



8 WAYS TO PREVENT CANCER

Sydney University March 10, 2010

 **Washington**
University in St. Louis

SCHOOL OF MEDICINE

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Outline

- Review number of deaths due to cancer in Australia
- Review number of new cases of cancer each year
- Describe causes of cancer
- 8 ways to prevent cancer
- For academics - point to some of the gaps we must fill to speed cancer prevention

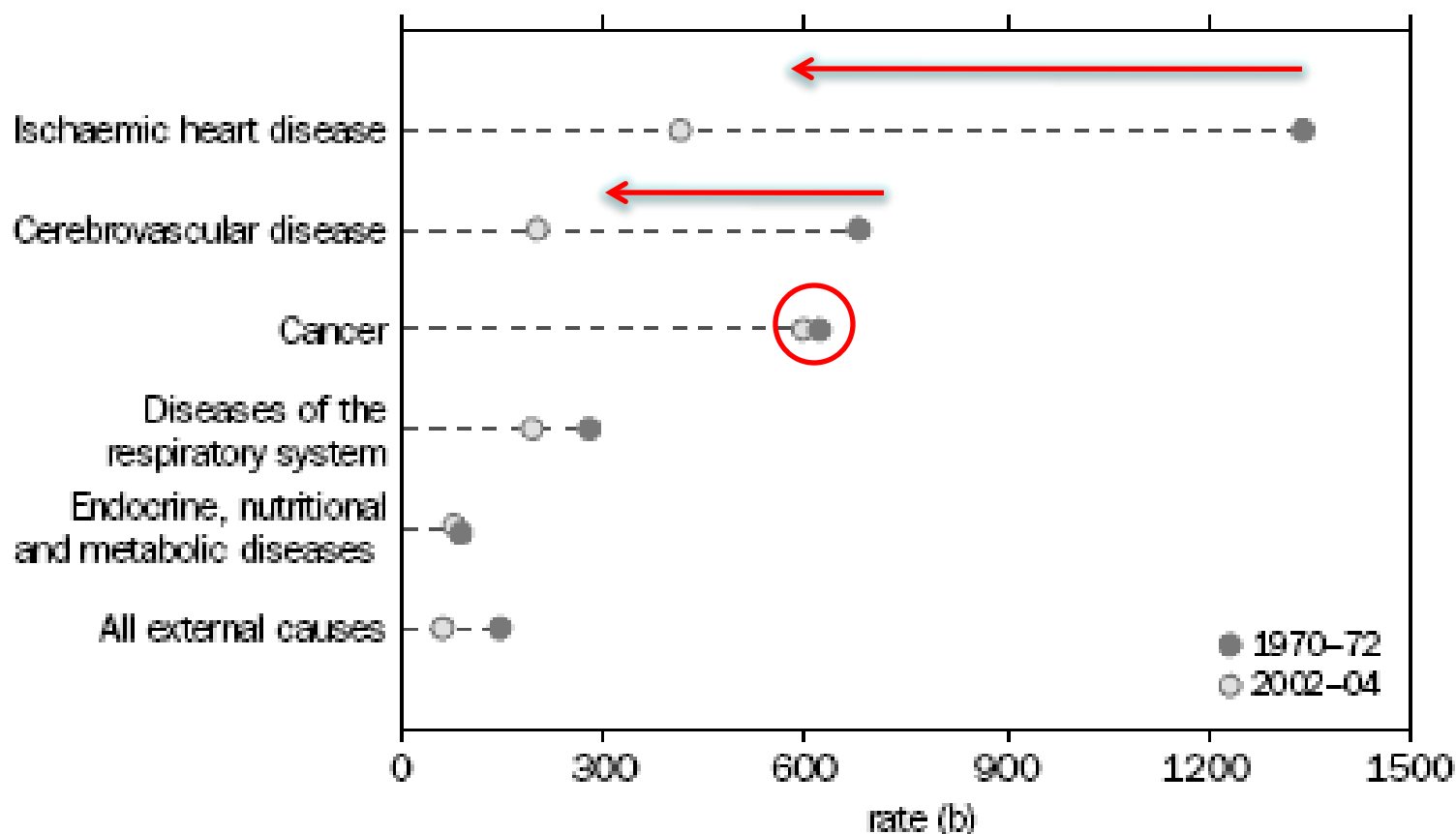


Cancer trends, Australia

- Mortality rate peaked in Australia, slow decline in lung cancer among men helps
- Rates of smoking related cancers decrease 1.4% per year from 1991 to 2001 among men but increased by 0.7% per year for women.
- Distinction
 - Rate = no. cases or deaths per 100,000
 - Burden = total no. cases diagnosed



Selected Causes of Death – 1970–72 AND 2002–04, Australia



(a) Persons aged 50 years and over.

(b) Deaths per 100,000 population. Standardised to 2001 Australian population.

Source: ABS Causes of Death collection.

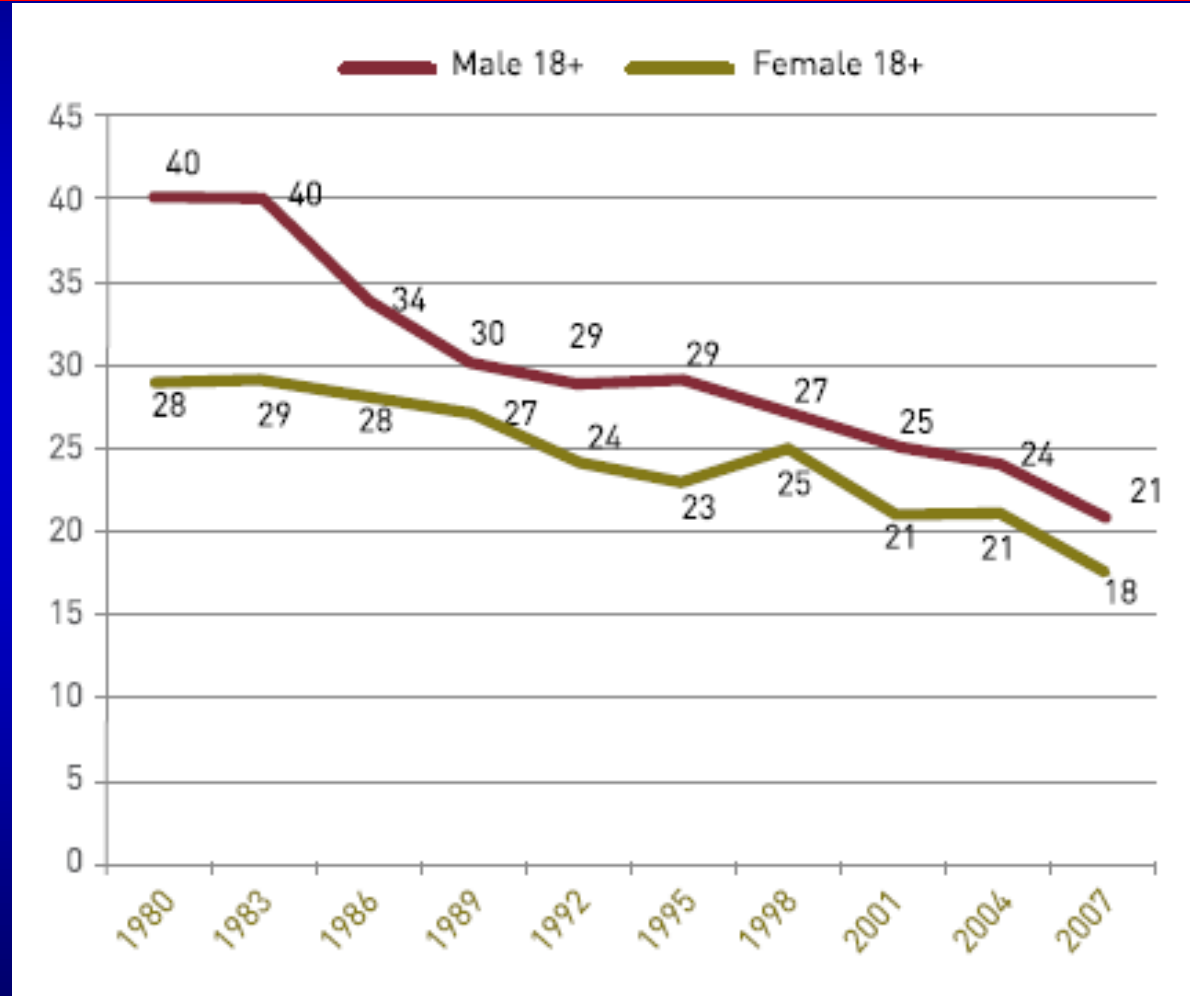


5 TO
NT CANCER

Mortality Rates, Annual Decline 1994 to 2004, women

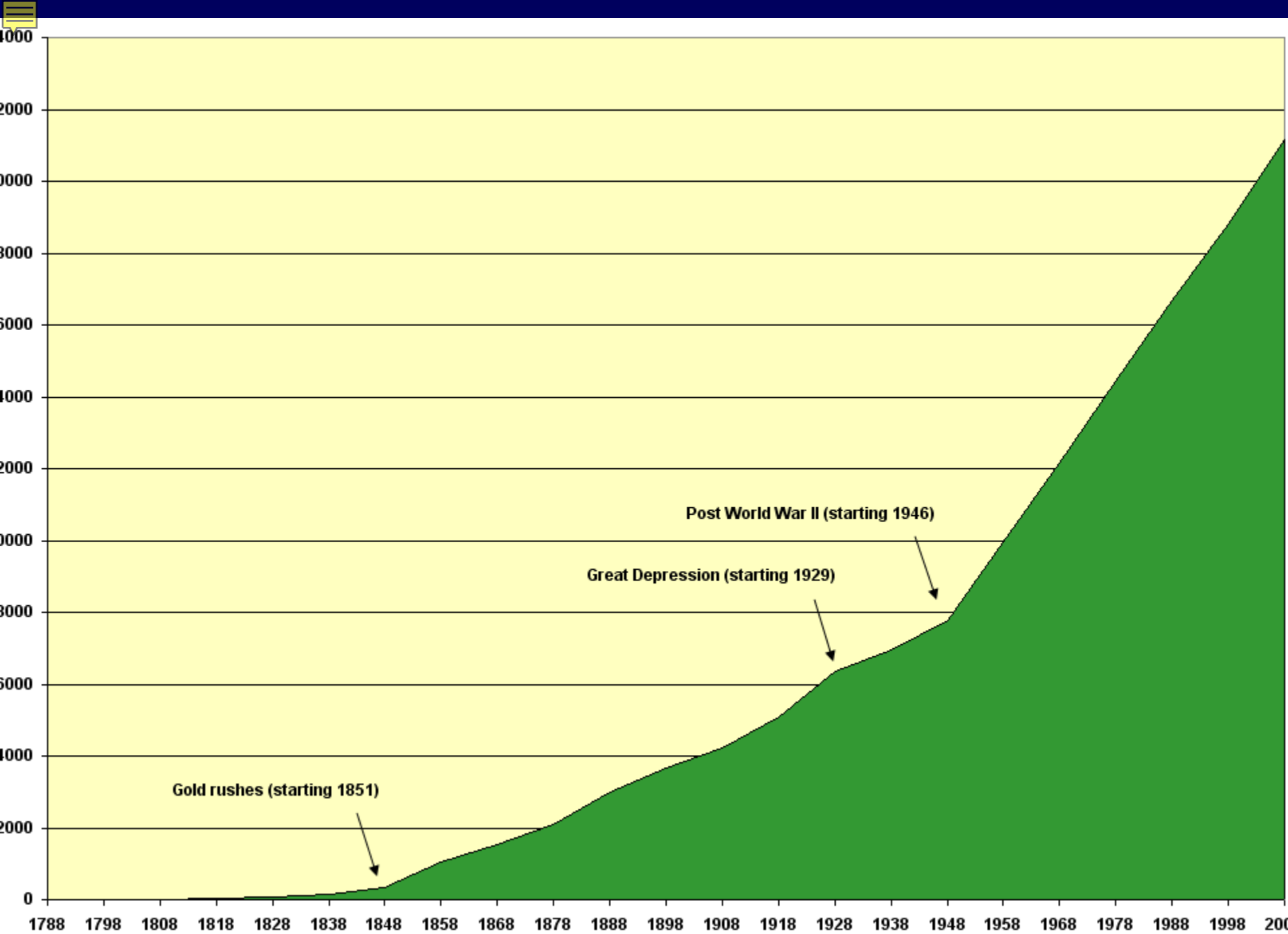
<i>Cancer</i>	<i>USA</i>	<i>Australia</i>	<i>Canada</i>
Lung	+ 0.2%	+0.7%	+ 1.2%
Colon	- 4.5%	- 2.7%	- 1.7%
Breast	- 4.5%	- 2.0%	- 1.2%
Lymphoma	- 3.8%	- 1.9%	- 1.4%
Liver	+ 2.6%	+ 5.3%	+ 2.3%
Total Ca. decline/yr	- 0.8%	- 1.0%	- 0.5%

Prevalence current smoking, 18 and over, Australia, 1980-2007



Australia The Healthiest Country, Tobacco Figure 1



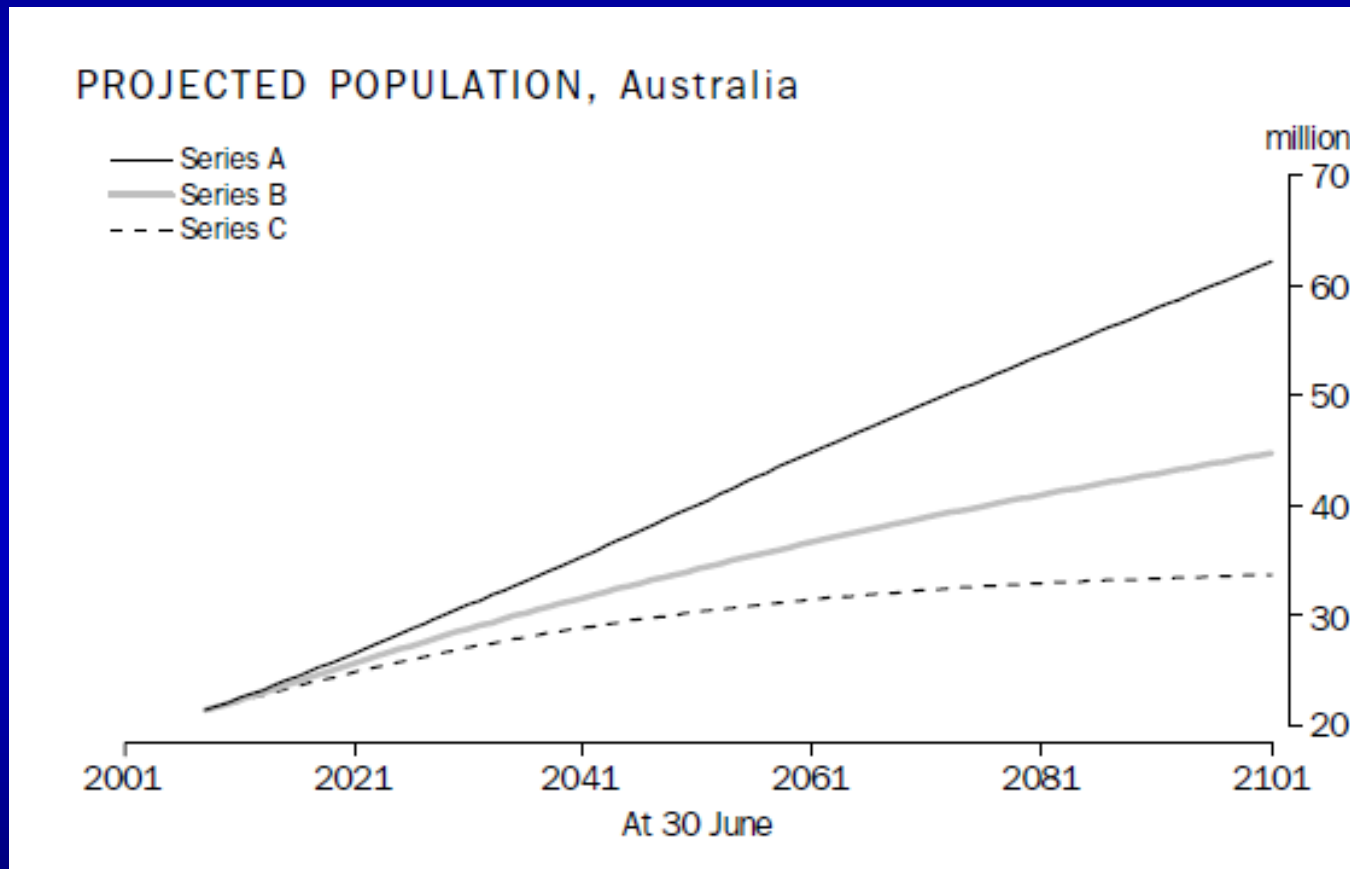


A growing population

- Today: 22,180,100 (March 10, 2010)
- 1 birth every 1 min 45 sec
- 1 immigrant every 1 min 54 sec
- 1 death every 3 min 40 sec
- Net increase 1 person every 1 min 11 sec

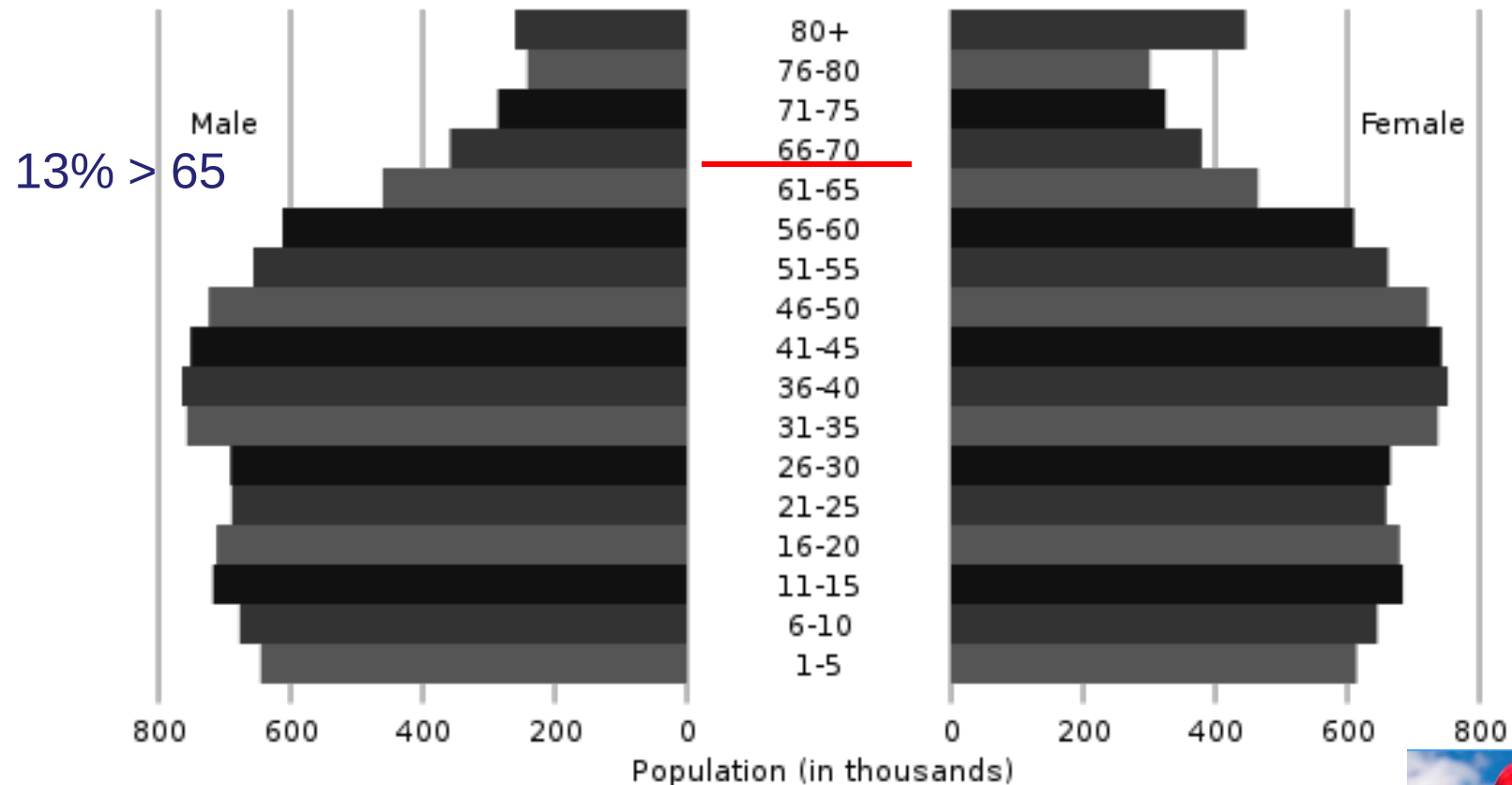


Projected Australian Population



Population Projections, ABS 3222, 2008

Australian Population, 2005



Median age 37.3; 22M



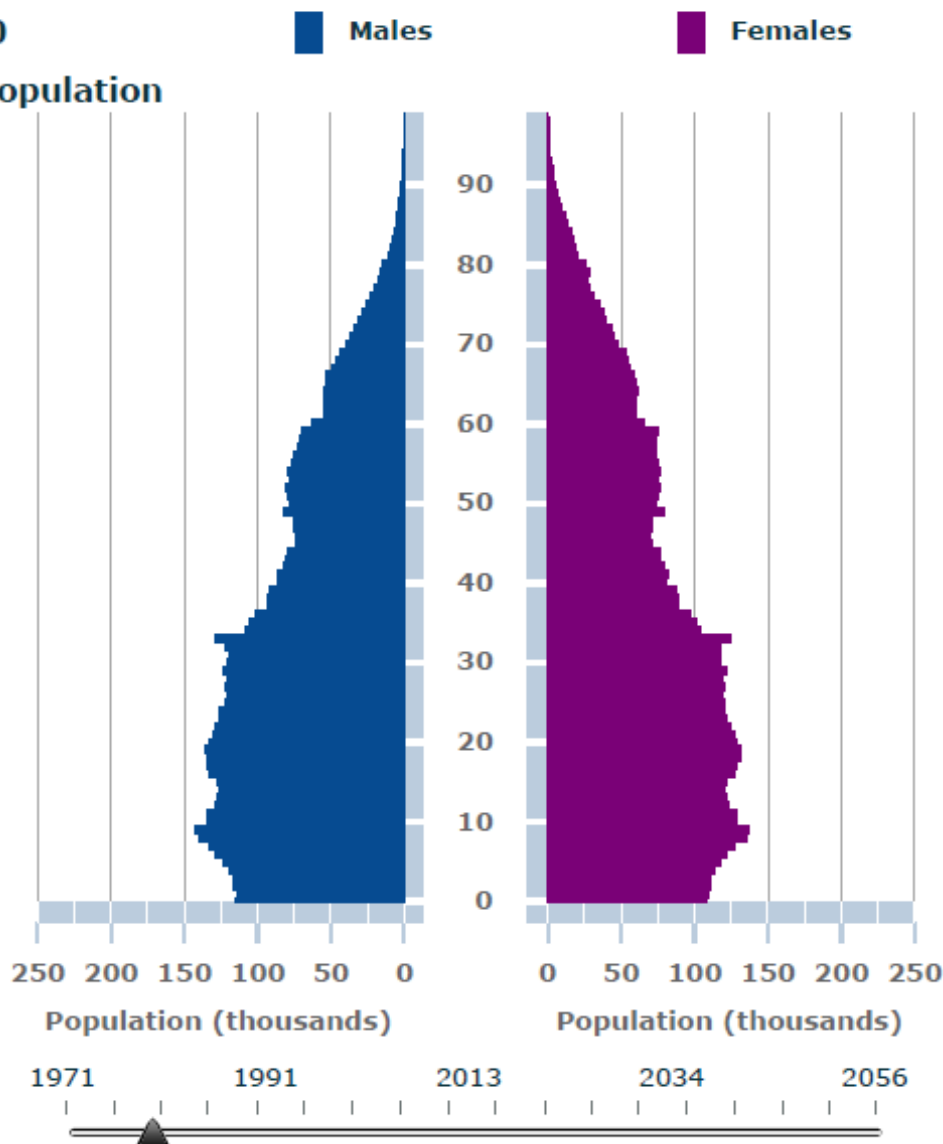
8 WAYS TO
PREVENT CANCER

Australia

Age Structure in 1980

Estimated Resident Population

Please note for Australia data, to ensure a consistent graph scale over the projection period, ages 100 and over are not displayed, but are used in the calculation of the total population.



Year

1980

Total (millions)

14.69

Select a state or territory

Australia

Use the Drop Down List to select a state or territory population pyramid.

Details

Aged:

Born:

Males:

Females:

Sex Ratio:

(Males per 100 Females)

Download Source Data

Play

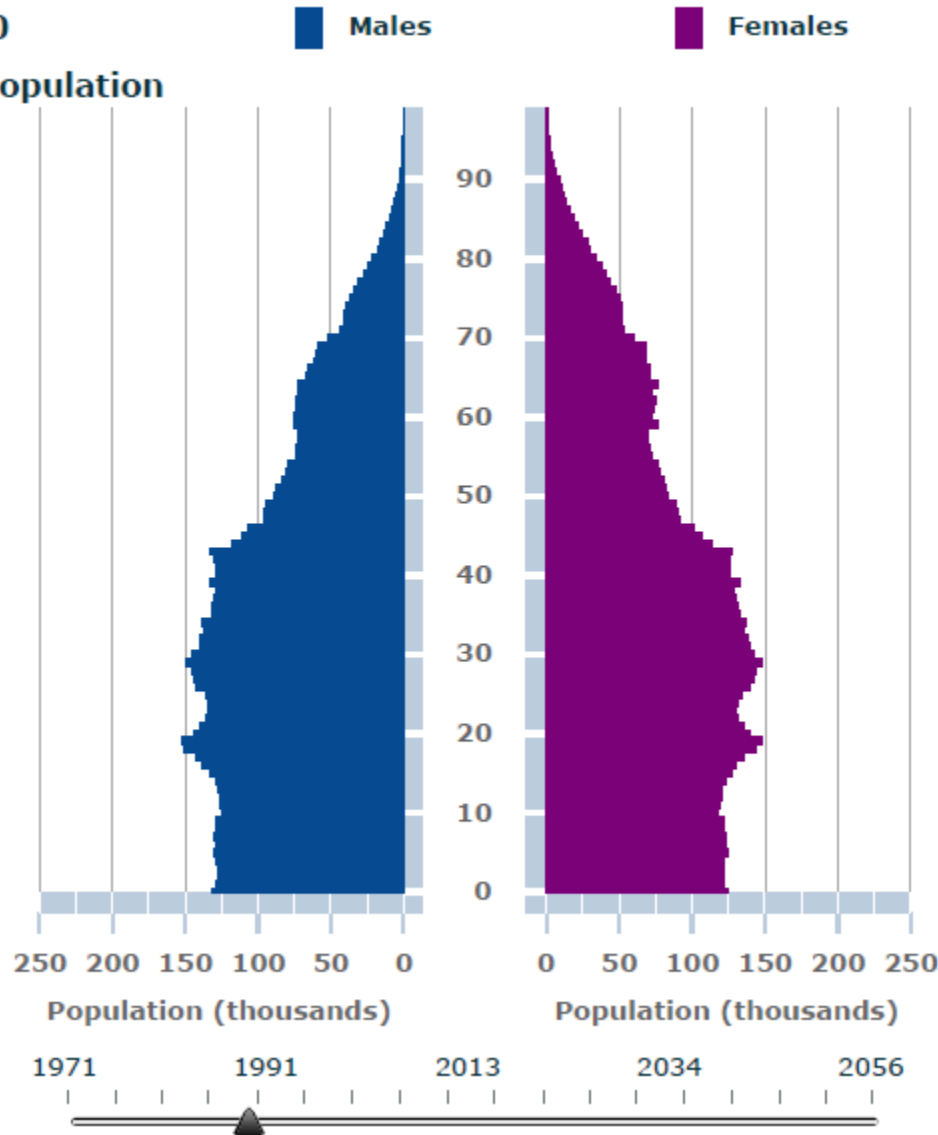
Stop

Australia

Age Structure in 1990

Estimated Resident Population

Please note for Australia data, to ensure a consistent graph scale over the projection period, ages 100 and over are not displayed, but are used in the calculation of the total population.



Year

1990

Total (millions)

17.06

Select a state or territory

Australia

Use the Drop Down List to select a state or territory population pyramid.

Details

Aged:

Born:

Males:

Females:

Sex Ratio:

(Males per 100 Females)

Download Source Data

Play

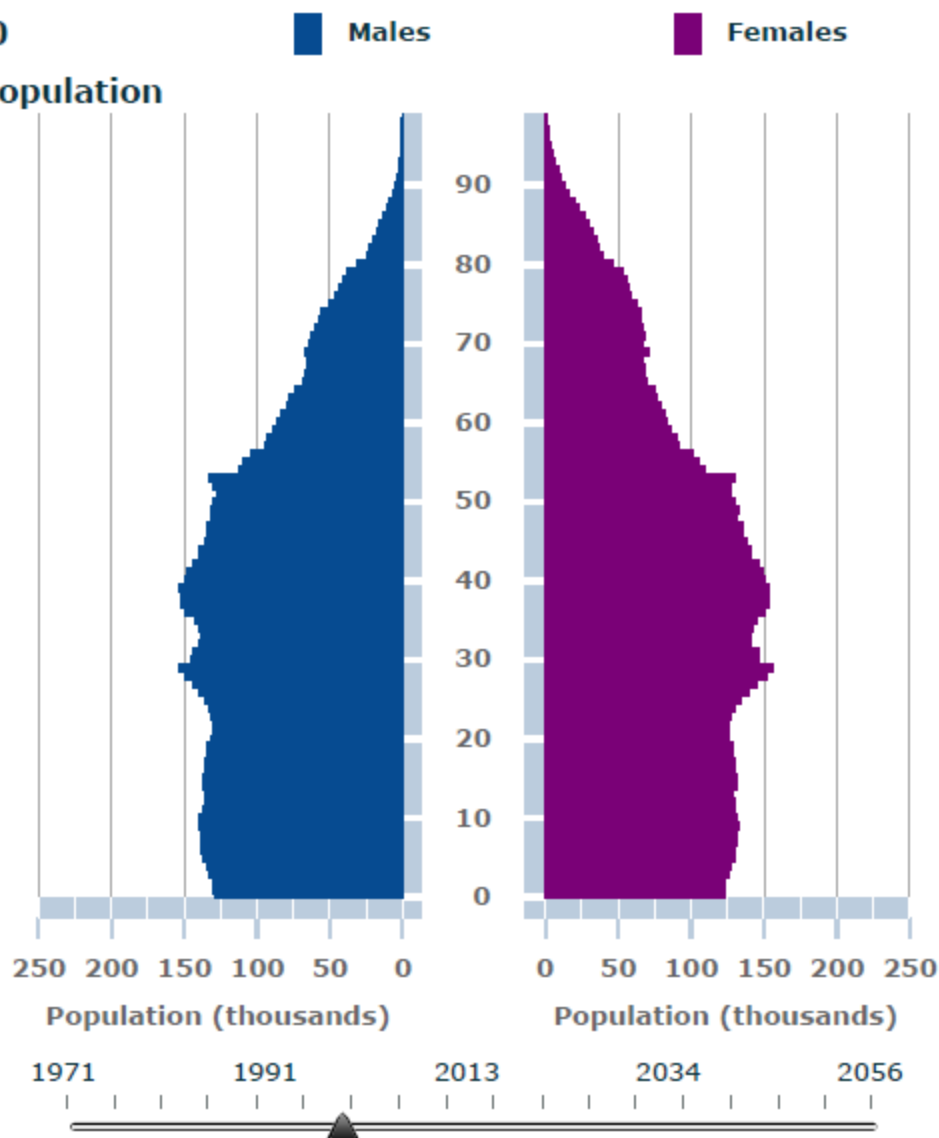
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Australia

Age Structure in 2000

Estimated Resident Population

Please note for Australia data, to ensure a consistent graph scale over the projection period, ages 100 and over are not displayed, but are used in the calculation of the total population.



Year

2000

Total (millions)

19.15

Select a state or territory

Australia

Use the Drop Down List to select a state or territory population pyramid.

Details

Aged:

Born:

Males:

Females:

Sex Ratio:

(Males per 100 Females)

Download Source Data

Play

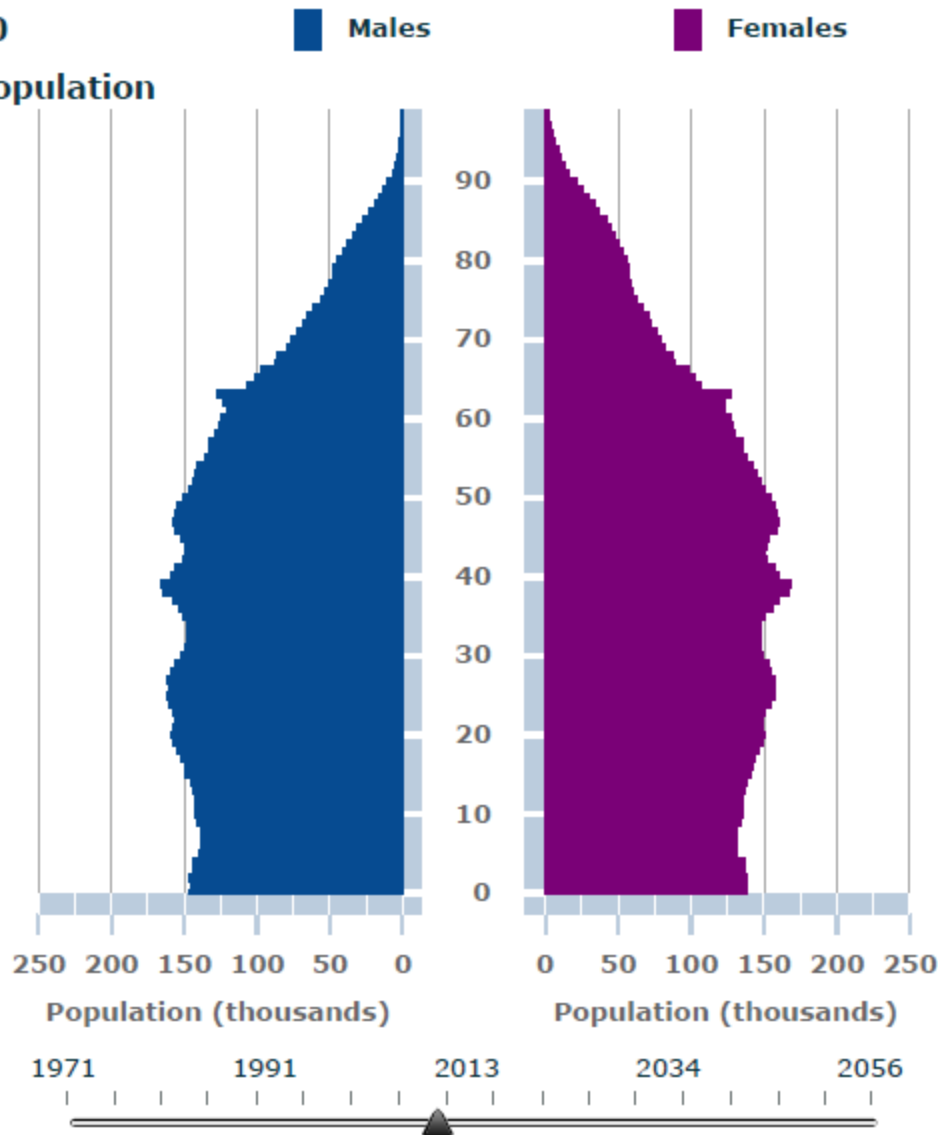
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Australia

Age Structure in 2010

Projected Resident Population

Please note for Australia data, to ensure a consistent graph scale over the projection period, ages 100 and over are not displayed, but are used in the calculation of the total population.



Year

2010

Total (millions)

21.99

Select a state or territory

Australia

Use the Drop Down List to select a state or territory population pyramid.

Details

Aged:

Born:

Males:

Females:

Sex Ratio:

(Males per 100 Females)

Download Source Data

Play

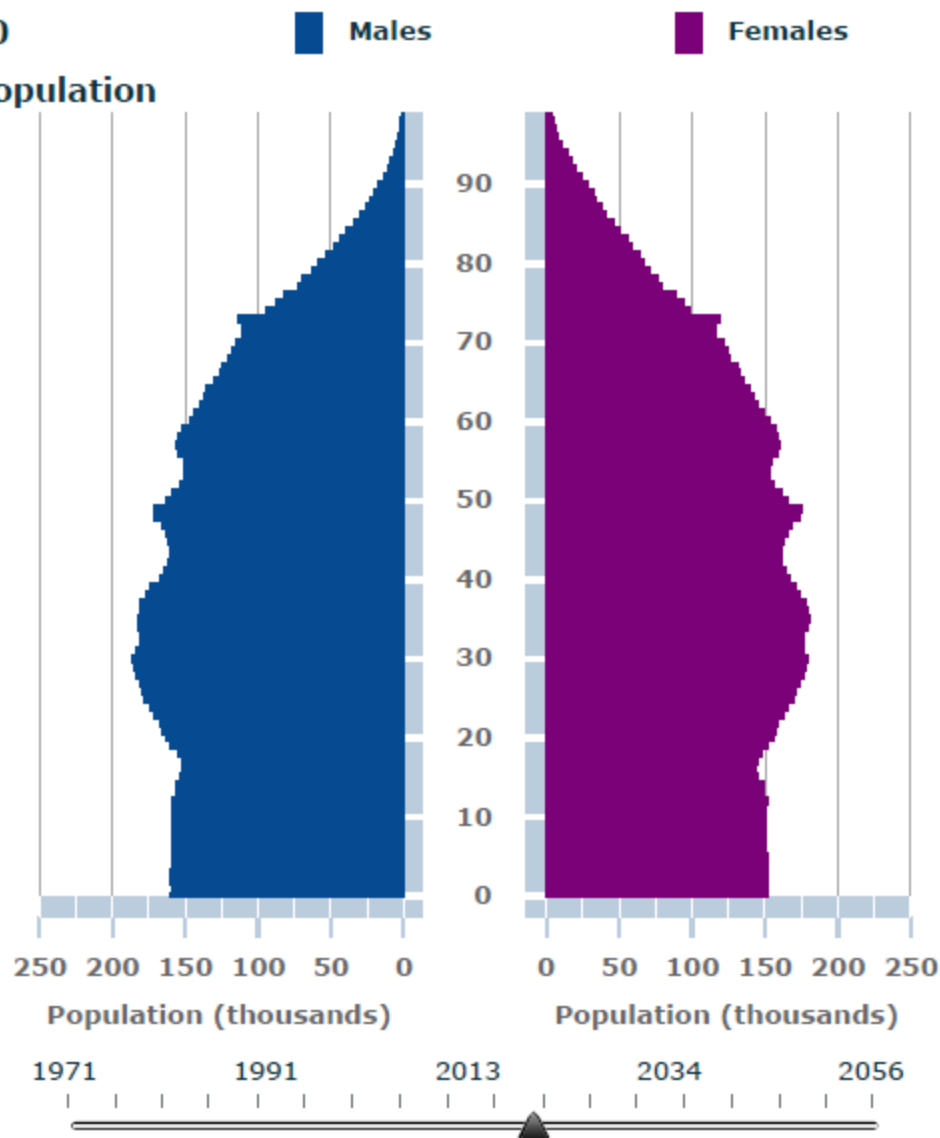
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Australia

Age Structure in 2020

Projected Resident Population

Please note for Australia data, to ensure a consistent graph scale over the projection period, ages 100 and over are not displayed, but are used in the calculation of the total population.



Year

2020

Total (millions)

25.28

Select a state or territory

Australia

Use the Drop Down List to select a state or territory population pyramid.

Details

Aged:

Born:

Males:

Females:

Sex Ratio:

(Males per 100 Females)

Download Source Data

Play

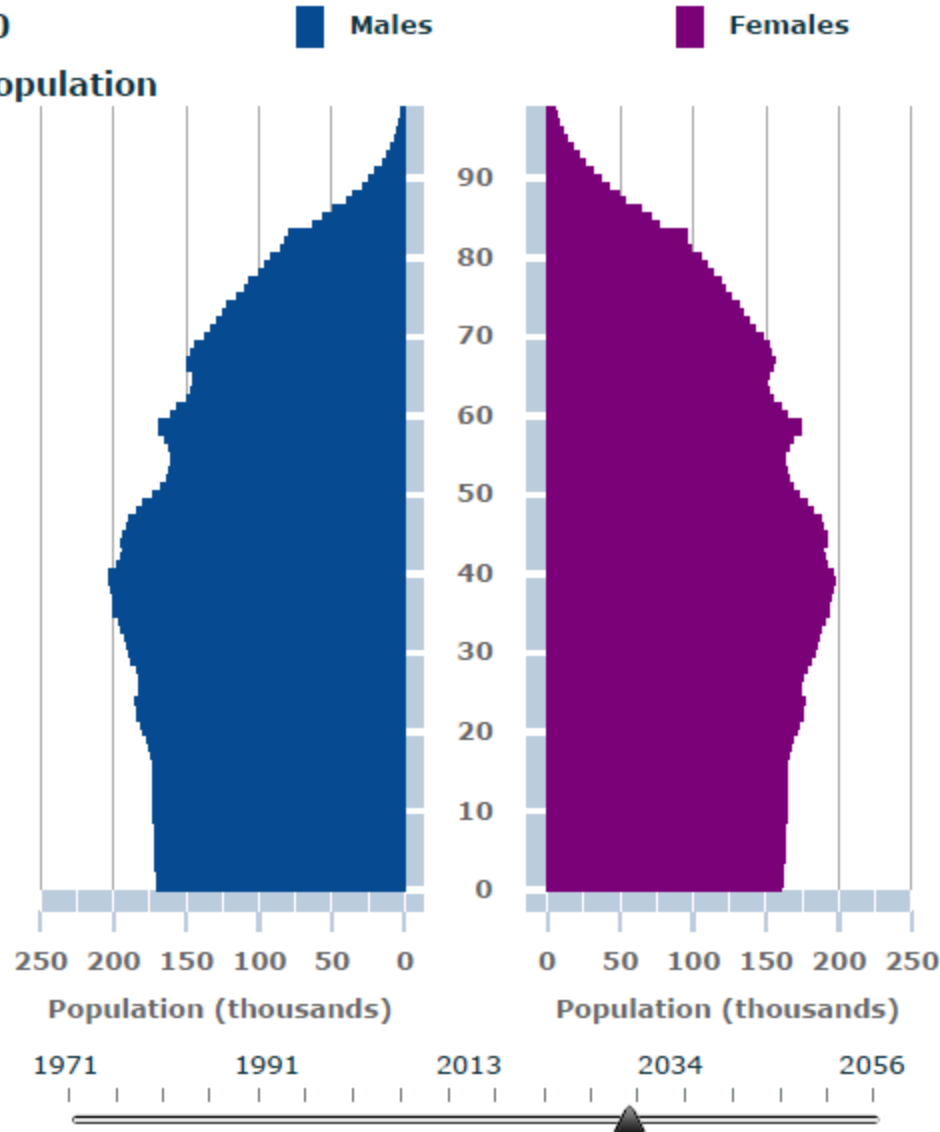
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Australia

Age Structure in 2030

Projected Resident Population

Please note for Australia data, to ensure a consistent graph scale over the projection period, ages 100 and over are not displayed, but are used in the calculation of the total population.



Year

2030

Total (millions)

28.48

Select a state or territory

Australia

Use the Drop Down List to select a state or territory population pyramid.

Details

Aged:

Born:

Males:

Females:

Sex Ratio:

(Males per 100 Females)

Download Source Data

Play

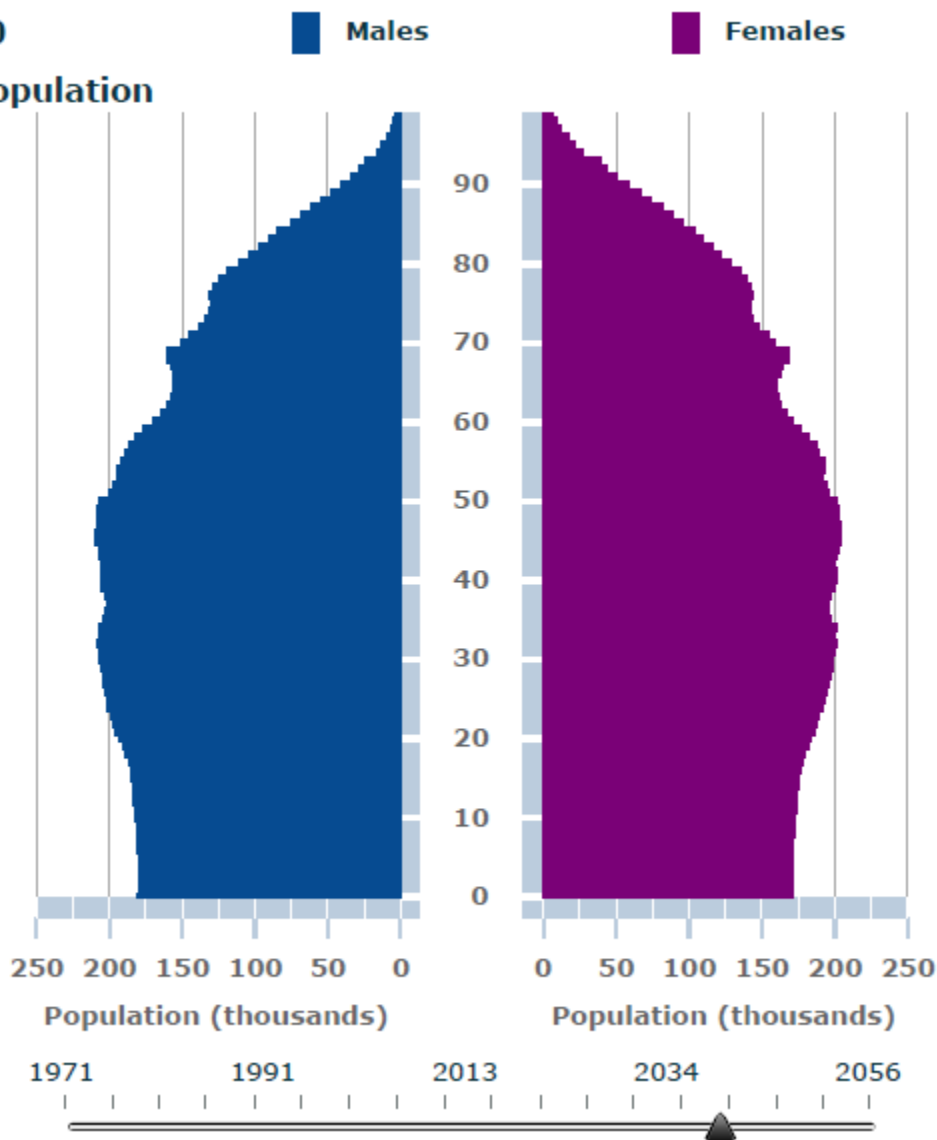
Stop

Australia

Age Structure in 2040

Projected Resident Population

Please note for Australia data, to ensure a consistent graph scale over the projection period, ages 100 and over are not displayed, but are used in the calculation of the total population.



Year

2040

Total (millions)

31.33

Select a state or territory

Australia

Use the Drop Down List to select a state or territory population pyramid.

Details

Aged:

Born:

Males:

Females:

Sex Ratio:

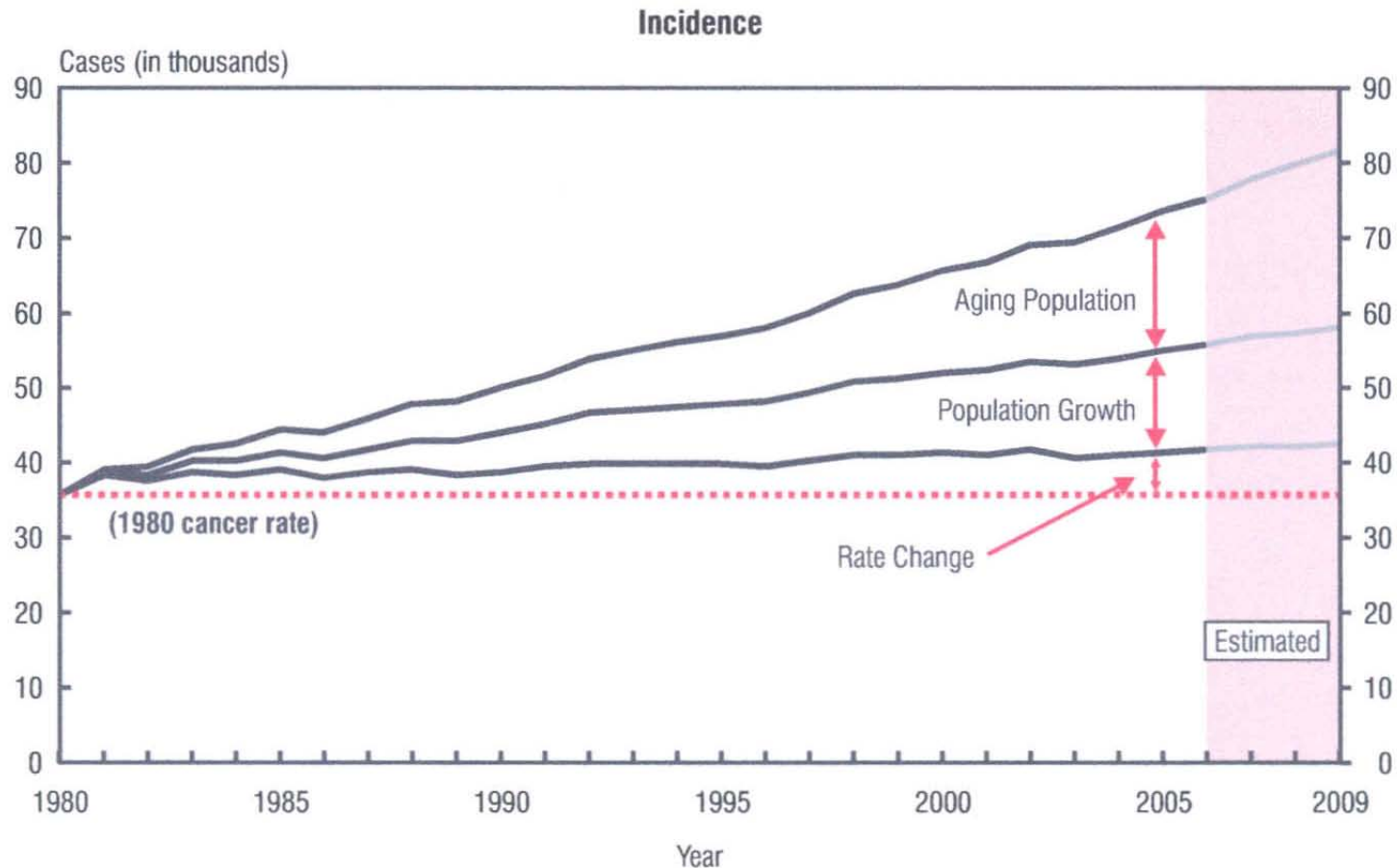
(Males per 100 Females)

Download Source Data

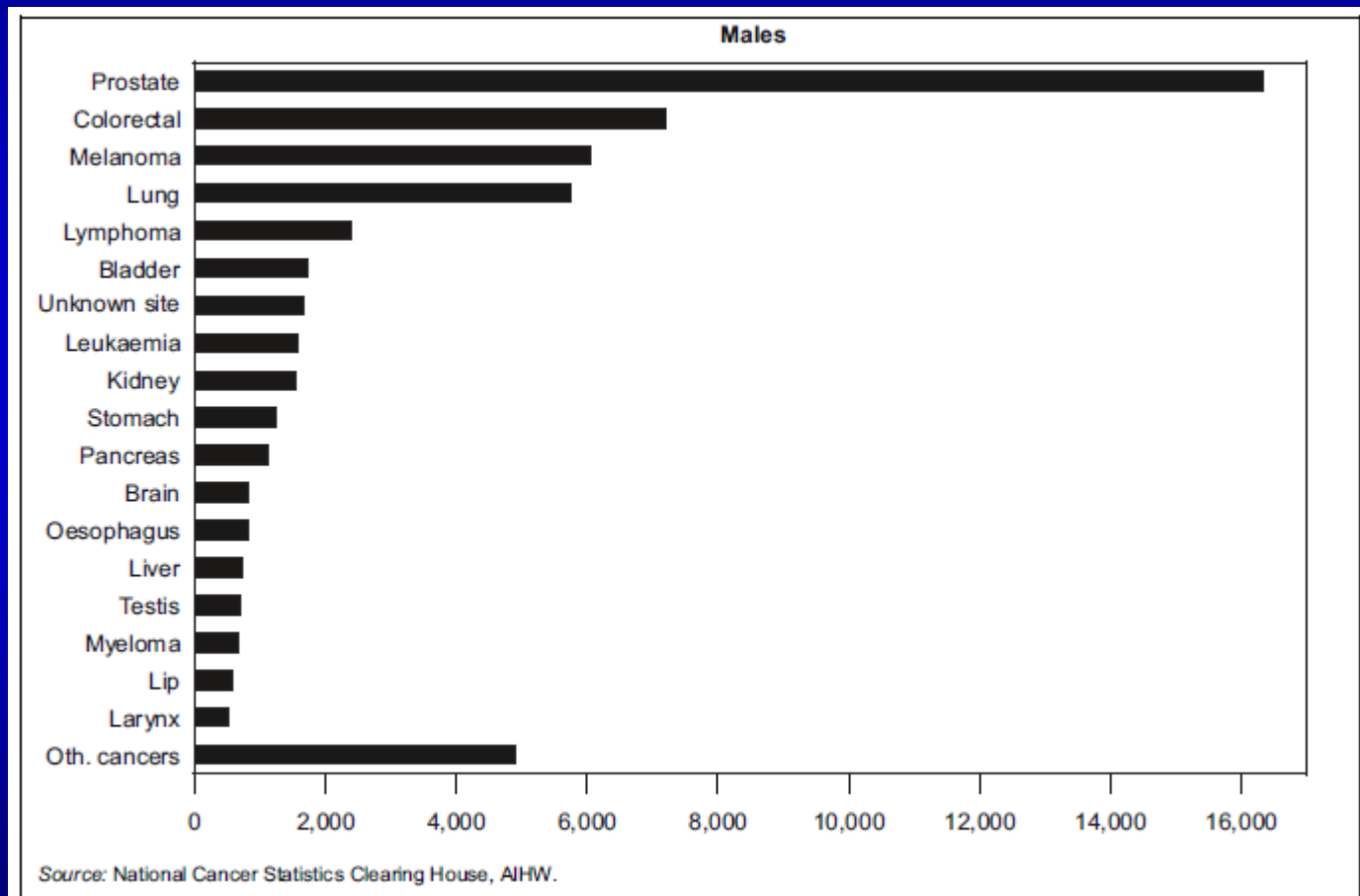
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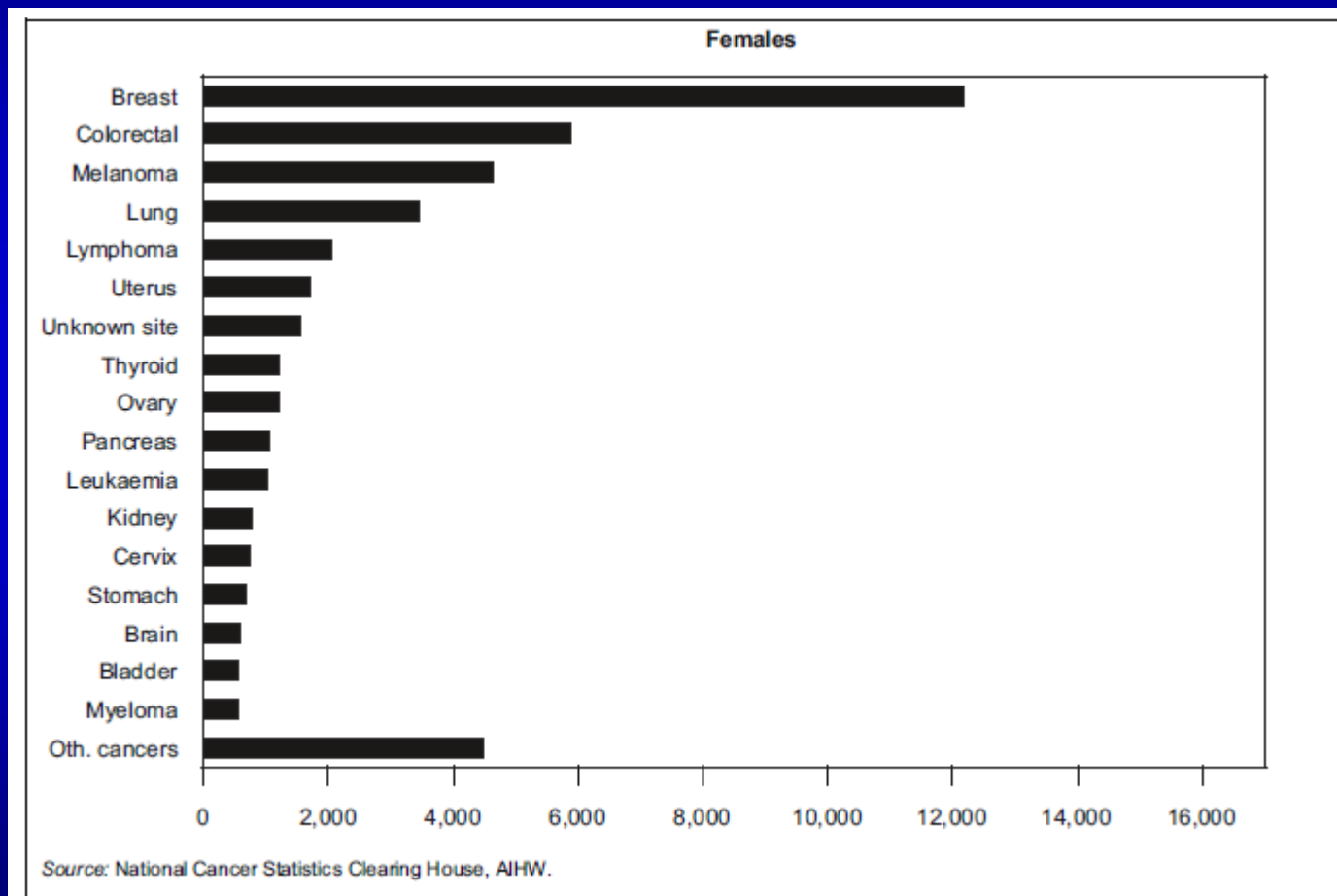
Trends in new cases, population structure, and burden of cancer, females, Canada 1980 to 2009



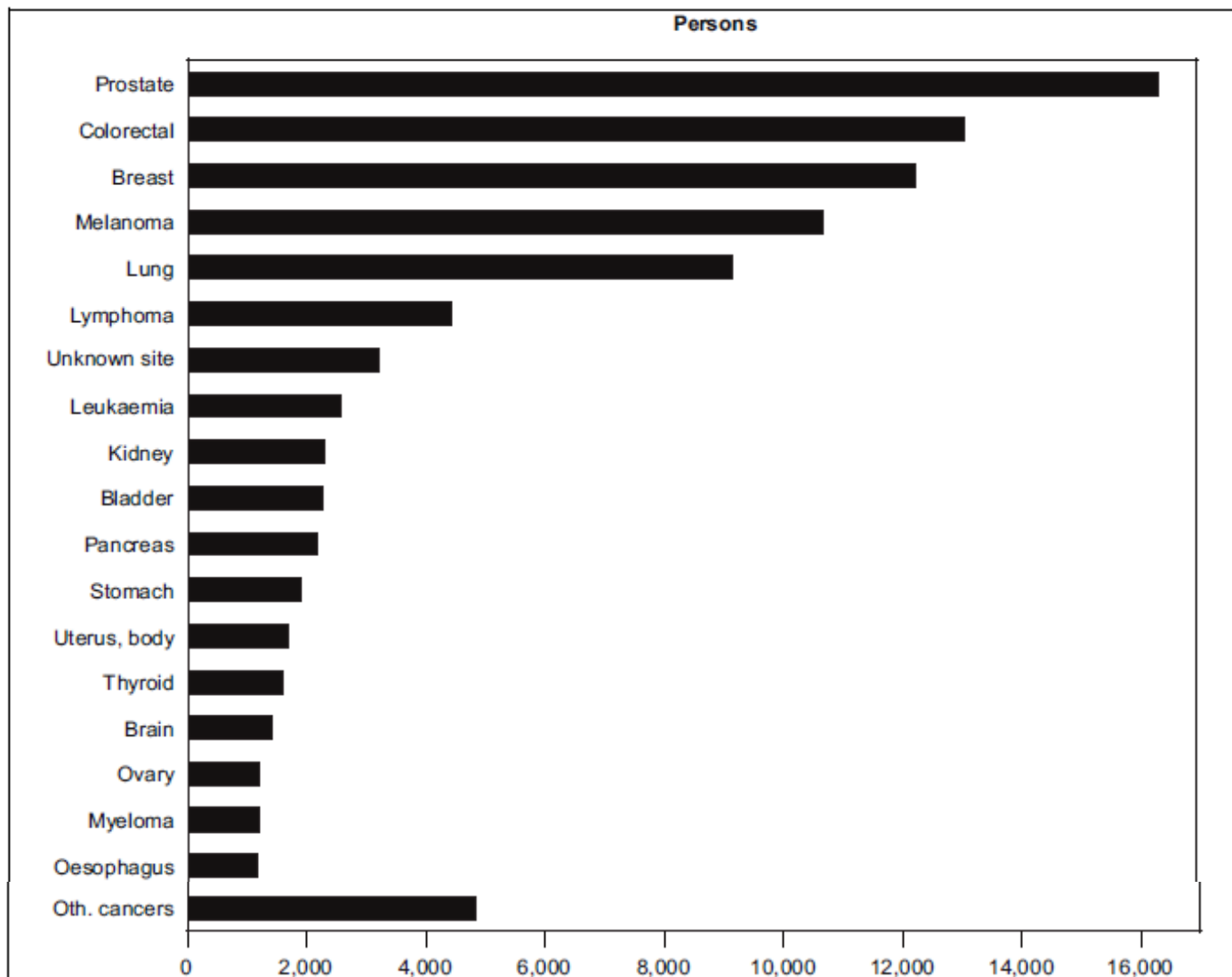
New cancer cases, 2005



New cancer cases, 2005



Total cases, Australia, 2005



Source: National Cancer Statistics Clearing House, AIHW.

Cancer cases and % total, 2005

Cancer type	Number	Per cent of total
Males		
Prostate	16,349	29.1
Colorectal	7,181	12.8
Melanoma	6,044	10.8
Lung	5,738	10.2
Lymphoma	2,373	4.2
Bladder	1,707	3.0

62%

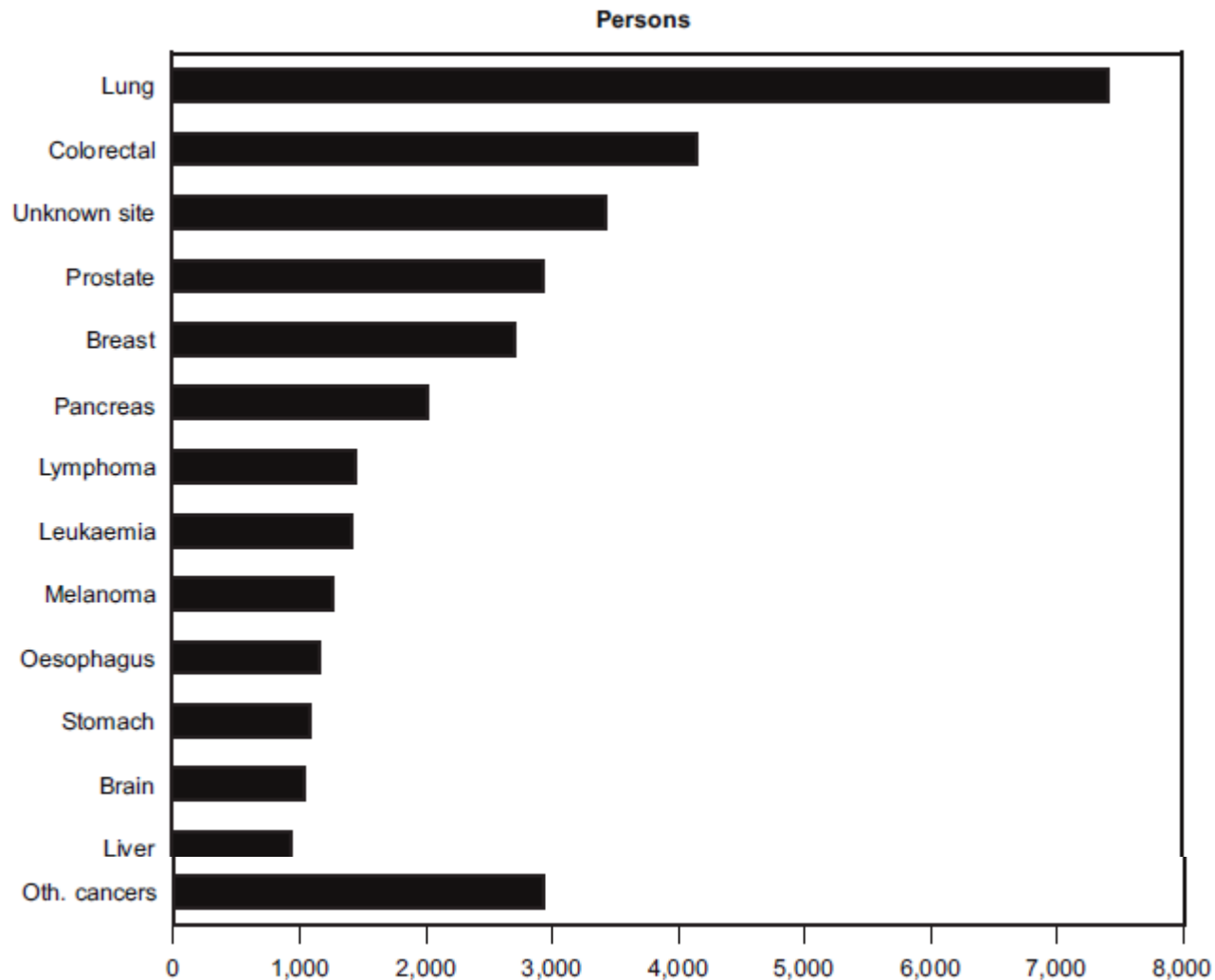
Cancer cases and % of total, 2005

Females

Breast	12,170	27.4
Colorectal	5,895	13.3
Melanoma	4,640	10.5
Lung	3,444	7.8
Lymphoma	2,057	4.6
Uterus	1,706	3.8

59%

Cancer Deaths, 2005



Avoidable sources of the cancer burden

- Tobacco, tobacco, tobacco
 - Risk is big, half are killed
- Obesity
- Lack of exercise - inactivity
- Chronic infection
- Occupational factors
- Exogenous hormones
- Alcohol



Preventable vs genetic

- Optimistically, 80% could be prevented with what we know today
 - In Australia 22.2 M population with 105,000
 - 85,000 cases could be prevented!
- 5-10% due to inherited genetic factors
 - 5,000 – 10,000 cases not readily modifiable yet, research continues aiming to identify strategies for those with major genetic risks

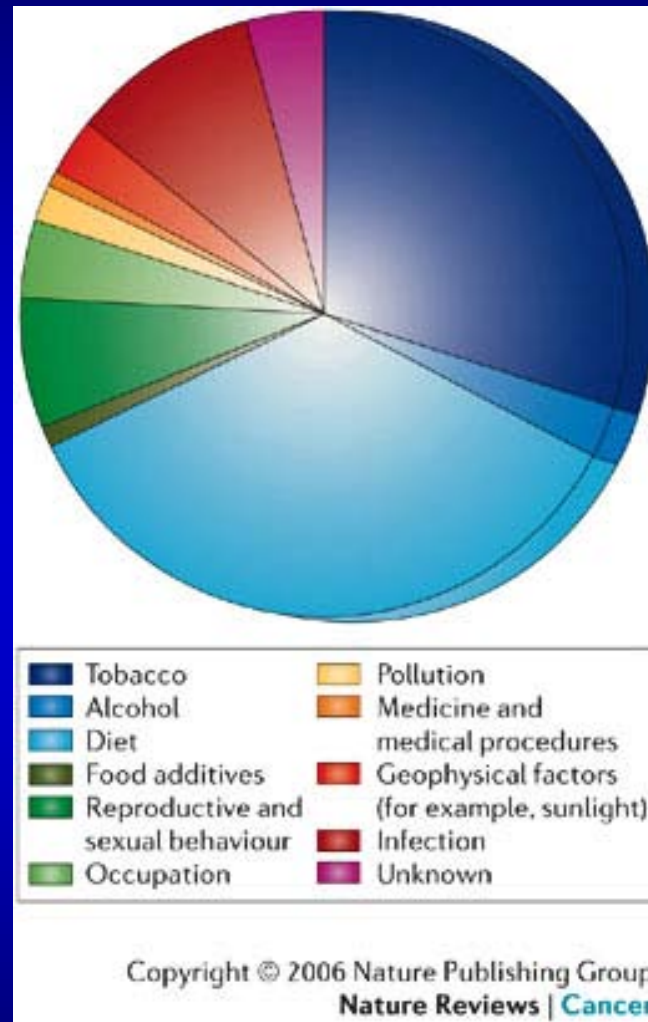


How do we know lifestyle is important?

- International variation in rates of cancer
 - These relate to diet, physical activity, obesity, and environmental exposures
- Migrant studies
 - This takes account of genetic predisposition
 - Japanese who migrated to Hawaii and California
 - Italians and Greeks who migrated to Australia
- Trials and other studies
 - Vaccines
 - Anti-estrogens (Tamoxifen & Evista)
 - Smoking cessation and risk of lung cancer, etc.



Proportion of cancer deaths attributed to non-genetic factors.



Colditz GA *et al.* (2006) Epidemiology—identifying the causes and preventability of cancer?
Nat. Rev. Cancer. 7: 2–9 doi:10.1038/nrc1784



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A National Cancer Institute Comprehensive Cancer Center



8 WAYS TO PREVENT CANCER

50% of all cancer can be prevented

- Healthy lifestyles can prevent more than half of all cancers
- 8 simple steps can help keep us healthy & prevent cancer and other diseases

1 Maintain a healthy weight

- Overweight and obesity cause cancer
- More than 14 percent of cancer deaths in men are due to overweight and obesity
- More than 20% of cancer deaths in women due to overweight and obesity
- ~ 6,500 cancer deaths per year in Australia
- These cancer deaths could be avoided if we did not gain weight through our adult years

1 Maintain a healthy weight

New cases of cancer

- Overweight and obesity also cause new cases of:
 - Breast
 - Colon
 - Esophagus
 - Kidney
 - Pancreas
 - Lymphoma

Review of Evidence

Obesity

Level of Evidence	Risk Increase Associated with Obesity			
	Small (RR 1.09-1.34)	Moderate (RR 1.35 - 1.99)	Large (RR 2.0 - 4.9)	Very Large (RR 5.0+)
Convincing		Colon	Breast Uterus Kidney	Esophagus
Probable		Prostate Myeloma Lymphoma		

Risk of Cancer with Increased BMI

Cancer	Sample Size	Follow-up (yrs)	RR Men	RR Women
Breast (premenopausal)	2.5 mil	11.0	-	0.92**
Breast (postmenopausal)	2.5 mil	11.0	-	1.12***
Colon	4.8 mil	11.0	1.24*	1.09*
Endometrium	3.0 mil	10.6	-	1.59*
Gallbladder	3.3 mil	12.7	1.09	1.59***
Gastric	4.7 mil	10.8	0.97	1.04
Leukemia	4.7 mil	13.7	1.08**	1.17***
Liver	3.3 mil	12.7	1.24	1.07
Lung	2.6 mil	11.9	0.76*	0.80***
Multiple myeloma	5.2 mil	14.6	1.11*	-
Non-Hodgkin lymphoma	5.0 mil	12.4	1.06*	1.07
Oesophageal adenocarcinoma	4.7 ml	10.8	1.52*	1.51*

Relative risk for a 5 point increase in BMI. For example, the relative risk linked to a BMI of 28 compared to a BMI of 23; or a BMI of 32 compared to 27.

*p < .0001; **p < .01; ***p < .05

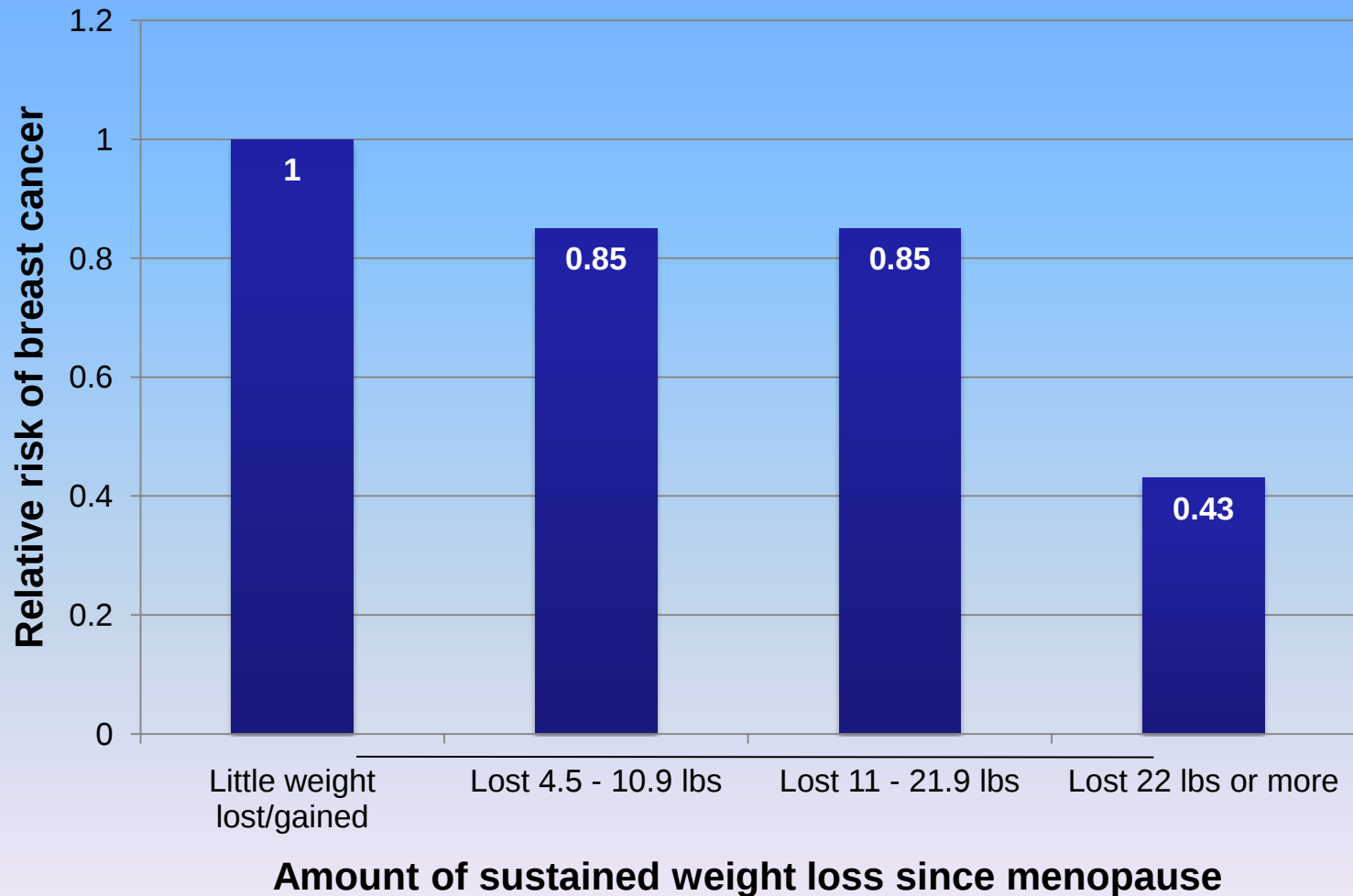


1 Maintain a healthy weight

Weight loss lowers risk

- Risk of breast cancer dropped by 60% in women who lost more than 10 kg (22 pounds) after menopause
- Loss of just 5 pounds lowered risk by 15%

Sustained Weight Loss and Risk of Breast Cancer in Postmenopausal Women Who Never Used Postmenopausal Hormones



1 Maintain a healthy weight

Take home messages

- Keeping weight in check can be hard—but well worth it.
- For many, just not gaining any more weight can improve health.
- Taking off some extra pounds (kilos) gives an even greater health boost.

1 Maintain a healthy weight

Tips

- Bring physical activity and movement into your life.
- Limit time in front of the TV and computer.
- Eat a diet rich in fruits, vegetables, and whole grains.
- Choose smaller portions, and eat more slowly.

2 Exercise regularly

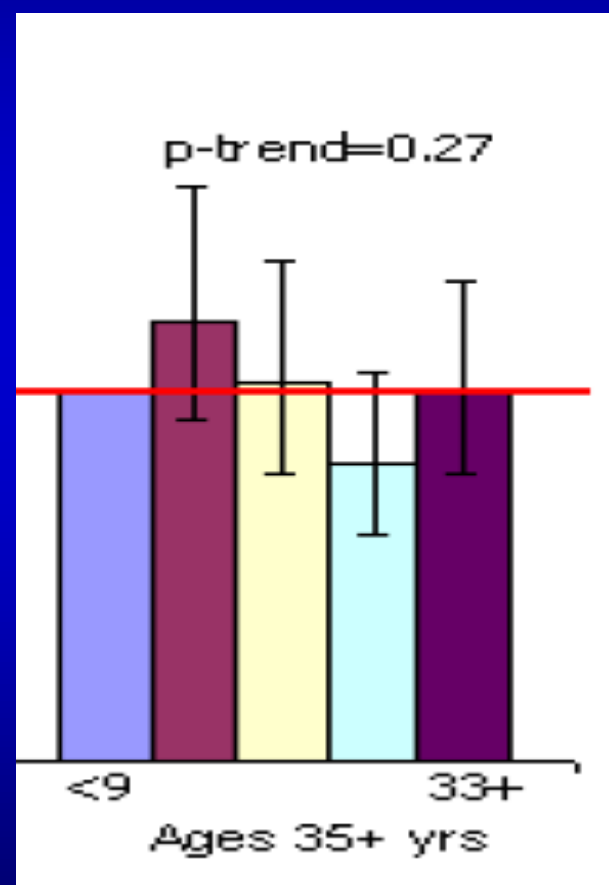
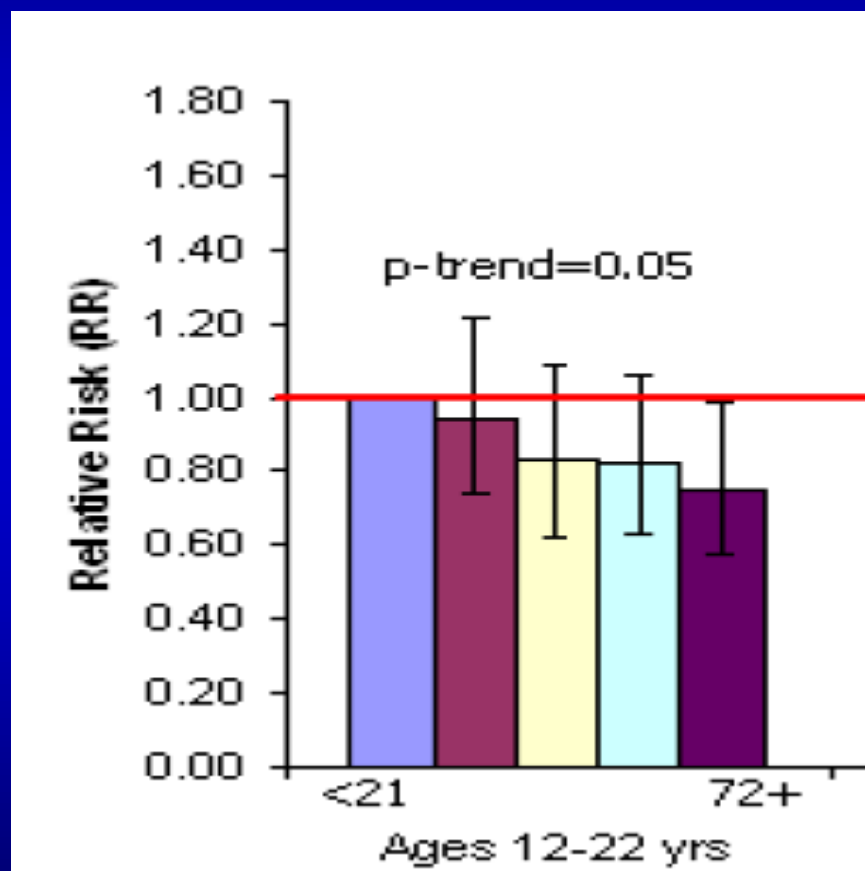
- Lack of exercise causes breast and colon cancers
- Regular exercise reduces breast cancer risk by 20%
- Regular exercise reduces colon cancer by a half – *you can walk away from colon cancer*

Energy Balance

- Retrospective data – Bernstein suggests sustained high activity from menarche reduces risk premenopausal breast cancer (RR = 0.42; 3.8 hr per week vs inactive)
 - Bernstein et al., JNCI 1994
- NHSII – prospective data show similar results
 - Maruti et al., JNCI 2008

What Time Period is Important?

Total activity (MET-h/wk) during different ages and breast cancer



2 Exercise regularly

Take home messages

- Few things are as good for you as regular physical activity.
- It can be hard to find the time, but it's important to fit in at least 30 minutes of activity every day.
- More is even better, but any amount is better than none.

2 Exercise regularly

Exercise tips

- Choose activities you enjoy—walking, gardening, and dancing.
- Make exercise a habit by setting aside the same time for it each day.
- Stay motivated by exercising with someone.
- Be active with your kids--go on family walks ride bikes, dance together.

3 Don't smoke

Smoking increases the risk of 11 different cancers, including:

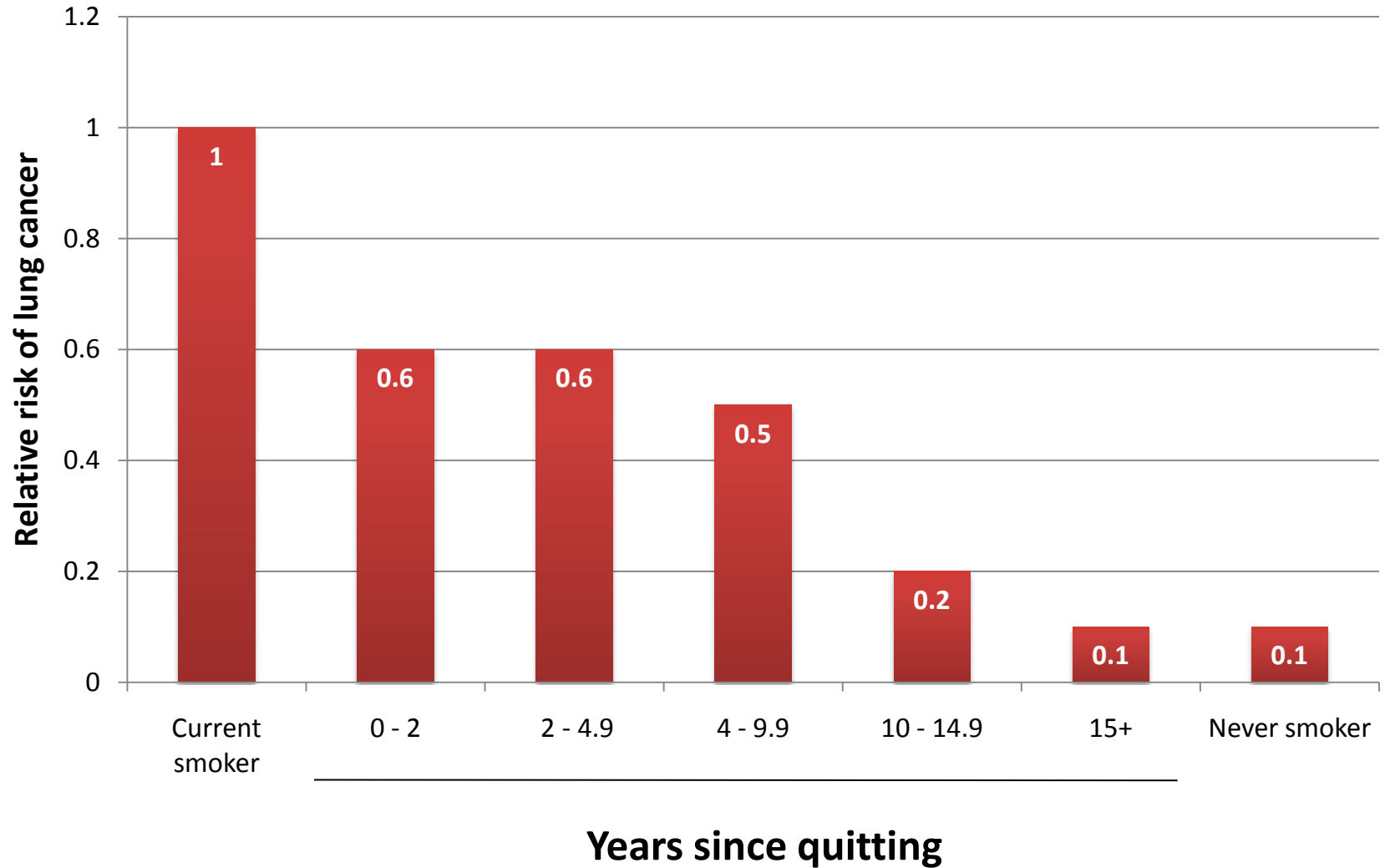
- Lung
- Stomach
- Kidney
- Myeloid Leukemia
- Pancreas
- Esophagus
- Bladder
- Larynx (wind pipe)
- Oropharynx (mouth)
- In total – over 30% cancer deaths,
 - but decreasing contribution due to tobacco control

3 Don't smoke

Quitting helps

- You've heard it before: quitting is the best thing you can do for your health.
- It's hard, but far from impossible.
- Many Australians stop for good every day.

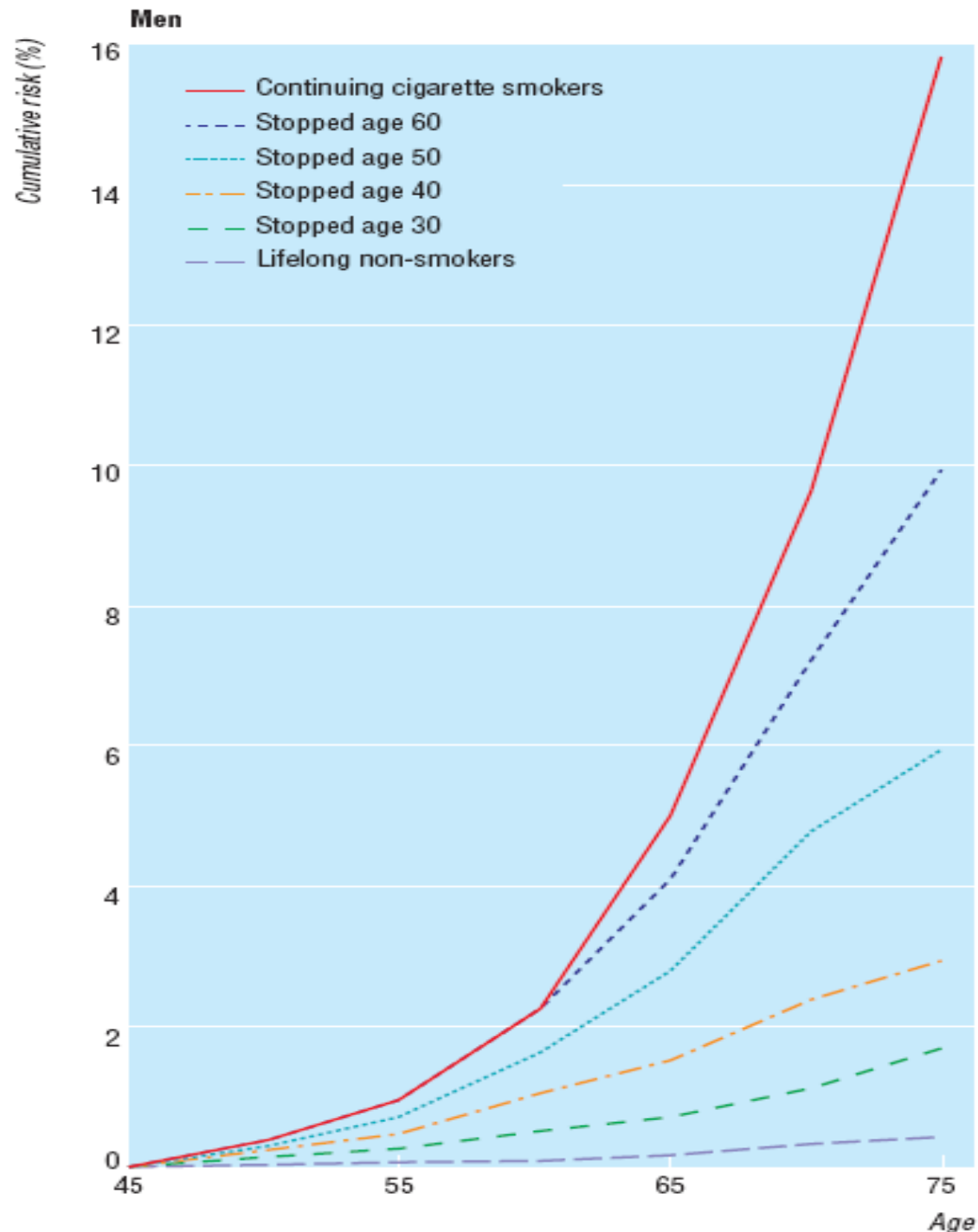
The Risk of Lung Cancer After Quitting Smoking



Speizer et al, 1999

Cumulative Risk of Death from Lung Cancer, United Kingdom

Peto et al. BMJ, 2000



3 Don't smoke

Tips

- Keep trying! It often takes 6 or 7 tries before you quit for good.
- Join a quit-smoking program. Your workplace or health plan may offer one.
- When appropriate, talk to your kids about the dangers of smoking and chewing tobacco.
- The best message to kids is being smoke-free yourself.

Diet



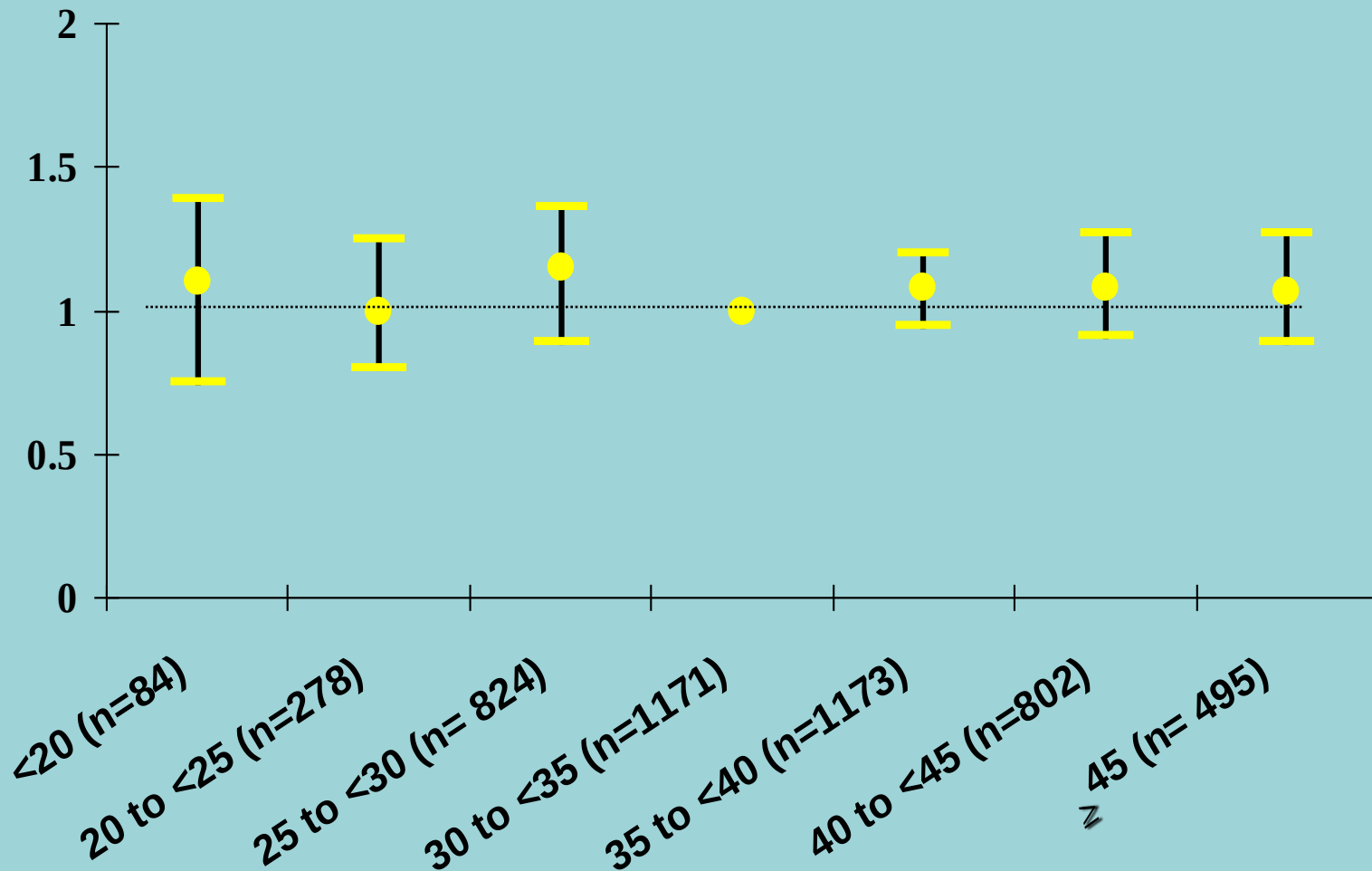
8 WAYS TO
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4 Eat a healthy diet

- Fat is not related to breast cancer risk
- But diet is important for many cancers
 - Red meat increases colon cancer
 - Tomatoes reduce prostate cancer
 - Diet rich in whole grains reduces risk of several cancers
 - Folate reduces risk of colon cancer



Relative Risk of breast cancer and (95% CI) by levels of energy from fat (4980 cases, 7 cohorts)



4 Eat a healthy diet

- Fat is not related to breast cancer risk
- But diet is important for many cancers
 - Red meat increases colon cancer
 - Tomatoes reduce prostate cancer
 - Diet rich in whole grains reduces risk of several cancers
 - Folate reduces risk of colon cancer



4 Eat a healthy diet

Take home messages

- Despite confusing reports, healthy eating is actually quite simple.
- Focus on fruits, vegetables, and whole grains.
- Keep red meat to a minimum.
- Cut back on bad fats (saturated and trans fats).
- Choose healthy fats (polyunsaturated and monounsaturated fats) more often.



4 Eat a healthy diet

Diet tips

- Make fruits and vegetables part of every meal.
- Choose chicken, fish, or beans, instead of red meat.
- Choose whole-grain cereal, brown rice, and whole-wheat bread over more refined counterparts (like white bread, white rice).
- Choose dishes made with olive or canola oil, which are high in healthy fats.
- Cut back on fast food and store-bought snacks (like biscuits and chips), which are high in bad fats.

5 Drink alcohol only in moderation

Alcohol is good for the heart, but can also increase the risk of cancer

- Breast cancer
- Colon cancer
- Head and neck cancer, to name a few

5 Drink alcohol only in moderation

Take home messages

- If you don't drink, no need to start.
- If you already drink moderately (about 1 a day for women, 2 a day for men), probably no reason to stop.
- People who drink more, should cut back.

5 Drink alcohol only in moderation

Tips

- Choose non-alcoholic beverages at meals and parties.
- Avoid occasions centered around alcohol.
- Talk to a health care professional if you feel you have a problem with alcohol.
- When appropriate, discuss the dangers of drug and alcohol abuse with children.

6 Protect yourself from the sun

- Sunburns and excess sun exposure are major causes of skin cancer, including serious melanoma.
- Melanoma is on the rise in the white populations. Australia leads the world.
- <http://www.sunsmart.com.au/>

6 Protect yourself from the sun

Message

- Avoid too much sun.
- Skin damage starts early in childhood, so it's especially important to protect children.



6 Protect yourself from the sun

Tips

- If UV index is above 3 protection is needed. Avoid direct sunlight between 10:00 a.m. and 4:00 p.m.
 - Use hats, long-sleeve shirts, and sunscreens with SPF15 or higher, broad spectrum.
- Don't use sun lamps or tanning booths.



7 Avoid sexually transmitted infections

- Among other problems, sexually transmitted infections—like human papillomavirus (HPV)—are linked to a number of different cancers.
- Infection with HPV (human papilloma virus) causes cervical cancer

7 Avoid sexually transmitted infections

Take home message

- Protecting yourself from sexually transmitted infections can lower your cancer risk.
- From 2007, 12-13 year olds covered through Immunise Australia



Information Line
1800 671 811



8 Get screening tests

A number of screening tests can help protect against cancer or detect it early

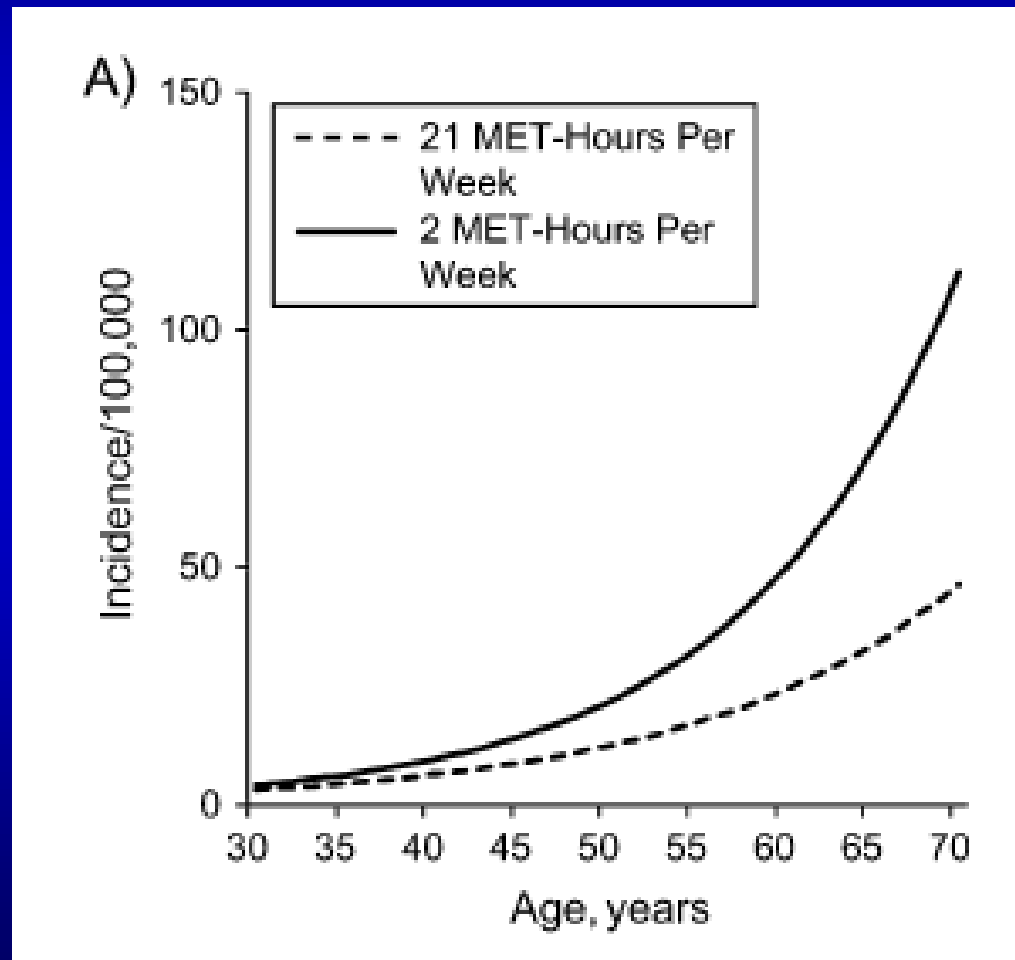
- Regular screening is recommended for:
 - Colon and rectal cancer
 - Cervical cancer
 - Breast cancer

8 Get screening tests

Take home messages

- Screening tests can find cancer early, or prevent it altogether.
- For colorectal cancer alone, regular screening could save many lives:
 - now 4,165 deaths per year, half preventable
- Talk to a health care professional about which tests you should have and when.

Activity and colon cancer risk reduction

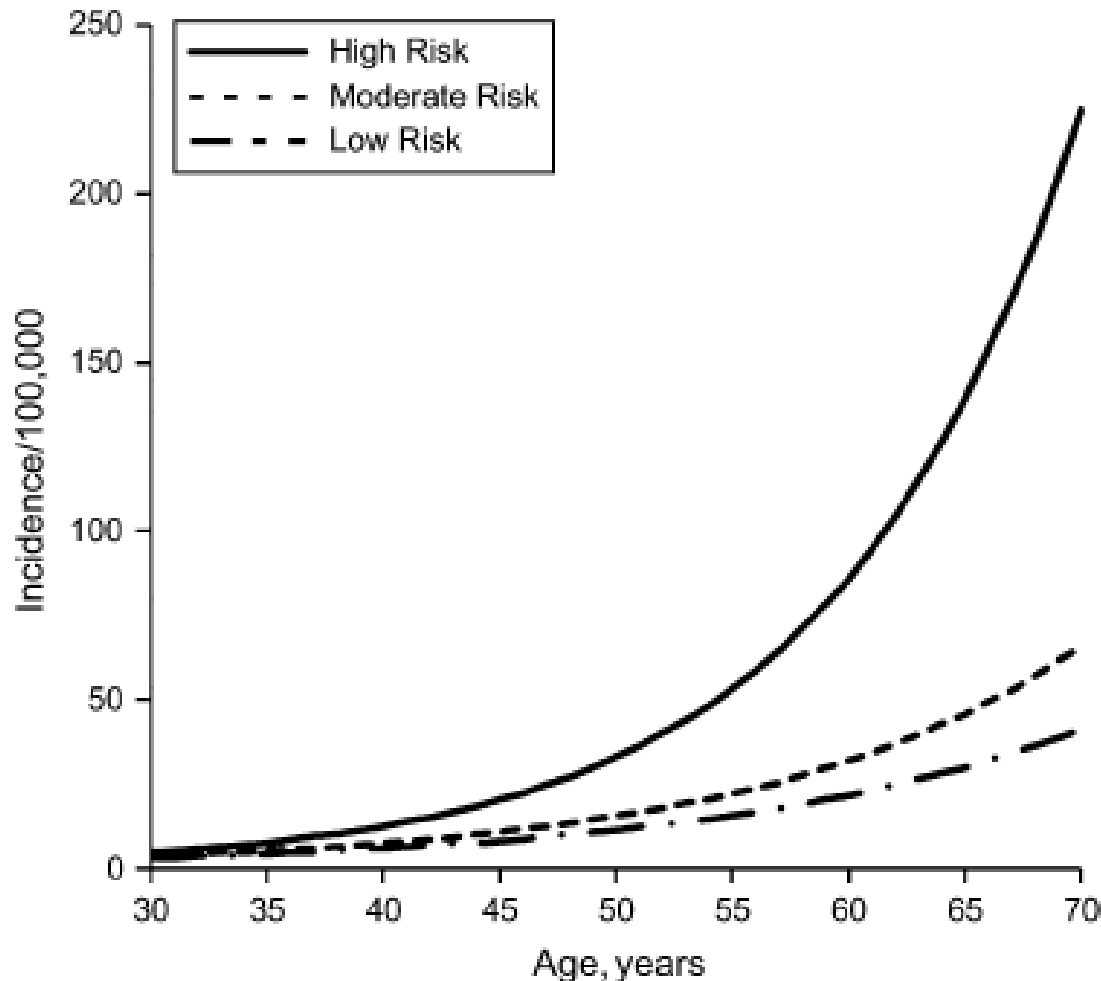


Risk
reduction
50%

Wei et al
AJE 2009



Colon cancer risk varies



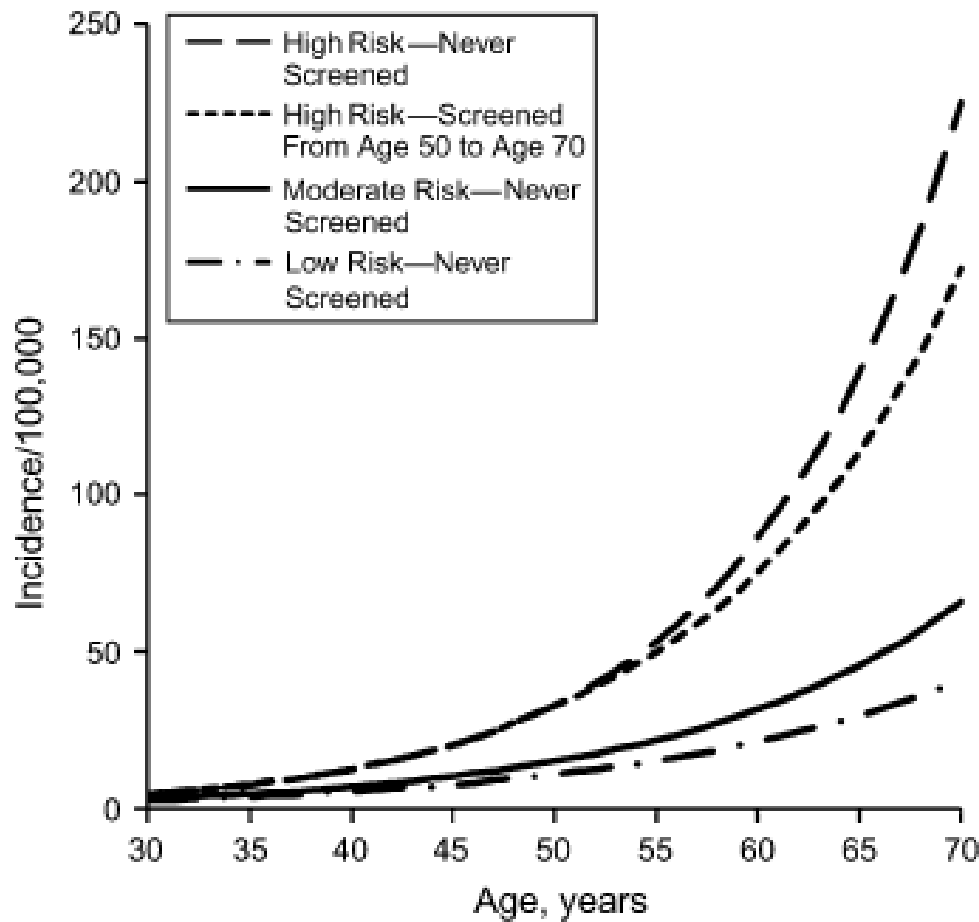
High Risk
Overweight
Smoker
Inactive
Red meat daily
Low folate

Wei et al AJE
2009

Low Risk
Active
Non-smoker
Lean
No red meat
Folate



Even after screening risk is elevated



Wei et al
AJE 2009



8 WAYS to **Stay Healthy & Prevent Cancer**

- 1 Maintain a healthy weight**
- 2 Exercise regularly**
- 3 Don't smoke**
- 4 Eat a healthy diet**
- 5 Drink alcohol only in moderation**
- 6 Protect yourself from the sun**
- 7 Avoid sexually transmitted infections**
- 8 Get screening tests**



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8 WAYS to Stay Healthy & Prevent Cancer

Other important factors

- Family history
- Among women, postmenopausal hormones increase risk of breast cancer and lower risk of fractures and colon cancer
- Aspirin (regular dose) reduces risk of colon cancer
- Talking to your health care provider



8 WAYS to Stay Healthy & Prevent Cancer

Take charge of your health

- Healthy behaviors can prevent over half of cancers
- Start with one or two changes now, then build
- Help your family to choose healthy behaviors
- Help build a healthy community
 - Our surroundings can have a big influence on choices
 - Look for ways to help reinforce and support healthy behaviors in your community (like schools, workplace, farmers markets, etc)



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to Help

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Professionals

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THE SOURCE ON PREVENTION

Cancer

Diabetes

Heart disease

Osteoporosis

Stroke

8 ways
to prevent
disease

What is...?

Prevention

Risk

A Screening Test

How to...

Estimate Risk

Community Action

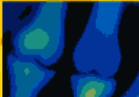
my results: **No Results Yet** ▼

About the Move to Siteman

Welcome to *Your Disease Risk*, the source on prevention. Here, you can find out your risk of developing five of the most important diseases in the United States and get personalized tips for preventing them.

Developed over the past ten years by world-renowned experts, *Your Disease Risk* collects the latest scientific evidence on disease risk factors into one easy-to-use tool.

To get started, choose one of the diseases below.

What is your risk?		
	Cancer: There's much more to it than just smoking and lung cancer.	What's your cancer risk? ➔
	Diabetes: Over 18 million in the U.S. suffer from it. Take steps now to lower your risk.	What's your diabetes risk? ➔
	Heart disease: The #1 killer in the U.S. is also one of the most preventable.	What's your heart disease risk? ➔
	Osteoporosis: Calcium isn't the only way (or even the best way) to protect yourself.	What's your osteoporosis risk? ➔

www.yourdiseaserisk.wustl.edu



8 WAYS to stay Healthy and Prevent Cancer



KNOW YOUR RISK. CHANGE YOUR FUTURE.



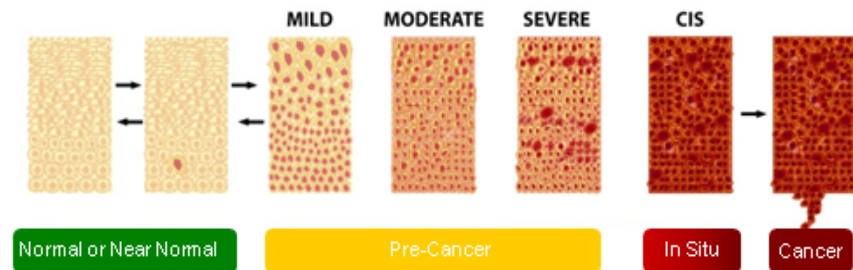
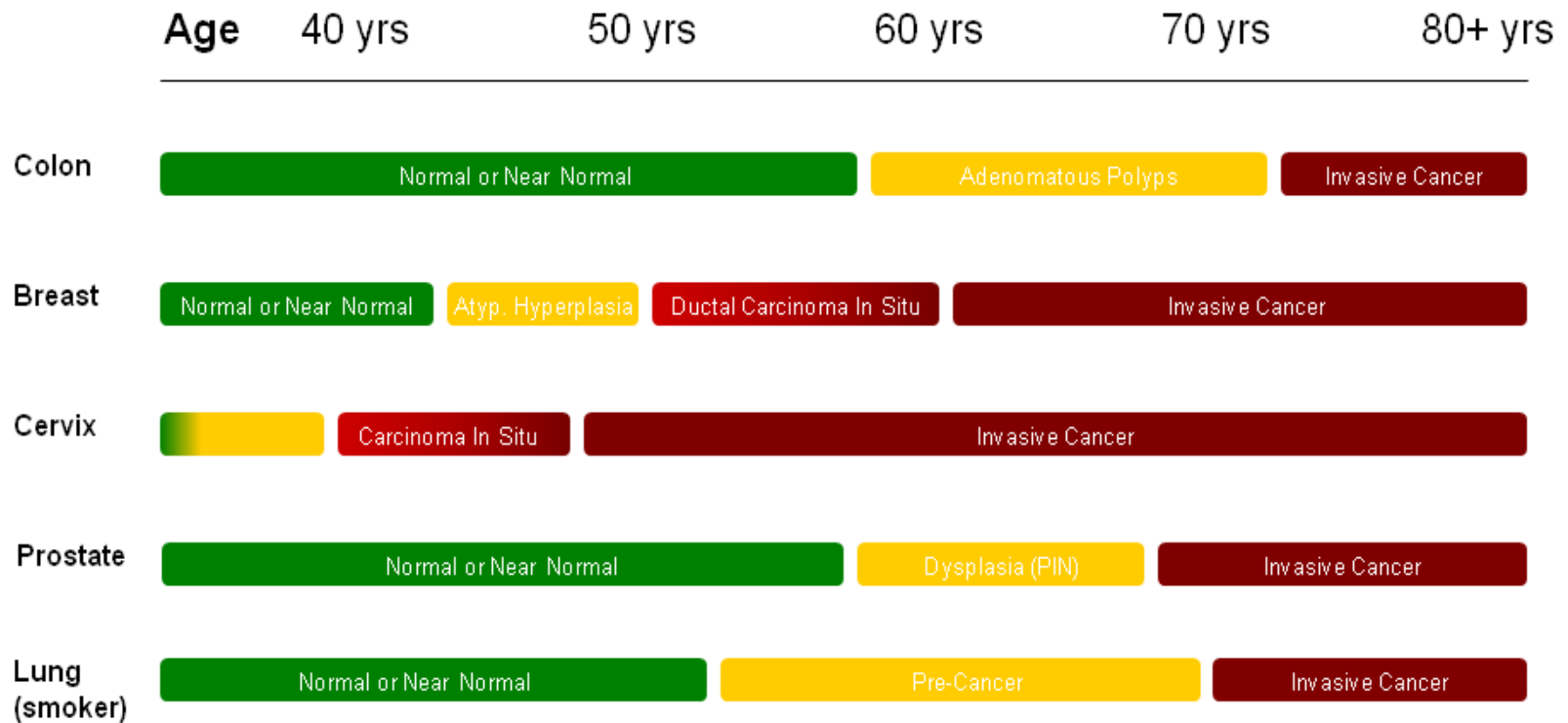
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Challenges

Table 1 Questions to frame cancer prevention

Prevention questions	Cohort
Which exposure?	Refined measures
Change by how much?	Observational cohorts ideally across broad range of exposure
Among whom? At what age must exposure be changed?	Level of exposure Time course of exposure and disease development
How long must change be sustained?	Duration of altered exposure to modify cancer incidence
Does risk reduction persist after cessation of exposure?	Updated exposure in cohort essential to address this question

Average Timeline from Normal Tissue to Invasive Cancer



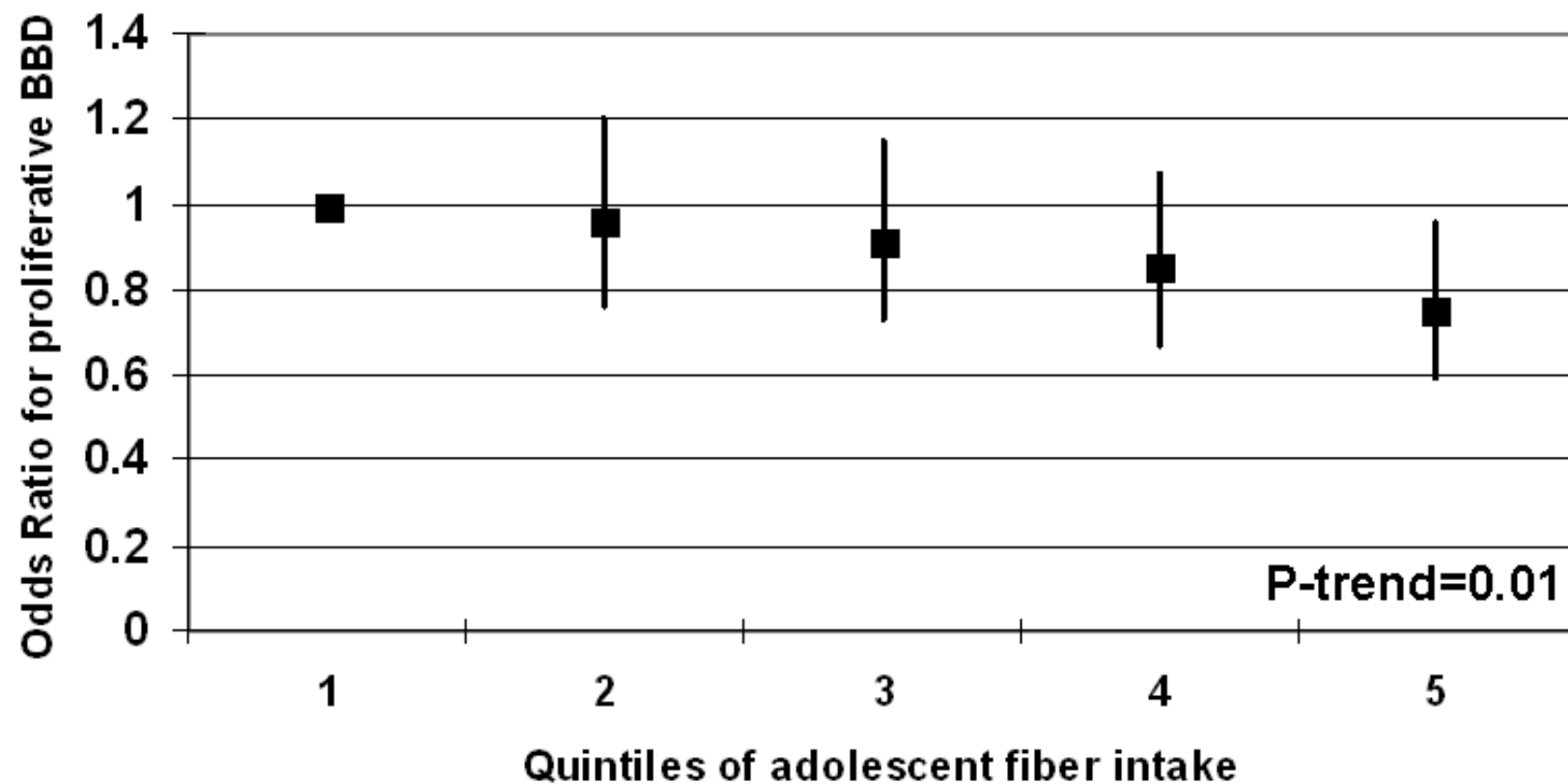
Adapted from Figure 11.7 *The Biology of Cancer*, Weinberg (© Garland Science 2007)

Fill gaps in knowledge

- Identify gaps of exposure assessment in framework of understanding the time course of disease etiology, e.g., radiation and breast cancer points to childhood and adolescent exposure
 - Adolescent and early life exposures in context of adult exposures etc...



Figure 2. Adolescent intake of fiber and risk of proliferative BBD, Nurses' Health Study II

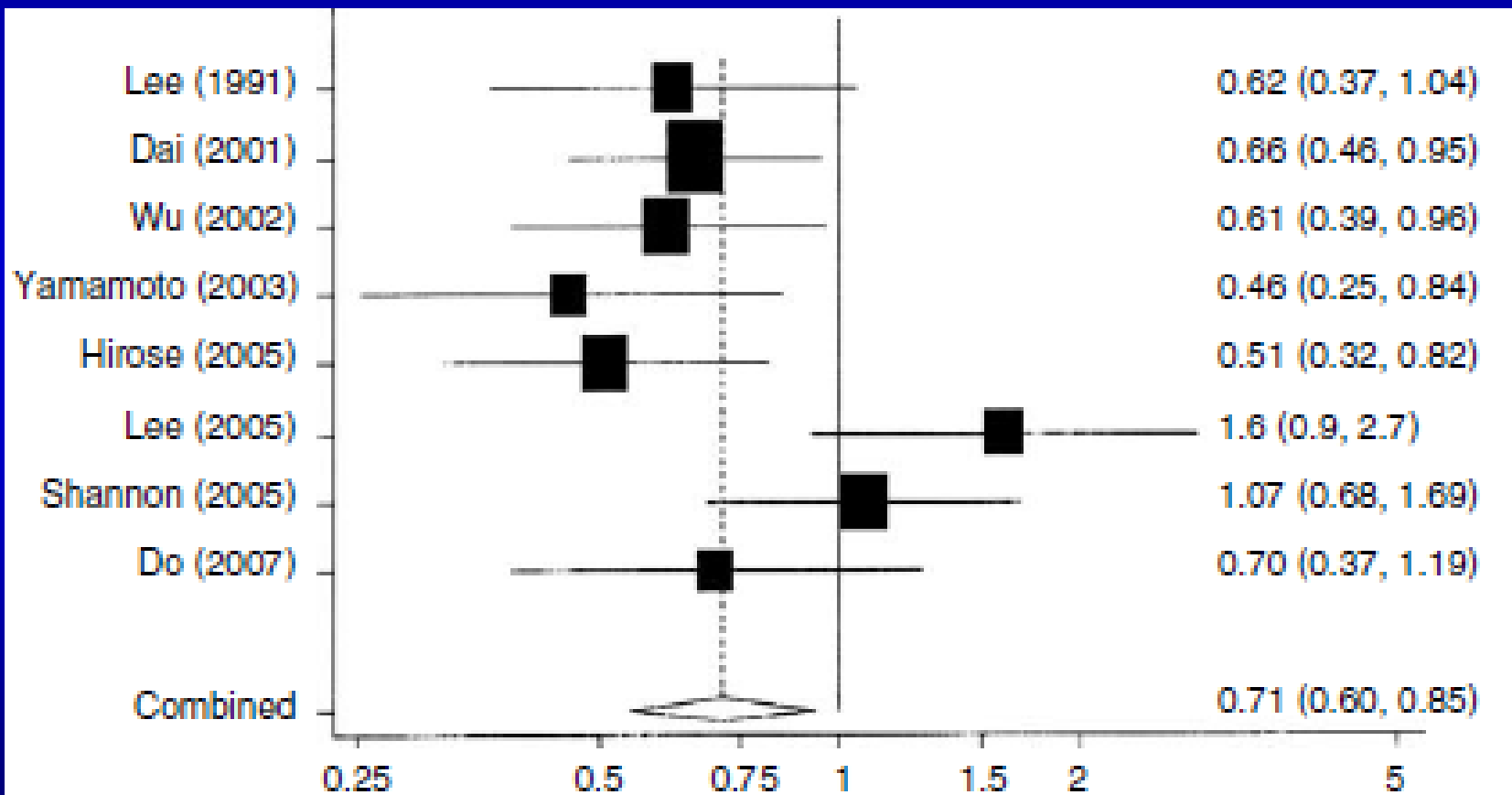


Adolescent diet exposures

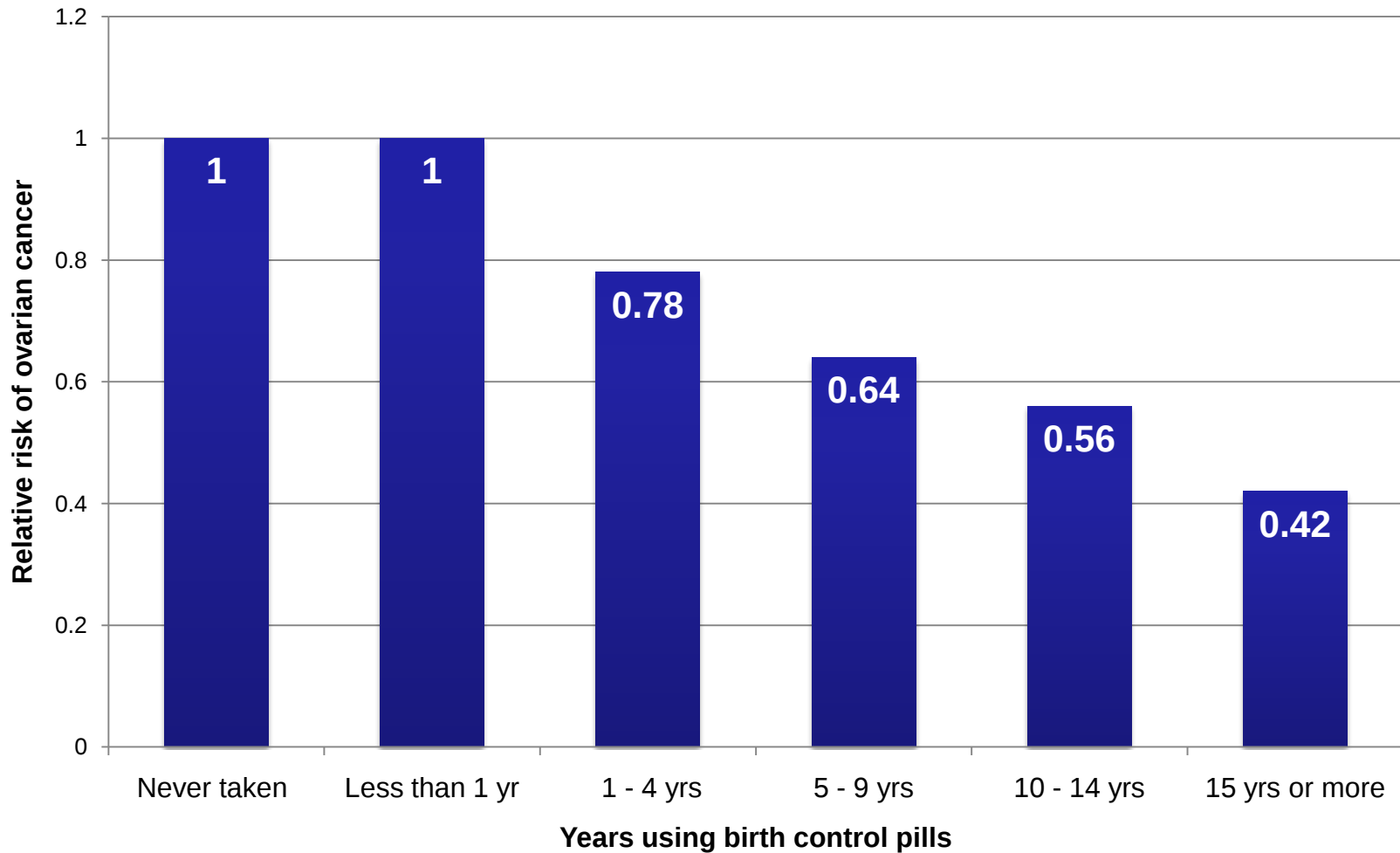
- Soy: Hi vs low intake (Korde CEBP2009)
 - Childhood $RR=0.42$
 - Adolescent $RR=0.77$
 - Adult $RR = 0.71$
- Prospective data from Shanghai cohort support this protective effect, (Lee AJCN 2009)
- US based studies of recent consumption of soy based products show no protection
 - US intake $\sim 0.8\text{mg}$ isoflavone per day
 - Asian intake $\sim 20\text{ mg/d}$ vs $<5\text{mg/d}$



8 Asian studies adult intake: >20 mg /d vs. <5mg/d isoflavone



Birth Control Pill Use and Risk of Ovarian Cancer



Beral et al, 2008

Setting priorities – seeing benefits

What works	Buren	When will we see benefit
Tobacco control	Lung & total cancer	Youth – adult
		Adult cessation – 5 years
Vaccine	Liver	20+ years
	Cervix	? 20+ years
Obesity	Breast/colon/ many others	Long term payoff
Physical activity	Breast, colon	Longer term (yrs)
Pap Smear	Cervix	Rapid decrease in incidence



*Scientific
Knowledge*

Political Will

Health

Social strategy

Provider

Regulations

Community

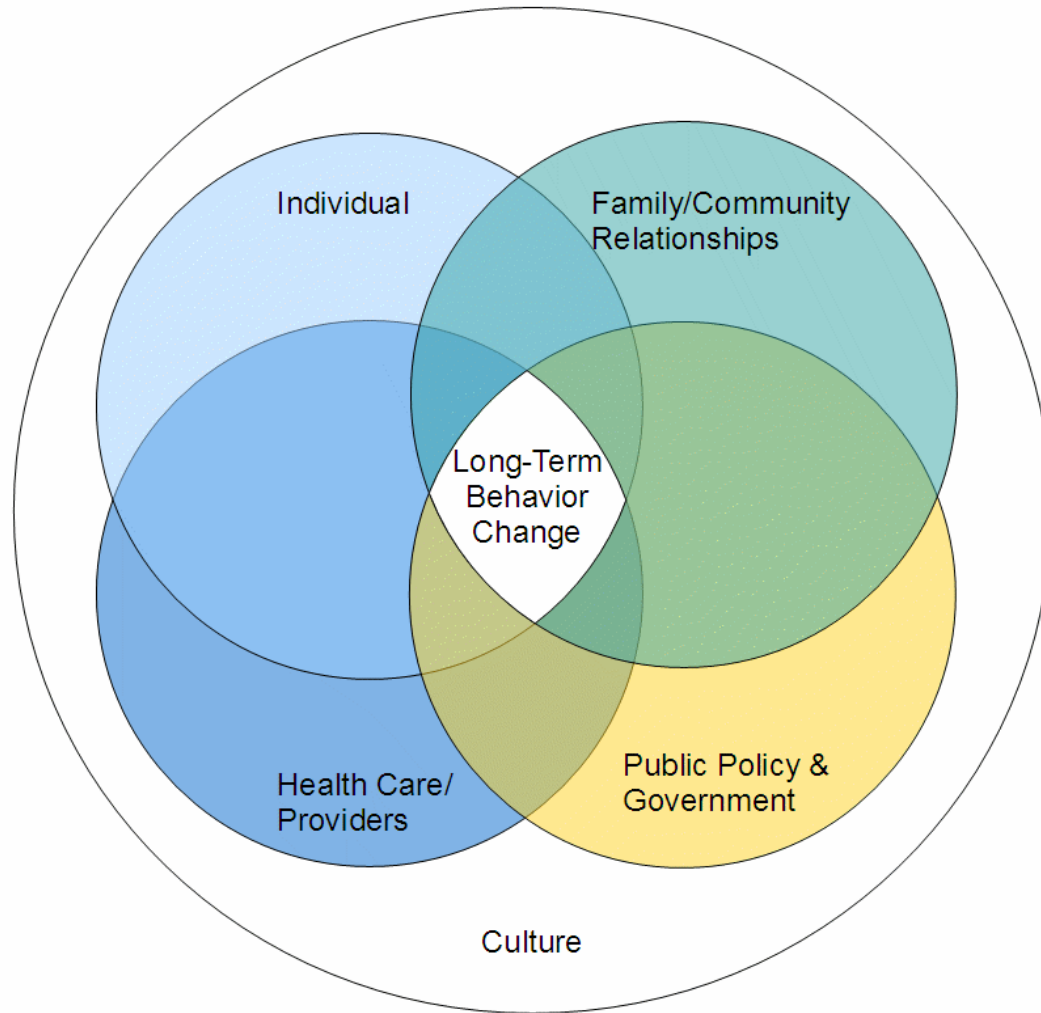
Atwood, Colditz, Kawachi, AJPH 1997; 87: 1603-1606.

Richmond: Social strategies

- Preventive services delivered by health providers to patients
- Structural interventions that are implemented by government and industry to protect the public from harm and reinforce behavior change
- Activities that communities can engage in to promote a healthier environment and lifestyle



An integrated approach





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