



Area
FORMAZIONE



Brunelli Andrea, PhD

Cosa è il Cancro ?

Si tratta di diversi tipi di malattie
(100/200 tipi diversi di cancro riportati in letteratura)

Cellule di un determinato tessuto si moltiplicano senza controllo

Carcinoma → tessuto epiteliale 80%

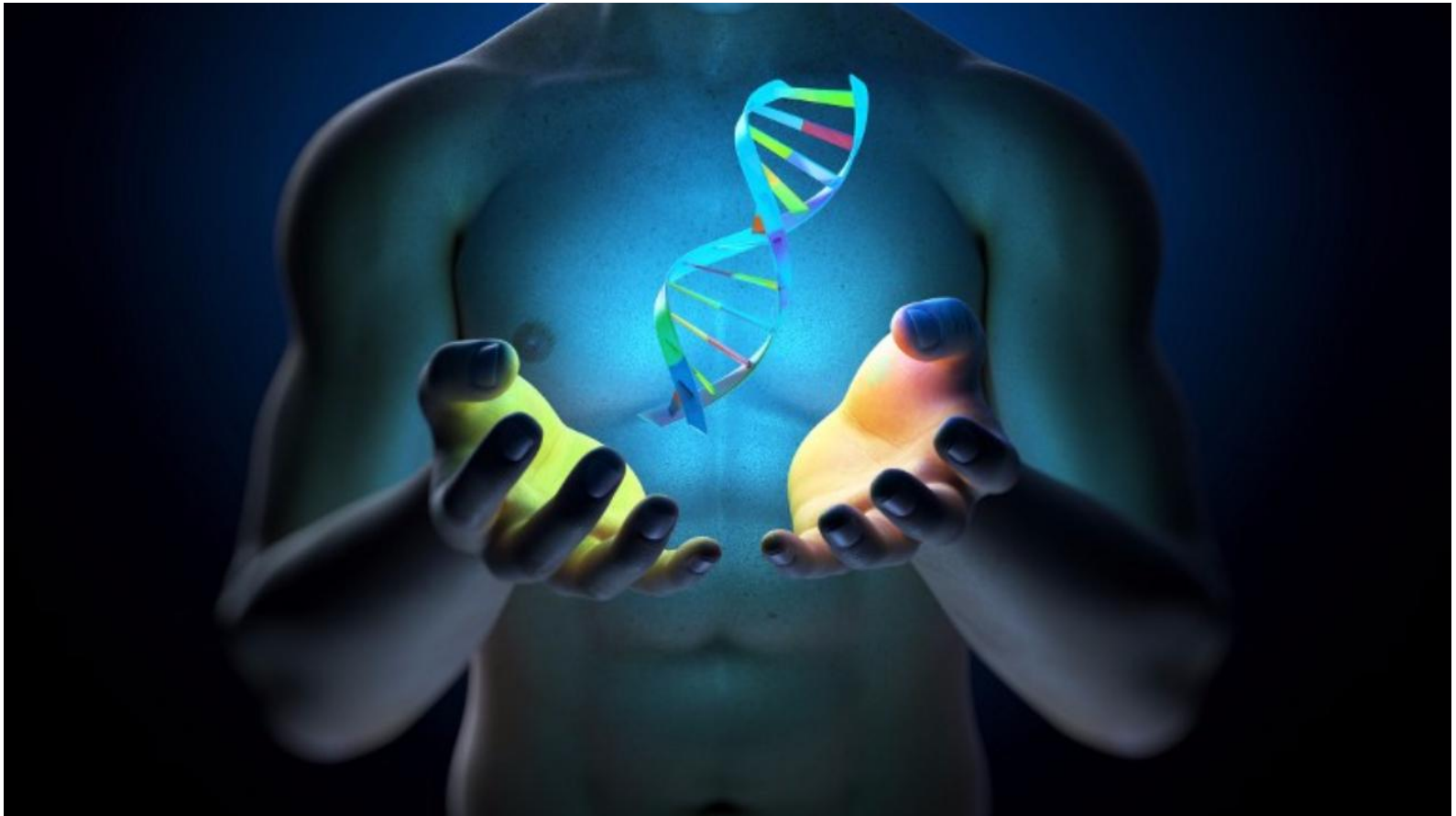
Leucemie → cellule del sangue

Linfoma → cellule immunitarie

Sarcoma → tessuto connettivo

Numerose ed incontrollate mutazioni genetiche

Apoptosi non più efficace



Qualche numero ...



Ogni giorno in Italia 1.000 diagnosi di cancro

Una ogni 86 secondi

I NUMERI
DEL CANCRO
IN ITALIA
2017

Versione per pazienti e cittadini
a cura di Fondazione AIOM



76% Neoplasie diagnosticato >55 anni

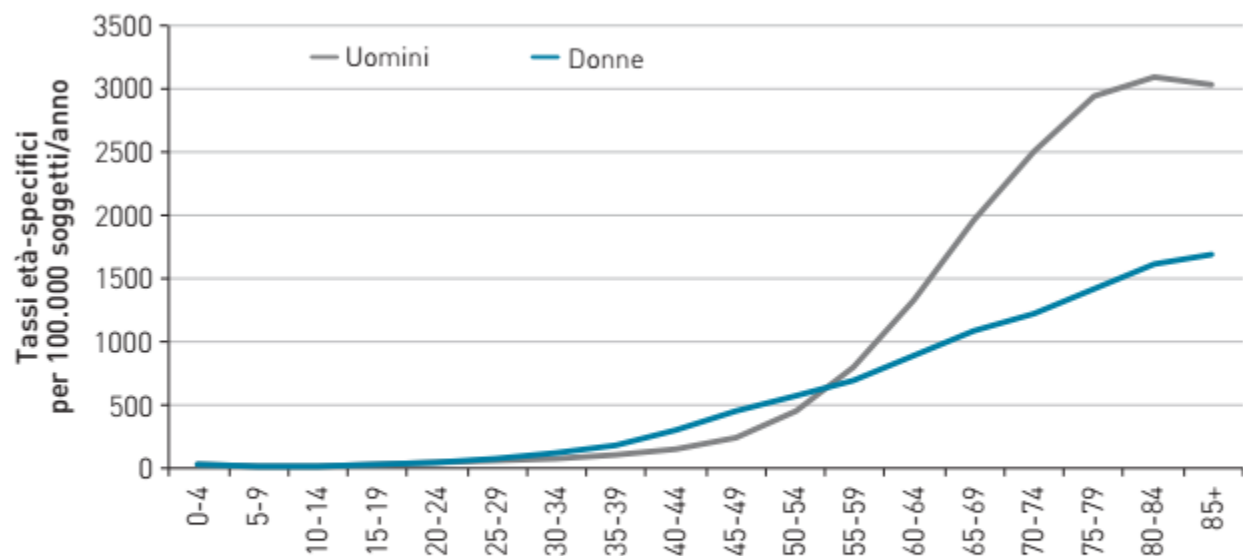
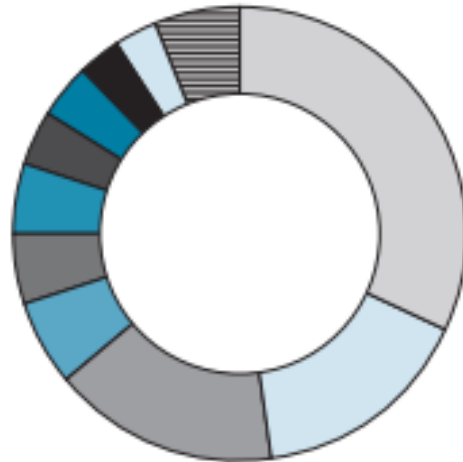


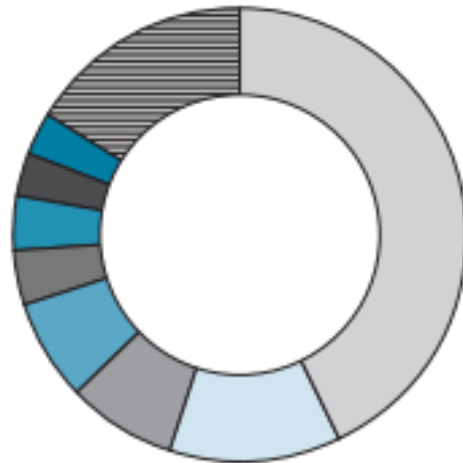
FIGURA 1. AIRTUM 2008-2013. Tassi età-specifici (x 100.000) per sesso. Tutti i tumori esclusi i carcinomi della cute.

U



Prostata	484.170	32%
Colon-retto	248.852	16%
Vescica	239.966	16%
Rene	86.070	6%
Polmone	74.255	5%
L. non-Hodgkin	73.610	5%
Melanoma cute	67.264	4%
Testicolo	53.269	4%
Stomaco	48.061	3%
Laringe	47.565	3%
Altri tipi	94.630	6%

D



Mammella	766.957	43%
Colon-retto	215.621	12%
Tiroide	141.935	8%
Utero, corpo	118.807	7%
Melanoma cute	79.762	4%
L. non-Hodgkin	67.973	4%
Vescica	56.133	3%
Utero, collo	53.404	3%
Altri	286.343	16%

**Nel 2017 in Italia 3.304.648 persone che vivono con diagnosi di tumore
Indipendentemente da quando essa sia stata fatta!**

In media, un uomo ogni 3 e una donna ogni 6 avranno una diagnosi di tumore nel corso della loro vita (AIRC)



Position stand

Australian Association for Exercise and Sport Science position stand:
Optimising cancer outcomes through exercise

Sandra C. Hayes^{a,*}, Rosalind R. Spence^b, Daniel A. Galvão^c, Robert U. Newton^c

^a *Institute of Health and Biomedical Innovation, School of Public Health, Queensland University of Technology, Australia*

^b *School of Human Movement Studies, University of Queensland, Australia*

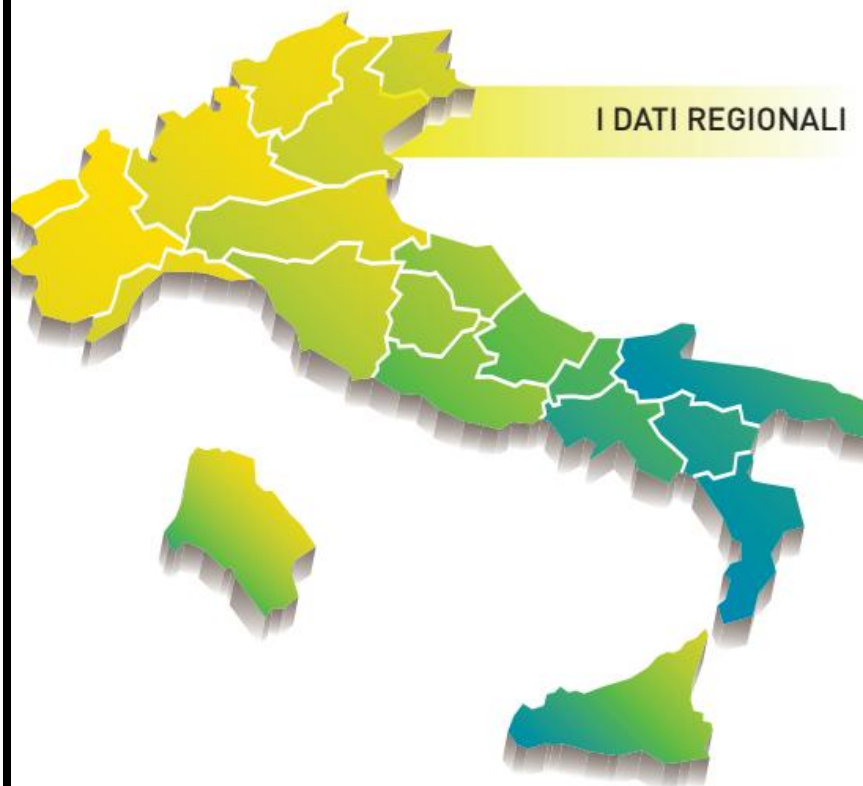
^c *Vario Health Institute, Edith Cowan University, Western Australia, Australia*

Received 19 November 2008; received in revised form 20 March 2009; accepted 20 March 2009

1:3 MAN
1:4 WOMAN

PRESENTAZIONE DEL VOLUME

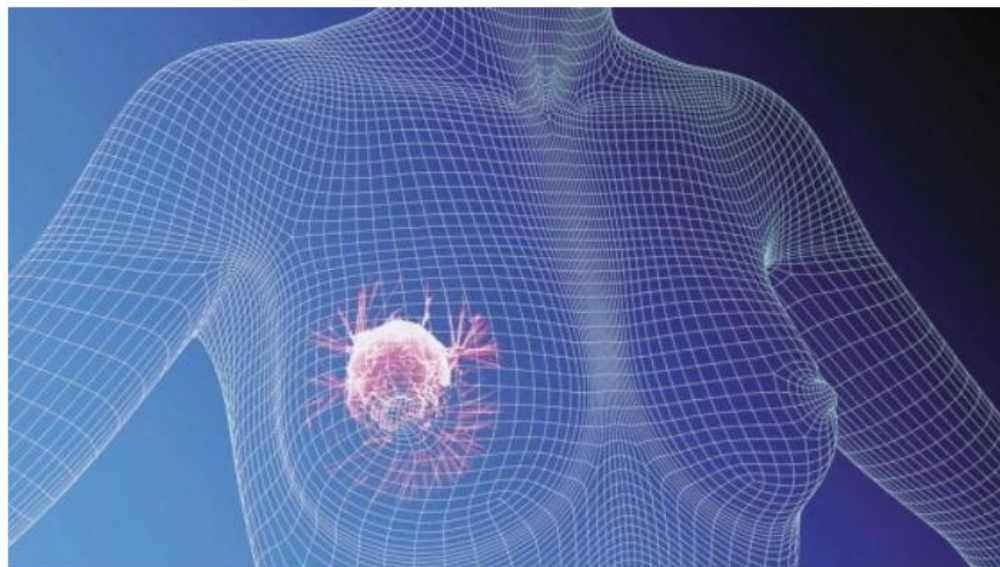
I NUMERI DEL CANCRO IN ITALIA 2018



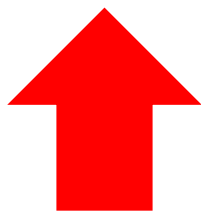
Roma

Giovedì 27 settembre 2018

Tumori: 373mila nuovi casi nel 2018 ma migliora la sopravvivenza



Presentata oggi l'ottava edizione del volume 'I numeri del cancro'. La neoplasia della mammella è la più frequente, in calo colon-retto e stomaco. In Emilia-Romagna e Toscana si sopravvive di più, Sud fanalino di coda. L'impegno del ministro della Salute ad accogliere le richieste degli oncologi



AUMENTANO
GLI AMMALATI



AUMENTANO
LA SOPPRAVIVENZA A
5 ANNI

Cancer, Physical Activity, and Exercise

Justin C. Brown¹, Kerri Winters-Stone², Augustine Lee¹, and Kathryn H. Schmitz¹

¹University of Pennsylvania: Perelman School of Medicine

²Oregon Health & Science University: School of Nursing

Il 35% dei decessi → **FATTORI DI RISCHIO PREVENTIVABILI**
2001 → 7 milioni : 2.43 milioni si sarebbero salvati

Weiderpass E., 2010

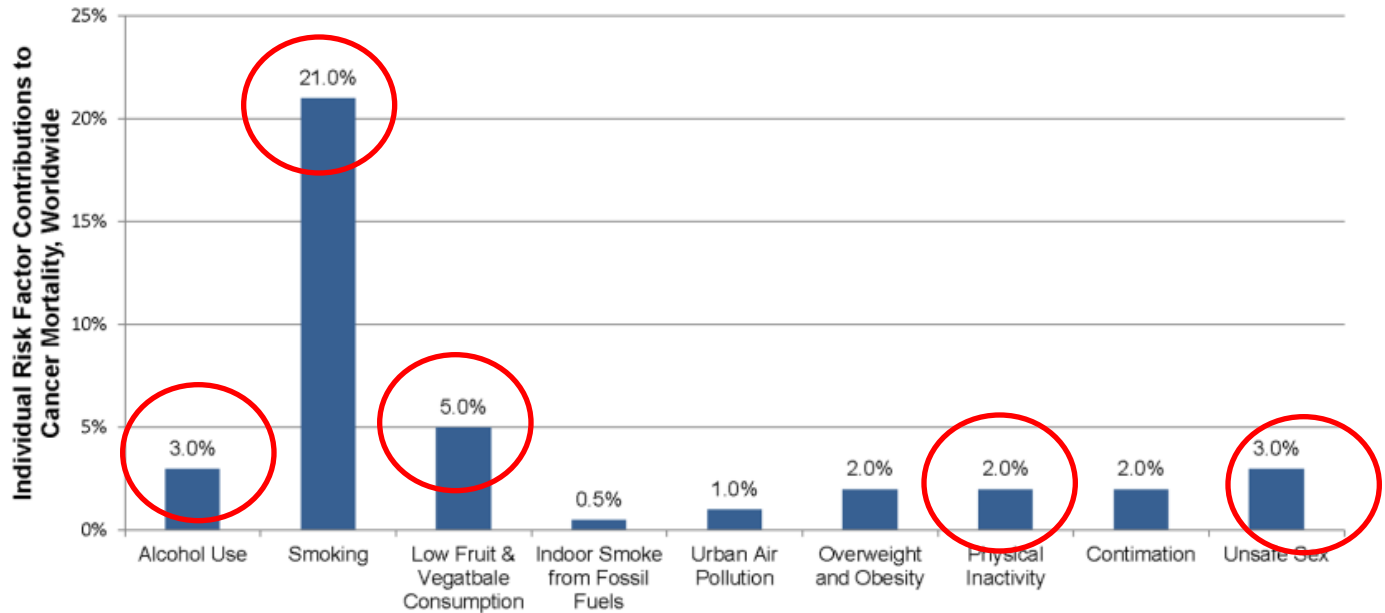


Figure 3.

Individual risk factor contributions to mortality from all cancers, worldwide. Data from

Cancer, Physical Activity, and Exercise

Justin C. Brown¹, Kerri Winters-Stone², Augustine Lee¹, and Kathryn H. Schmitz¹

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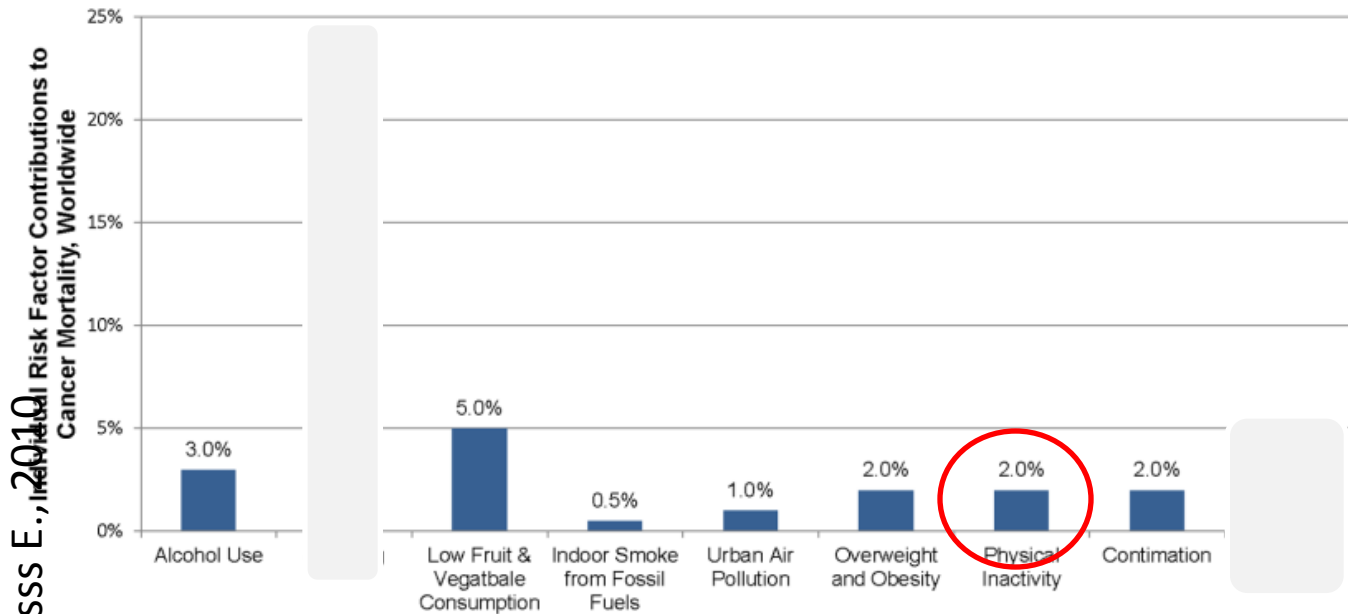


Figure 3.

Individual risk factor contributions to mortality from all cancers, worldwide. Data from

Tipologie di tumore sulle quali l'esercizio fisico regolare ha un importante effetto preventivo

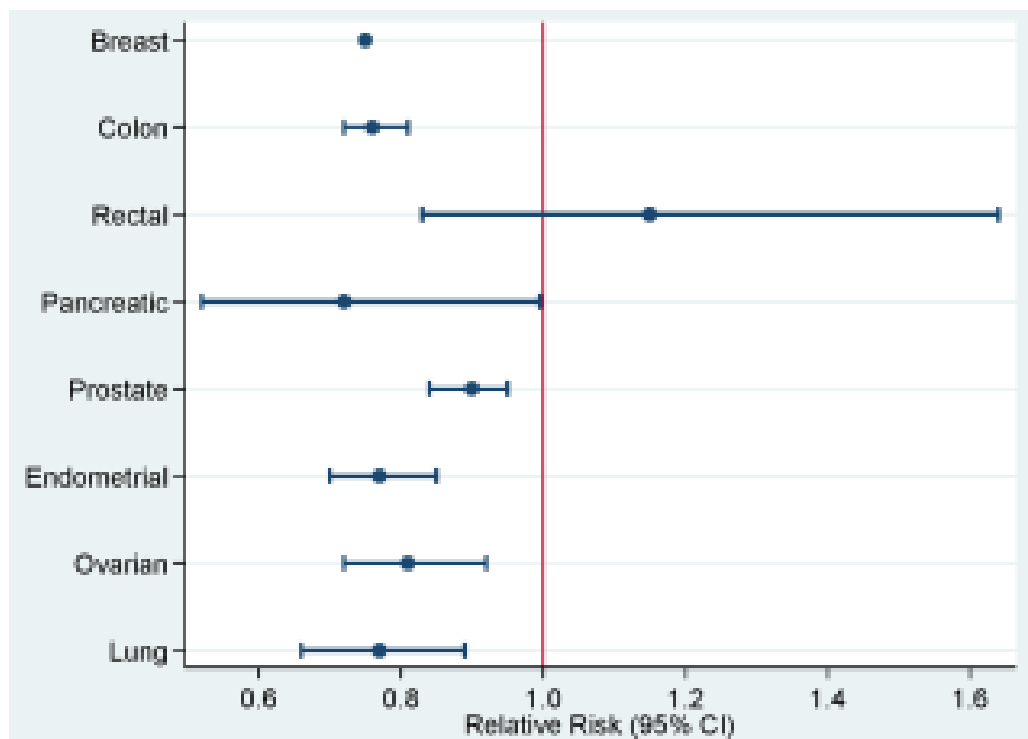


Figure 4.
Relative risk and 95% confidence intervals (95% CI) comparing highest versus lowest levels of physical activity and cancer risk reduction.



73 studi osservazionali, che hanno osservato l'associazione tra PA e Breast Cancer

Un'incidenza del -30% absolute risk reduction

(Brown et al., 2012)

50 studi osservazionali su PA e colon e retto

Circa -17% riduzione del rischio quando comparavano LPA- HPA

(Brown et al., 2012)

Malattia eziologia complessa → più biomarkers coinvolti

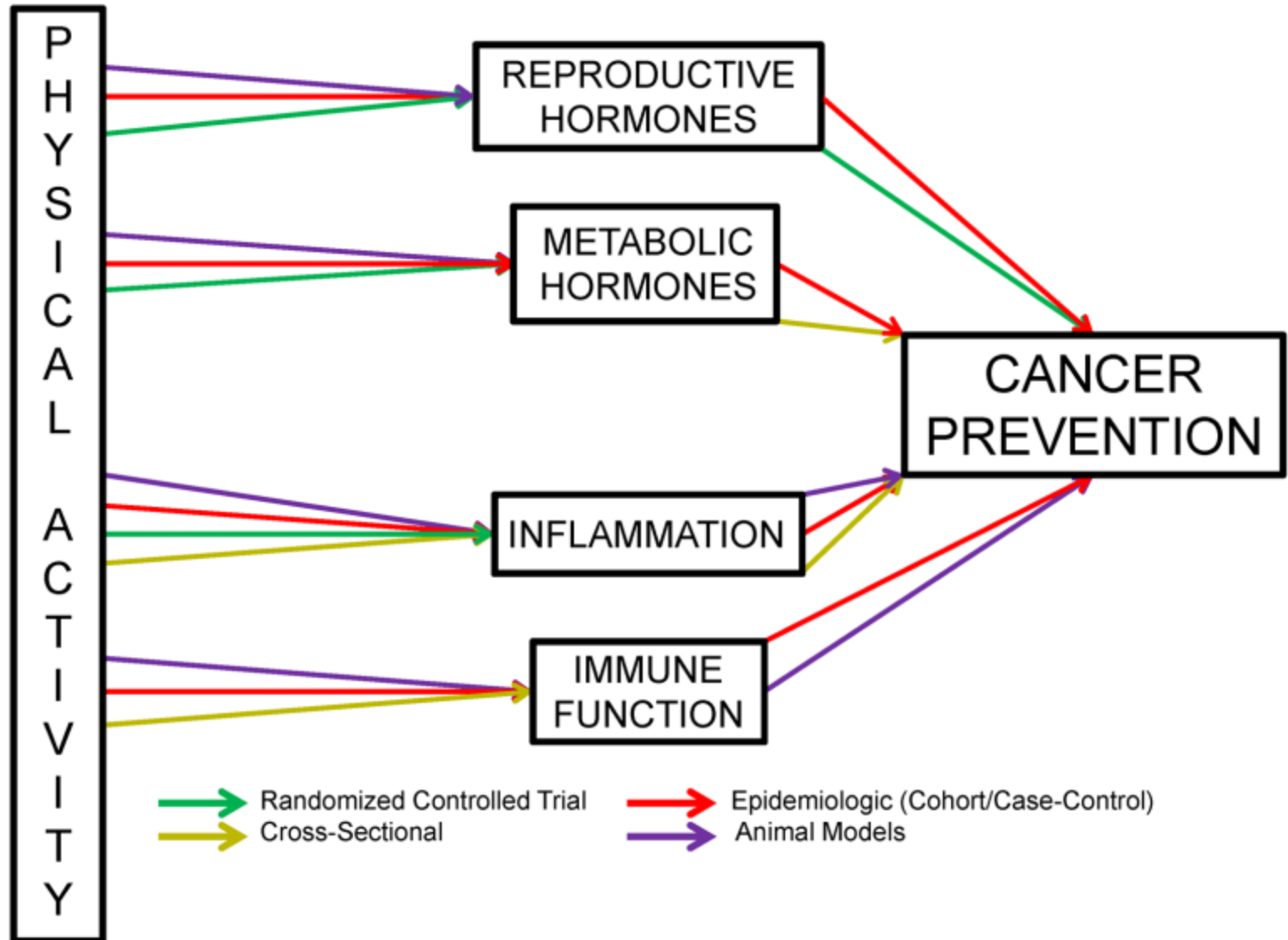


Figure 6

BEING PHYSICALLY ACTIVE DECREASES RISK OF THESE CANCERS:



POST-MENOPAUSAL
BREAST

COLORECTAL

ENDOMETRIAL

Activity helps to:

- Regulate blood levels of hormones that contribute to cancer risk
- Speed food through the colon, reducing exposure to dietary carcinogens
- Prevent the build up of body fat, a cause of many cancers

AIM FOR 30 MINUTES A DAY, IN ANY WAY

The evidence is the latest from the Continuous Update Project (CUP), which systematically updates and reviews the research conducted worldwide into cancer risk related to diet, physical activity and body weight. All the evidence gathered is then assessed by a panel of independent scientists who make recommendations for cancer prevention.

Factors that can help **LOWER**
the risk of **BREAST CANCER:**



Healthy weight



Not smoking



Physical activity



No alcohol use

Source: American Cancer Society



CORSO Fisiologo dell'Esercizio Clinico

**DOTTORI e DOTTORESSE in SCIENZE MOTORIE:
I PROFESSIONISTI DELLA PREVENZIONE**

IX CONGRESSO NAZIONALE DMSA

**QUALE FUTURO PER IL CHINESIOLOGO
DEL TERZO MILLENNIO?**

FITNESS, MEDICAL FITNESS, PHYSIO,
FUNCTIONAL TRAINING, CHINESIOLOGIA,
AQUAWELLNESS, INDOOR CYCLING

MEDICAL FITNESS SUMMIT

Parco Termale del Garda di Villa dei Cedri

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**VERONA - Colà di Lazise
29 - 30 Settembre 2018**



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EXERCISE – CANCER Continuum

PRE CANCER

EXERCISE – CANCER Continuum

DURING CANCER

Indipendentemente dal tipo e dalla fase del cancro,
le modalità di trattamento hanno purtroppo degli **effetti collaterali importanti**

Le modalità terapeutiche sono:

CHIRURGIA

CHEMIOTERAPIA

RADIO TERAPIA

TERAPIE ENDOCRINE

TRAPIANTO

CAR-T (Chimeric Antigen Receptor Tcell)

Physiologic systems impacted as a result from various cancer treatment modalities. Adapted from Schmitz (138).

Physiologic Symptom Affected	Treatment Modality					
	Surgery	Chemotherapy	Radiation	Endocrine Therapy	Transplant	Targeted Therapy
Cardiovascular	X	X	X	X	X	X
Endocrine	X	X	X	X	X	X
Musculoskeletal	X	X	X	X	X	X
Neurologic	X	X	X	X	X	X
Immune	X	X	X	X	X	X
Gastrointestinal	X	X	X	X	X	X

Table 1. Late and long-term effects of cancer treatment where physical activity can have a positive impact.

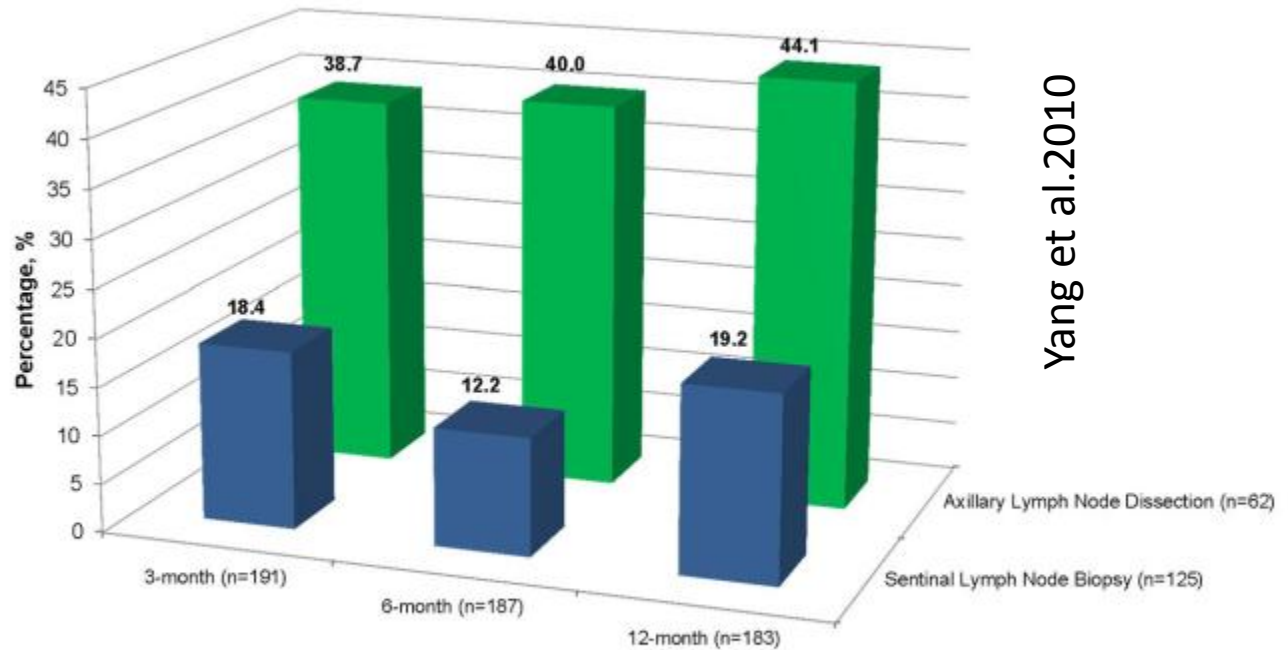
Cancer Treatment		Physical Changes		Psychological and Behavioral Changes
	↓	pulmonary function	↓	decreased exercise/physical activity
	↓	cardiac function	↑	physical symptoms and pain
Surgery	↓	muscle mass	↑	depression
Radiation	↑	fat mass	↓	cognitive function
Chemotherapy	↑	body weight or body mass index	↓	quality of life (multiple domains)
Immunotherapy	↓	decreased muscle strength/power		
Hormone Therapy	↑	inflammation		
Steroid Therapy	↓	immune function		
	↓	bone health		
	↑	trauma and scarring		
	↑	lymphedema		

Ogni terapia anti cancro **ha degli effetti dannosi** sul sistema corpo

CHIRURGIA → l' effetto collaterale più studiato è linfedema

Brown et al.

1



Yang et al.2010

Figure 11.

Prevalence of upper limb dysfunction among breast cancer survivors. Data from (185).

CHEMIOTERAPIA → il principale effetto collaterale CARDIOTOSSICITA'

ANTRACICLINE - TAXANI - DERIVATI DEL FLUORO

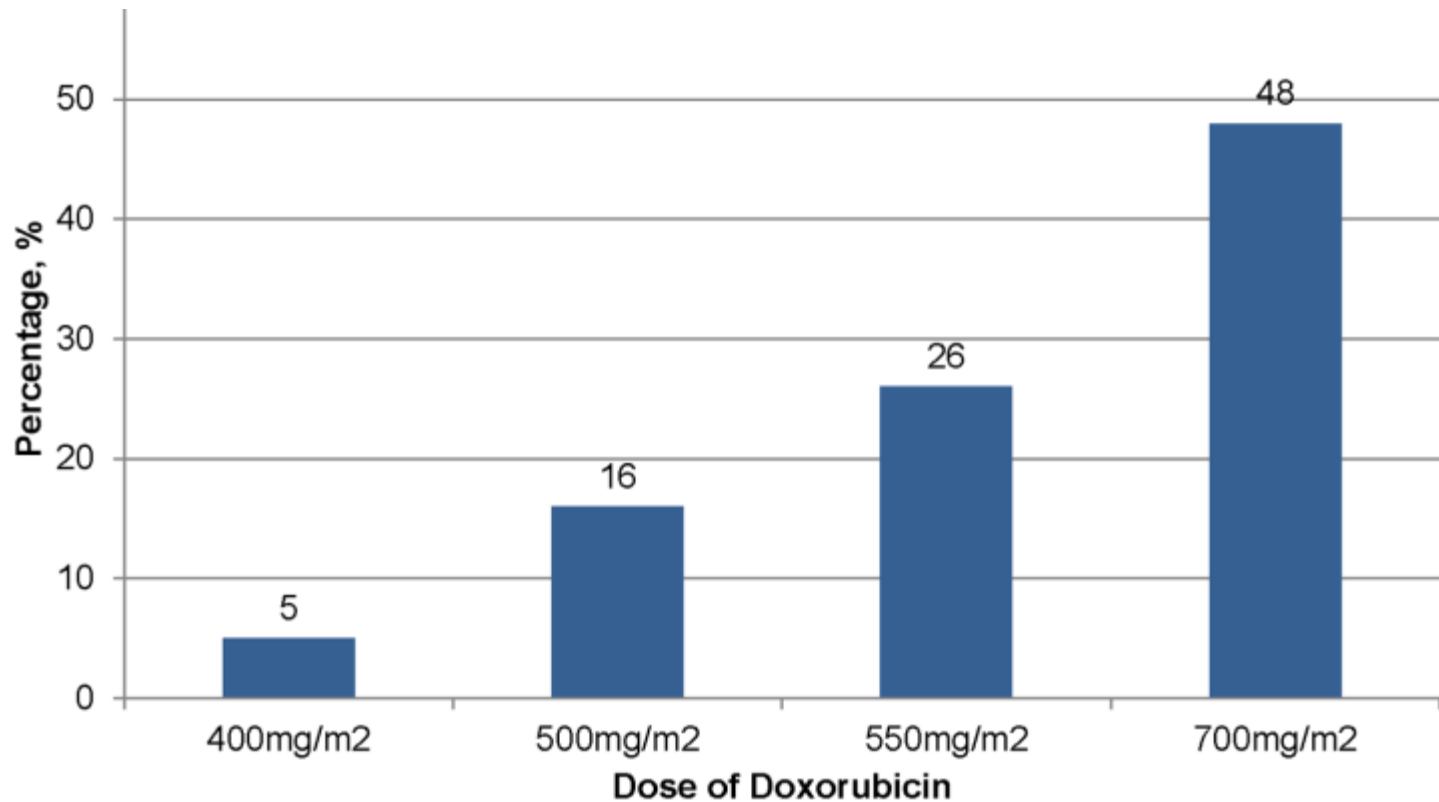


Figure 12.

Prevalence of congestive heart failure at varying doses of anthracycline. Data from (161).

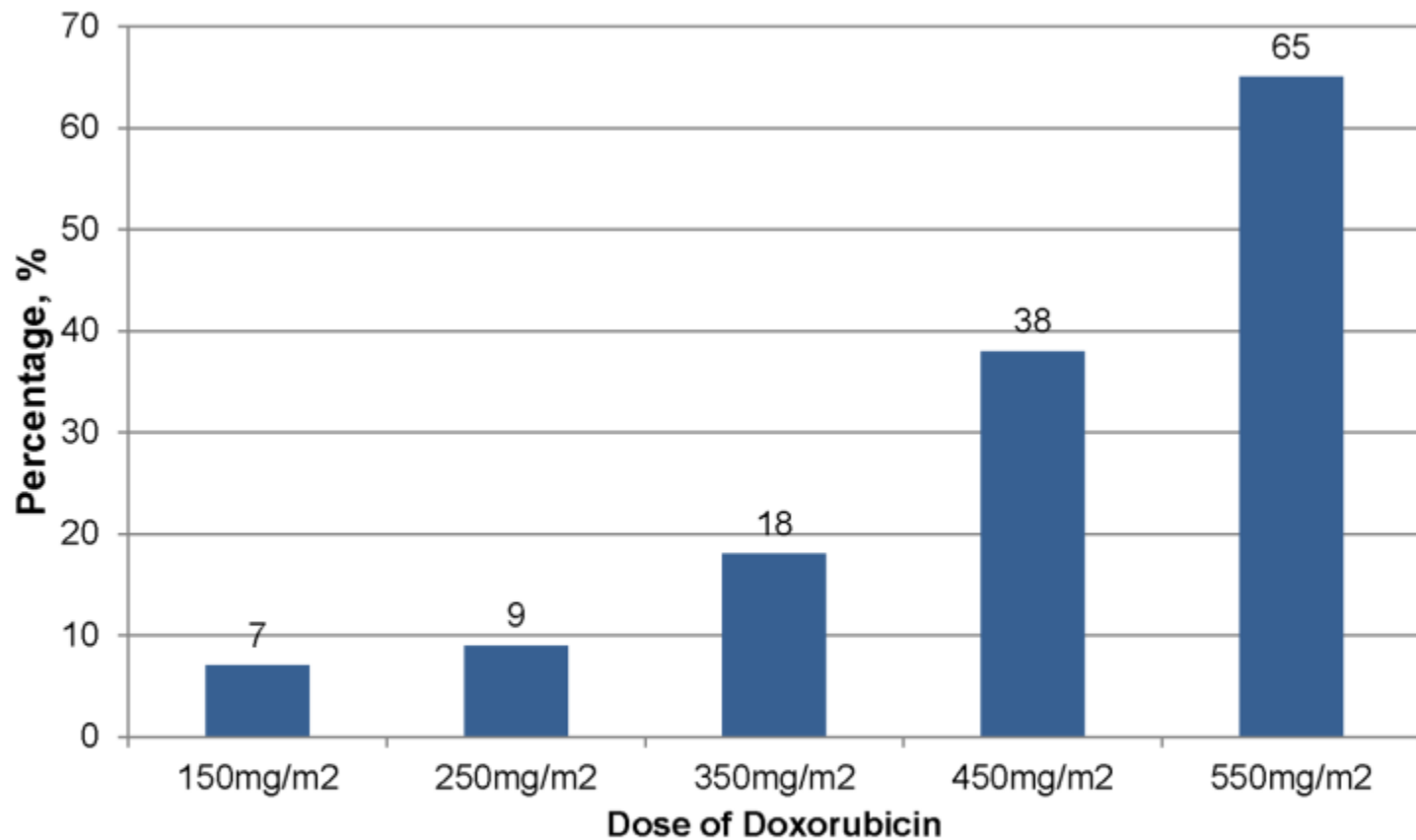


Figure 13. Prevalence of any cardiac event at varying doses of anthracycline. Data from (161).

RADIOTERAPIA → i principali effetti collaterali sono **CARDIOTOSSICITA'**

Danni a livello **NEUROMUSCOLARE** e **MUSCOSCHELETRICO**
(*danno al nervo + ipossia locale*)

Fibrosi dei tessuti, miopatie, spasmi dolorosi, stanchezza e fatica



TERAPIE ORMONALI →

Tamoxiflene → abbassare gli estrogeni

Androgen deprivation therapy

Spasmi e dolori muscolari

Calo della libido

Impotenza

Osteopenia e Osteoporosi



Scardinare il concetto

“Bed Rest is the Best”

well-being over the course of treatment. Additionally, many are advised to rest throughout treatment,³ and an overemphasis on energy conservation can exacerbate the treatment-related losses of physical conditioning and muscle strength. This can lead to the development of a perpetual cycle of deteriorating function and accumulating fatigue that is very hard to escape.

Alcuni autori (*Stefani et al*)

addirittura indicano l'esercizio x migliorare l'efficacia nel delivering delle terapie

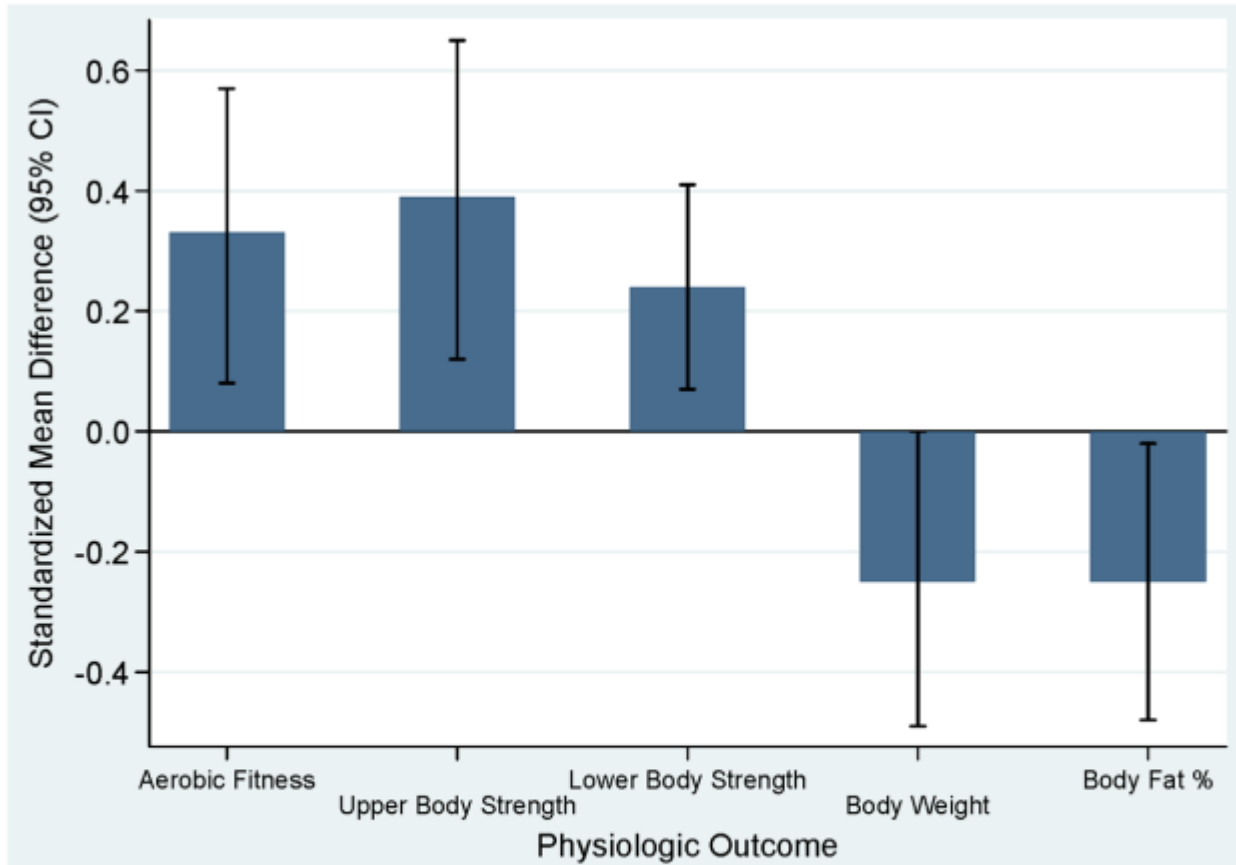


Figure 15. Physiologic effects occurring as a result of exercise training during cancer treatment. Data from (154).

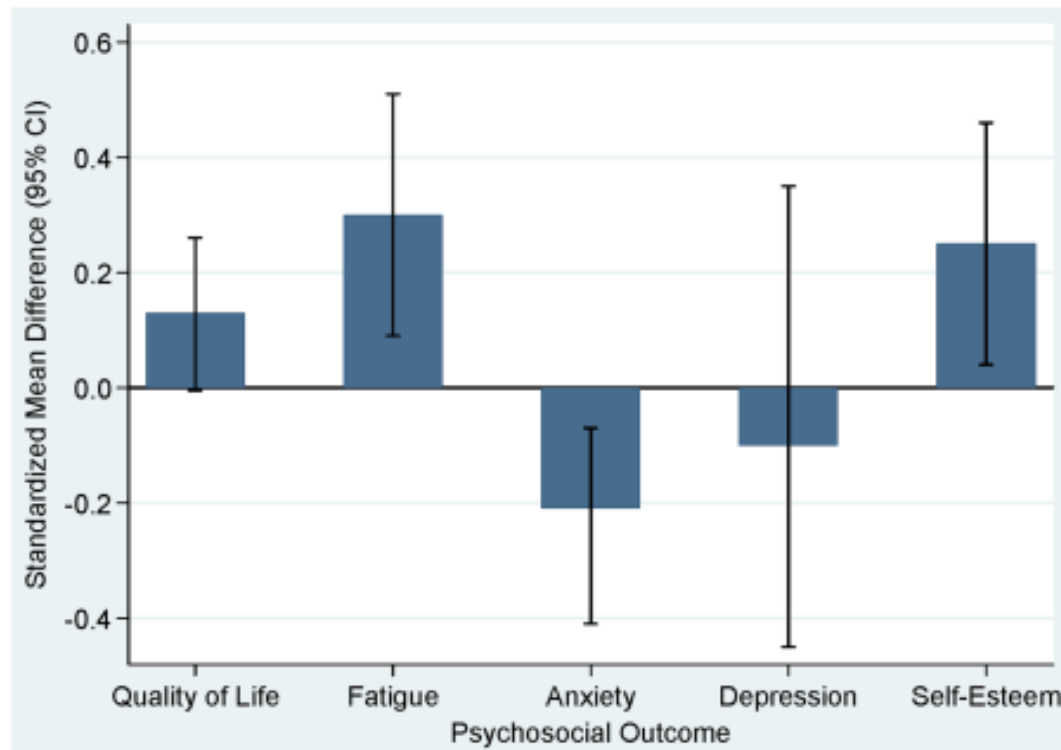
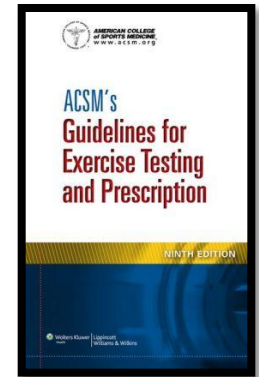


Figure 16. Psychosocial effects occurring as a result of exercise training during cancer treatment. Data from (35, 154). ■

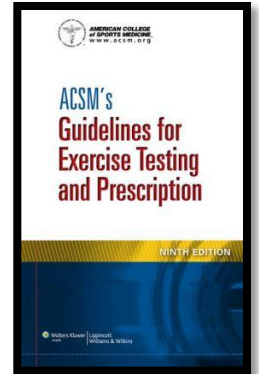
Valutazione medica in entrata

(oncologo, medico dello sport, cardiologo)



Stress ECG / PA - Emocromo - Rischio Fratture - QOL - Comorbidità
Body Composition - Neuropatie -

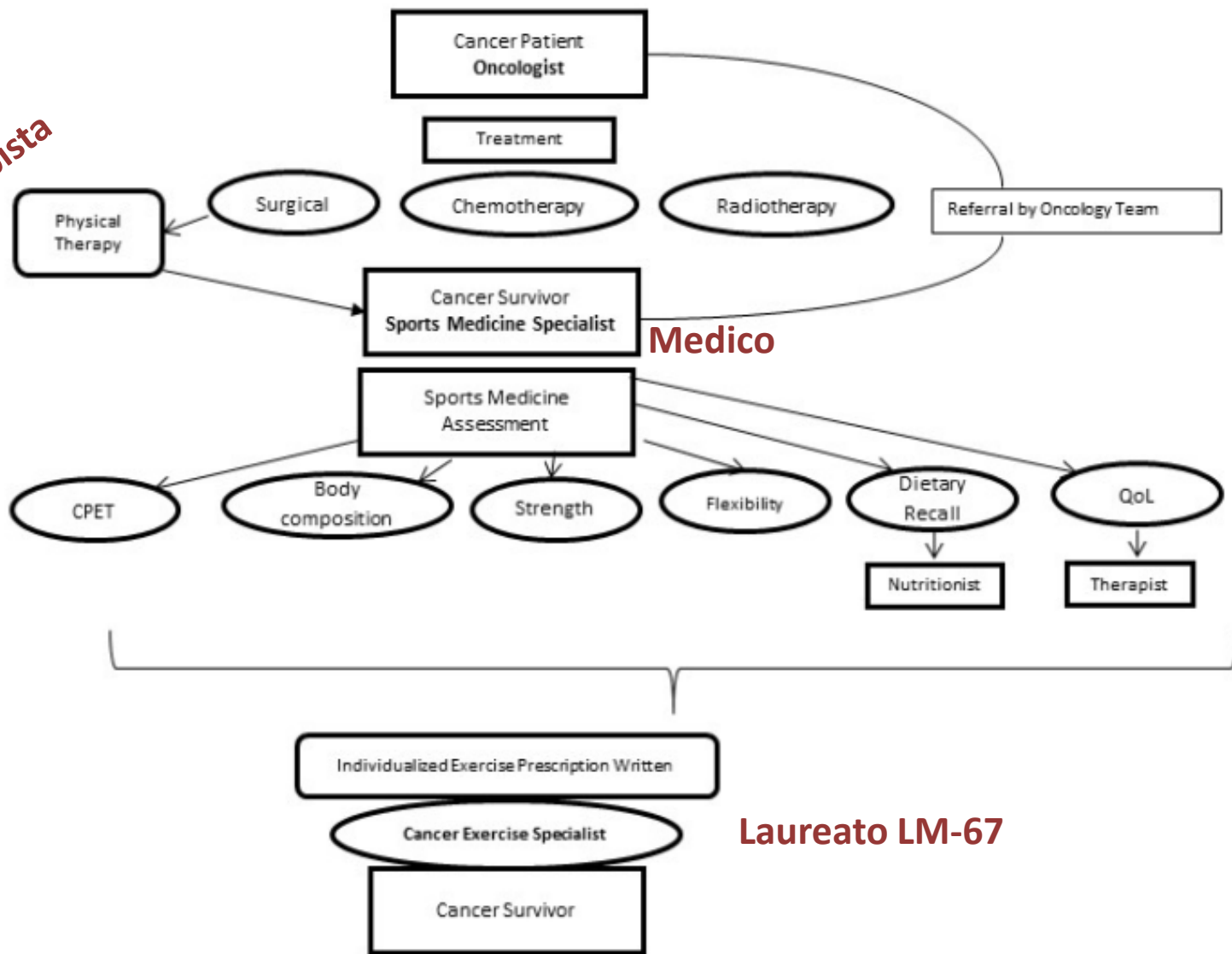
Valutazione chinesiologica



6MWT - Test specifici per: FORZA - FLESSIBILITA' - EQUILIBRIO
INDICI MOTIVAZIONALI - VISSUTO SPORTIVO

Medico

Fisioterapista



Medico

Laureato LM-67



F 3-5 giorni settimana

I - T Esercizio **aerobico** MODERATO 40-60 % HRR
Esercizio **resistenza** 60-70% 1 RM – 12-15 rep-set
Esercizi di **flessibilità** coerenti con chirurgia e radioterapia

T Quanto tempo:

150 min/settimana se moderato

75 min / settimana se intenso

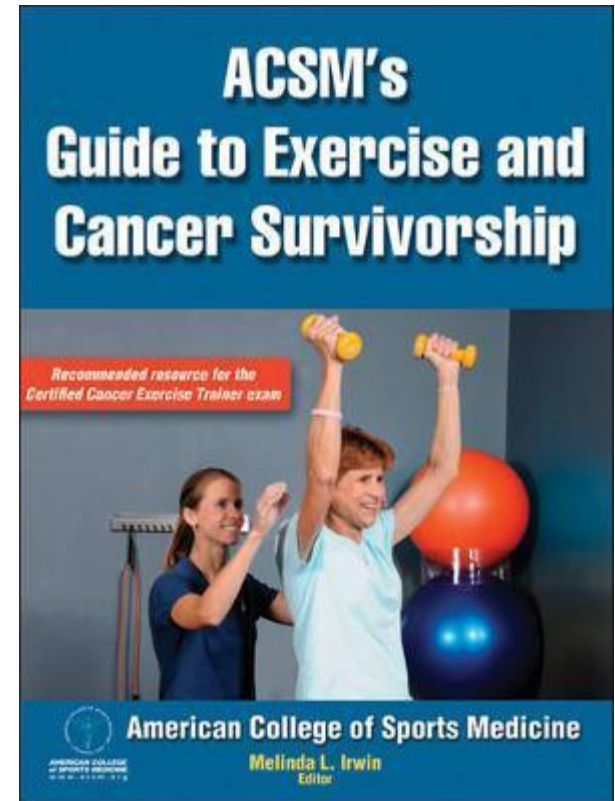


Table 2. Contraindications and precautions to the exercise prescription for cancer.

Clinical Cancer Complications and Acute Conditions	Contraindications to Exercise Testing and Training	Precautions Requiring Modification and/or Physician Approval
Factors Related to Cancer Treatment	No exercise on days of intravenous chemotherapy (recommendation changing) No exercise before blood draw Severe tissue reaction to radiation therapy	Caution if on treatments that affect the lung and/or heart: recommend medically supervised exercise testing and training Mouth sores/ulcerations: avoid mouthpiece for maximal testing; use face mask Lymphedema: wear appropriate compression garments
Hematologic	Platelet Count < 50,000 Hemoglobin level < 10.0 g/dL Absolute Neutrophil Count < $0.5 \times 10^9/L$	Platelets > 50,000–150,000: avoid tests or exercise (contact sports) that increase risk of bleeding White blood cells > 3000–4000: ensure proper sterilization of equipment Hemoglobin > 10 g/dL (11.5–13.5 g/dL): caution with maximal tests Avoid activities that may increase the risk of bacterial infection (swimming)
Musculoskeletal	Extreme fatigue/muscle weakness Bone, back or neck pain Severe cachexia (loss of >35% pre-morbid weight) Karnofsky performance status score <60%; Poor functional status: avoid exercise testing	Any pain or cramping: investigate Osteopenia: avoid high-impact exercise if risk of fracture Loss of muscle mass limits exercise to mild intensity Cachexia: multidisciplinary approach to exercise
Systemic	Acute infections Febrile illness: fever > 100 F General Malaise	May indicate systemic infection and should be investigated. Avoid high intensity exercise Avoid exercise until asymptomatic for >48 h
Gastrointestinal	Severe Nausea Dehydration Vomiting or diarrhea within 24–36 h Poor nutrition: inadequate fluid and/or intake	Compromised fluid and/or food intake: recommend multidisciplinary approach/consultation with nutritionist Ensure adequate nutrition with electrolyte drinks and water (avoid hyponatremia) Avoid exercise Avoid exercise
Cardiovascular	Chest pain Resting HR > 100 bpm or < 50 bpm Resting SBP > 145 mmHg and/or DBP > 95 mmHg Resting SBP < 85 mmHg Irregular HR Swelling of ankles	Exercise is contraindicated (refer to physician) Caution: recommend medically supervised exercise testing and training Caution with exercise Caution with exercise Exercise is contraindicated (refer to physician) Lymphedema: wear appropriate compression garments
Pulmonary	Dyspnea Cough, wheezing Chest pain increased by deep breath	Mild to moderate dyspnea: avoid maximal tests Avoid activities that require significant oxygen transport (high intensity X) Avoid exercise
Neurologic	Ataxia/Dizziness/peripheral Sensory Neuropathy Significant decline in cognitive performance Disorientation Blurred vision	Avoid activities that require significant balance and coordination (treadmill) Ensure patient is able to understand and follow instructions Use well supported positions for exercise Avoid activities that require significant balance and coordination

EXERCISE – CANCER Continuum

POST CANCER

Physical Activity and Survival After Breast Cancer Diagnosis

JAMA, 2005

Michelle D. Holmes, MD, DrPH

Wendy Y. Chen, MD

Diane Feskanich, ScD

Candyce H. Kroenke, ScD

Context Physical activity has been shown to decrease the incidence of breast cancer, but the effect on recurrence or survival after a breast cancer diagnosis is not known.

Objective To determine whether physical activity among women with breast cancer decreases their risk of death from breast cancer compared with more sedentary women.

Table 1. Age-Standardized Covariates According to Physical Activity Category After Breast Cancer Diagnosis

	Physical Activity After Diagnosis, MET-h/wk (N = 2987)				
	<3 (n = 959)	3-8.9 (n = 862)	9-14.9 (n = 335)	15-23.9 (n = 428)	≥24 (n = 403)
BMI, mean*†	26.4	25.3	24.7	24.6	24.6
Current smoker, %*	25.8	16.7	15.4	17.5	15.8
Medication use, %					
Oral contraceptives (ever)*	41.4	39.6	51.0	42.3	46.3
Hormone therapy (current; postmenopausal women only)*	30.7	30.2	44.0	33.3	35.5
Chemotherapy‡	31.4	33.9	37.5	33.4	32.1
Family history of breast cancer, %*	22.6	20.5	25.3	20.8	25.5
Intake, mean‡					
Energy, kcal/d	1699	1738	1828	1761	1748
Energy-adjusted protein, g/d	73.1	74.3	73.1	75.0	75.2
Cancer stage, %‡					
I	58.7	57.9	58.6	56.5	57.0
II	34.1	35.2	33.9	36.1	36.2
III	7.2	6.9	7.4	7.5	6.8
Weight gain (BMI increase of >0.5), %‡	52.9	52.6	56.4	51.3	46.5

Abbreviations: BMI, body mass index; MET, metabolic equivalent task.

*Determined prior to diagnosis.

†Calculated as weight in kilograms divided by the square of height in meters.

‡Determined after diagnosis.

14 ANNI
FOLLOW UP

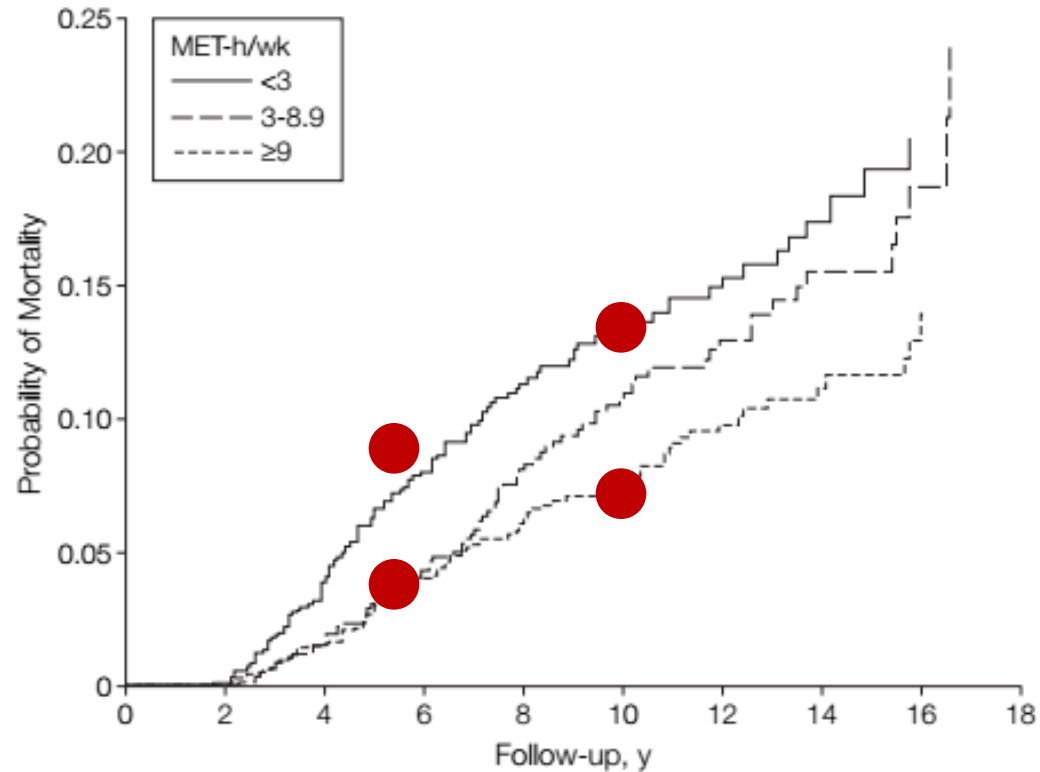
Table 2. Age-Adjusted and Multivariable-Adjusted Relative Risks According to Physical Activity Category After Breast Cancer Diagnosis

	Physical Activity After Diagnosis, MET-h/wk						P for Trend
	Total (N = 2987)	<3 (n = 959)	3-8.9 (n = 862)	9-14.9 (n = 335)	15-23.9 (n = 428)	≥24 (n = 403)	
Total deaths	463	188	126	38	51	60	
Age-adjusted RR (95% CI)		1.00	0.69 (0.55-0.87)	0.53 (0.37-0.75)	0.56 (0.41-0.77)	0.67 (0.50-0.90)	.004
Multivariable-adjusted RR (95% CI)*		1.00	0.71 (0.56-0.89)	0.59 (0.41-0.84)	0.56 (0.41-0.77)	0.65 (0.48-0.88)	.003
Breast cancer deaths	280	110	84	20	32	34	
Age-adjusted RR (95% CI)		1.00	0.79 (0.60-1.06)	0.47 (0.29-0.76)	0.60 (0.41-0.89)	0.64 (0.44-0.94)	.01
Multivariable-adjusted RR (95% CI)*		1.00	0.80 (0.60-1.06)	0.50 (0.31-0.82)	0.56 (0.38-0.84)	0.60 (0.40-0.89)	.004
Recurrence	370	137	108	29	45	51	
Age-adjusted RR (95% CI)		1.00	0.82 (0.64-1.06)	0.53 (0.35-0.79)	0.66 (0.47-0.93)	0.76 (0.55-1.04)	.05
Multivariable-adjusted RR (95% CI)*		1.00	0.83 (0.64-1.08)	0.57 (0.38-0.85)	0.66 (0.47-0.93)	0.74 (0.53-1.04)	.05

Abbreviations: CI, confidence interval; MET, metabolic equivalent task; RR, relative risk.

*Adjusted for age (months); interval between diagnosis and physical activity assessment (28-33, 34-40, ≥41 mo); smoking status (never, current, past); body mass index (<21, 21-22.9, 23-24.9, 25-28.9, ≥29), which was calculated as weight in kilograms divided by the square of height in meters; menopausal status and hormone therapy use (premenopausal, postmenopausal, and never use; postmenopausal and current use; postmenopausal and past use; uncertain menopausal status; missing); age at first birth and parity (nulliparous, <25 y and 1-2 births, <25 y and ≥3 births, ≥25 y and 1-2 births, ≥25 y and ≥3 births); oral contraceptive use (never, ever, missing); energy intake (quintiles); energy-adjusted protein intake (quintiles); disease stage (I, II, III); radiation treatment (yes or no); chemotherapy (yes or no); and tamoxifen treatment (yes or no).

Figure. Kaplan-Meier Survival Curves



No. at Risk

Physical Activity, MET-h/wk

<3	959	957	809	573	407	286	222	83	43
3-8.9	862	862	767	569	489	372	184	84	31
≥9	1166	1166	1066	773	692	449	290	164	86

MET indicates metabolic equivalent task.



Position stand

Australian Association for Exercise and Sport Science position stand: Optimising cancer outcomes through exercise

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^a *Institute of Health and Biomedical Innovation, School of Public Health, Queensland University of Technology, Australia*

^b *School of Human Movement Studies, University of Queensland, Australia*

^c *Vario Health Institute, Edith Cowan University, Western Australia, Australia*

Received 19 November 2008; received in revised form 20 March 2009; accepted 20 March 2009

There are now well-defined physical and psychological problems associated with cancer and its treatment that respond well to appropriate exercise. **Therefore, exercise prescription with this population should be seen as vital adjuvant therapy aimed at maintaining or improving structure and function, alleviating symptoms, and assisting recovery of survivors or slowing decline of palliative patients.** Regardless, the overarching goal should be to enhance quality of life, and the social and interpersonal interactions derived from exercise are critical components of this process.

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29 - 30 Settembre 2018**



grazie della vostra attenzione