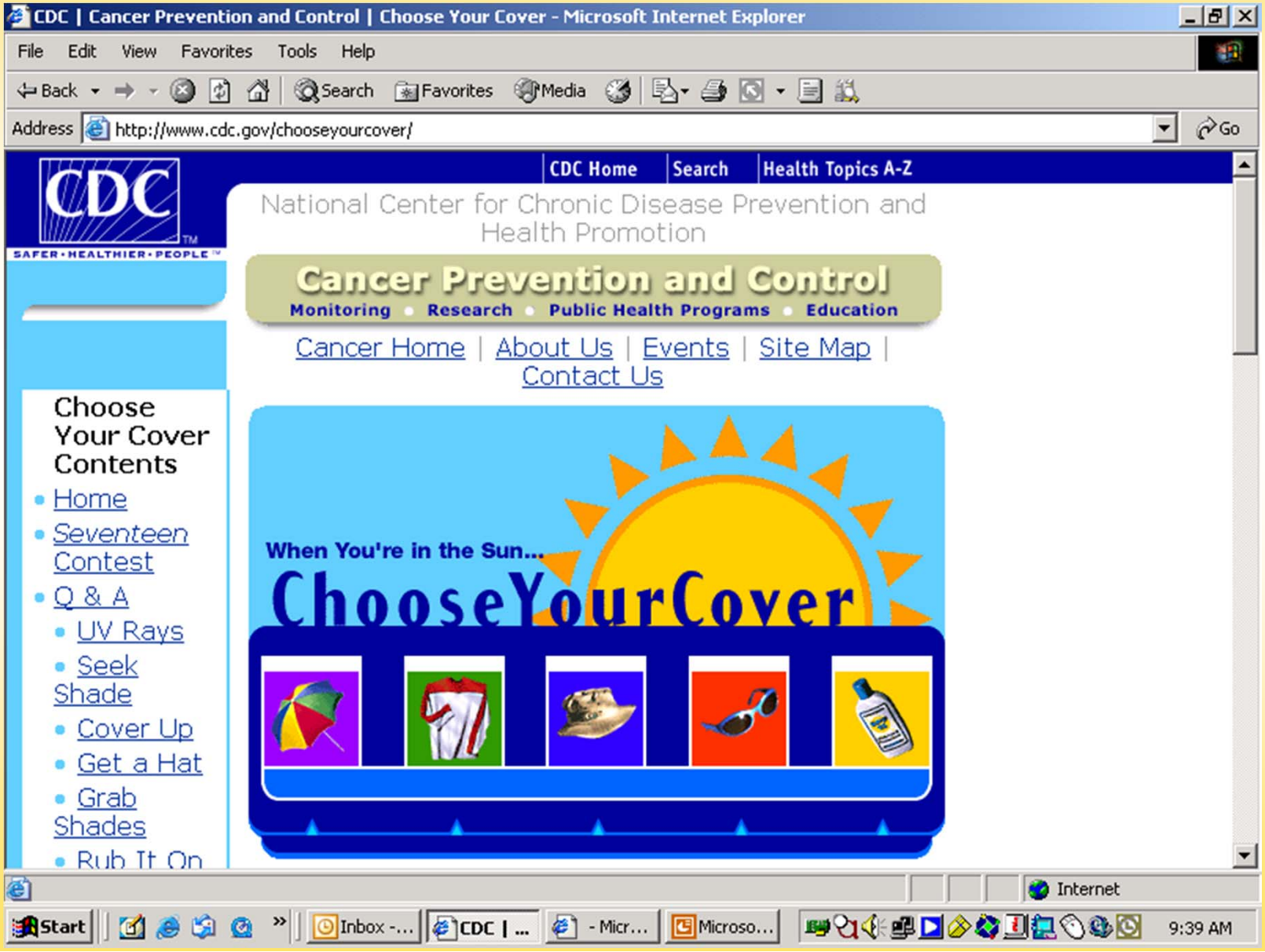
CDC Resources



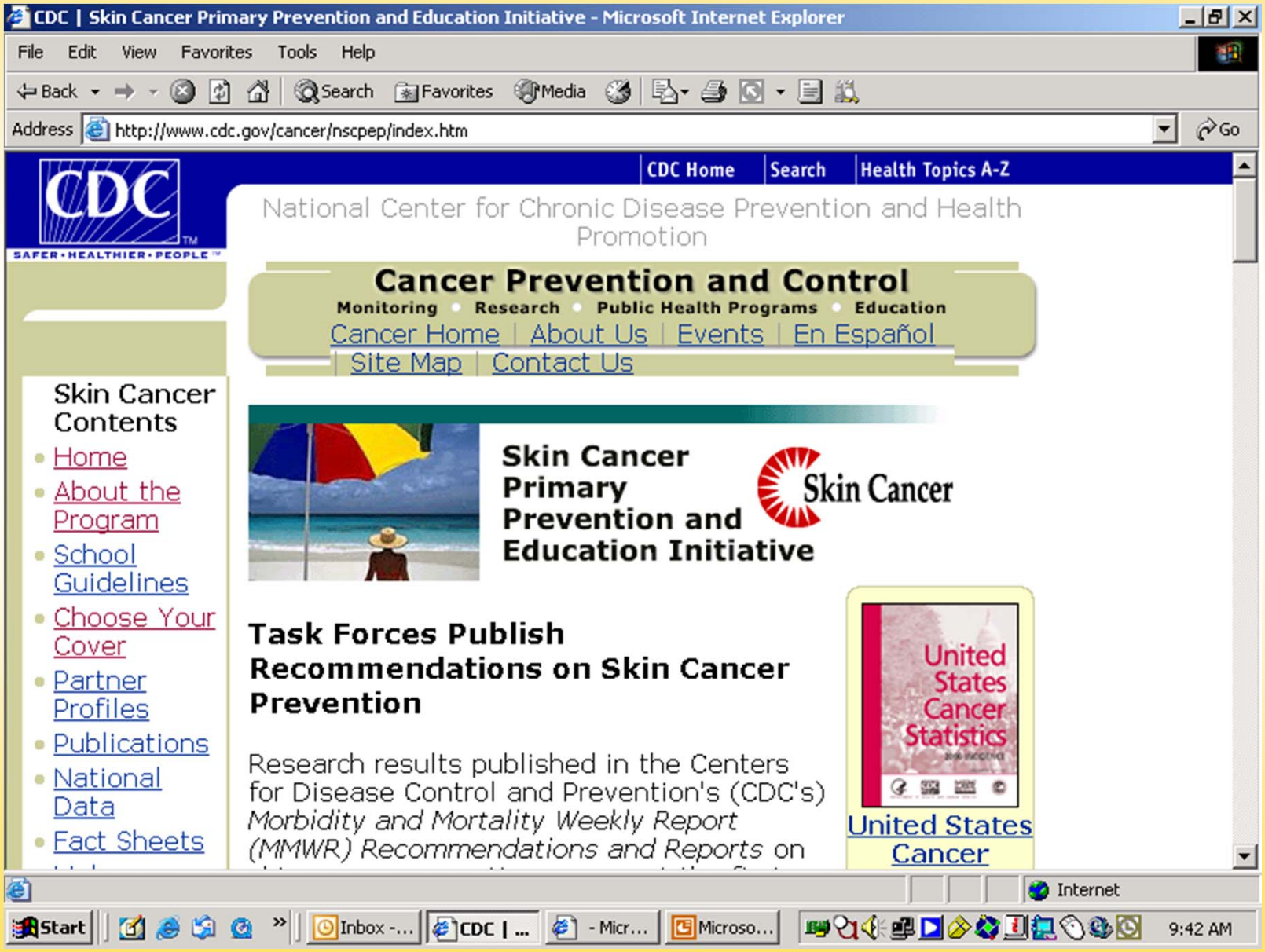
CDC Resources



CDC Resources



CDC Resources




WARNING: Even a
few serious sunburn
can increase your ri
of getting skin cance