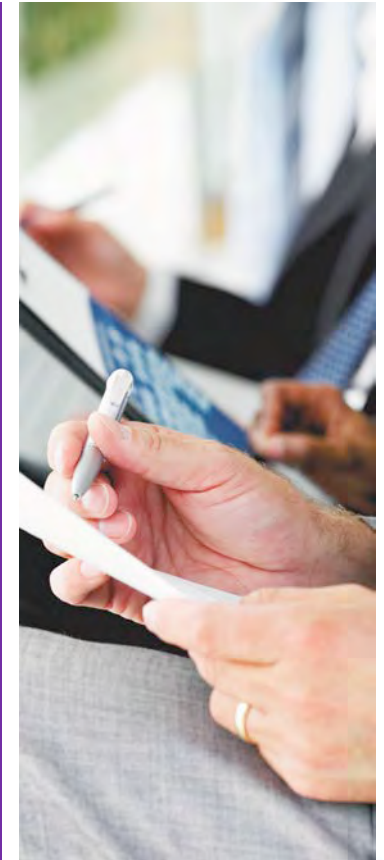# World Cancer Research Fund International

Diet, Nutrition, Physical Activity and Cancer: update from WCRF

6 February 2017

Martin Wiseman

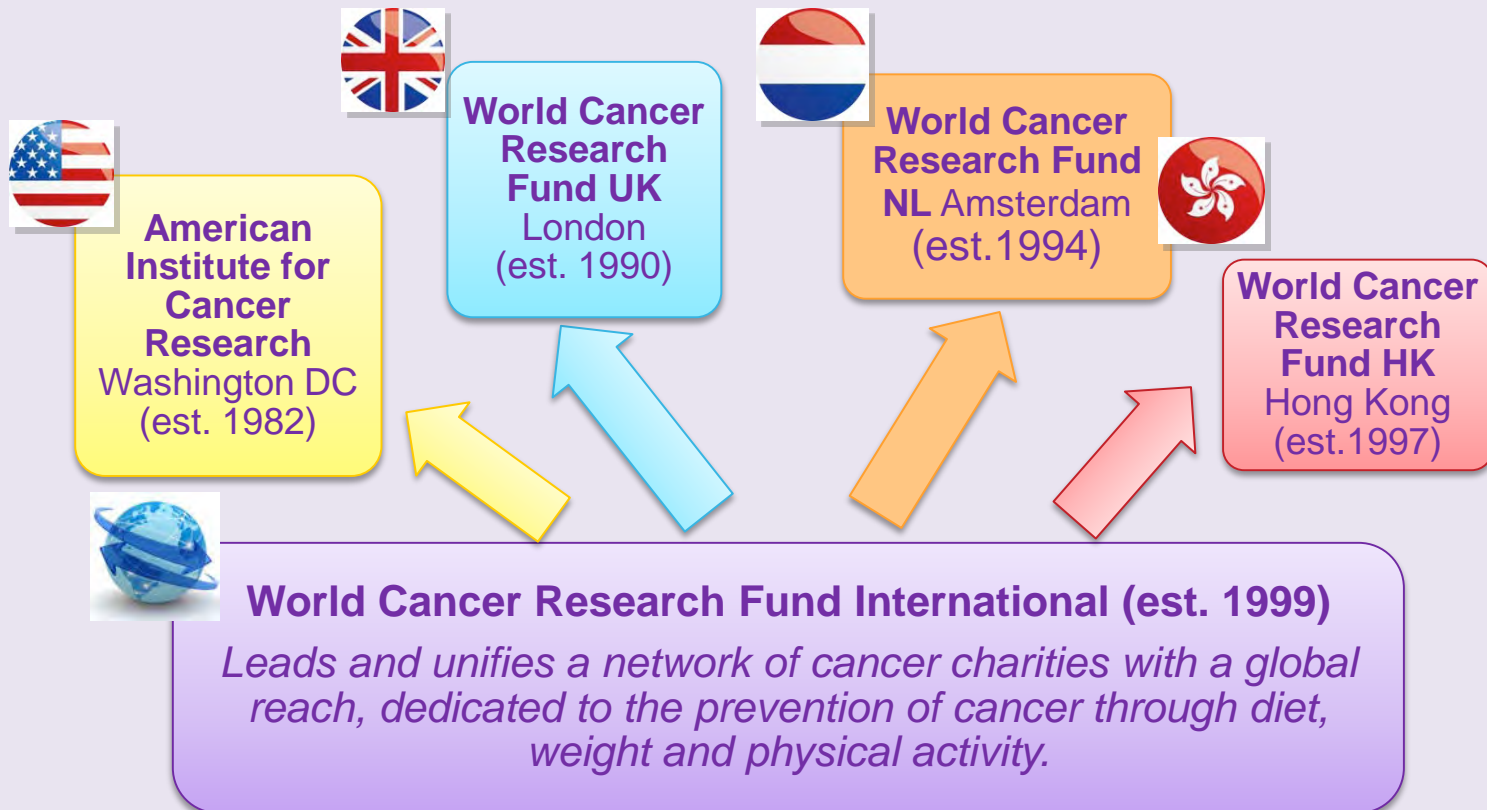**World Cancer Research Fund International & University of Southampton**

Outline

- Intro to WCRF
- Background
- Continuous Update Project
- Impact of adherence to recommendations
- Changes in emphasis
- Conclusion

Outline

- Intro to WCRF
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Who we are

🇺🇸 AICR

🇬🇧 WCRF UK

🇳🇱 WCRF Netherlands

🇭🇰 WCRF Hong Kong

WCRF International

Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective

Continuous Update Project

Analysing research on cancer prevention and survival
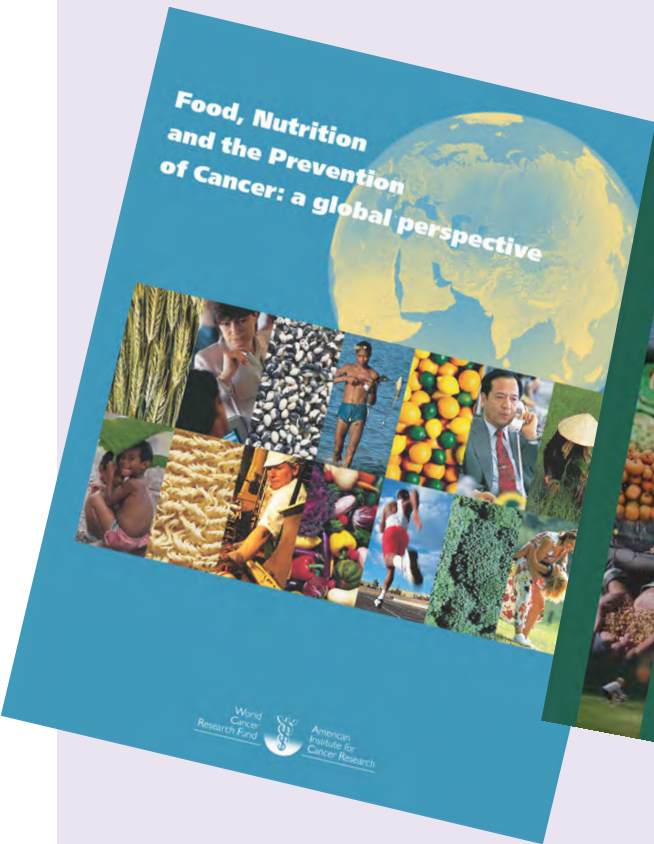
What we do

Fund research on the relationship of diet, nutrition, physical activity and body weight to cancer risk

Interpret the accumulated scientific literature to derive Cancer Prevention Recommendations

Educate people through our national Health Information programmes

Advocate effective policies to help people and populations to reduce their chances of developing cancer

Food, Nutrition and the Prevention of Cancer: a global perspective

Policy and Action for Cancer

Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective

Continuous Update Project 2011
Keeping the science current
Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective

Continuous Update Project CUP

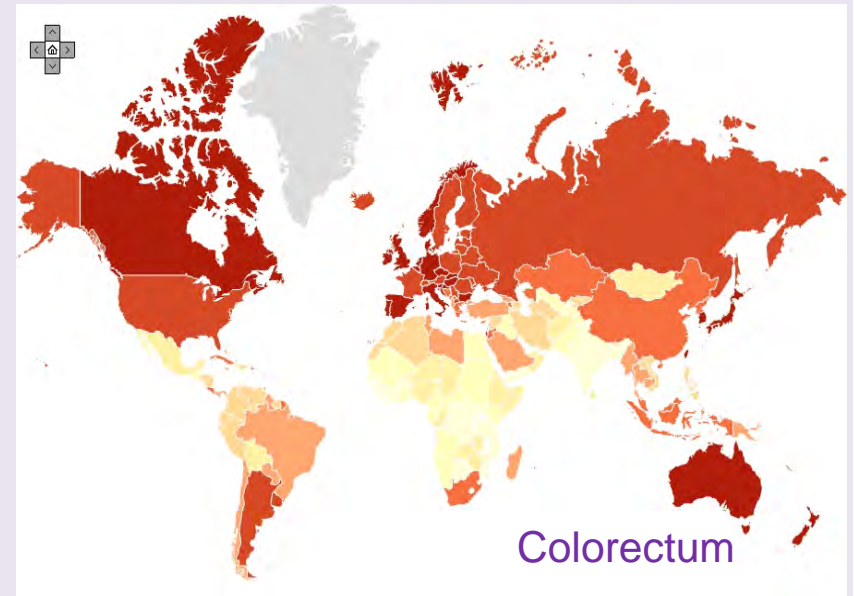# Outline

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Global variation in cancer incidence

Breast

Colorectum

Globocan, WHO

Migration data

Figure 1.2.20 Cancer incidence for selected cancers in Japanese women by generation in Hawaii and Japan, 1968–1977
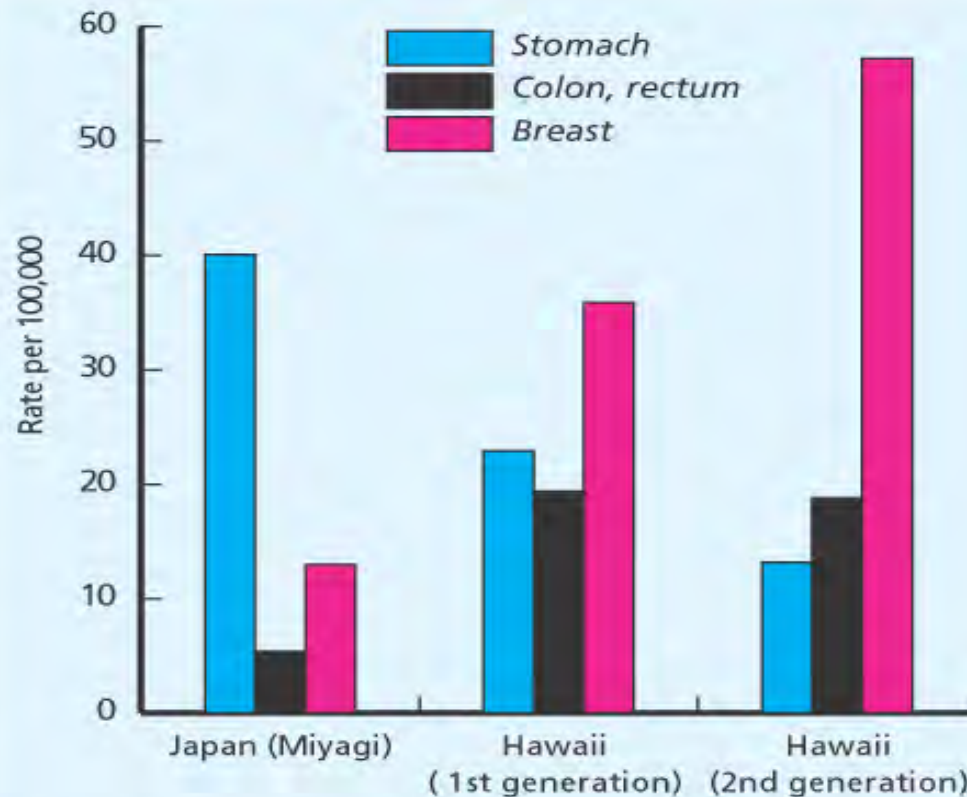
Age-adjusted to the World Standard Population
(From Kolonel et al, 1980)

Cancer Incidence in Japan*
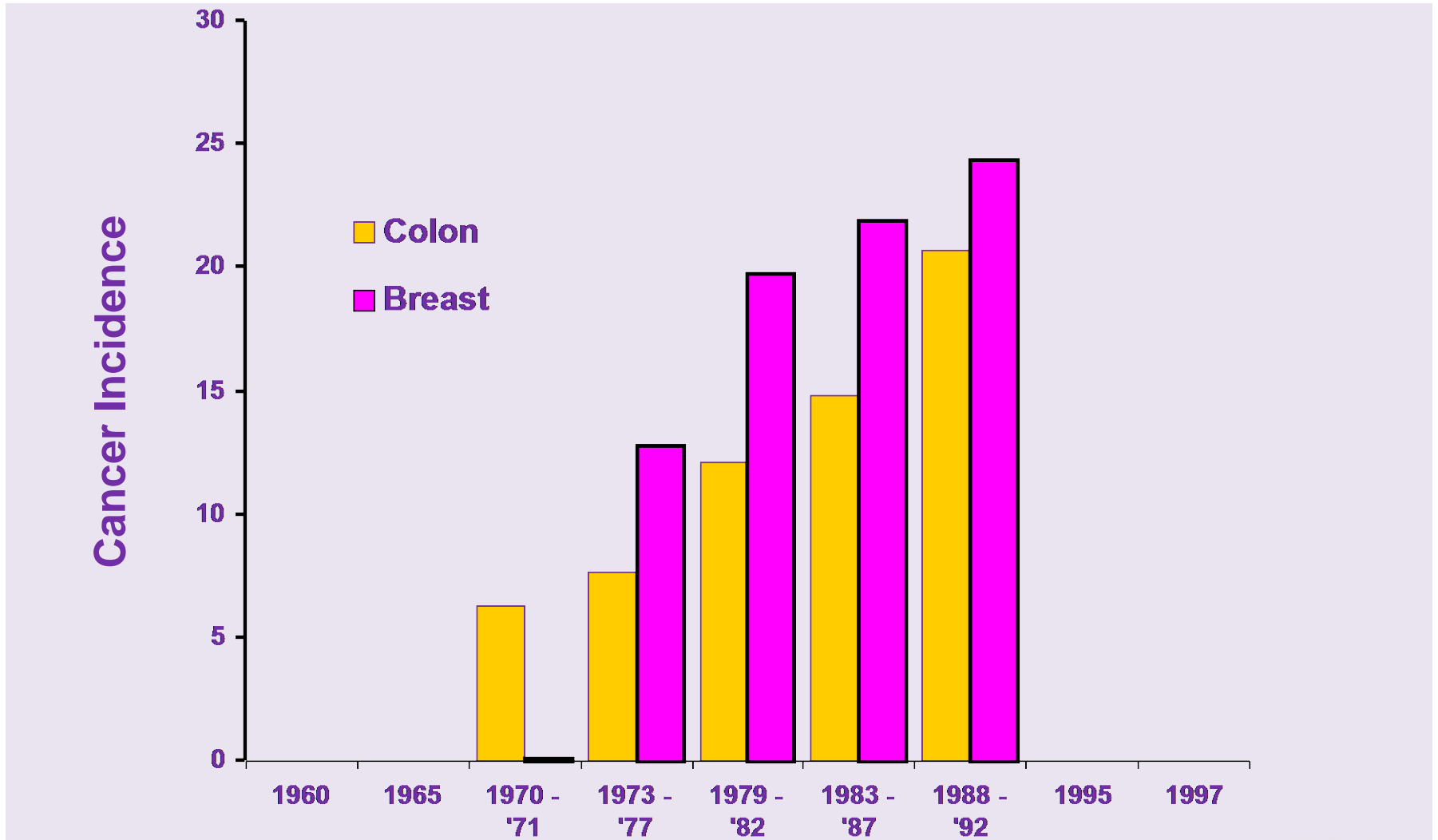
* Per 100,000, world population standard

www.wcrf.org

Hallmarks of cancer
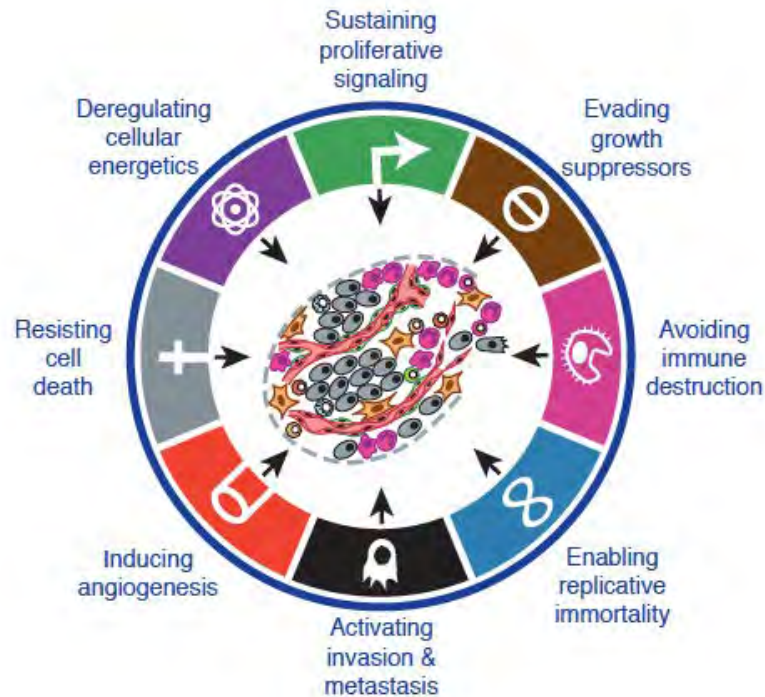
Two enabling characteristics for acquiring hallmarks
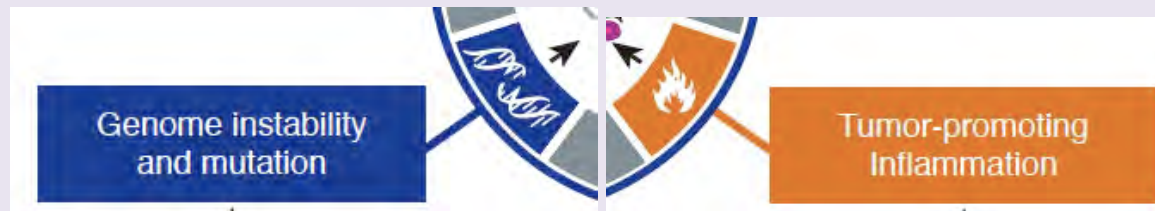
Hanahan & Weinberg (2011) Cell; Hanahan & Coussens (2012) Cancer Cell
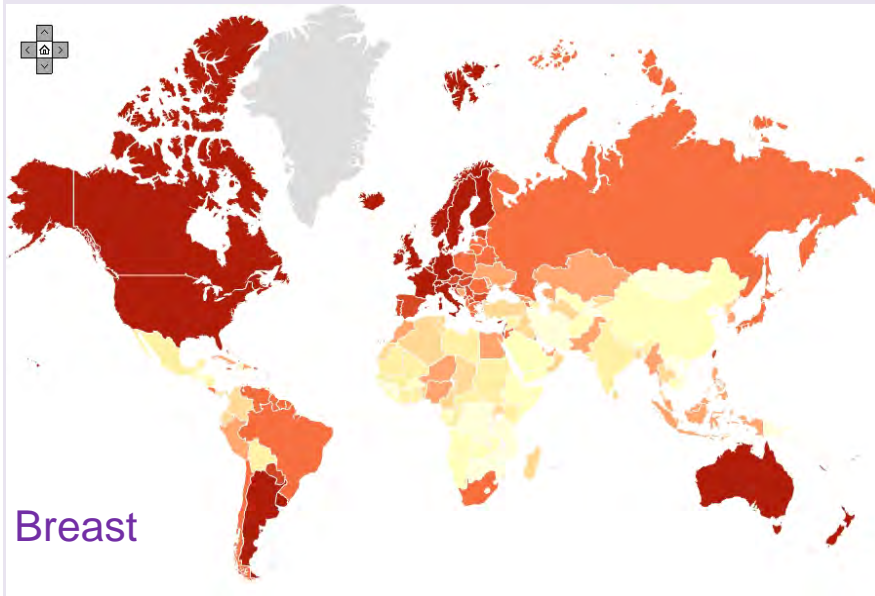
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World
Cancer
Research Fund

American
Institute for
Cancer Research

Food, Nutrition,
Physical Activity,
and the Prevention
of Cancer:
a Global Perspective
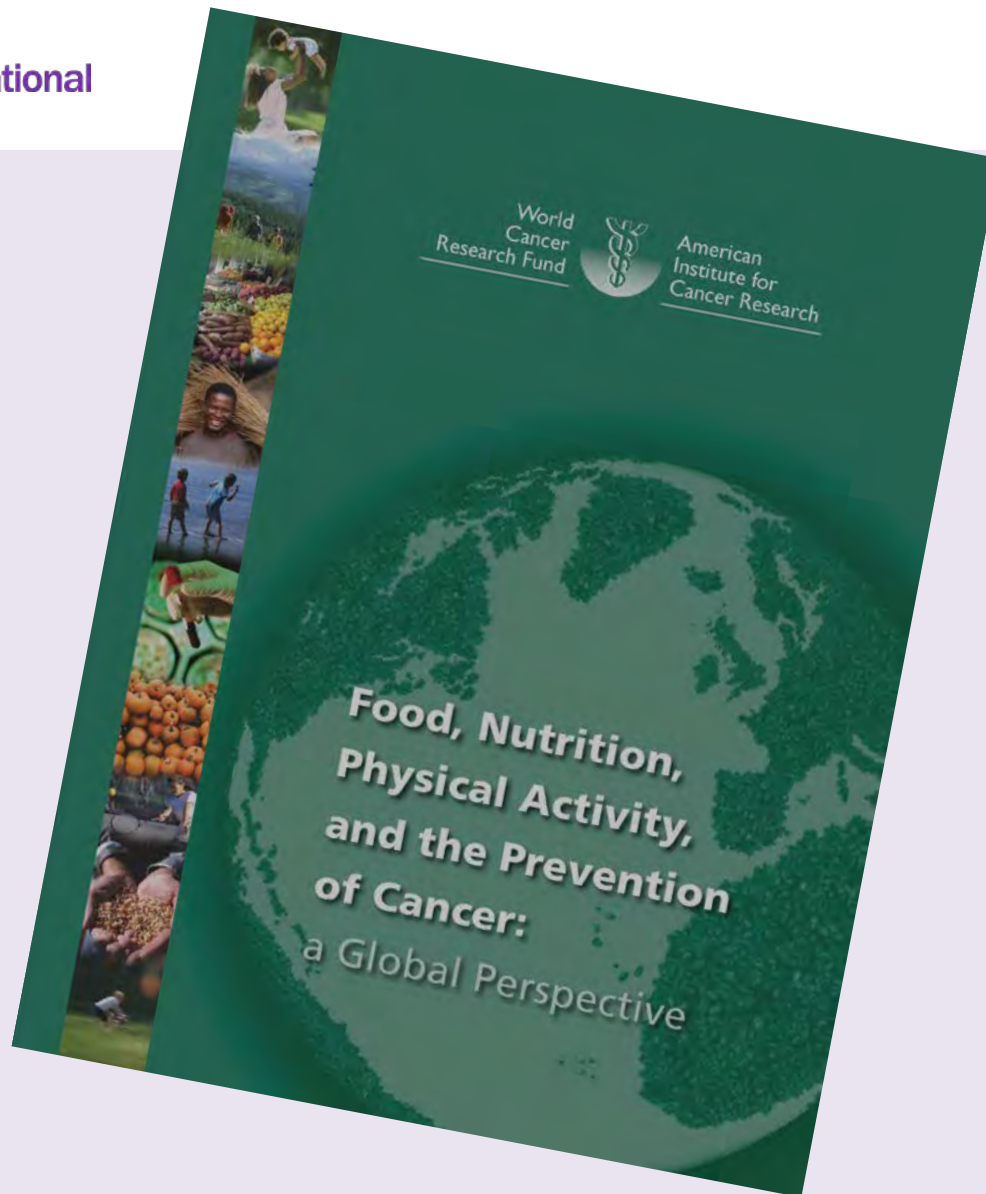
Summary of 'convincing' and 'probable' judgements

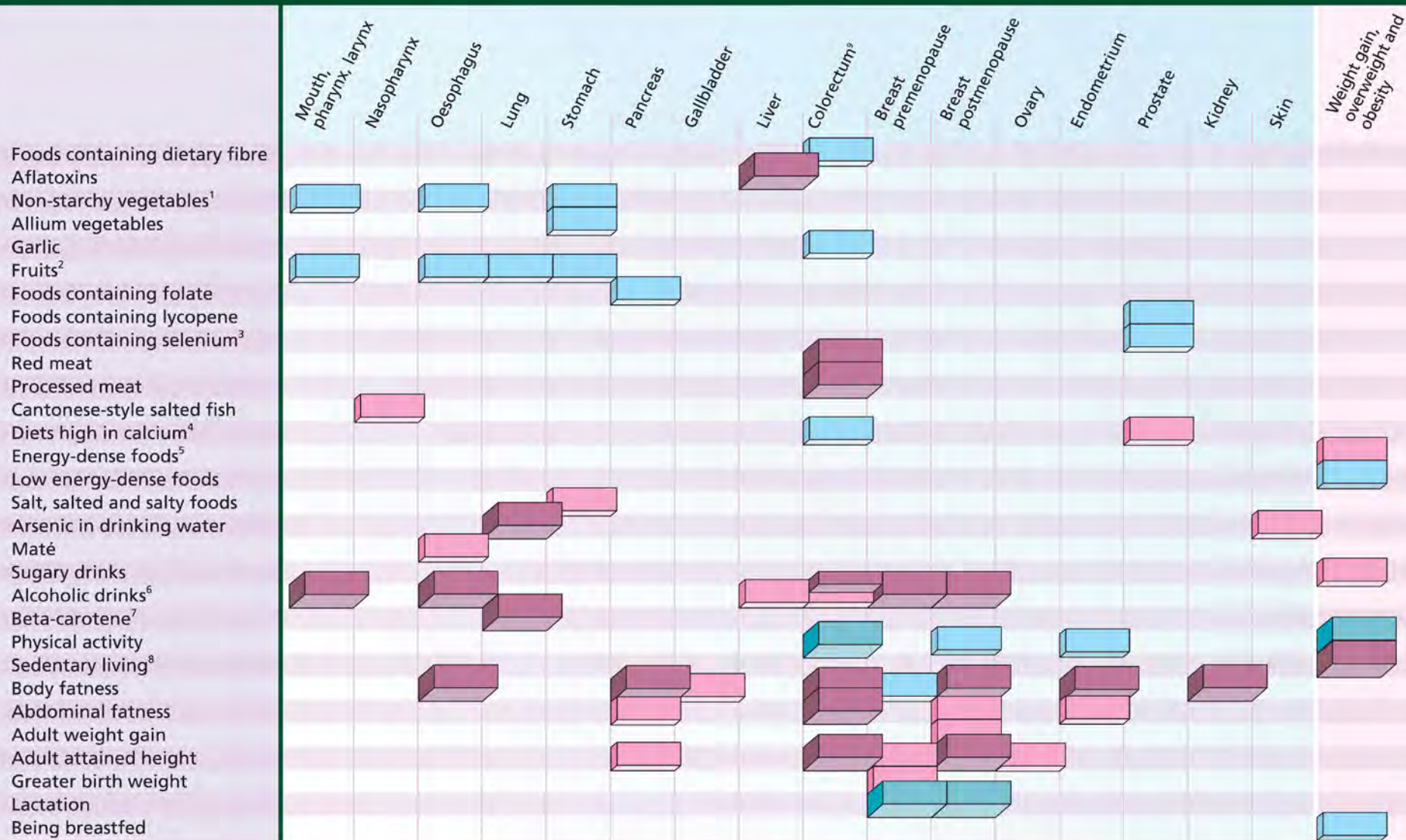|	Mouth, pharynx, larynx	Nasopharynx	Oesophagus	Lung	Stomach	Pancreas	Gallbladder	Liver	Colorectum[9]	Breast premenopause	Breast postmenopause	Ovary	Endometrium	Prostate	Kidney	Skin	Weight gain, overweight and obesity
Foods containing dietary fibre									PD								
Aflatoxins								CI									
Non-starchy vegetables[1]	PD		PD		PD												
Allium vegetables					PD												
Garlic									PD								
Fruits[2]	PD		PD	PD	PD												
Foods containing folate						PD											
Foods containing lycopene														PD			
Foods containing selenium[3]														PD			
Red meat									CI								
Processed meat									CI								
Cantonese-style salted fish		PI															
Diets high in calcium[4]									PD					PI			
Energy-dense foods[5]																	PI
Low energy-dense foods																	PD
Salt, salted and salty foods					PI												
Arsenic in drinking water				PI													
Maté			PI														
Sugary drinks																	PI
Alcoholic drinks[6]	CI		CI					PI	CI	PI	CI						
Beta-carotene[7]																	
Physical activity									CD		PD		PD				CD
Sedentary living[8]																	PI
Body fatness			PI			PI			CI	PD	CI		CI		CI		
Abdominal fatness						PI			CI		PI		CI				
Adult weight gain											PI						
Adult attained height									CI	PI	CI						
Greater birth weight										PI							
Lactation										CD	CD						
Being breastfed																	PD

KEY

- Convincing decreased risk
- Probable decreased risk
- Probable increased risk
- Convincing increased risk

[1] Includes evidence on foods containing carotenoids for mouth, pharynx, larynx; foods containing beta-carotene for oesophagus; foods containing vitamin C for oesophagus

[2] Includes evidence on foods containing carotenoids for mouth, pharynx, larynx and lung; foods containing beta-carotene for oesophagus; foods containing vitamin C for oesophagus

[3] Includes evidence from supplements for prostate

[4] Evidence is from milk and studies using supplements for colorectum

[5] Includes 'fast foods'

[6] Convincing harm for men and probable harm for women for colorectum

[7] The evidence is derived from studies using supplements for lung

[8] Includes evidence on televison viewing

[9] Judgement for physical activity applies to colon and not rectum

World Cancer Research Fund American Institute for Cancer Research

The Panel emphasises the importance of not smoking and of avoiding exposure to tobacco smoke

RECOMMENDATIONS

BODY FATNESS
Be as lean as possible within the normal range of body weight

PHYSICAL ACTIVITY
Be physically active as part of everyday life

FOODS AND DRINKS THAT PROMOTE WEIGHT GAIN
Limit consumption of energy-dense foods
Avoid sugary drinks

PLANT FOODS
Eat mostly foods of plant origin

ANIMAL FOODS
Limit intake of red meat and avoid processed meat

ALCOHOLIC DRINKS
Limit alcoholic drinks

PRESERVATION, PROCESSING, PREPARATION
Limit consumption of salt
Avoid mouldy cereals (grains) or pulses (legumes)

DIETARY SUPPLEMENTS
Aim to meet nutritional needs through diet alone

BREASTFEEDING
Mothers to breastfeed; children to be breastfed

CANCER SURVIVORS
Follow the recommendations for cancer prevention

SUMMARY OF STRONG EVIDENCE ON DIET, NUTRITION, PHYSICAL ACTIVITY AND PREVENTION OF CANCER

Legend:
- ■ Convincing decreased risk
- ■ Probable decreased risk
- ■ Convincing increased risk
- ■ Probable increased risk
- ■ Substantial effect on risk unlikely

	MOUTH, PHARYNX, LARYNX (2007)	NASOPHARYNX (2007)	OESOPHAGUS (2007)	LUNG (2007)	STOMACH (2007)	PANCREAS (2012)	GALLBLADDER (2015)	LIVER (2015)	COLORECTUM (2011)	BREAST PREMENOPAUSE (2010)	BREAST POSTMENOPAUSE (2010)	OVARY (2014)	ENDOMETRIUM (2013)	PROSTATE (2014)	KIDNEY (2015)	SKIN (2007)
Foods containing dietary fibre									Convincing decreased							
Aflatoxins								Convincing increased								
Non-starchy vegetables[1]	Probable decreased		Probable decreased		Probable decreased											
Allium vegetables					Probable decreased											
Garlic									Probable decreased							
Fruits[2]	Probable decreased		Probable decreased	Probable decreased	Probable decreased											
Red meat									Convincing increased							
Processed meat									Convincing increased							
Cantonese-style salted fish		Probable increased														
Diets high in calcium[3]									Probable decreased							
Salt, salted and salty foods					Probable increased											
Glycaemic load													Probable increased			
Arsenic in drinking water				Convincing increased												Probable increased
Maté			Probable increased													
Alcoholic drinks[4]	Convincing increased		Convincing increased					Convincing increased	Convincing increased	Probable increased	Convincing increased				Probable decreased	
Coffee						Substantial effect unlikely		Probable decreased					Probable decreased			
Beta-carotene[5]				Convincing increased										Substantial effect unlikely		Substantial effect unlikely
Physical activity[6]									Convincing decreased		Probable decreased		Probable decreased			
Body fatness[7]			Convincing increased			Convincing increased	Probable increased	Convincing increased	Convincing increased	Probable decreased	Convincing increased	Probable increased	Convincing increased	Probable increased	Convincing increased	
Adult attained height[8]						Probable increased			Convincing increased	Convincing increased	Convincing increased	Convincing increased		Probable increased	Probable increased	
Greater birth weight										Probable increased						
Lactation										Convincing decreased	Convincing decreased					

NUTRITION AND CANCERS

- **ADIPOSITY**
  - BREAST (PM), COLORECTUM, ENDOMETRIUM, OESOPHAGUS, PANCREAS, GALLBLADDER, KIDNEY, OVARY, PROSTATE (ADVANCED), LIVER
- **PHYSICAL (IN)ACTIVITY**
  - COLON, BREAST, ENDOMETRIUM
- **MEAT – RED AND PROCESSED**
  - COLON, RECTUM, STOMACH (non-cardia)
- **ALCOHOL**
  - MPL, BREAST, COLORECTUM, LIVER, OESOPHAGUS
- **PLANT FOODS (F&V, PULSES, WHOLEGRAINS)**
  - MPL, OESOPHAGUS, STOMACH, COLORECTUM (DF), LUNG
- **BREASTFEEDING**
  - BREAST (MOTHER), OBESITY (CHILD)

Publications timetable

Year	Publication
2010	Breast
2011	Colorectum
2012	Pancreas
2013-14	Endometrium, ovary, breast cancer survivors, prostate
2014-15	Bladder, kidney, liver, gallbladder
2016	Stomach, oesophagus
2017	Mouth, pharynx, larynx, nasopharynx, lung, breast, colorectum
2017	**Review Recommendations for Cancer Prevention**

Changes to conclusions for strong evidence since 2007

Cancer	Exposure	2007	New
Colorectum	Dietary fibre	Prob ↓	Convincing ↓
Endometrium	Coffee	-	Prob ↓
	Glycaemic load	-	Prob ↑
Liver	Body fatness	LS ↑	Convincing ↑
	Coffee	-	Prob ↓
Kidney	Height	LNC	Prob ↑
	Alcohol	Effect unlikely	Prob ↑
Bladder	Arsenic	LS ↑	Prob ↑
Ovary	Body fatness	LNC	Prob ↑
Pancreas	Folate	Prob ↓	LNC
Prostate	Body fatness	LNC	Prob ↑ (adv)
	Height	LNC	Prob ↑
Oesophagus	Fruit/veg/βcarotene/vit C	Prob ↓	LS↓/LNC
Stomach	Body fatness	LNC	Prob ↑ (cardia)
	Alcohol	LNC	Prob ↑
	Processed meat	LNC	Prob ↑ (non-cardia)
	Fruit/veg	Prob ↓	LNC/LS ↓

Estimates of cancer preventability by appropriate diet, nutrition, physical activity and body fatness

	USA	UK	BRAZIL	CHINA
Mouth, pharynx, larynx	63	67	63	44
Oesophagus	63	71	50	33
Lung	36	33	36	38
Stomach	47	45	41	33
Pancreas	19	15	11	8
Gallbladder	21	16	10	6
Liver	30	24	13	7
Colorectum	50	47	41	22
Breast	33	38	22	11
Ovary	5	4	3	1
Endometrium	59	44	37	21
Prostate (advanced)	11	9	5	4
Kidney	24	19	13	8
Total for these cancers	31	32	25	24
Total for all cancers	21	24	18	20

World Cancer Research Fund International

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Our Cancer Prevention Recommendations

Be a healthy weight
Keep your weight as low as you can within the healthy range

Move more
Be physically active for at least 30 minutes every day, and sit less

Avoid high-calorie foods and sugary drinks
Limit high-calorie foods (particularly processed foods high in fat or added sugar, or low in fibre) and avoid sugary drinks

Enjoy more grains, veg, fruit and beans
Eat a wide variety of whole grains, vegetables, fruit and pulses such as beans

Limit red meat and avoid processed meat
Eat no more than 500g (cooked weight) a week of red meat, such as beef, pork and lamb. Eat little, if any, processed meat such as ham and bacon

For cancer prevention, don't drink alcohol
For cancer prevention, it's best not to drink alcohol. If you do, limit alcoholic drinks to two for men and one for women a day

Eat less salt and avoid mouldy grains & cereals
Limit your salt intake to less than 6g (2.4g sodium) a day by adding less salt and eating less food processed with salt

Avoid mouldy grains and cereals as they may be contaminated by aflatoxins

For cancer prevention, don't rely on supplements
Eat a healthy diet rather than relying on supplements to protect against cancer

If you can, breastfeed your baby
If you can, breastfeed your baby for six months before adding other liquids and foods

Cancer survivors should follow our Recommendations (where possible)

After cancer treatment, the best advice is to follow the Cancer Prevention Recommendations. Check with your health professional

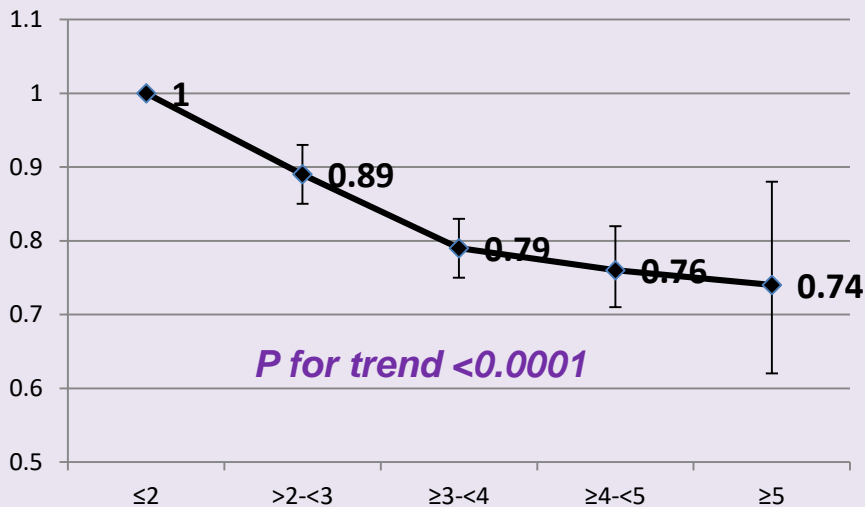# Association between the WCRF/AICR score and total cancer risk
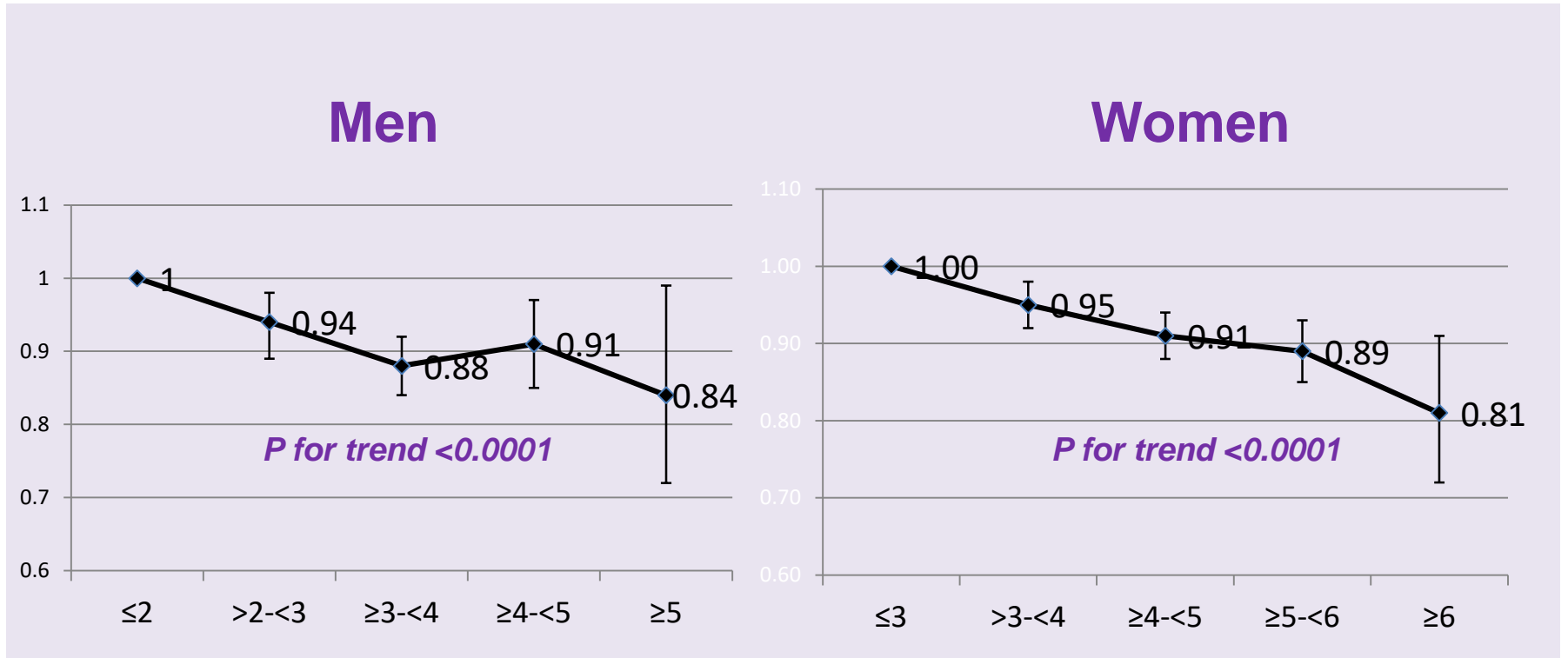
Cox regression model stratified by centre and age, and adjusted by energy intake, level of school, smoking status, presence of chronic diseases at baseline, ever use of contraceptive pills, ever use of HRT, age at first menarche, age at first pregnancy, and menopausal status
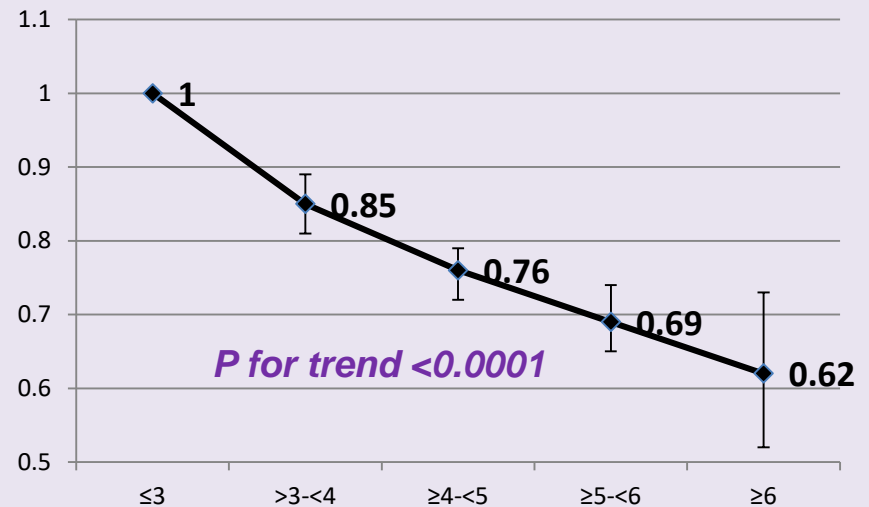
Romaguera D et al, AJCN 2012

Association between the WCRF/AICR score and total mortality

Men

Women

Men chart:
- ≤2: 1
- >2-<3: 0.89
- ≥3-<4: 0.79
- ≥4-<5: 0.76
- ≥5: 0.74

P for trend <0.0001

Women chart:
- ≤3: 1
- >3-<4: 0.85
- ≥4-<5: 0.76
- ≥5-<6: 0.69
- ≥6: 0.62

P for trend <0.0001

Cox regression model stratified by centre and age, and adjusted by level of school, smoking status, smoke intensity, and menopausal status

Vergnaud AC et al, AJCN 2013

WCRF and ACS recommendations and cancer – systematic review

- Ten large prospective studies; 12 publications

- Strong and consistent evidence

- Greater adherence to score associated with lower overall cancer incidence and mortality

- Both men and women

- Also breast, colorectal endometrium

Kohler LN et al, CEBP 2016, 25, 1-11

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Inferring causality

- **Strength**
- **Consistency**
- **Specificity**
- **Timing**
- **Dose Response**
- **Plausibility**
- **Coherence**
- **Experiment**
- **Analogy**

Bradford Hill

Reasons for uncertainty

- Measurement error
  - Diet, activity, anthropometry (cf adiposity)
  - Random error, systematic bias
- Study design
  - RCT vs cohort vs case control
  - Mechanistic
  - Population
  - Study size
- Confounding
  - Smoking
  - Nutrient vs food
  - Multiple collinearity eg PA
- Exposure homogeneity
- Small effect size

Certainty is unattainable – degrees of uncertainty

Is the evidence strong enough to take action?

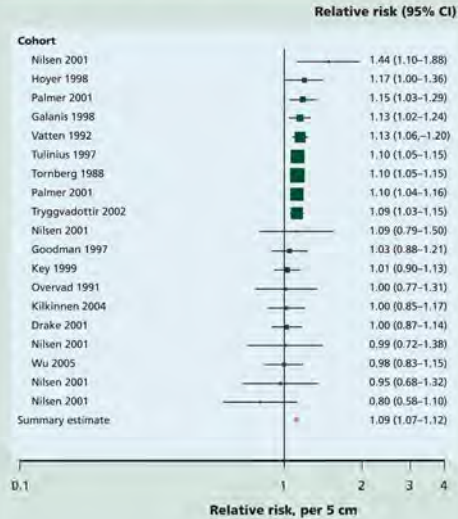Evidence accrues and conclusions may change

Convincing is not the same as proof

Significant shifts in emphasis

- Adiposity and activity vs foods and drinks
- Foods vs nutrients
- Whole diets vs individual foods
- Plant foods vs fruit and veg
- Lifecourse (height)

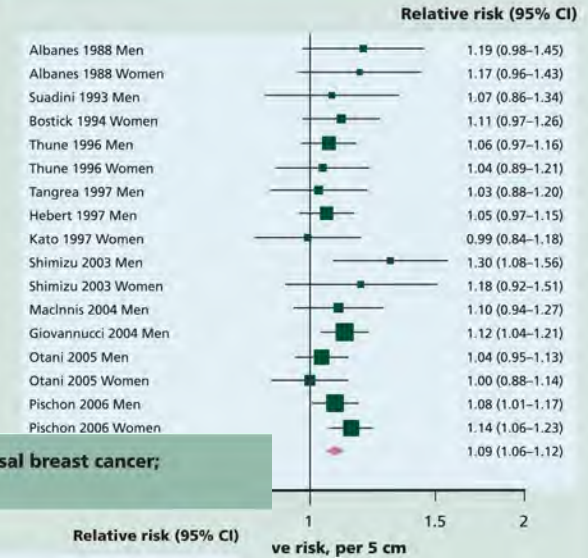# IMPACT OF OFFSPRING SIZE AND GROWTH ON CANCER RISK - 2007

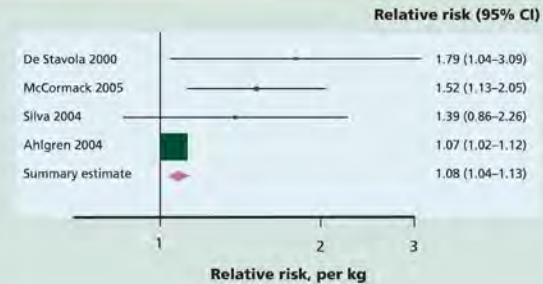**Height and breast cancer (age unspecified); cohort studies**

Cohort	Relative risk (95% CI)
Nilsen 2001	1.44 (1.10–1.88)
Hoyer 1998	1.17 (1.00–1.36)
Palmer 2001	1.15 (1.03–1.29)
Galanis 1998	1.13 (1.02–1.24)
Vatten 1992	1.13 (1.06–1.20)
Tulinius 1997	1.10 (1.05–1.15)
Tornberg 1988	1.10 (1.05–1.15)
Palmer 2001	1.10 (1.04–1.16)
Tryggvadottir 2002	1.09 (1.03–1.15)
Nilsen 2001	1.09 (0.79–1.50)
Goodman 1997	1.03 (0.88–1.21)
Key 1999	1.01 (0.90–1.13)
Overvad 1991	1.00 (0.77–1.31)
Kilkinnen 2004	1.00 (0.85–1.17)
Drake 2001	1.00 (0.87–1.14)
Nilsen 2001	0.99 (0.72–1.38)
Wu 2005	0.98 (0.83–1.15)
Nilsen 2001	0.95 (0.68–1.32)
Nilsen 2001	0.80 (0.58–1.10)
Summary estimate	1.09 (1.07–1.12)

Relative risk, per 5 cm

Height and postmenopausal breast cancer; cohort studies

Cohort	Relative risk (95% CI)
Manjer 2001	1.21 (1.05–1.40)
Toniolo 1994	1.20 (1.00–1.44)
Mattisson 2004	1.19 (1.08–1.30)
Vatten 1990	1.18 (0.99–1.41)
Barrett-Connor 1993	1.17 (0.76–1.81)
Van den Brandt 1997	1.17 (1.08–1.27)
Galanis 1998	1.16 (1.03–1.31)
Tryggvaddottir 2002	1.21 (1.03–1.22)
Tulinius 1997	1.10 (1.00–1.22)
Tornberg 1998	1.10 (1.07–1.13)
Saadatien-Elahi 2002	1.10 (0.88–1.37)
Sonnenschein 1999	1.09 (0.95–1.25)
Kaaks 1998	1.08 (0.85–1.38)
Palmer 2001	
Wirfalt 2004	
Summary estimate	

Relative risk, per 5 cm

Height and colorectal cancer; cohort studies

	Relative risk (95% CI)
Albanes 1988 Men	1.19 (0.98–1.45)
Albanes 1988 Women	1.17 (0.96–1.43)
Suadini 1993 Men	1.07 (0.86–1.34)
Bostick 1994 Women	1.11 (0.97–1.26)
Thune 1996 Men	1.06 (0.97–1.16)
Thune 1996 Women	1.04 (0.89–1.21)
Tangrea 1997 Men	1.03 (0.88–1.20)
Hebert 1997 Men	1.05 (0.97–1.15)
Kato 1997 Women	0.99 (0.84–1.18)
Shimizu 2003 Men	1.30 (1.08–1.56)
Shimizu 2003 Women	1.18 (0.92–1.51)
MacInnis 2004 Men	1.10 (0.94–1.27)
Giovannucci 2004 Men	1.12 (1.04–1.21)
Otani 2005 Men	1.04 (0.95–1.13)
Otani 2005 Women	1.00 (0.88–1.14)
Pischon 2006 Men	1.08 (1.01–1.17)
Pischon 2006 Women	1.14 (1.06–1.23)
	1.09 (1.06–1.12)

Relative risk, per 5 cm

Birth weight and premenopausal breast cancer; cohort studies

	Relative risk (95% CI)
De Stavola 2000	1.79 (1.04–3.09)
McCormack 2005	1.52 (1.13–2.05)
Silva 2004	1.39 (0.86–2.26)
Ahlgren 2004	1.07 (1.02–1.12)
Summary estimate	1.08 (1.04–1.13)

Relative risk, per kg

Height and premenopausal breast cancer; cohort studies

Cohort	Relative risk (95% CI)
Palmer 2001	1.17 (1.08–1.26)
Tulinius 1997	1.16 (0.95–1.41)
Vatten 1992	1.16 (1.06–1.27)
Tornberg 1988	1.11 (0.98–1.26)
Kaaks 1998	1.09 (0.93–1.29)
Galanis 1998	1.04 (0.86–1.25)
Manjer 2001	0.99 (0.87–1.14)
Tryggvadottir 2002	0.99 (0.79–1.24)
Sonnenschein 1999	0.99 (0.84–1.16)
Saadatian-Elahi 2002	0.98 (0.80–1.21)
Toniolo 1994	0.92 (0.78–1.09)

Relative risk, per 5 cm

Height and ovarian cancer; cohort studies

Cohort	Relative risk (95% CI)
Schouten 2003	1.42 (1.08–1.87)
Engeland 2003	1.14 (1.08–1.22)
Andersaon 2004	1.07 (0.89–1.28)
Summary estimate	1.15 (1.08–1.21)

Relative risk, per 10 cm

...tic cancer;

	Relative risk (95% CI)
	1.00 (0.81–1.24)
Tulinius 1997 Men	1.19 (0.97–1.45)
Tulinius 1997 Women	1.31 (0.97–1.77)
Michaud 2001 Women	1.21 (1.02–1.34)
Stolzenberg-Solomon 2002 Men	1.04 (0.92–1.17)
Song 2003 Men	1.07 (0.95–1.20)
Giovannucci 2004 Men	1.07 (0.94–1.22)
Summary estimate	1.11 (1.05–1.17)

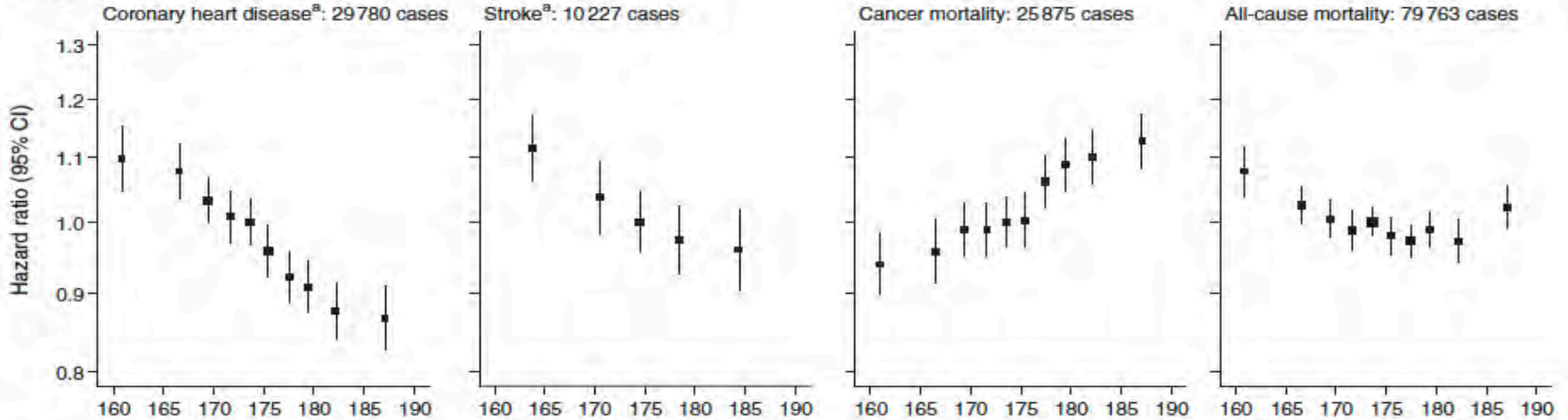Relative risk, per 5 cm

Height and cancer CUP 2015

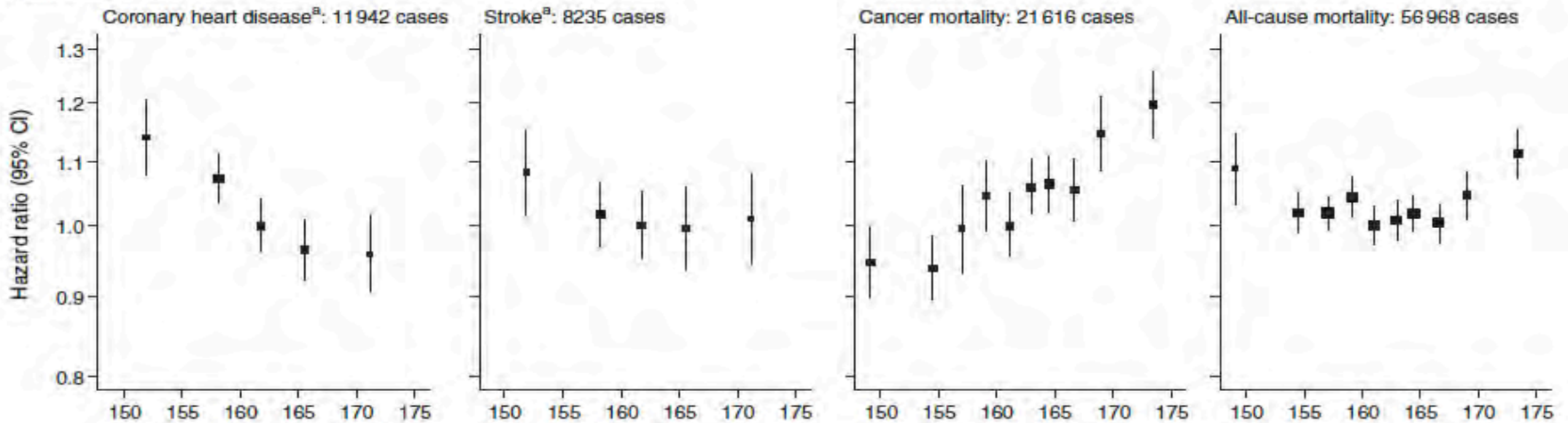Every 5 cm increment in height increases risk of cancers of:

- Kidney -10%

- Breast (pre-menopausal) - 9%

- Breast (post-menopausal) -11%

- Ovary - 8%

- Pancreas - 7%

- Colorectum - 5%

- Prostate – 4%

Height and risk of CVD and cancer

Bottom Line

The key messages are robust and generally agreed

- Be active, and don't be sedentary – and keep it up as long as possible

- Eat enough but not too much – don't get too thin or fat

- Eat food not pills

- Mostly from plants, emphasise wholegrains and pulses

- Avoid highly processed energy dense foods and sugar sweetened beverages (and alcohol, processed meat and salty foods)

- Grow appropriately from conception to adulthood

- Get your mother to be well nourished before getting pregnant. And to breastfeed you.

Bottom Line

If you already have a diagnosis of cancer, the evidence on nutrition and outcome is not strong, but the best advice is to follow (as far as possible) the recommendations for cancer prevention

Cancer & Nutrition NIHR infrastructure collaboration

Improving cancer prevention and care.
For patients. For clinicians. For researchers

NHS
National Institute for Health Research

Cancer and Nutrition
NIHR infrastructure collaboration

Improving cancer prevention and care.
For patients. For Clinicians. For researchers.

Full Report of Phase One July 2015

Aim:

To help facilitate translational research in cancer and nutrition which will generate the evidence to improve cancer prevention and care

Objectives:

To bring coherence to existing activities by

– creating a framework for future research
– establishing better networks between cancer and nutrition stakeholders

JOHN TUKEY

Far better an approximate answer to the *right* question, which is often vague, than an *exact* answer to the wrong question, which can always be made precise.

> *The future of data analysis*. Annals of Mathematical Statistics 1962

An approximate answer to the right question is worth a great deal more than a precise answer to the wrong question.

> – *Super Freakonomics*

The WCRF/AICR Continuous Update Reports
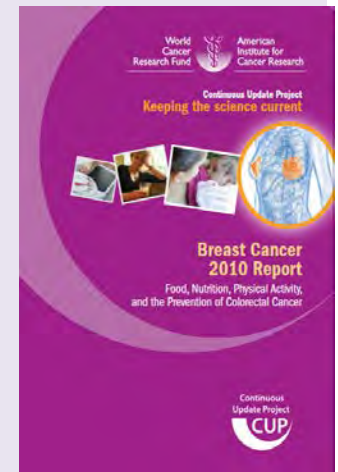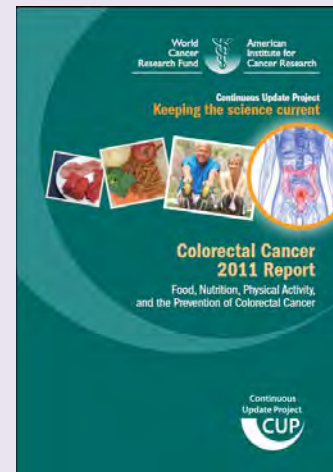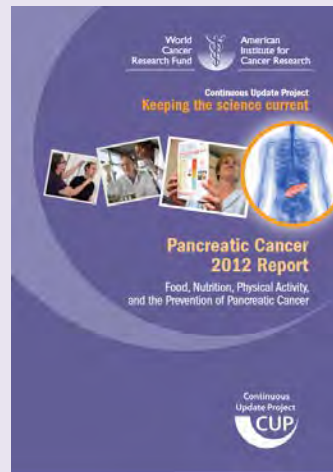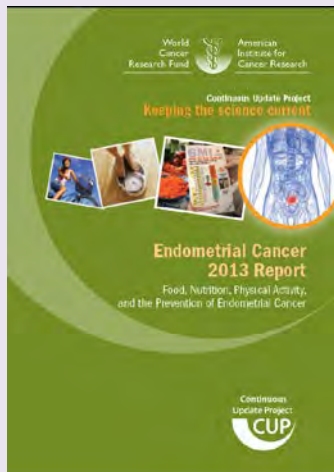
http://www.wcrf.org/cancer_research/cup/key_findings/index.php

Breast Cancer (C50): 2014
Number of New Cases, Crude and European Age-Standardised (AS) Incidence Rates per 100,000 Population, UK

		England	Wales	Scotland	Northern Ireland	UK
Female	Cases	46,085	2,872	4,583	1,293	54,833
	Crude Rate	167.3	182.8	166.6	137.9	167.2
	AS Rate	173.4	176.1	164.1	151.4	172.1
	AS Rate - 95% LCL	171.8	169.7	159.3	143.2	170.7
	AS Rate - 95% UCL	175.0	182.5	168.8	159.7	173.6

AS rate	173.4	182.8	166.6	151.4	172.1

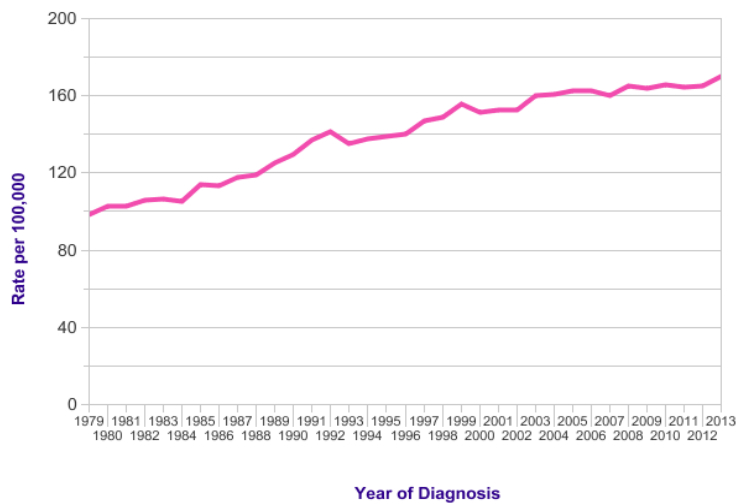95% LCL and 95% UCL are the 95% lower and upper confidence limits around the AS Rate
Source: cruk.org/cancerstats
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Breast Cancer (C50): 1979-2013
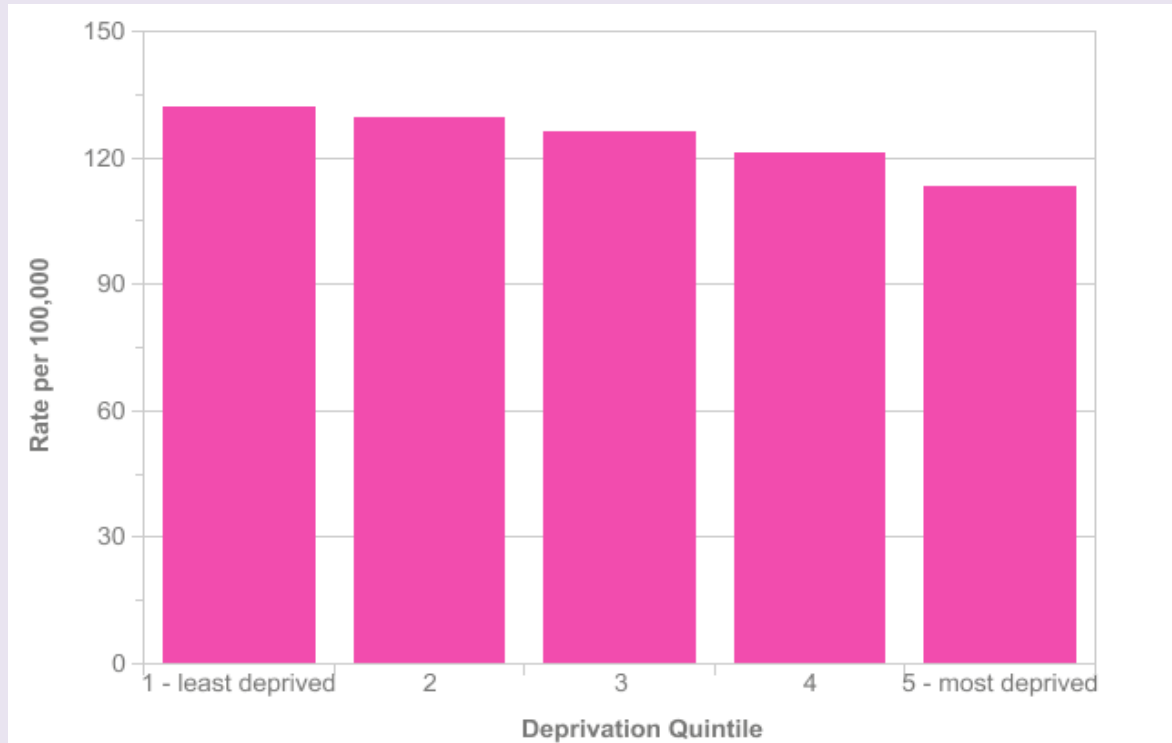European Age-Standardised Incidence Rates per 100,000 Population, Females, Great Britain

Breast Cancer (C50): 1971-2014
European Age-Standardised Mortality Rates per 100,000 Population, Females, UK

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Breast Cancer (C50): 2006-2010
European Age-Standardised Incidence Rates by Deprivation Quintile, England

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Breast Cancer

FOOD, NUTRITION, PHYSICAL ACTIVITY AND BREAST CANCER (PREMENOPAUSE) 2010

	DECREASES RISK	INCREASES RISK
Convincing	Lactation	Alcoholic drinks
Probable	Body fatness	Adult attained height[1] Greater birth weight
Substantial effect on risk unlikely	None identified	

1 Adult attained height is unlikely directly to modify the risk of cancer. It is a marker for genetic, environmental, hormonal, and also nutritional factors affecting growth during the period from preconception to completion of linear growth (see chapter 6.2.13 – Second Expert Report).

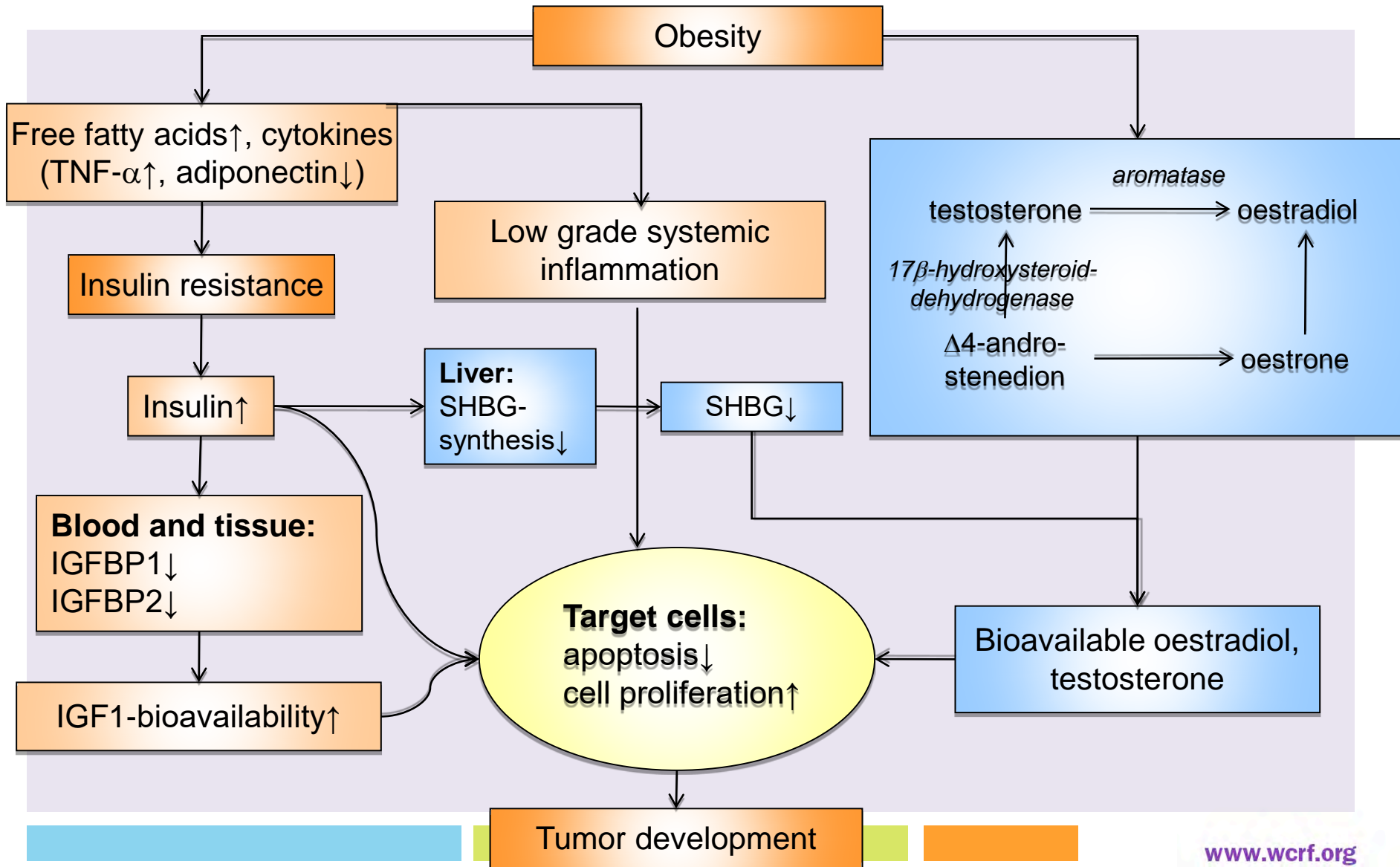## FOOD, NUTRITION, PHYSICAL ACTIVITY AND BREAST CANCER (POSTMENOPAUSE) 2010

	DECREASES RISK	INCREASES RISK
Convincing	Lactation	Alcoholic drinks Body fatness Adult attained height[1]
Probable	Physical activity[2]	Abdominal fatness Adult weight gain
Substantial effect on risk unlikely	None identified	

1 Adult attained height is unlikely directly to modify the risk of cancer. It is a marker for genetic, environmental, hormonal, and also nutritional factors affecting growth during the period from preconception to completion of linear growth (see chapter 6.2.13 – Second Expert Report).
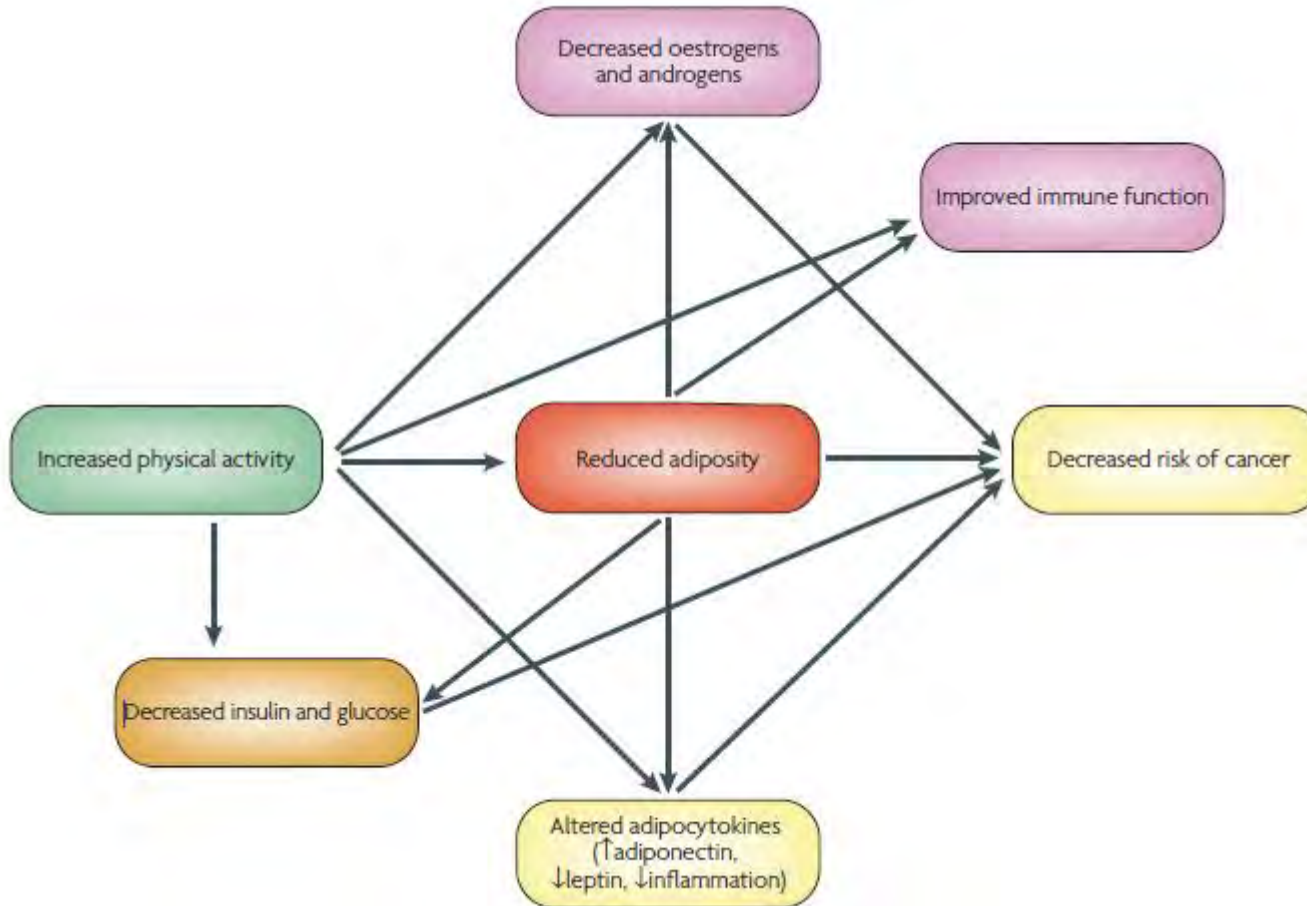
2 Physical activity of all types: occupational, household, transport and recreational.

Obesity and Cancer – Potential Mechanisms

World Cancer Research Fund International

Obesity

Free fatty acids↑, cytokines (TNF-α↑, adiponectin↓)

Insulin resistance

Insulin↑

Low grade systemic inflammation

Liver: SHBG-synthesis↓

SHBG↓

aromatase
testosterone ⟶ oestradiol

17β-hydroxysteroid-dehydrogenase

Δ4-andro-stenedion ⟶ oestrone

Blood and tissue:
IGFBP1↓
IGFBP2↓

IGF1-bioavailability↑

Target cells:
apoptosis↓
cell proliferation↑

Bioavailable oestradiol, testosterone

Tumor development

McTiernan 2008

Obesity, physical inactivity and cancer Mechanisms - Summary

- Insulin resistance
  - abnormal insulin/IGF axis
  - excess growth factors
- Inflammation
  - promotes oncogenic genetic signature
  - increases proliferation, angiogenesis
  - reduces apoptosis
- Excess oestrogen
  - promotes proliferation and cancer in sensitive tissues
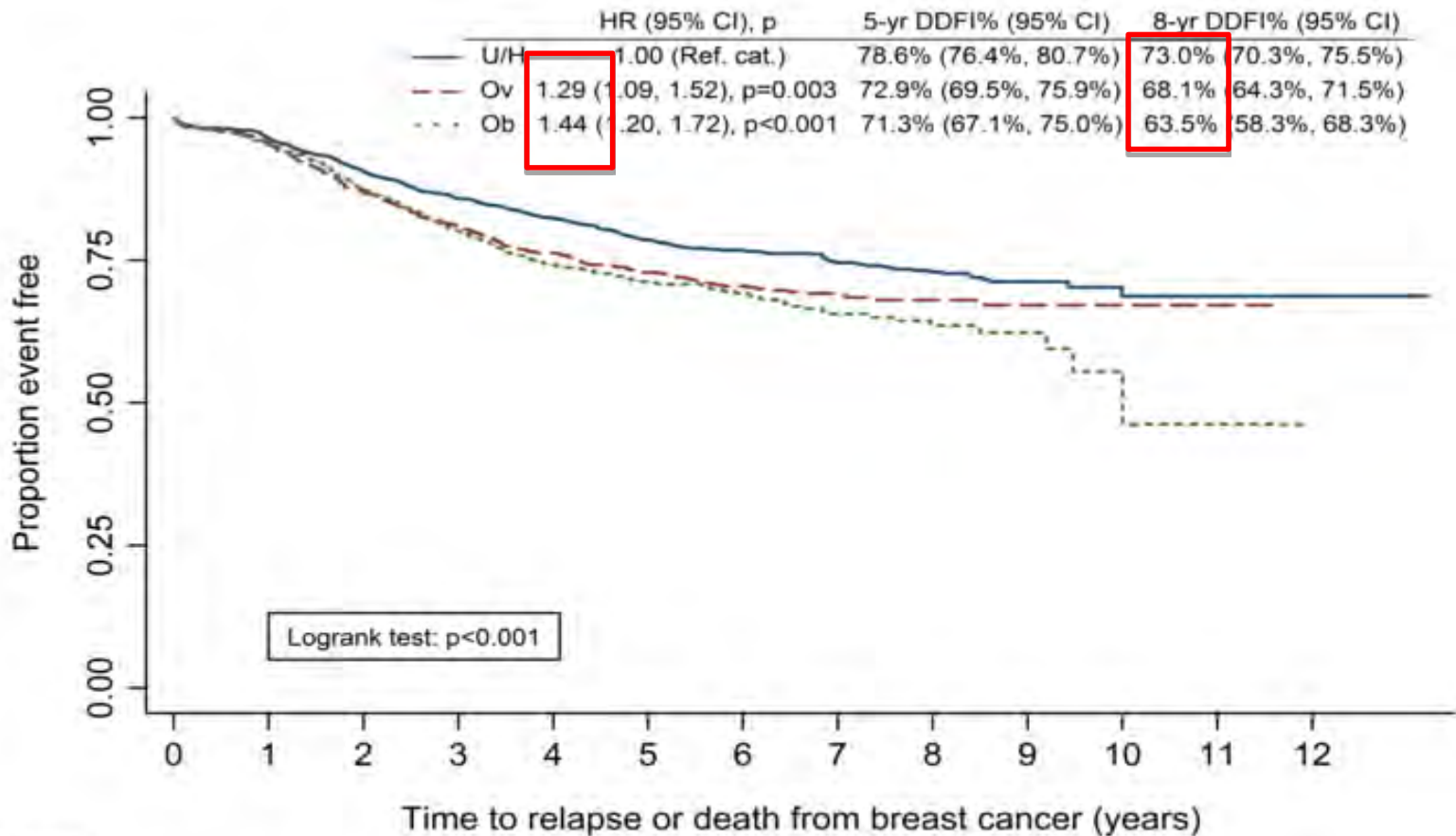- Reduced immune function

Pathological features - POSH

	Underweight or Healthy weight n=1526 (54.0%)	Overweight n=784 (27.6%)	Obese n=533 (18.8%)	
Mean tumour size/ mm	20 (0-170)	24 (0-199)	26 (0.5-130)	U/H vs. Ov: p<0.0001 U/H vs. Ob: p<0.0001
Multifocal	12 (30.6%)	220 (30.4%)	130 (27.2%)	NS
Grade 3	879 (59.0%)	485 (63.6%)	331 (63.9%)	U/H vs. Ov: p=0.034 U/H vs. Ob: p =0.048
Node positive	736 (49.0%)	419 (54.2%)	284 (54.6%)	U/H vs. Ov: p=0.019 U/H vs. Ob: p=0.027
ER negative	483 (31.7%)	273 (34.9%)	213 (40.1%)	U/H vs Ob: p<0.001
HER 2 positive	381 (28.2%)	180 (26.4%)	129 (27.3%)	NS
ER/ PR/ HER 2 negative	305 (20.8%)	176 (23.4%)	136 (26.8%)	U/H vs. Ob: p=0.005

Copson et al. Ann Onc 26: 2015, 101-112

Distant disease free survival – POSH

	HR (95% CI), p	5-yr DDFI% (95% CI)	8-yr DDFI% (95% CI)
U/H	1.00 (Ref. cat.)	78.6% (76.4%, 80.7%)	73.0% (70.3%, 75.5%)
Ov	1.29 (1.09, 1.52), p=0.003	72.9% (69.5%, 75.9%)	68.1% (64.3%, 71.5%)
Ob	1.44 (1.20, 1.72), p<0.001	71.3% (67.1%, 75.0%)	63.5% (58.3%, 68.3%)

Logrank test: p<0.001

Time to relapse or death from breast cancer (years)

Number at risk

U/H (BMI Less than 25)	1518	1459	1355	1256	1144	938	679	462	284	137	44	14	3
Ov (BMI 25 to 30)	778	738	663	611	544	462	321	206	116	42	14	2	0
Ob (BMI 30 or more)	525	498	453	409	358	291	199	131	74	30	6	1	0

U/H (BMI Less than 25) — Ov (BMI 25 to 30) ⋯ Ob (BMI 30 or more)

Copson et al. Ann Onc 26: 2015, 101-112
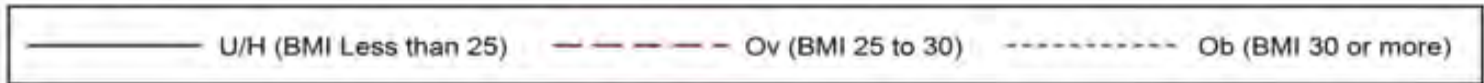
DIET, NUTRITION, PHYSICAL ACTIVITY AND BREAST CANCER SURVIVAL (BY OUTCOME)

Outcome		ALL CAUSE MORTALITY		BREAST CANCER MORTALITY		SECOND PRIMARY BREAST CANCER	
		DECREASED RISK	INCREASED RISK	DECREASED RISK	INCREASED RISK	DECREASED RISK	INCREASED RISK
		Exposure Timeframe	Exposure Timeframe	Exposure Timeframe	Exposure Timeframe	Exposure Timeframe	Exposure Timeframe
STRONG EVIDENCE	Convincing						
	Probable						
LIMITED EVIDENCE	Limited-suggestive	Physical activity — Before diagnosis ≥12 months after diagnosis; Foods containing fibre — Before diagnosis ≥12 months after diagnosis; Foods containing soy — ≥12 months after diagnosis	Body fatness — Before diagnosis <12 months after diagnosis ≥12 months after diagnosis; Total fat — Before diagnosis; Saturated fatty acids — Before diagnosis	Physical activity — Before diagnosis	Body fatness[1] — Before diagnosis <12 months after diagnosis		Body fatness — Before diagnosis <12 months after diagnosis
STRONG EVIDENCE	Substantial effect on risk unlikely						

STRONG: Evidence strong enough to support a judgement of a convincing or probable causal relationship and generally justify making recommendations
LIMITED: Evidence that is too limited to justify making specific recommendations

1 Post menopause only

Continuous update Project Report: Diet, Nutrition, Physical Activity and Breast Cancer Survivors: http://www.wcrf.org/sites/default/files/Breast-Cancer-Survivors-2014-Report.pdf

Summary of Breast Cancer Survivors Report

- Although there were significant associations between some exposures and outcomes, incomplete adjustment for potential confounders restricted the ability to ascribe causality

- CUP Panel concluded that evidence is limited