Northumbria University NEWCASTLE

Pragmatic exercise and dietary interventions in overweight cancer survivors

Impact on body weight and other health outcomes

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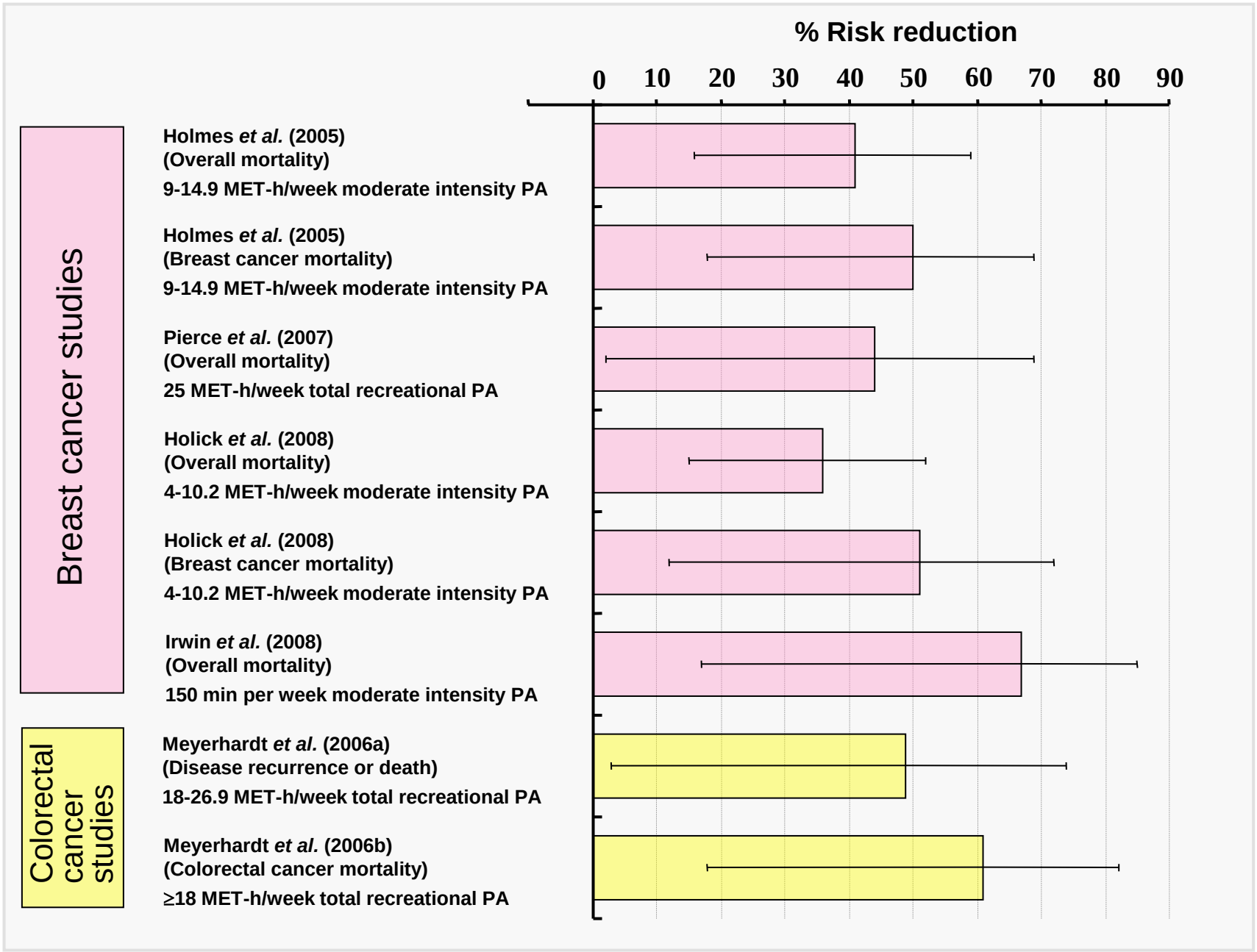
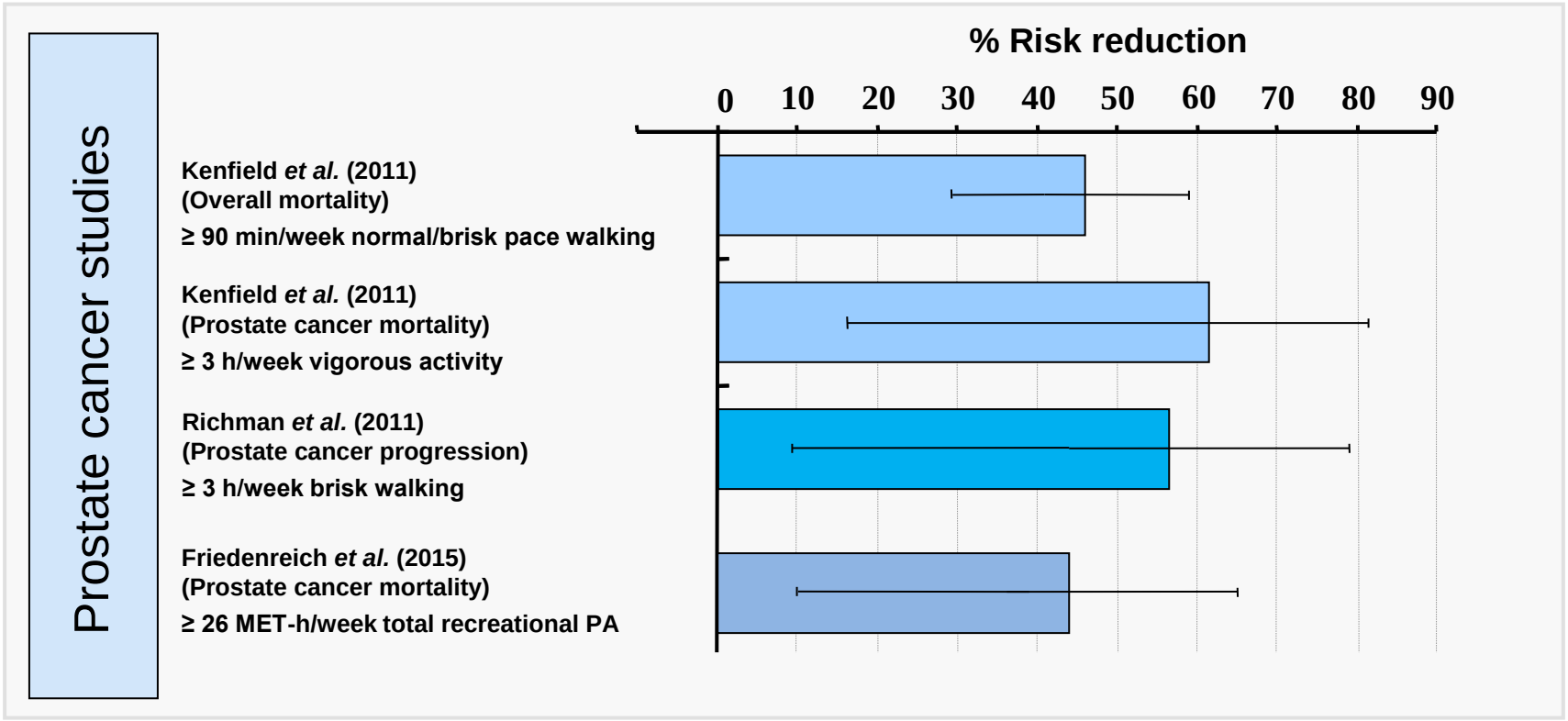
If we had a pill that conferred all the confirmed health benefits of exercise, would we not do everything humanly possible to see to it that everyone had access to this wonder drug? Would it not be the most prescribed pill in the history of mankind?

Robert E. Sallis 2009; Br J Sports Med 43(1), 3-4.

Physical Activity (PA) and survival outcomes after cancer treatment



Physical Activity (PA) and survival outcomes after cancer treatment



The Colon Health and Life-Long Exercise Change trial: a randomized trial of the National Cancer Institute of Canada Clinical Trials Group

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P. O'Brien MSc,† J. Vardy MD PhD,§
C.M. Friedenreich PhD,|| H.J. Au MD,#
M.D. Brundage MD,† D. Tu PhD,† H. Dhillon MA,§
and R.M. Meyer MD†

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Intense Exercise for Survival among Men with Metastatic Castrate-Resistant Prostate Cancer (INTERVAL-GAP4): a multicentre, randomised, controlled phase III study protocol

Robert U Newton,[1,2,3] Stacey A Kenfield,[4] Nicolas H Hart,[1,3,5] June M Chan,[4,6] Kerry S Courneya,[1,7] James Catto,[8] Stephen P Finn,[9] Rosemary Greenwood,[10] Daniel C Hughes,[11] Lorelei Mucci,[12] Stephen R Plymate,[13] Stephan F E Praet,[13,14] Emer M Guinan,[15] Erin L Van Blarigan,[6] Orla Casey,[15] Mark Buzza,[16] Sam Gledhill,[16] Li Zhang,[6,17] Daniel A Galvão,[1,3] Charles J Ryan,[4,17,18] Fred Saad[19]

BMJ Open 2018;**8**:e022899.

The Alberta moving beyond breast cancer (AMBER) cohort study: a prospective study of physical activity and health-related fitness in breast cancer survivors

Kerry S Courneya[1,10*], Jeff K Vallance[2], S Nicole Culos-Reed[3], Margaret L McNeely[4], Gordon J Bell[1], John R Mackey[5], Yutaka Yasui[6], Yan Yuan[6], Charles E Matthews[7], David CW Lau[8], Diane Cook[1] and Christine M Friedenreich[9]

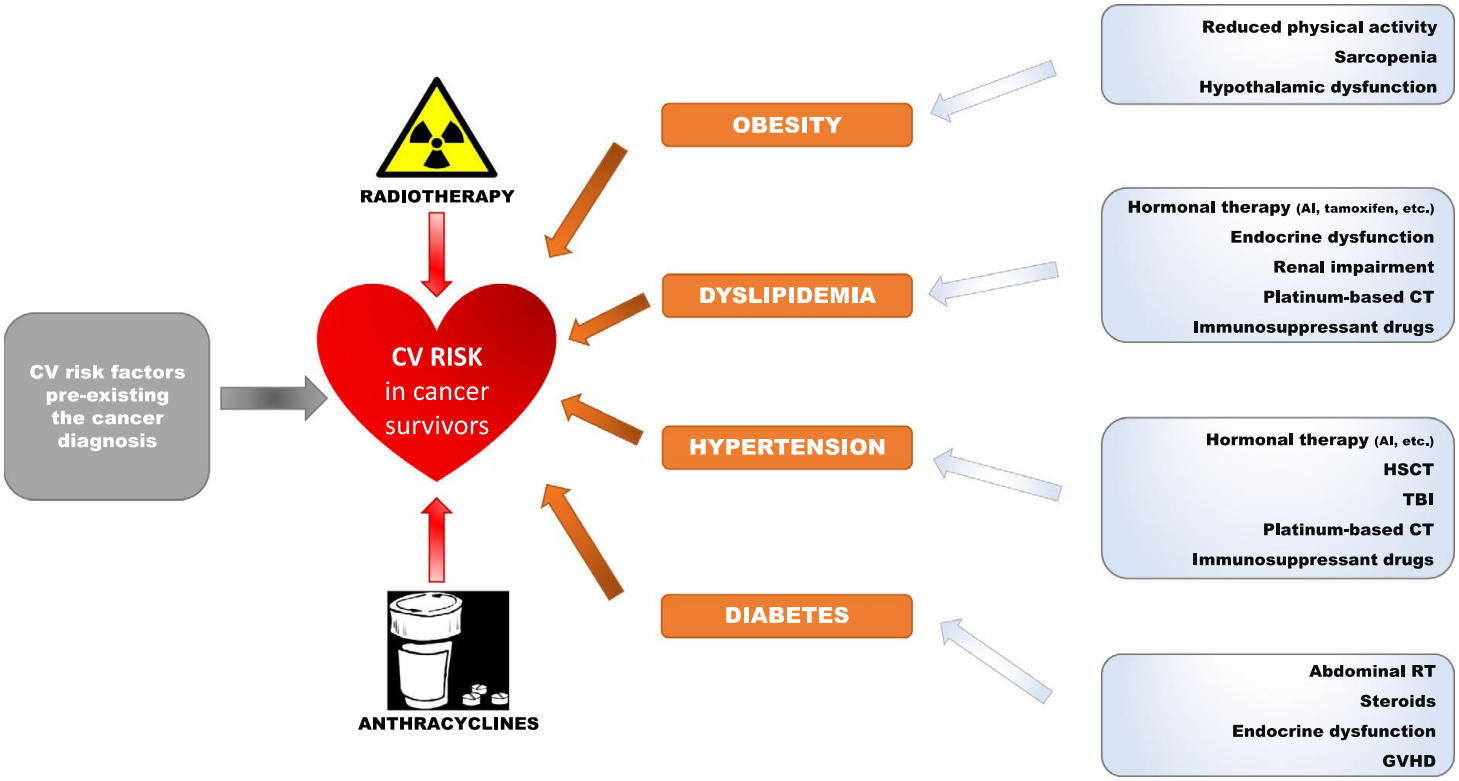
BMC Cancer 2012, **12**:525

Excess body weight and cancer survival

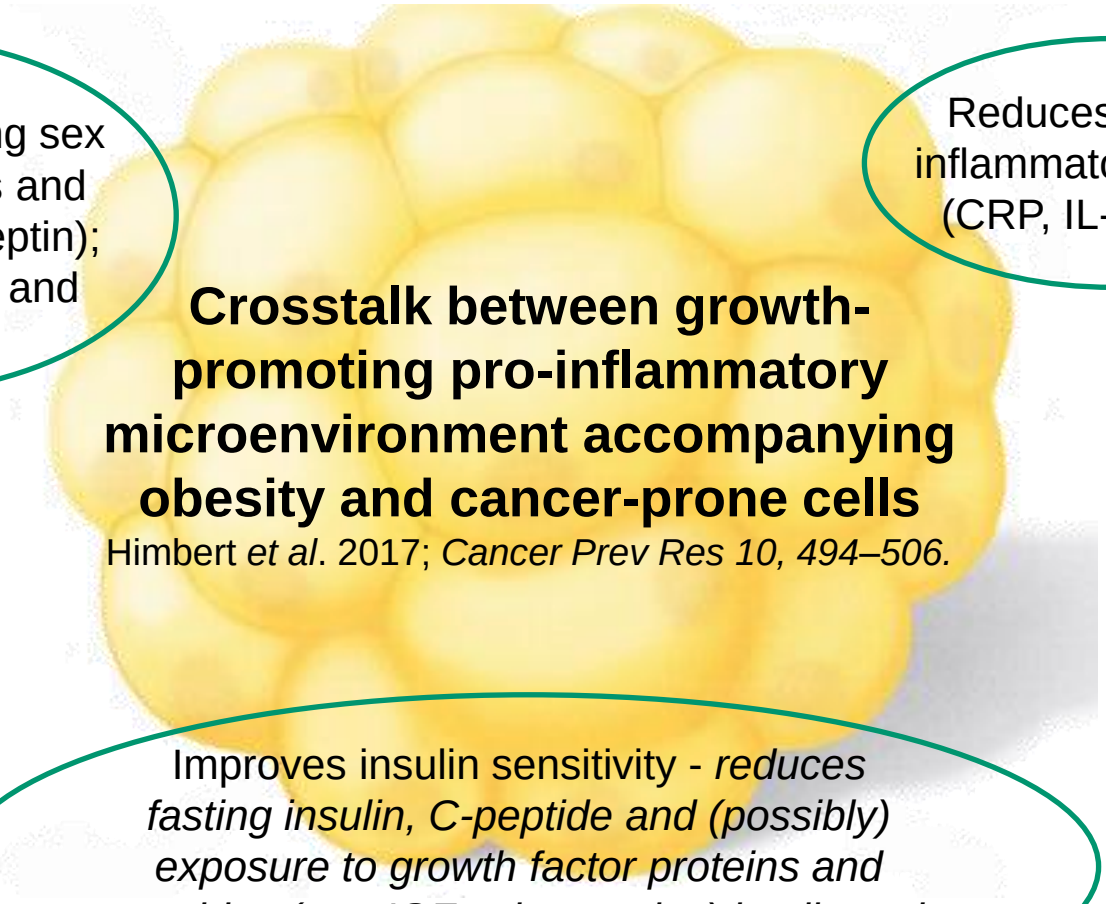
- *Each 5 kg/m2 BMI increment <12 months after and ≥12 months after diagnosis was associated with an increased risk of 14% and 29%, respectively, for breast cancer mortality (Chan et al. 2014; Ann Oncol 25, 1901-14).*
- *Each 5 kg/m² increase in BMI was associated with 15% increased risk of prostate cancer mortality and 21% increased risk of biochemical recurrence (Cao et al. 2011; Cancer Prev Res 4, 486-501).*
- *Obesity prior to diagnosis was associated with 22% increased risk of colorectal cancer mortality and 25% increased risk of all-cause mortality; obesity after diagnosis was associated with 8% increased risk of all-cause mortality (Lee et al. 2015; PLoS One 10, e0120706).*

Cancer survivors: An expanding population with an increased cardiometabolic risk

Felicetti *et al*. (2018): *Diabetes Research and Clinical Practice 143; 432-442.*



Physical activity promotes negative energy balance and weight (body fat) loss – reducing general/central adiposity



Reduces circulating sex steroid hormones and adipokines (e.g. leptin); increases SHBG and adiponectin

Reduces systemic inflammatory markers (CRP, IL-6, TNF-α)

Crosstalk between growth-promoting pro-inflammatory microenvironment accompanying obesity and cancer-prone cells

Himbert *et al*. 2017; *Cancer Prev Res 10, 494–506.*

Improves insulin sensitivity - *reduces fasting insulin, C-peptide and (possibly) exposure to growth factor proteins and peptides (e.g. IGF axis proteins) implicated in breast, prostate and colon cancer*

Ballard-Barbash *et al*. (2012); J Natl Cancer Inst 104, 815–840.
Inoue and Tsugane (2012); Endocrine-Related Cancer19, F1–F8.
Picon-Ruiz *et al.* (2017); CA Cancer J Clin 67, 378–397.
McTiernan *et al*. (2018); Proc Nutr Soc 77, 403-411.

Weight loss-independent mechanisms?

Improves the anti-tumour defence system (enhanced immune system function)?

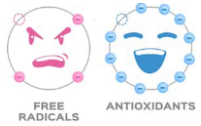
Fairey *et al*. (2002), *Cancer 94, 539–551.*

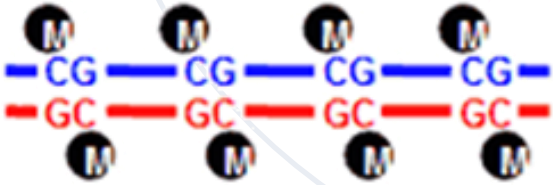
Hojman (2017), *Biochem Soc Trans 45,905-911*.

Reduces oxidative DNA damage and enhances anti-oxidant defences?

de Sousa *et al.* (2017), *Sports Med 47,277-293.*

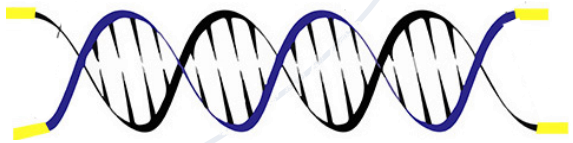
Allgayer *et al.* (2008), *Scand J Gastroenterol 43,971–978.*





Epigenetic changes **- genetic control by factors other than DNA sequence?**

Ferioli *et al*. (2019), J Cell Physiol: Feb 14.



Reduces telomere attrition?

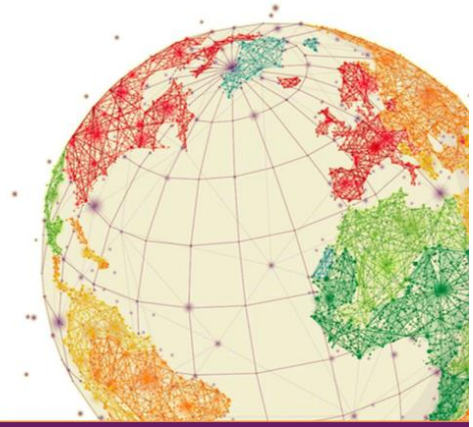
Nomikos *et al.* (2018), *Front Physiol 9,1798*.

World Cancer Research Fund | American Institute for Cancer Research

CUP Continuous Update Project
Analysing research on cancer prevention and survival

Diet, Nutrition, Physical Activity and Cancer: a Global Perspective

A summary of the Third Expert Report



World Cancer Research Fund International | World Cancer Research Fund UK | Wereld Kanker Onderzoek Fonds | World Cancer Research Fund

American Institute for Cancer Research

PHYSICAL ACTIVITY AND CANCER: REDUCING YOUR RISK

GETTING REGULAR PHYSICAL ACTIVITY
EVERY DAY IN ANY WAY
LOWERS RISK FOR CANCER

WALK MORE AND SIT LESS

AIM TO GET AT LEAST
150 MINUTES A WEEK

FOR MORE PROTECTION, BE ACTIVE FOR
45 - 60 MINUTES EVERY DAY

Resistance exercise?

For maintaining skeletal muscle mass

American Institute for Cancer Research

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Lean body mass (skeletal muscle) represents a key determinant of the magnitude of resting metabolic rate and predicts total daily energy expenditure.

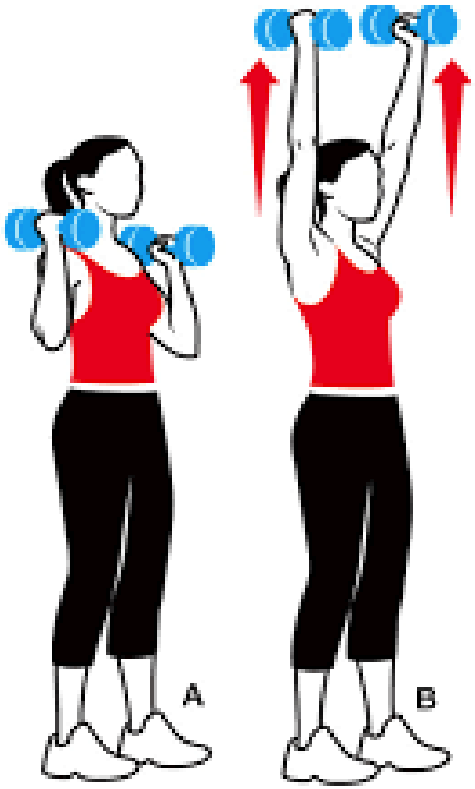
Cunningham (1996); Am J Clin Nutr 56, 460-461.
Stiegler & Cunliffe 2006; *Sports Med 36, 239-262.*

Resting metabolic rate is elevated for at least 12 hours after bouts of aerobic exercise lasting 20-80 minutes.

Bahr R, Newsholme E *et al.* (1985).

Greater reduction in body fat and preservation of lean body mass following 16 week aerobic + resistance exercise + daily 250 kcal deficit versus diet only intervention (daily 500 kcal deficit) in overweight, inactive postmenopausal women.

Van Gemert *et al.* (2015). *Breast Cancer Res 17,120.*



Physical activity and long-term body weight regulation

Clamp *et al.* (2018). *J Nutr Sci 7, e20*

- **Objective physical activity measures** in weight loss maintainers (≥15 % of body weight from a BMI ≥27kg/m^2 for over 12 months) showed they engaged in more MVPA and spent less time in sedentary behaviours versus BMI-matched controls with no weight loss history.

Ostendorf et al.* (2019). *Obesity 27, 496-504

- Higher levels of **objectively measured PA** energy expenditure recorded in individuals maintaining a substantial weight loss (≥13.6 kg for ≥1 year) versus overweight/obese and normal weight controls.

Chaput *et al*. (2011). *J Obes 2011. pii: 360257*

- Appetite control; counteracting sedentary time and associated behaviours (e.g. snacking, over-eating); stress-reducing effects of PA – impact on comfort eating.