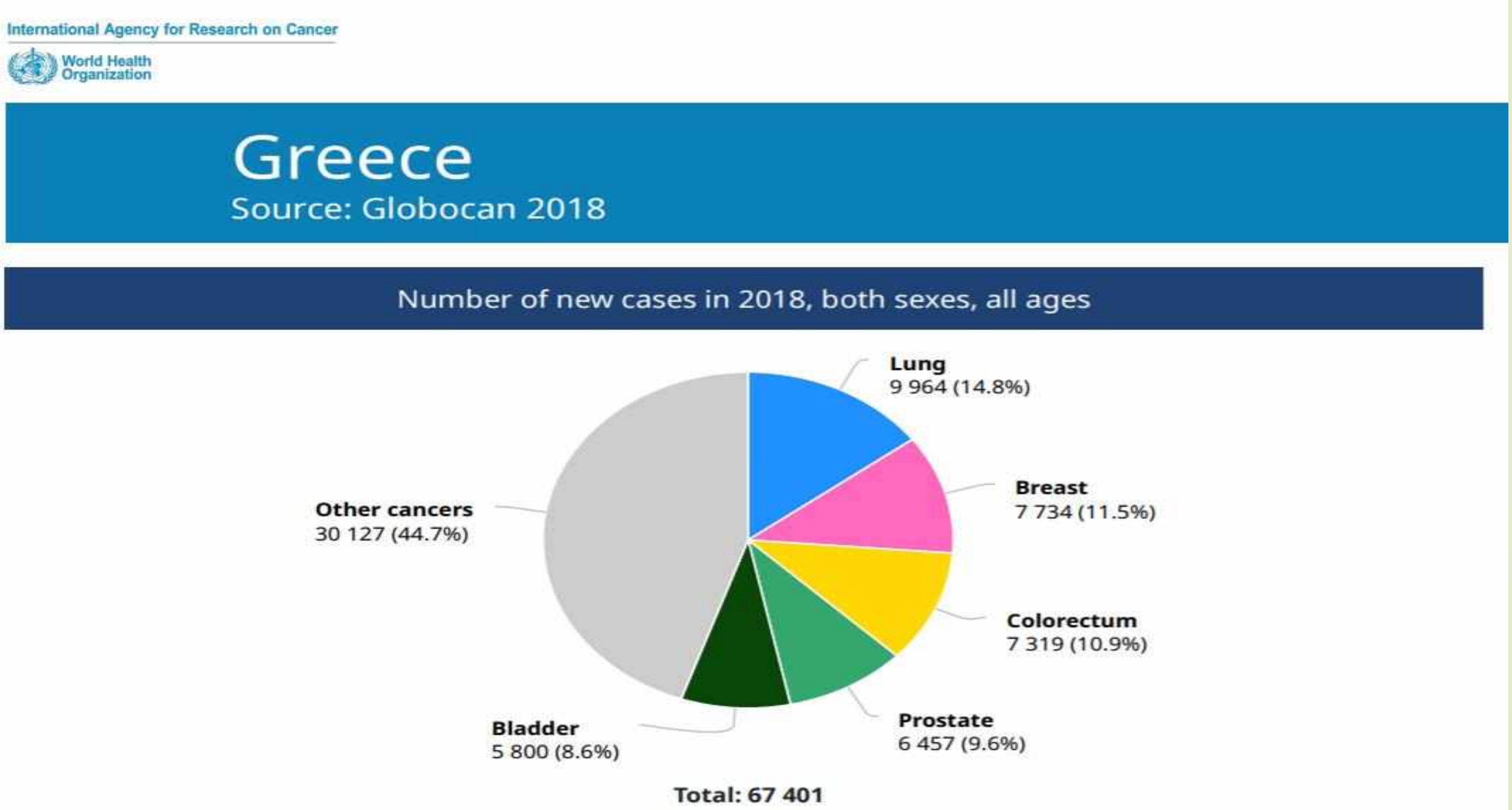
15η Πανελλήνια Εκπαιδευτική Συνάντηση ΕΛΙΓΑΣΤ

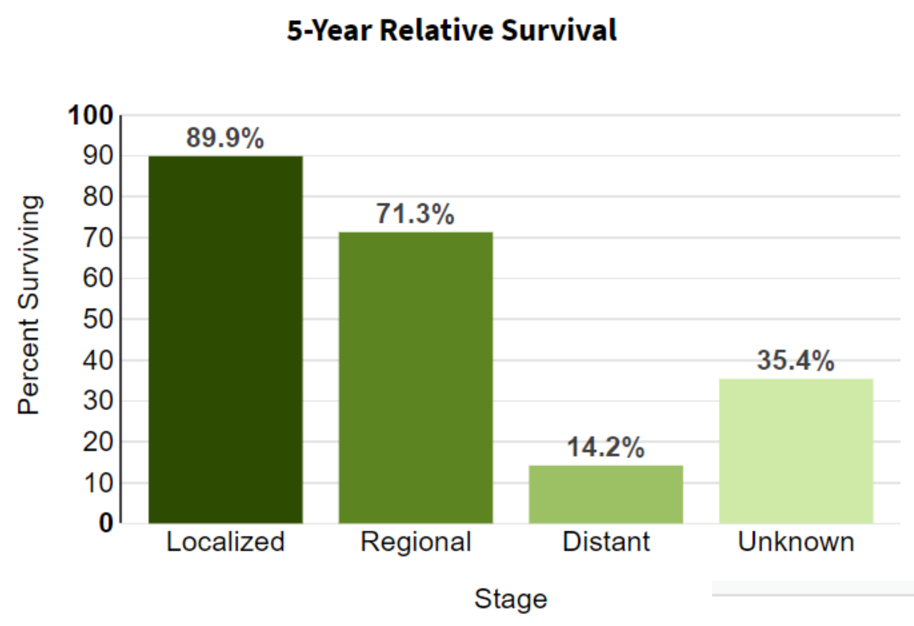
"Εξελίξεις στη Γαστρεντερολογία και Ηπατολογία"

Τρόπος ζωής και δευτερογενής πρόληψη καρκίνου παχέος εντέρου

Τσίγκας Αλέξανδρος

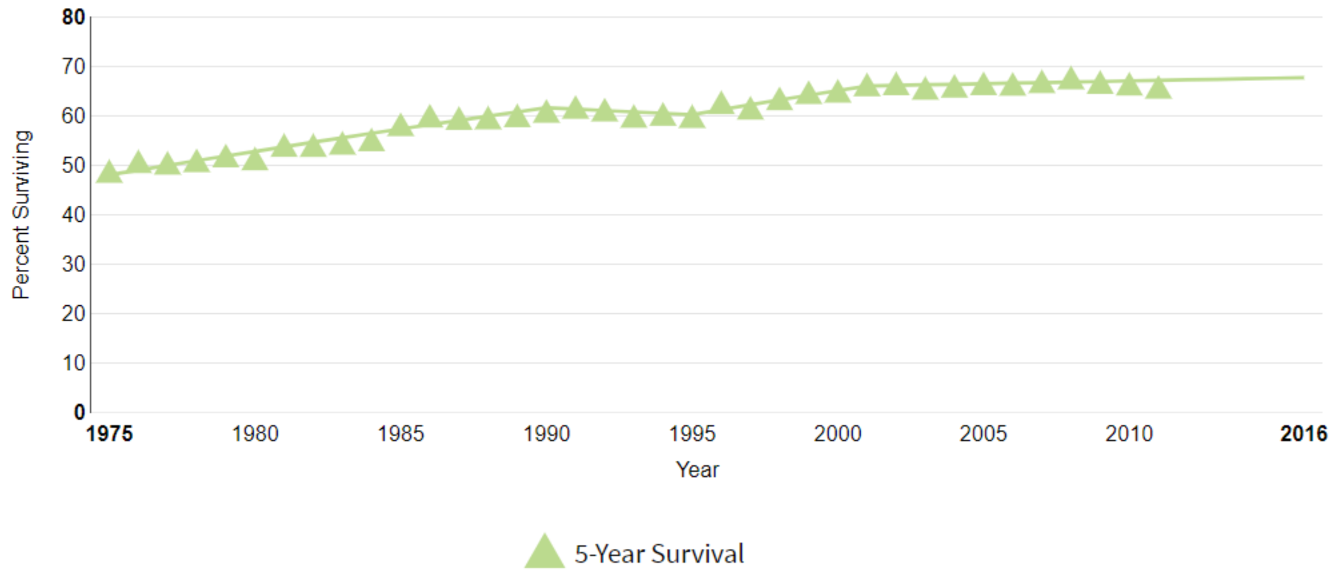
Διαιτολόγος-Διατροφολόγος, MSc Κλινικής διατρποφής


International Agency for Research on Cancer
World Health Organization
Greece
Source: Globocan 2018
Number of new cases in 2018, both sexes, all ages
Lung
9 964 (14.8%)
Breast
7 734 (11.5%)
Colorectum
7 319 (10.9%)
Prostate
6 457 (9.6%)
Bladder
5 800 (8.6%)
Other cancers
30 127 (44.7%)
Total: 67 401



SEER 18 2009-2015, All Races, Both Sexes by SEER Summary Stage 2000

Up to one-half of patients with stage I–III colon cancer will experience disease recurrence (Siegel et al, CA Cancer J Clin. 2014)



SEER 9 5-Year Relative Survival Percent from 1975-2011, All Races, Both Sexes.

American Cancer Society & ESPEN

TABLE 2. American Cancer Society Guidelines on Nutrition and Physical Activity for Cancer Survivors

Achieve and maintain a healthy weight. • If overweight or obese, limit consumption of high-calorie foods and beverages and increase physical activity to promote weight loss.
Engage in regular physical activity. • Avoid inactivity and return to normal daily activities as soon as possible following diagnosis. • Aim to exercise at least 150 minutes per week. • Include strength training exercises at least 2 days per week.
Achieve a dietary pattern that is high in vegetables, fruits, and whole grains. • Follow the American Cancer Society Guidelines on Nutrition and Physical Activity for Cancer Prevention.

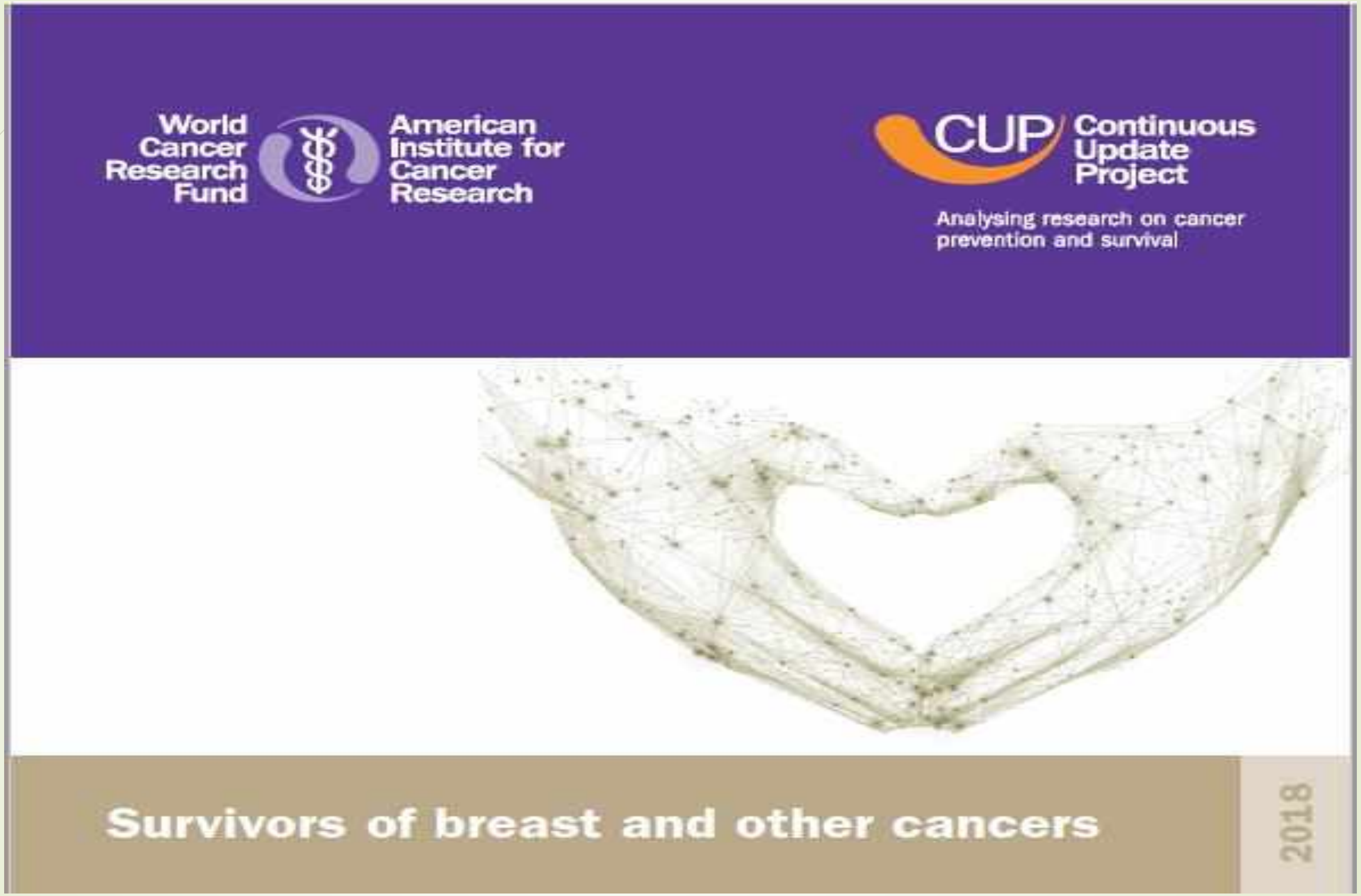
Section C5: Cancer survivors

C5 − 1	Cancer survivors: Physical activity
Strength of recommendation STRONG	*We recommend that cancer survivors engage in regular physical activity.*
Level of evidence	Low
Questions for research	Effects of physical activity on physical function, recurrence and survival in cancer survivors

C5 − 2	Cancer survivors: Body weight and lifestyle
Strength of recommendation STRONG	*In cancer survivors we recommend to maintain a healthy weight (BMI 18.5–25 kg/m^2) and to maintain a healthy lifestyle, which includes being physically active and a diet based on vegetables, fruits and whole grains and low in saturated fat, red meat and alcohol.*
Level of evidence	Low
Questions for research	Effects of a healthy diet on metabolic syndrome, quality of life, cancer relapse rates and overall survival

Arends J, et al. Clin Nutr. 2017:11-48

World Cancer Research Fund/American Institute for Cancer Research



World Cancer Research Fund/American Institute for Cancer Research. *Diet, Nutrition, Physical Activity and Cancer: a Global Perspective.* Continuous Update Project Expert Report 2018. Available at dietandcancerreport.org

World Cancer Research Fund/American Institute for Cancer Research. *Diet, Nutrition, Physical Activity and Cancer: a Global Perspective.* Continuous Update Project Expert Report 2018. Available at dietandcancerreport.org

RECOMMENDATION

Be a healthy weight

Keep your weight within the healthy range[1] and avoid weight gain in adult life

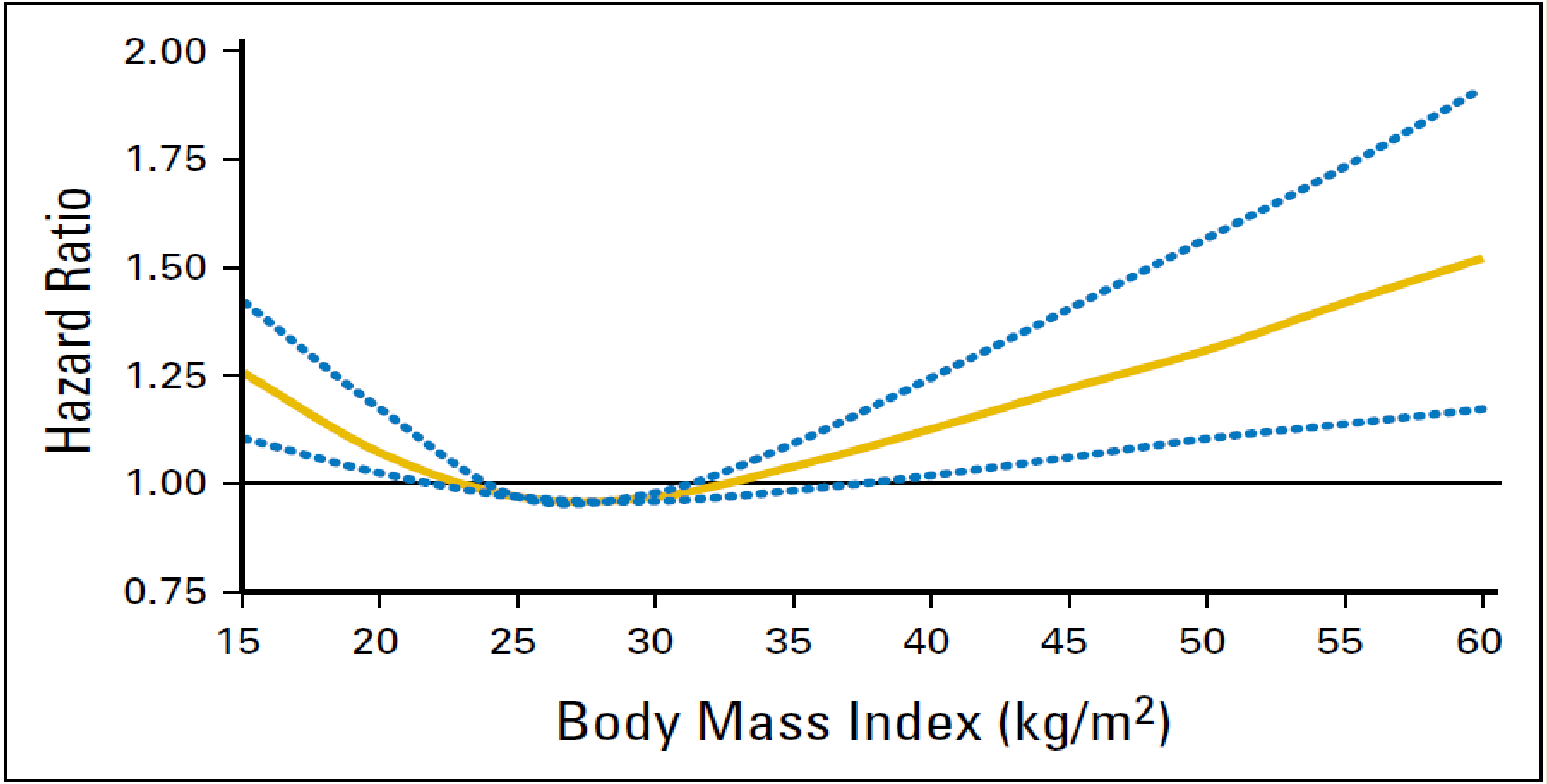
- GOAL Ensure that body weight during childhood and adolescence projects towards the lower end of the healthy adult BMI range
- GOAL Keep your weight as low as you can within the healthy range throughout life
- GOAL Avoid weight gain (measured as body weight or waist circumference)[2] throughout adulthood

[1] The healthy (or, as defined by WHO, 'normal') range of BMI for adults is 18.5–24.9 kg/m^2 [1]. Different reference ranges have been proposed for Asian populations [1]. Where these ranges differ from the WHO definition, they are to be used as the guide. Further research is required to establish appropriate thresholds in other ethnic groups. The healthy range for BMI during childhood varies with age [2].

[2] WHO recommends keeping waist circumference below 94 cm (37 inches) in men and 80 cm (31.5 inches) in women (based on data from European people). These values are roughly equivalent to a BMI of around 25 kg/m^2 [3]. For Asian populations, cut-offs for waist circumferences of 90 cm (35.4 inches) for men and 80 cm (31.5 inches) for women have been proposed [3]. Further research is required to establish appropriate waist circumference values for other ethnic groups.

World Cancer Research Fund/American Institute for Cancer Research. *Diet, Nutrition, Physical Activity and Cancer: a Global Perspective.* Continuous Update Project Expert Report 2018. Available at dietandcancerreport.org

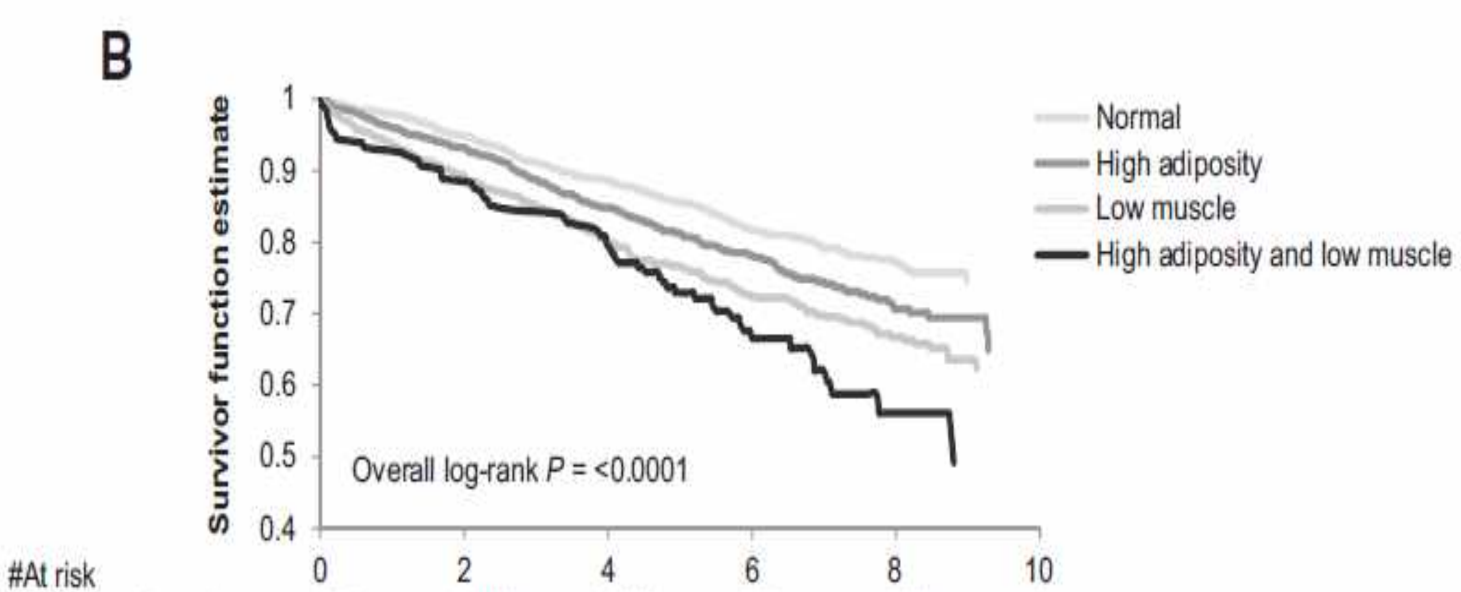
Δείκτης Μάζας Σώματος – Επανεμφάνιση καρκίνου παχέος εντέρου



Renfro et al, J Natl Cancer Inst, 2014

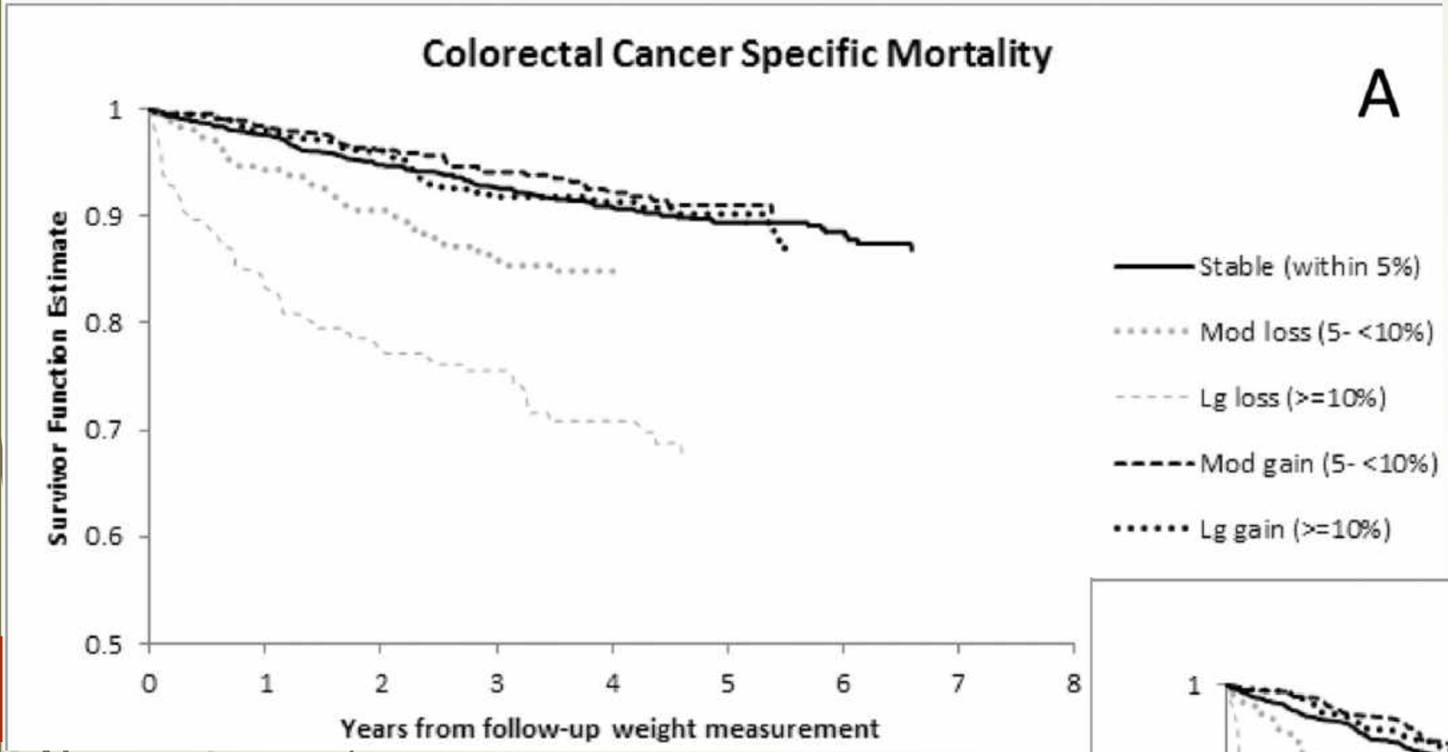
Explaining the Obesity Paradox: The Association between Body Composition and Colorectal Cancer Survival (C-SCANS Study)

Bette J. Caan[1], Jeffrey A. Meyerhardt[2], Candyce H. Kroenke[1], Stacey Alexeeff[1], Jingjie Xiao[3], Erin Weltzien[1], Elizabeth Cespedes Feliciano[1], Adrienne L. Castillo[1], Charles P. Quesenberry[1], Marilyn L. Kwan[1], and Carla M. Prado[3]

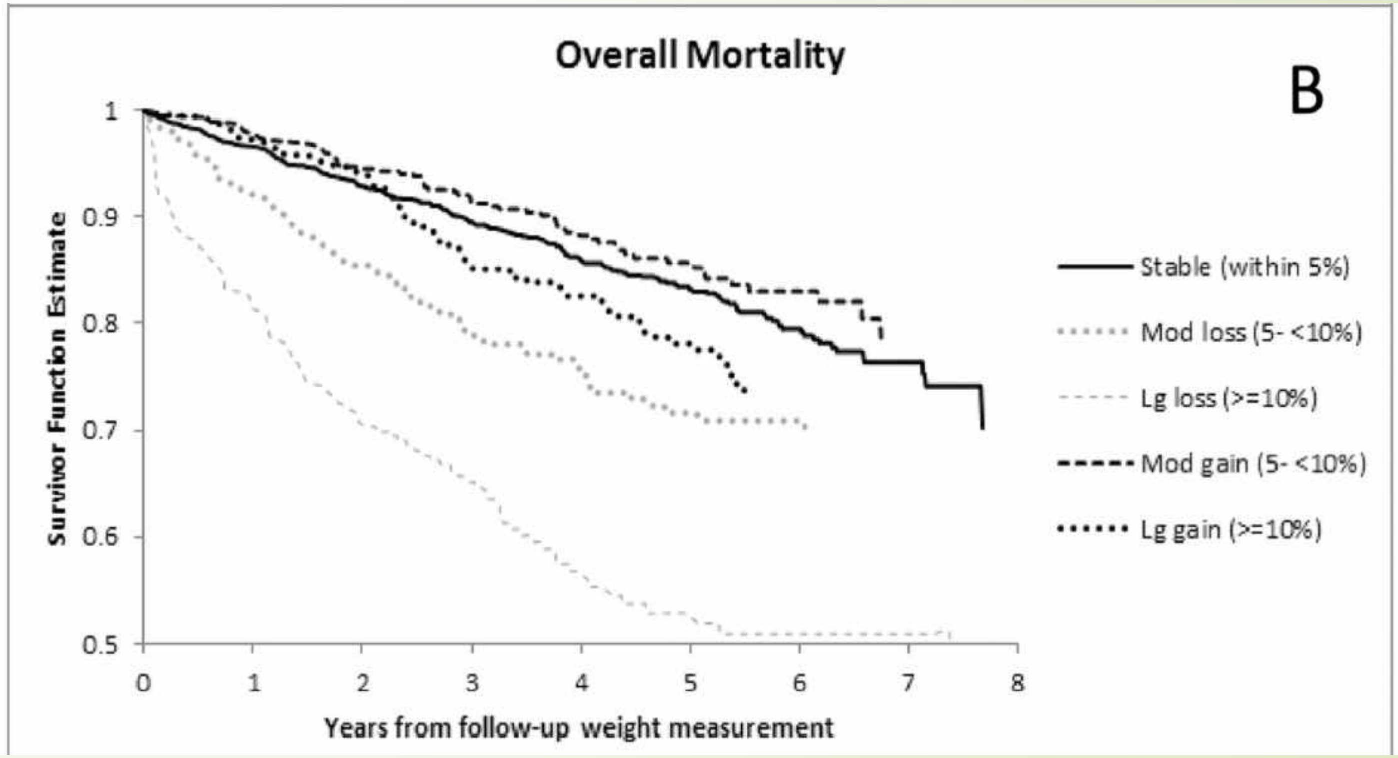


#At risk	0	2	4	6	8	10
Normal	1,251	1,188	1,099	656	226	0
High adiposity	925	864	783	460	151	0
Low muscle	925	827	739	459	162	0
Both	161	144	128	64	17	0

Caan et al, Cancer Epidemiol Biomarkers Prev. 2017 Jul;26(7):1008-1015.



Αλλαγές στο σωματικό βάρος



Meyerhardt et al, Cancer Epidemiol Biomarkers Prev. 2017

WCRF/AICR Cancer Prevention Recommendations and public health and policy implications

Eat a diet rich in wholegrains, vegetables, fruit and beans

- Make wholegrains, vegetables, fruit and pulses (legumes) such as beans and lentils a major part of your usual daily diet.

WCRF/AICR Cancer Prevention Recommendations and public health and policy implications

Limit consumption of 'fast foods' and other processed foods high in fat, starches or sugars

- Limiting these foods helps control calorie intake and maintain a healthy weight.

Limit consumption of red and processed meat

- Eat no more than moderate amounts of red meat, such as beef, pork and lamb. Eat little, if any, processed meat.

Limit consumption of sugar sweetened drinks

- Drink mostly water and unsweetened drinks.

Επιδημιολογικά δεδομένα

Οι κύριες μελέτες που συναντώνται στη βιβλιογραφία:

- Cancer Prevention Study II (CPS II)
- Nurses' Health Study (NHS)
- Health Professional Follow-Up Study (HPFS)
- Cancer & Leukemia Group B 89803

Το κόκκινο κρέας – Αντικρουόμενα δεδομένα??

Αν και η πλειονότητα των μελετών καταδεικνύει θετική συσχέτιση:

- Red meat consumption after CRC diagnosis was not associated with mortality (McCullough et al, J Clin Oncol. 2013)

- Low intake of red meat did not appear to contribute to the benefit of American Cancer Society Guidelines – cancer recurrence, overall mortality (Van Blarigan et al, JAMA Oncol. 2018

Το κόκκινο κρέας..

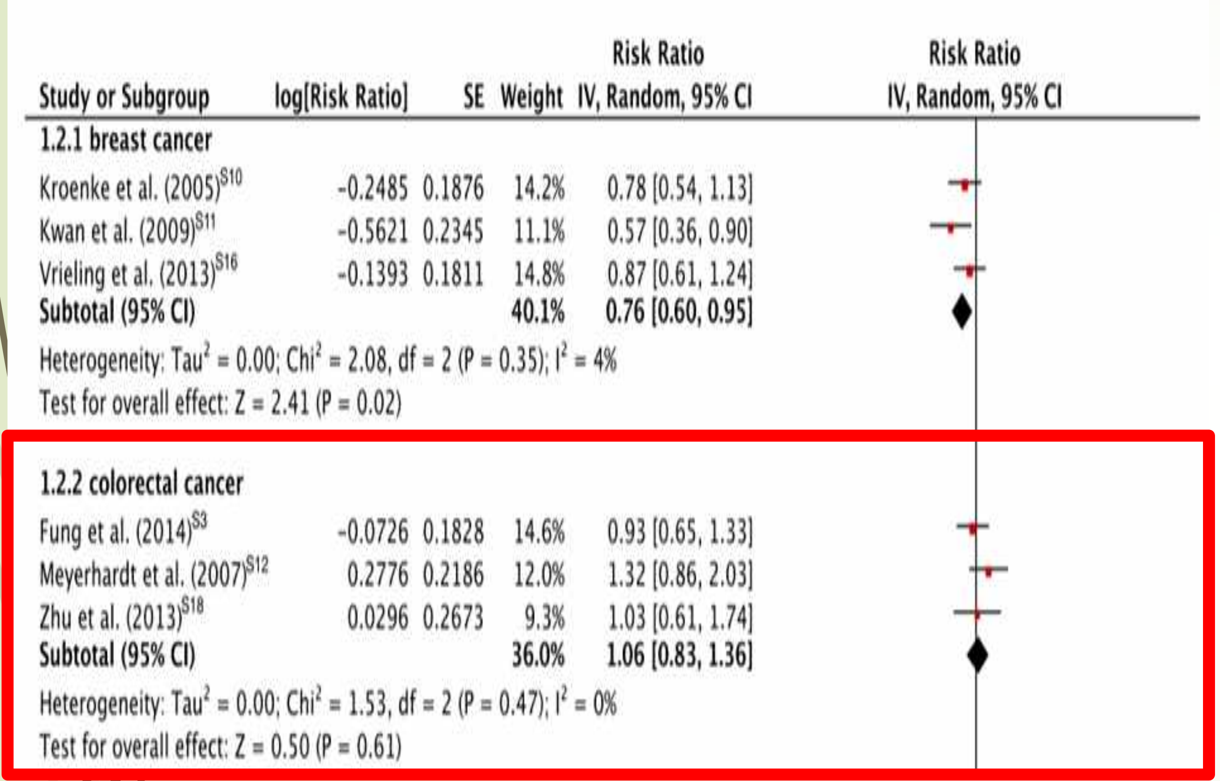
- Red and processed meat c … is was not associated wi … in Oncol. 2013)

Higher protein intake beneficial???

- Low intake of red meat did not appear to contribute to the benefit of American Cancer Society Guidelines – cancer recurrence, overall mortality (Van Blarigan et al, JAMA Oncol. 2018

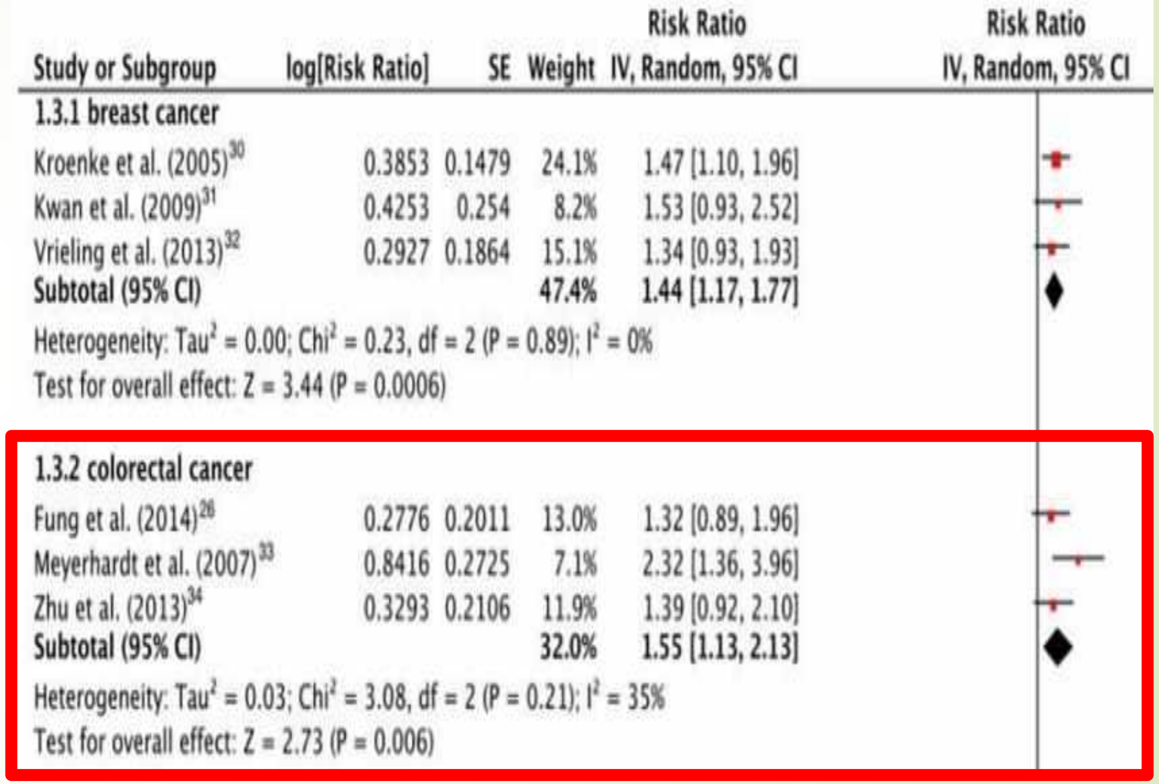
Επίδραση διατροφικών προτύπων στην ολική θνησιμότητα

«Υγιεινό πρότυπο»



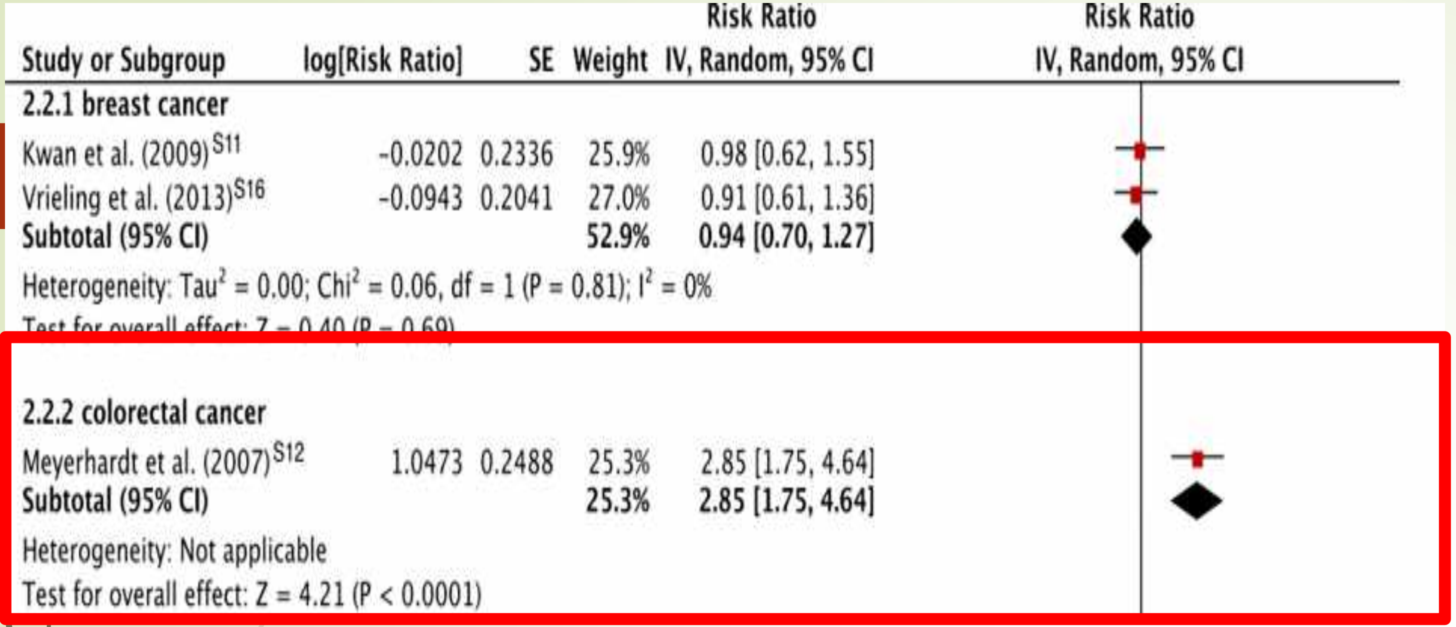
Study or Subgroup	log[Risk Ratio]	SE	Weight	Risk Ratio IV, Random, 95% CI
1.2.1 breast cancer				
Kroenke et al. (2005)[S10]	-0.2485	0.1876	14.2%	0.78 [0.54, 1.13]
Kwan et al. (2009)[S11]	-0.5621	0.2345	11.1%	0.57 [0.36, 0.90]
Vrieling et al. (2013)[S16]	-0.1393	0.1811	14.8%	0.87 [0.61, 1.24]
Subtotal (95% CI)			**40.1%**	**0.76 [0.60, 0.95]**
Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 2.08$, $df = 2$ ($P = 0.35$); $I^2 = 4\%$				
Test for overall effect: $Z = 2.41$ ($P = 0.02$)				
1.2.2 colorectal cancer				
Fung et al. (2014)[S3]	-0.0726	0.1828	14.6%	0.93 [0.65, 1.33]
Meyerhardt et al. (2007)[S12]	0.2776	0.2186	12.0%	1.32 [0.86, 2.03]
Zhu et al. (2013)[S18]	0.0296	0.2673	9.3%	1.03 [0.61, 1.74]
Subtotal (95% CI)			**36.0%**	**1.06 [0.83, 1.36]**
Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 1.53$, $df = 2$ ($P = 0.47$); $I^2 = 0\%$				
Test for overall effect: $Z = 0.50$ ($P = 0.61$)				

«Δυτικού τύπου»



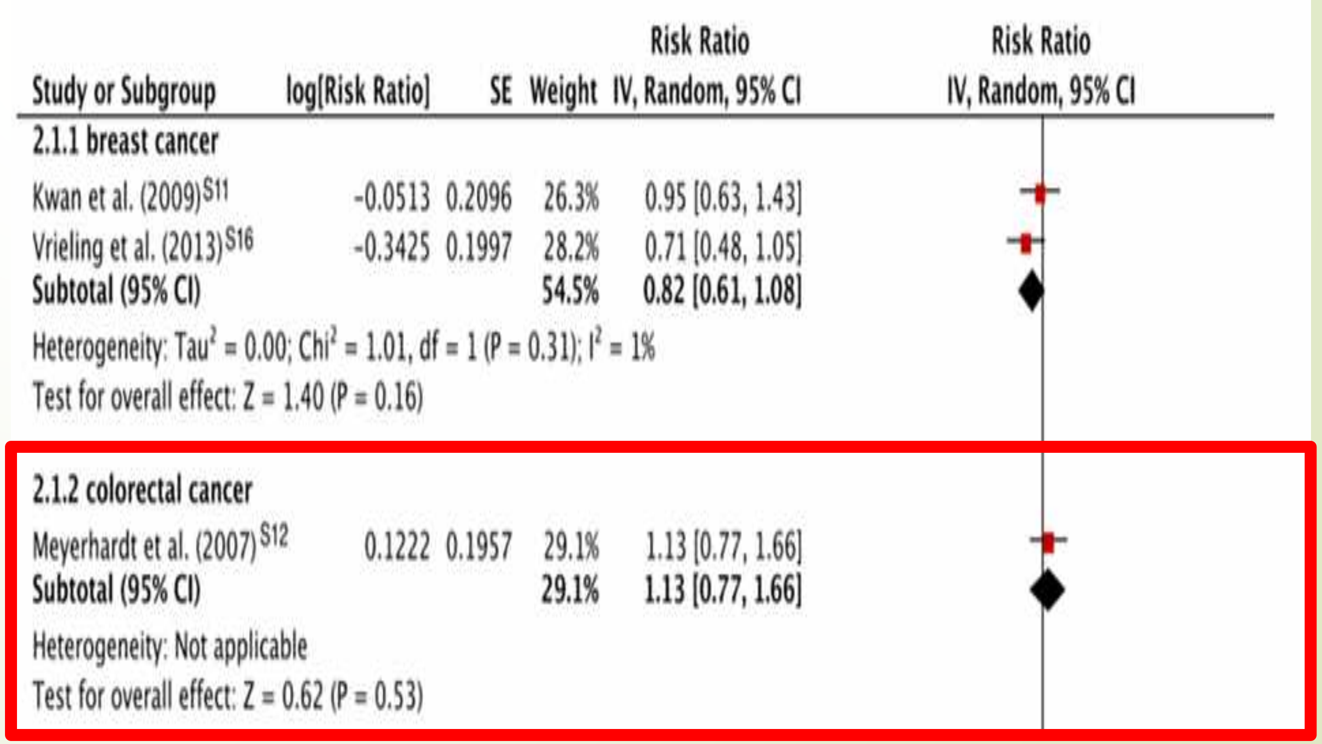
Study or Subgroup	log[Risk Ratio]	SE	Weight	Risk Ratio IV, Random, 95% CI
1.3.1 breast cancer				
Kroenke et al. (2005)[30]	0.3853	0.1479	24.1%	1.47 [1.10, 1.96]
Kwan et al. (2009)[31]	0.4253	0.254	8.2%	1.53 [0.93, 2.52]
Vrieling et al. (2013)[32]	0.2927	0.1864	15.1%	1.34 [0.93, 1.93]
Subtotal (95% CI)			**47.4%**	**1.44 [1.17, 1.77]**
Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 0.23$, $df = 2$ ($P = 0.89$); $I^2 = 0\%$				
Test for overall effect: $Z = 3.44$ ($P = 0.0006$)				
1.3.2 colorectal cancer				
Fung et al. (2014)[26]	0.2776	0.2011	13.0%	1.32 [0.89, 1.96]
Meyerhardt et al. (2007)[33]	0.8416	0.2725	7.1%	2.32 [1.36, 3.96]
Zhu et al. (2013)[34]	0.3293	0.2106	11.9%	1.39 [0.92, 2.10]
Subtotal (95% CI)			**32.0%**	**1.55 [1.13, 2.13]**
Heterogeneity: $Tau^2 = 0.03$; $Chi^2 = 3.08$, $df = 2$ ($P = 0.21$); $I^2 = 35\%$				
Test for overall effect: $Z = 2.73$ ($P = 0.006$)				

Schwedhelm C et al, Nutr Rev. 2016



Study or Subgroup	log[Risk Ratio]	SE	Weight	Risk Ratio IV, Random, 95% CI
2.2.1 breast cancer				
Kwan et al. (2009)[S11]	-0.0202	0.2336	25.9%	0.98 [0.62, 1.55]
Vrieling et al. (2013)[S16]	-0.0943	0.2041	27.0%	0.91 [0.61, 1.36]
Subtotal (95% CI)			**52.9%**	**0.94 [0.70, 1.27]**
Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 0.06$, df = 1 (P = 0.81); $I^2 = 0\%$				
Test for overall effect: Z = 0.40 (P = 0.69)				
2.2.2 colorectal cancer				
Meyerhardt et al. (2007)[S12]	1.0473	0.2488	25.3%	2.85 [1.75, 4.64]
Subtotal (95% CI)			**25.3%**	**2.85 [1.75, 4.64]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 4.21 (P < 0.0001)				

«Δυτικού τύπου»
Επίδραση στην επανεμφάνιση της νόσου



Study or Subgroup	log[Risk Ratio]	SE	Weight	Risk Ratio IV, Random, 95% CI
2.1.1 breast cancer				
Kwan et al. (2009)[S11]	-0.0513	0.2096	26.3%	0.95 [0.63, 1.43]
Vrieling et al. (2013)[S16]	-0.3425	0.1997	28.2%	0.71 [0.48, 1.05]
Subtotal (95% CI)			**54.5%**	**0.82 [0.61, 1.08]**
Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 1.01$, df = 1 (P = 0.31); $I^2 = 1\%$				
Test for overall effect: Z = 1.40 (P = 0.16)				
2.1.2 colorectal cancer				
Meyerhardt et al. (2007)[S12]	0.1222	0.1957	29.1%	1.13 [0.77, 1.66]
Subtotal (95% CI)			**29.1%**	**1.13 [0.77, 1.66]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 0.62 (P = 0.53)				

«Υγιεινό πρότυπο»
Επίδραση στην επανεμφάνιση της νόσου

150 min/wk μέτριας έντασης
75 min/wk έντονη
+ τουλάχιστον 2 φορές/wk
ασκήσεις με αντιστάσεις

World Cancer Research Fund/American Institute for Cancer Research. *Diet, Nutrition, Physical Activity and Cancer: a Global Perspective.* Continuous Update Project Expert Report 2018. Available at dietandcancerreport.org

American College of Sports Medicine Roundtable Report on Physical Activity, Sedentary Behavior, and Cancer Prevention and Control

ALPA V. PATEL[1], CHRISTINE M. FRIEDENREICH[2], STEVEN C. MOORE[3], SANDRA C. HAYES[4], JULIE K. SILVER[5], KRISTIN L. CAMPBELL[6], KERRI WINTERS-STONE[7], LYNN H. GERBER[8], STEPHANIE M. GEORGE[9], JANET E. FULTON[10], CRYSTAL DENLINGER[11], G. STEPHEN MORRIS[12], TRISHA HUE[13], KATHRYN H. SCHMITZ[14], and CHARLES E. MATTHEWS[3]

Επίδραση της φυσικής δραστηριότητας στη θνησιμότητα

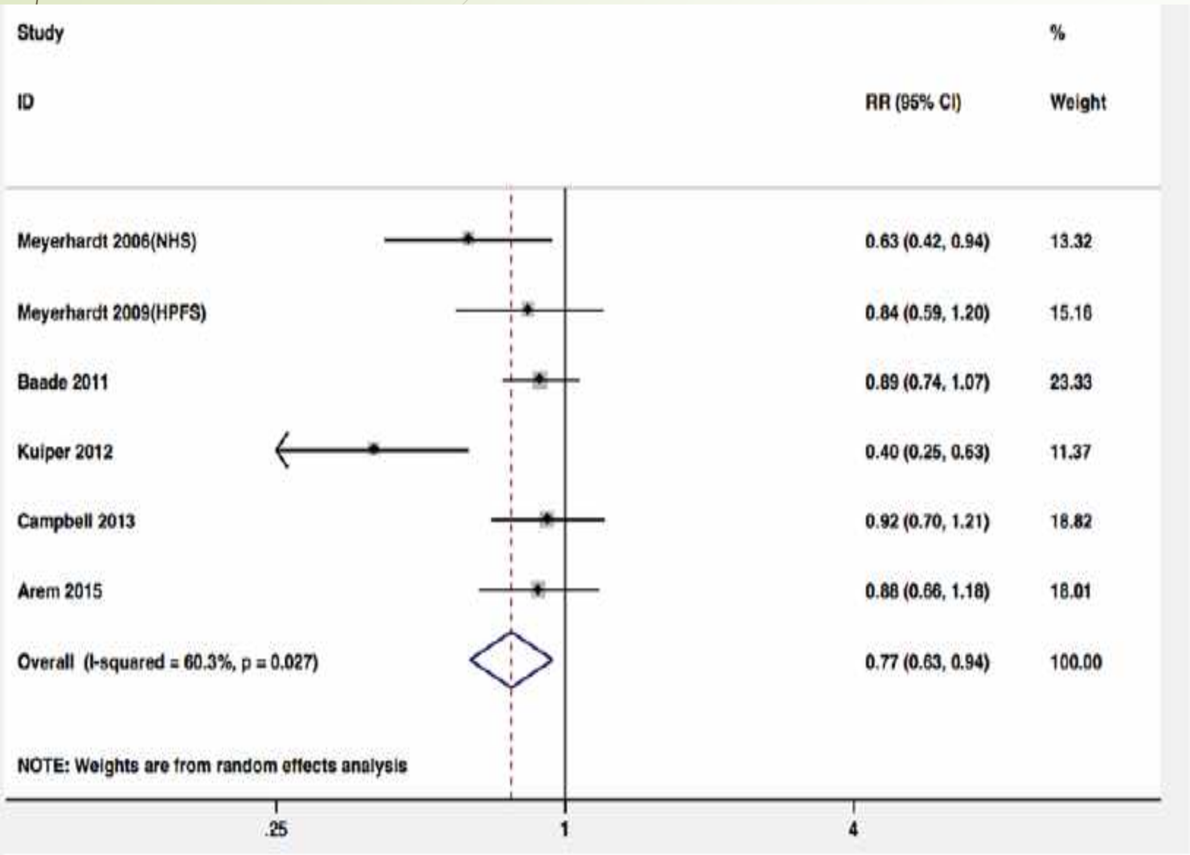
TABLE 3. Summary of risk estimates for prediagnosis and postdiagnosis physical activity in relation to cancer-specific and all-cause mortality among cancer survivors.

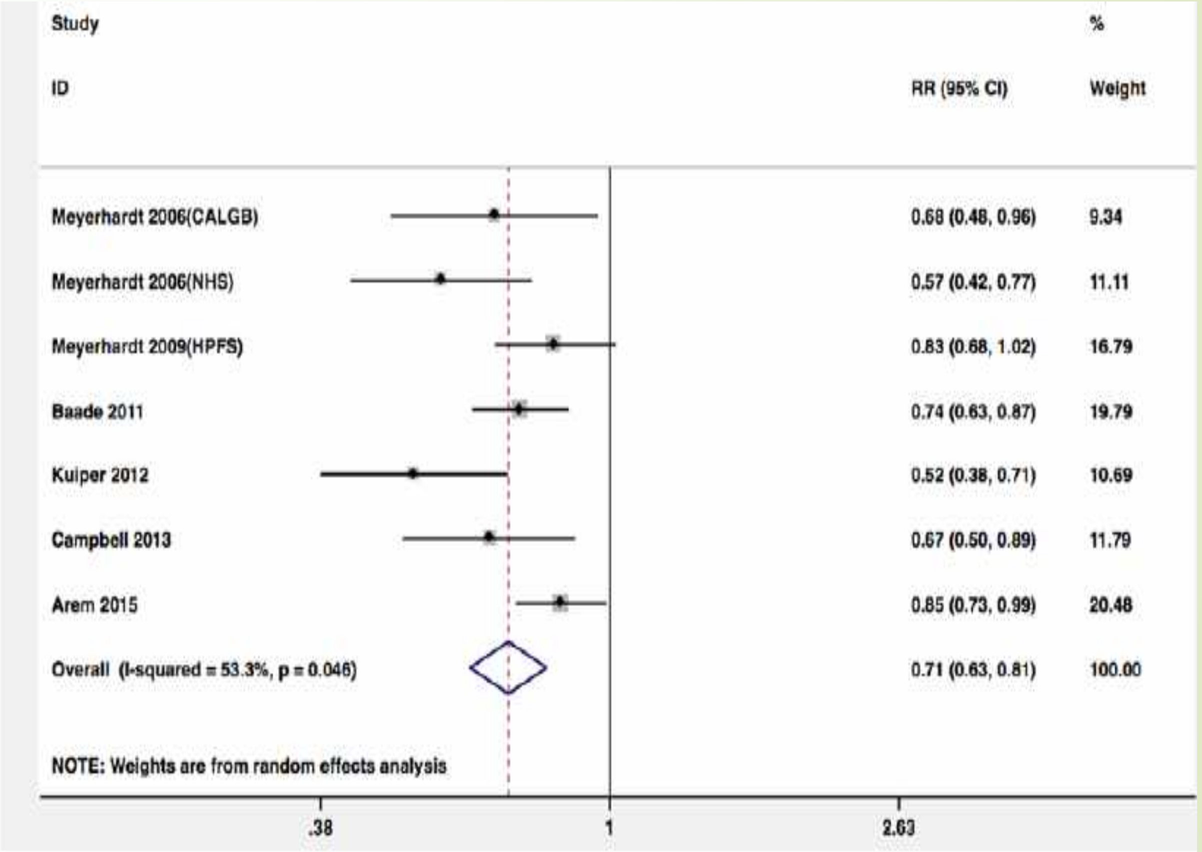
	Prediagnosis Physical Activity				Postdiagnosis Physical Activity			
	Cancer-Specific Mortality		All-Cause Mortality		Cancer-Specific Mortality		All-Cause Mortality	
Cancer Site	N[a]	RR (95% CI)	N	RR (95% CI)	N	RR (95% CI)	N	RR (95% CI)
Breast	17	0.82 (0.73–0.92)	17	0.79 (0.72–0.86)	12	0.69 (0.56–0.84)	13	0.59 (0.48–0.71)
Colorectal	8	0.77 (0.68–0.87)	7	0.75 (0.68–0.83)	7	0.70 (0.54–0.90)	9	0.62 (0.50–0.77)
Prostate	6	0.99 (0.86–1.15)	2	0.87 (0.80–0.96)	4	0.67 (0.52–0.87)	3	0.55 (0.40–0.76)
Endometrium	2	1.04 (0.81–1.36)	2	0.92 (0.77–1.10)	—	—	—	—
Ovarian	2	1.01 (0.80–1.27)	3	0.90 (0.71–1.13)	—	—	—	—
Kidney	1	0.50 (0.27–0.93)	—	—	—	—	—	—
Lung	1	0.78 (0.66–0.93)	—	—	—	—	1	0.67 (0.31–1.48)
Melanoma	1	1.09 (0.69–1.70)	—	—	—	—	—	—
Non-Hodgkin Lymphoma	—	—	1	0.85 (0.73–0.99)	1	0.56 (0.31–1.03)	1	0.63 (0.48–0.81)
Childhood cancers	—	—	—	—	1	0.74 (0.39–1.42)	1	0.79 (0.62–1.00)
Esophageal	—	—	—	—	1	0.31 (0.22–0.43)	—	0.79 (0.55–1.13)
Gastric	—	—	—	—	—	—	1	0.75 (0.61–0.93)
Malignant glioma	—	—	—	—	—	—	1	0.64 (0.46–0.91)

Διάρκεια?

Ένταση?

Relative risks for the association between physical activity and survival among exercise patients VS non-exercise patients.



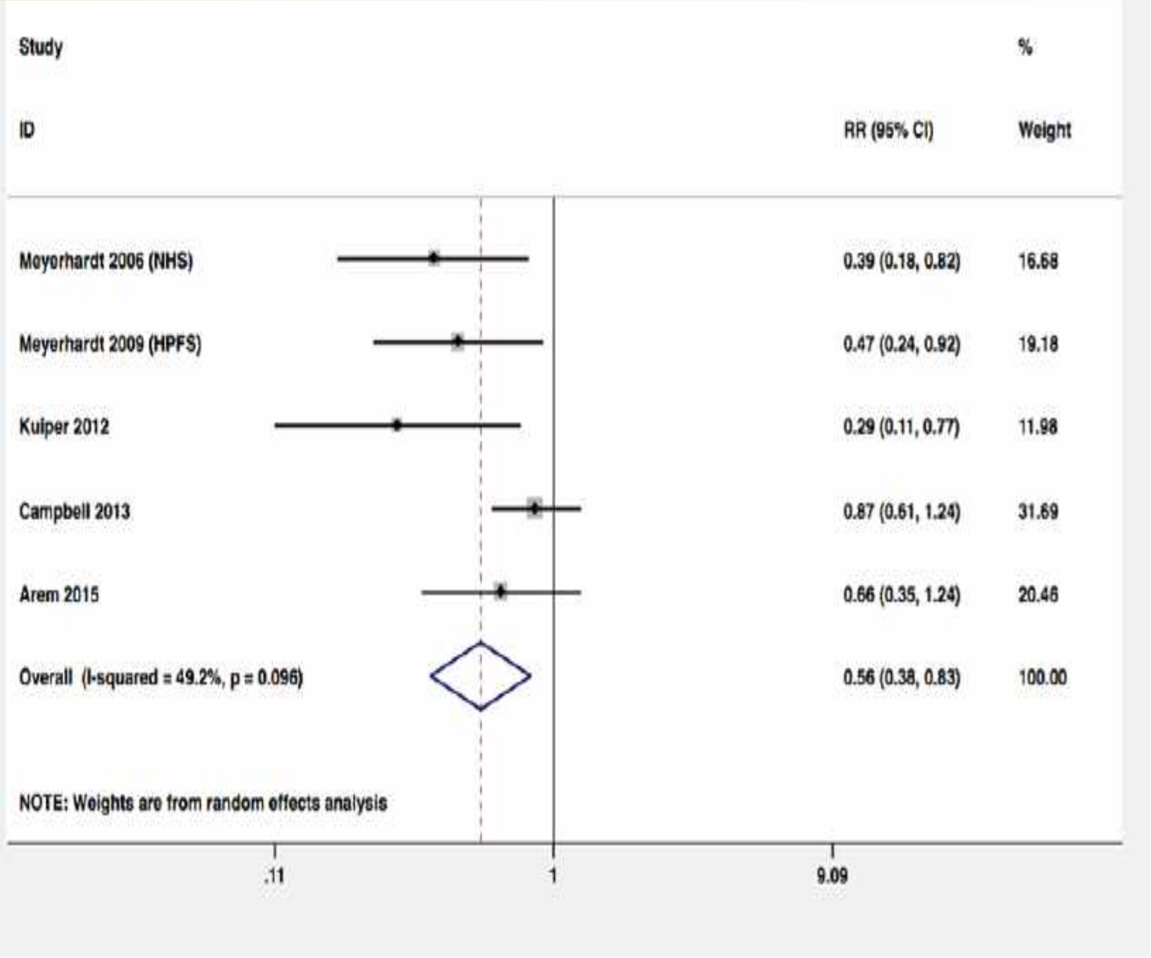


Post-diagnosis and CRC-specific mortality

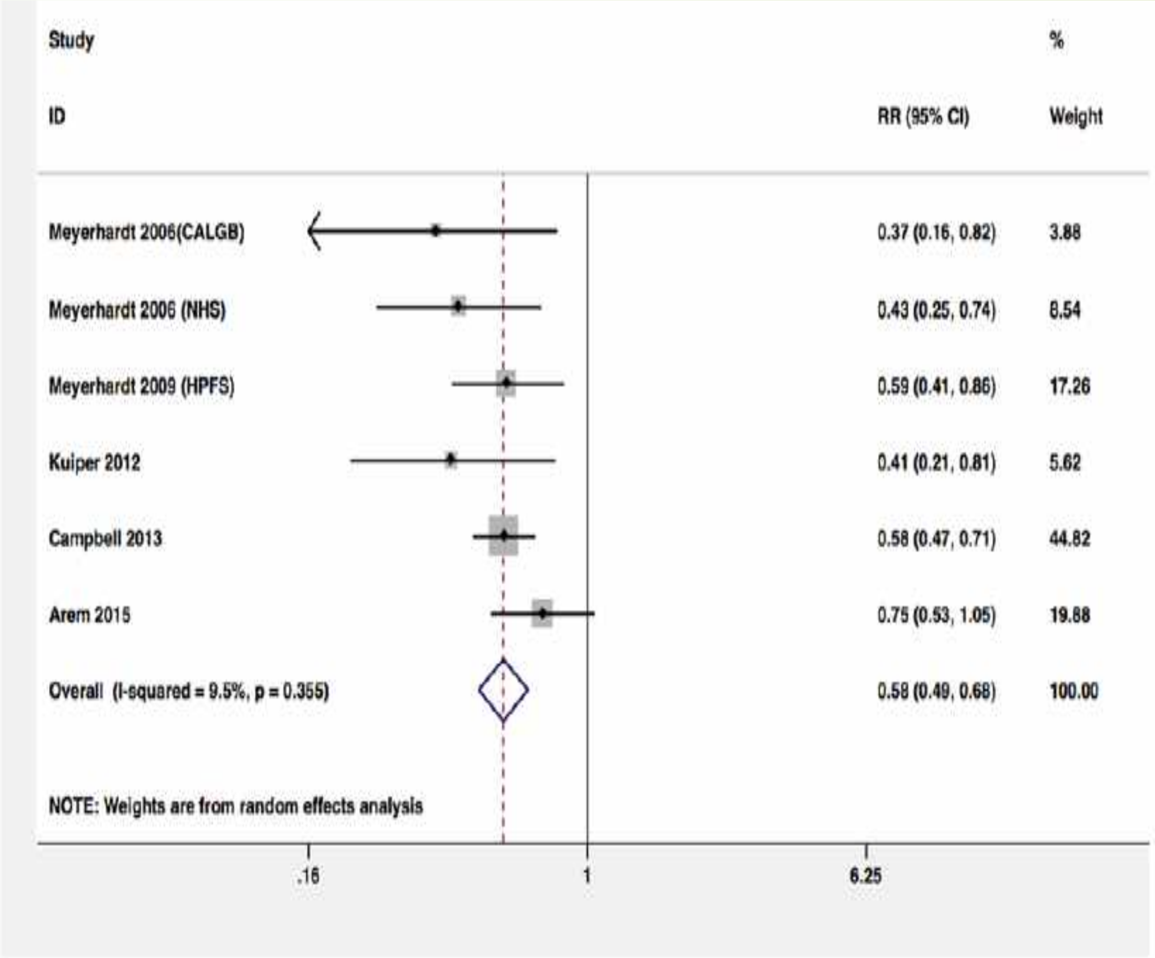
Post-diagnosis and overall mortality.

Wu et al, Oncotarget. 2016 Aug 9;7(32):52095-52103

Relative risks for the association between physical activity and survival among high-level VS low-level



Post-diagnosis and CRC-specific mortality



Post-diagnosis and overall mortality

Wu et al, Oncotarget. 2016 Aug 9;7(32):52095-52103

Association of Survival With Adherence to the American Cancer Society Nutrition and Physical Activity Guidelines for Cancer Survivors After Colon Cancer Diagnosis

The CALGB 89803/Alliance Trial

Van Blarigan, JAMA Oncol. 2018

Table 2. Cancer Recurrence and Mortality Among the 992 Patients With Stage III Colon Cancer by ACS Guidelines Score

	ACS Guidelines Score (0-6)					
Outcome	0-1	2	3	4	5-6	*P* Value for Trend[a]
No. at risk	262	248	251	140	91	NA
Overall Mortality						
Events	92	80	70	39	18	NA
Person-years	1485	1364	1397	853	552	NA
Model 1 HR (95% CI)[b]	1.00	0.94 (0.68-1.29)	0.78 (0.56-1.10)	0.73 (0.49-1.08)	0.56 (0.33-0.96)	.01
Model 2 HR (95% CI)[c]	1.00	0.96 (0.69-1.33)	0.78 (0.55-1.10)	0.73 (0.49-1.10)	0.58 (0.34-0.99)	.01
Cancer Recurrence or Death From Any Cause (Disease-Free Survival)						
Events	110	102	91	48	27	NA
Person-years	1292	1195	1234	770	496	NA
Model 1 HR (95% CI)[b]	1.00	0.99 (0.76-1.30)	0.88 (0.67-1.16)	0.75 (0.54-1.06)	0.69 (0.45-1.05)	.02
Model 2 HR (95% CI)[c]	1.00	1.01 (0.76-1.33)	0.88 (0.66-1.17)	0.78 (0.55-1.10)	0.69 (0.45-1.06)	.03
Cancer Recurrence (Recurrence-Free Survival)						
Events	97	88	80	43	27	NA
Person-years	1292	1195	1232	770	496	NA
Model 1 HR (95% CI)[b]	1.00	0.99 (0.74-1.32)	0.88 (0.66-1.19)	0.79 (0.55-1.13)	0.80 (0.52-1.22)	.11
Model 2 HR (95% CI)[c]	1.00	0.99 (0.74-1.33)	0.86 (0.64-1.17)	0.80 (0.56-1.16)	0.78 (0.51-1.20)	.11

e 4 Aims and outcomes of RCTs on weight loss and diet interventions in patients with colorectal cancer

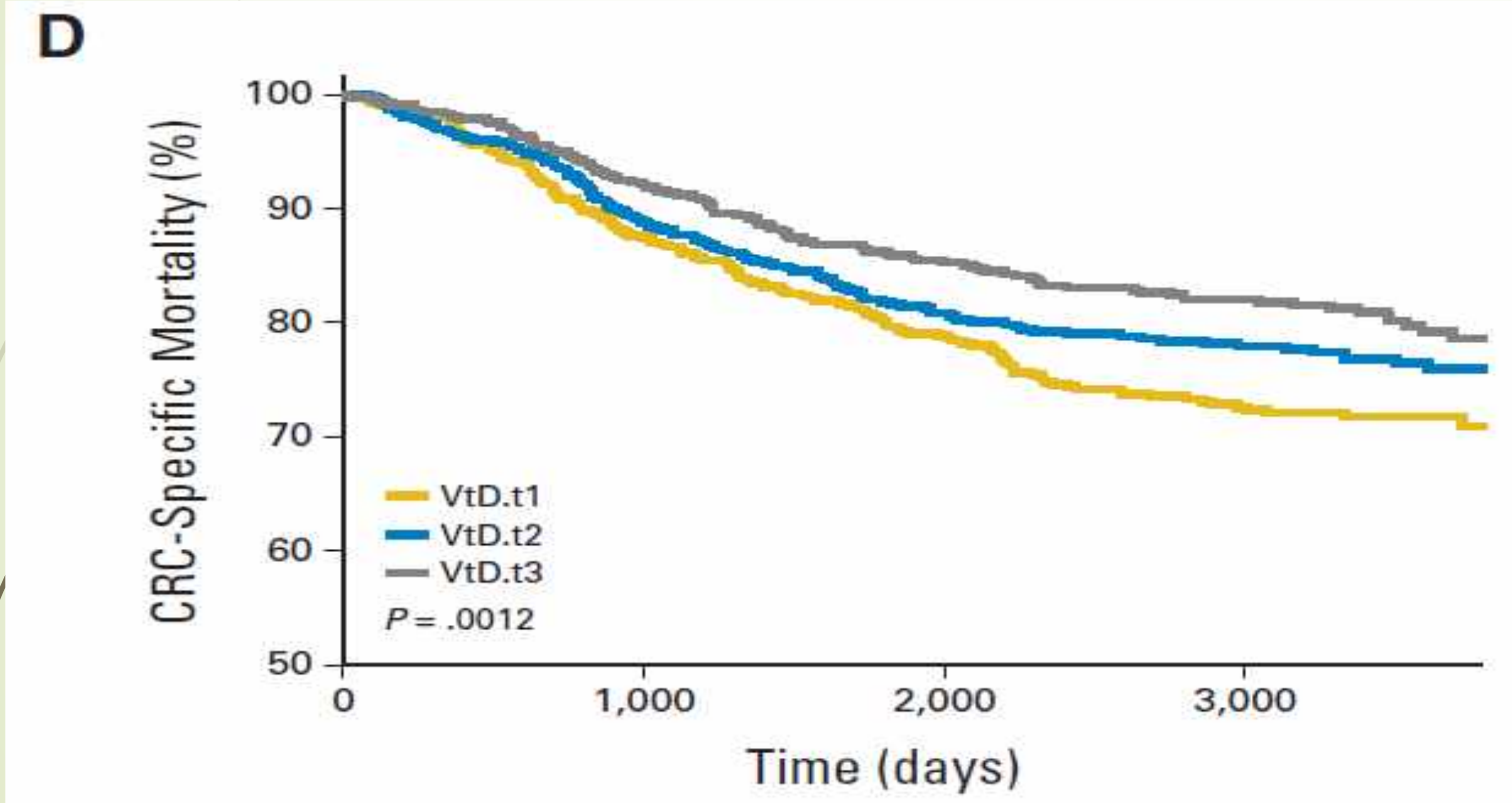
Intervention	Primary aim	Study Population	Inclusion criteria	Exclusion criteria	Nos of patients: recruited (approached)	Nos patient in each arm	Drop out rate	Follow-up Retention rate	Intervention adherence	Follow up	Primary Outcome
4 groups stratified by having CRC or healthy population: TPC, TMI, combination, control.	To increase fruit and vegetable intake and moderate PA.	>2.5 years from diagnosis (n=266)	40-79 years old; African American and European American ethnicity; On registry of North Carolina.	Not stated	825 (1850)	TPC: 207 TMI: 208 Combination: 204 Controls: 206	N=90 (11%)	89%	Not stated	6 and 12 months.	At 12 months, TPC group increased daily serving of fruit and veg by 1. No significant increases documented in colorectal patients.
Telephone delivered multiple health behavior change intervention for 6 months (including: health-coaching sessions by nurses, psychologists or health promotion practitioners) versus Controls (standard care)	Physical activity levels, quality of life, fatigue. Secondary aim: BMI; dietary intake of fat, fibre, fruit and vegetables.	Completed CRC treatment. (n=410 CRC)	Within 12 months of CRC diagnosis	No mets; Co-morbidities interfering with ability to exercise; BMI <25 kg.m^2, 2 servings of fruit/day and 5 serving of veg/day;	410 (523)	Intervention: 205 Control: 205	12%	77.6-79.5%	81.4% received >5 telephone calls; 77.3% received 8 72.2% all 11 calls.	6 and 12 months (period of no-intervention contact)	BMI reduced at 6 and 12 months in intervention group (0.5 kg/m^2 and 0.9 kg/m^2). Significant reduction in fat at 6 and 12 months. Significant increase in vegetable consumption only at 6 months (0.4 serving/day, p=0.001)
12-month home-based programme of telephone/post materials (exercise/diet/weight loss) vs controls (standard care then delayed intervention at 12 months)	Change in self-reported function (SF36 physical function subscale); BMI and dietary quality analyses.	Overweight, older, long-term survivors of cancer (n=91 CRC)	BMI 25-39.9 ≥65yo ≥5y post-diagnosis with no recurrence	PA >150min/week Warfarinised Non-english speakers, hearing impaired	641 (2156) n= 91 CRC	Intervention: 319 Control: 322	11%	87.1% - 12 months 76.1% - 24 months	Not stated	12 and 24 months	At 1 year, immediate intervention group significantly improved BMI (-0.56kg/m^2) and dietary quality (Diet quality score p<0.001). Delayed intervention group caught up at 2 years with no differences between the two groups.

Moug et al, Int J Colorectal Dis (2017)

World Cancer Research Fund/American Institute for Cancer Research. *Diet, Nutrition, Physical Activity and Cancer: a Global Perspective.* Continuous Update Project Expert Report 2018. Available at dietandcancerreport.org

Βιταμίνη D

t1: median: 4.80 ng/mL
t2: median: 10.11 ng/mL;
t3: 18.26 ng/mL



Πιθανή συμπληρωματική χορήγηση??

Zgaga et al, J Clin Oncol. 2014

World Cancer Research Fund/American Institute for Cancer Research. *Diet, Nutrition, Physical Activity and Cancer: a Global Perspective.* Continuous Update Project Expert Report 2018. Available at dietandcancerreport.org

Αλκοόλ και θνησιμότητα (πρόσφατη μετα-ανάλυση επιδημιολογικών μελετών)

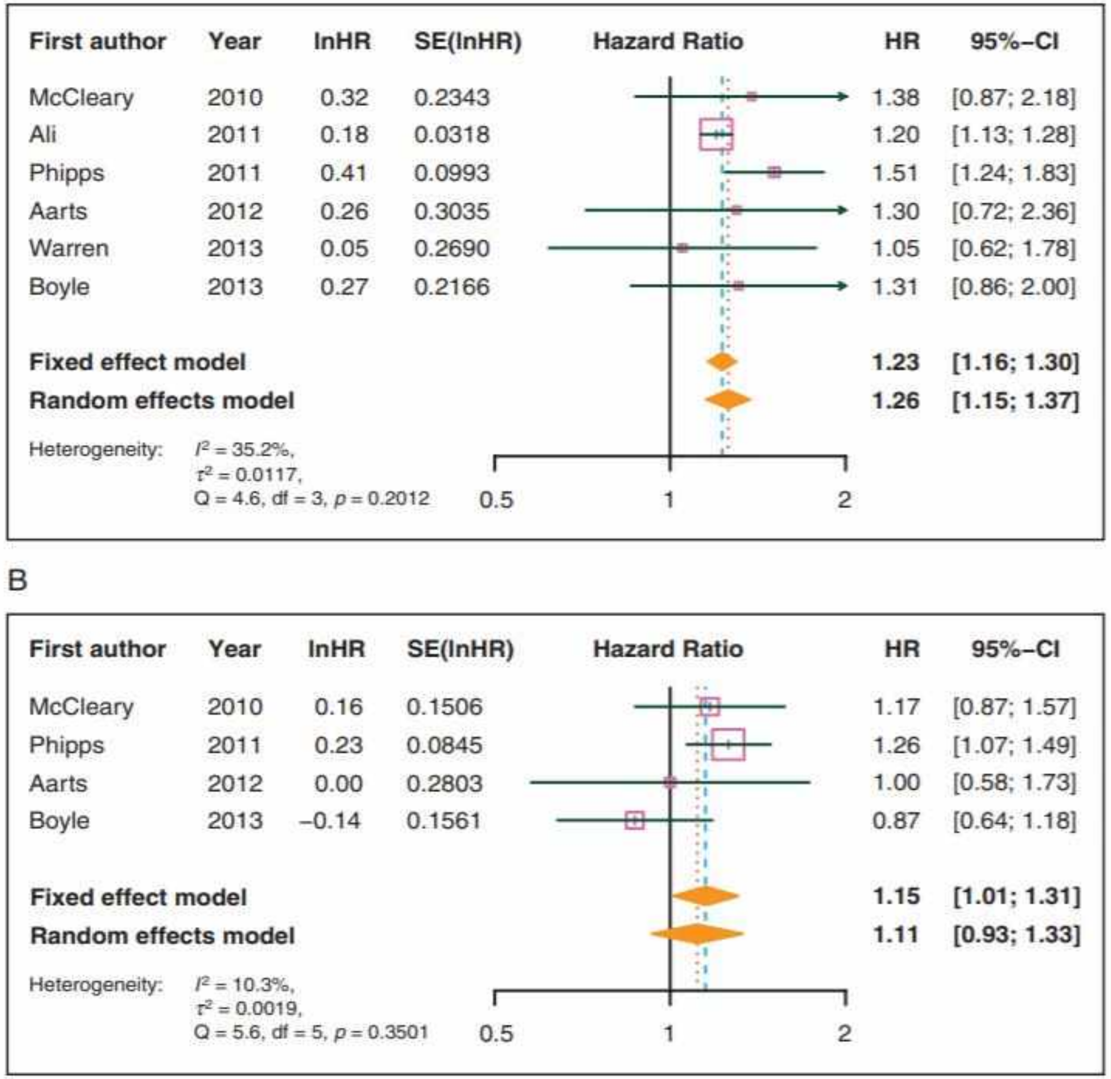
Supplementary Table 2. Summary of pooled relative risks (RR) for post-diagnostic alcohol consumption and mortality

	Light vs. none			Moderate vs. none		
	No. of studies	RR	95% CI	No. of studies	RR	95% CI
All-cause mortality	2	0.99	0.68-1.42	3	0.98	0.79-1.22
Colorectal cancer-specific mortality	2	0.95	0.28-3.30	2	0.85	0.36-2.00

Non-significant inverse associations between light and moderate post-diagnostic alcohol consumption and mortality from all-causes and colorectal cancer were found.

Kim et al, Cancer Epidemiol Biomarkers Prev. 2019

Κάπνισμα



Meta-analysis results for all-cause mortality in (A) current and (B) former smokers, compared with never smokers.

Current (A) and former smokers (B) vs never smokers

Walter et al, Ann Oncol. 2014

Συμπεράσματα

Ερευνητικά κενά κυρίως για το recurrence

Καλά σχεδιασμένες μελέτες

Εντατικοποιημένες παρεμβάσεις

Συστήνεται η υιοθέτηση των συστάσων της πρωτογενούς πρόληψης (Εξατομίκευση!!)

Εν αναμονή του report από τον WCRF σχετικά με τους colorectal cancer survivors

Will following WCRF/AICR's Recommendations lessen fatigue in colorectal cancer survivors?

This randomised controlled trial aims to find out if healthier lifestyles can reduce fatigue associated with colorectal cancer treatment

- **Topic:** Colorectal cancer
- **Institution:** Wageningen University and Research Centre
- **Country:** Netherlands
- **Status:** Ongoing

Colorectal cancer survivors and following WCRF/AICR Recommendations

Martijn Bours's research study looks at whether adherence to World Cancer Research Fund/American Institute for Cancer Research lifestyle recommendations for cancer prevention are associated with a better quality of life in survivors of colorectal cancer

- **Topic:** Colorectal cancer
- **Institution:** Maastricht University
- **Country:** Netherlands
- **Status:** Ongoing

Can vitamin D reduce fatigue in colorectal cancer patients?

Hermann Brenner's research study aims to test whether vitamin D supplementation improves fatigue, and subsequently quality of life, in patients

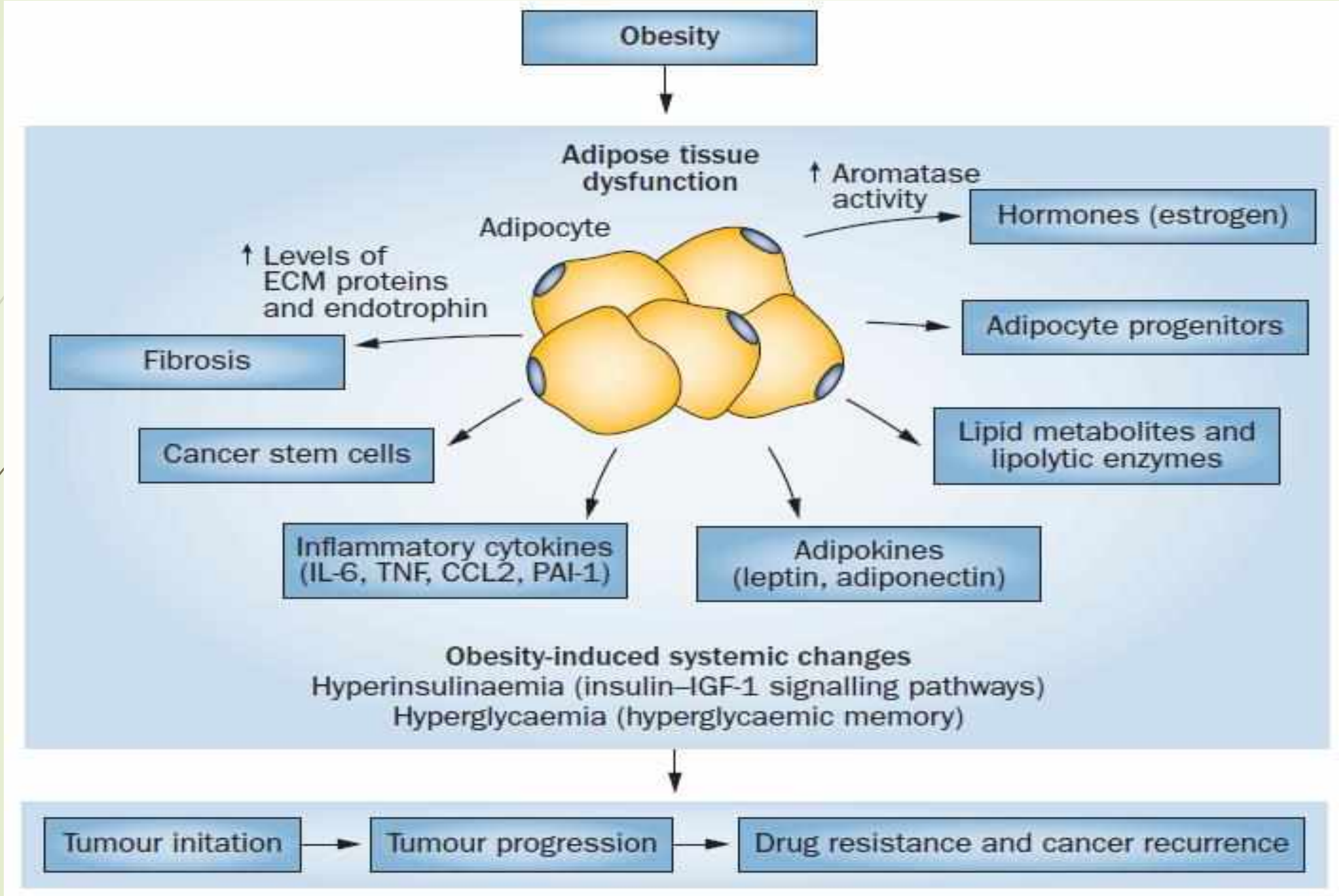
- **Topic:** Colorectal cancer
- **Institution:** German Cancer Research Center (DKFZ)
- **Country:** Germany
- **Status:** Ongoing

Body composition and colorectal cancer recurrence and survival

Ellen Kampman's research project aims to show whether measures of muscle mass and adiposity either separately or combined have an impact on recurrence and survival

- **Topic:** Colorectal cancer
- **Institution:** Wageningen University and Research Centre
- **Country:** Netherlands
- **Status:** Ongoing


Thank you...



Obesity
Adipose tissue
dysfunction
↑ Aromatase
activity
Hormones (estrogen)
Adipocyte
↑ Levels of
ECM proteins
and endotrophin
Fibrosis
Adipocyte progenitors
Cancer stem cells
Lipid metabolites and
lipolytic enzymes
Inflammatory cytokines
(IL-6, TNF, CCL2, PAI-1)
Adipokines
(leptin, adiponectin)
Obesity-induced systemic changes
Hyperinsulinaemia (insulin–IGF-1 signalling pathways)
Hyperglycaemia (hyperglycaemic memory)
Tumour initation
Tumour progression
Drug resistance and cancer recurrence

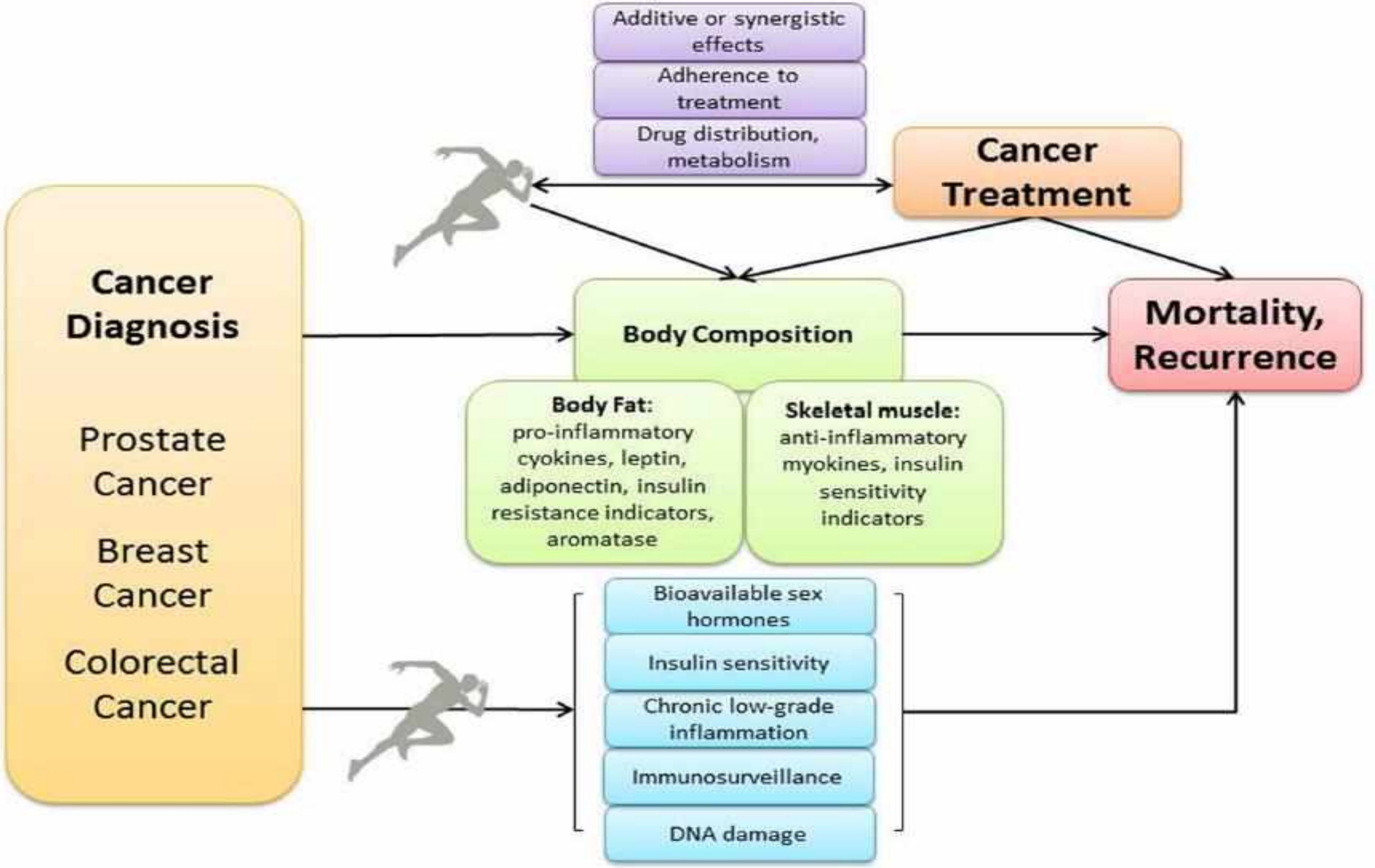


Fig. 1 Commonly proposed mechanisms relating physical activity to cancer recurrence and/or survival. Potential additive or synergistic effects between physical activity and cancer treatment are possible