ISTITUTO AUXOLOGICO ITALIANO
Istituto di ricovero e cura a carattere scientifico

BIOMETRA
DIPARTIMENTO DI BIOTECNOLOGIE MEDICHE E MEDICINA TRASLAZIONALE

UNIVERSITÀ DEGLI STUDI DI MILANO

Attività fisica e metastasi osseeterapia

10.09.2022

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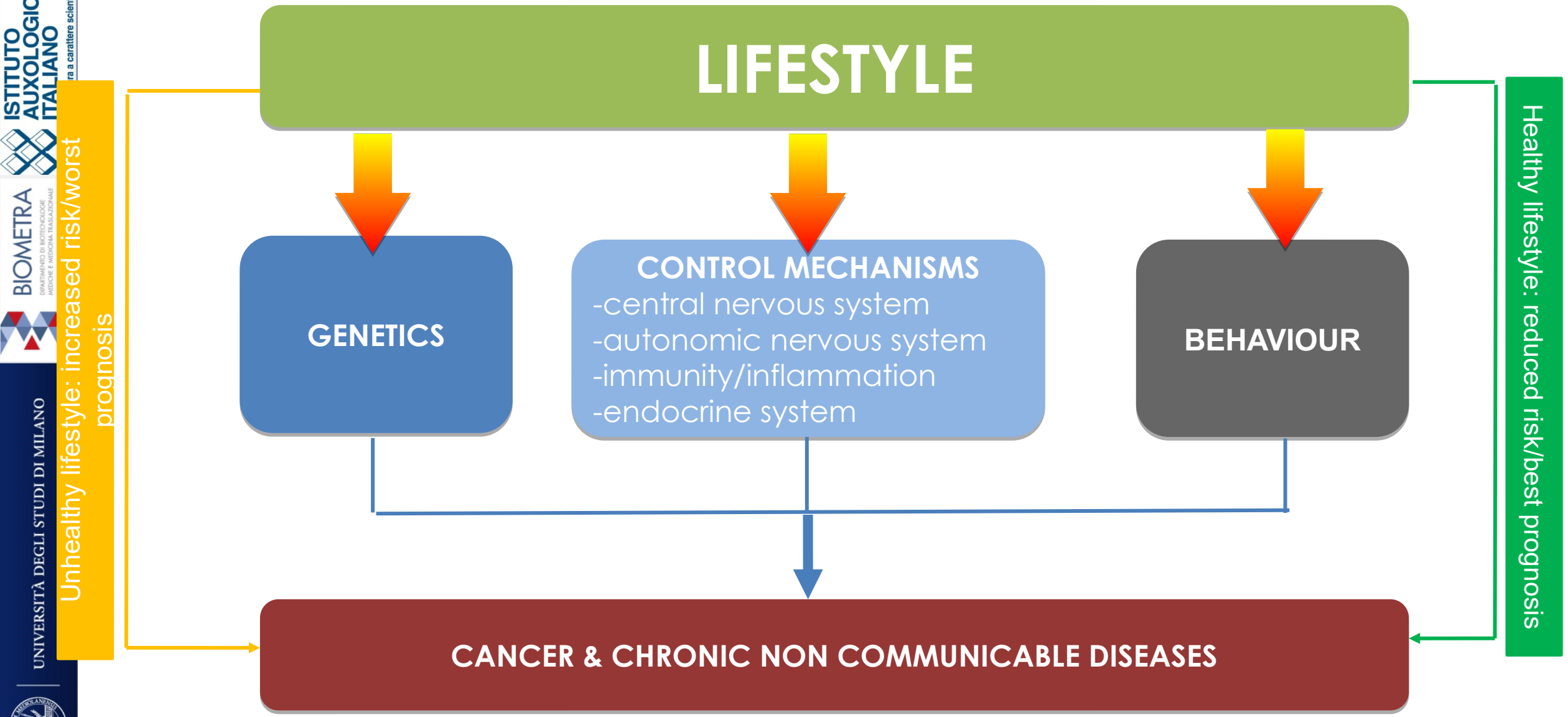

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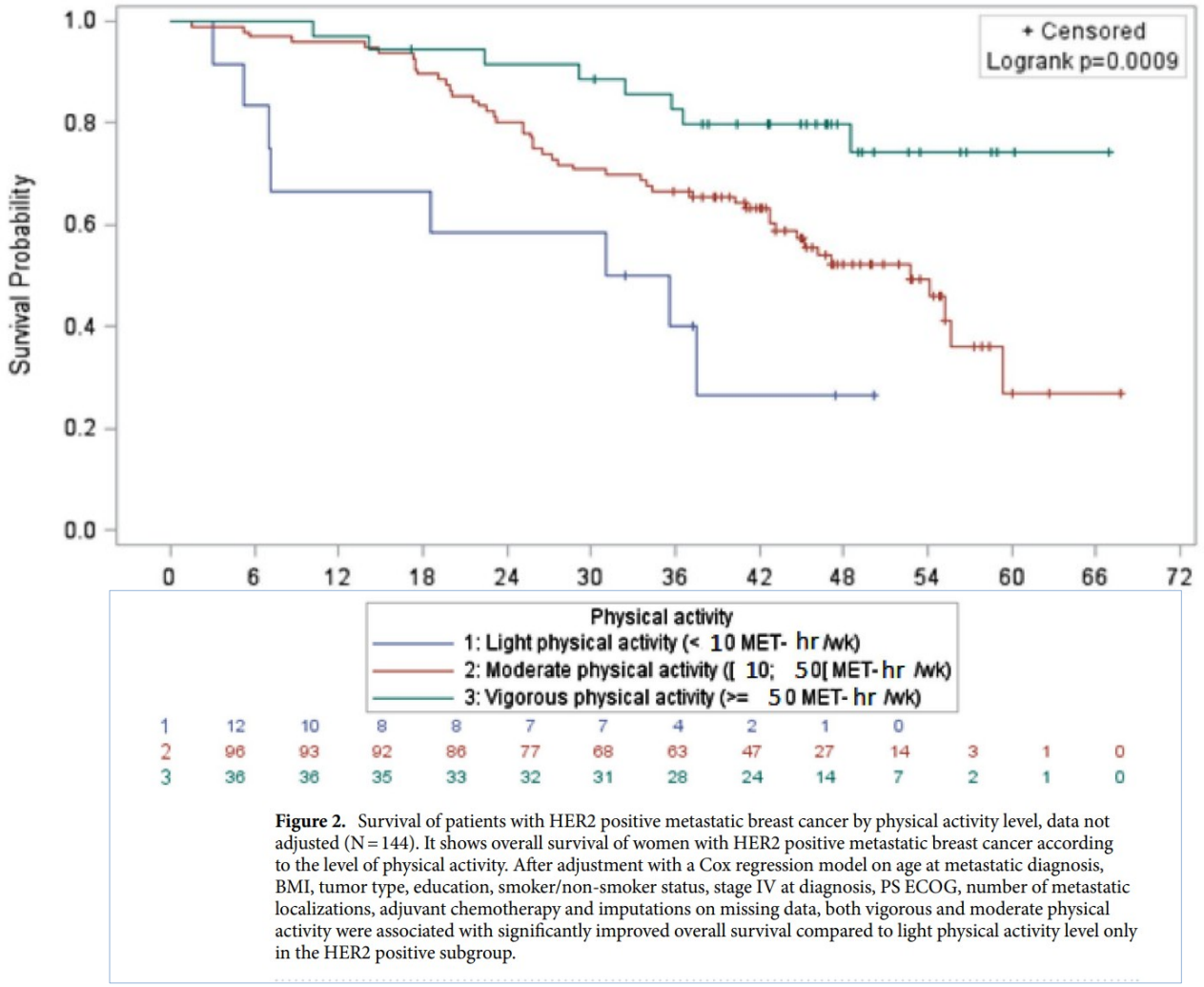

Figure 2. Survival of patients with HER2 positive metastatic breast cancer by physical activity level, data not adjusted (N = 144). It shows overall survival of women with HER2 positive metastatic breast cancer according to the level of physical activity. After adjustment with a Cox regression model on age at metastatic diagnosis, BMI, tumor type, education, smoker/non-smoker status, stage IV at diagnosis, PS ECOG, number of metastatic localizations, adjuvant chemotherapy and imputations on missing data, both vigorous and moderate physical activity were associated with significantly improved overall survival compared to light physical activity level only in the HER2 positive subgroup.

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SCIENTIFIC REPORTS
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Analysis of the StoRM cohort reveals physical activity to be associated with survival in metastatic breast cancer

Discussion

To our knowledge, this report is the first study to evaluate the impact of physical activity on overall survival in a large prospective cohort of patients with metastatic breast cancer, regardless of histological subtype. We showed that physical activity levels were associated with prognostic factors (lower Performance status, lower age, lower metastases numbers), higher education, lower BMI, and with a better overall survival. After adjustment in a Cox regression model, a moderate or vigorous amounts of physical activity remained statistically significantly associated with better overall survival only for patients with HER2 positive metastatic breast cancer. Patients reporting moderate physical activity or vigorous physical activity had better overall survival than those reporting light physical activity, with an HR of 0.38 (95% CI 0.15–0.96, $p = 0.04$) and an HR of 0.23 (95% CI 0.07–0.70, $p = 0.01$) respectively. On the other hand, survival of luminal and triple negative patients is not affected by physical activity level.

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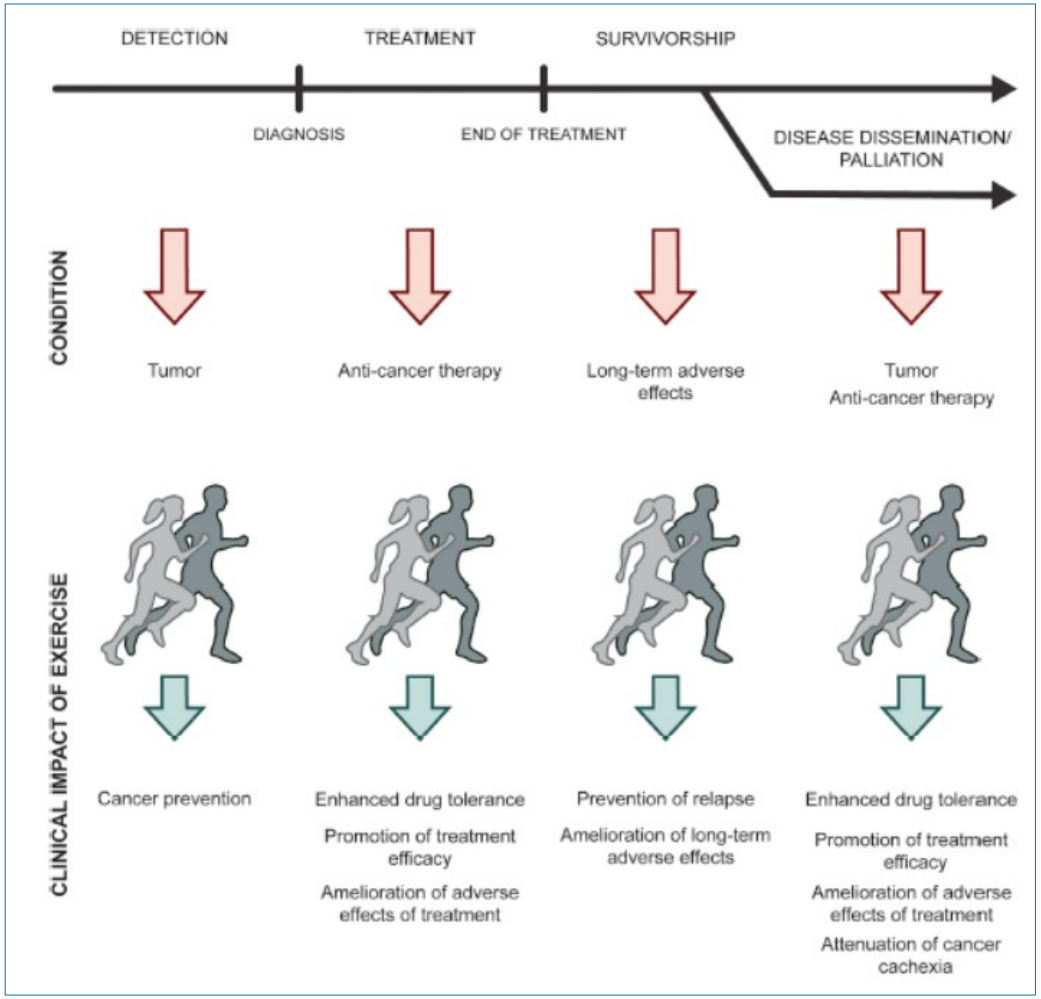

Prescription of exercise in a breast cancer patient needs to be tailored considering patient's characteristics and disease stage

DIFFERENT GOALS!

Molecular Mechanisms Linking Exercise to Cancer Prevention and Treatment

Cell Metabolism 27, January 9, 2018 © 2017 Elsevier Inc.

Figure 2. Running from Cancer at All Stages

The cancer continuum comprises detection, treatment, survivorship, and disease dissemination and palliation. Each stage is characterized by different pathological conditions (presence of tumor, anti-cancer therapy, long-term adverse effect, and those in combination), and exercise training may play different roles across the cancer continuum: reducing the risk of cancer in the pre-diagnostic period; improving drug tolerance and efficacy during treatment; preventing relapse, controlling adverse effects post-primary anti-cancer treatment, and reducing risk of comorbidities; and doing all of the above in advanced-stage cancer patients.

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Ministero della Salute

Ministero della Salute

LINEE DI INDIRIZZO SULL'ATTIVITÀ FISICA

Revisione delle raccomandazioni per le differenti fasce d'età e situazioni fisiologiche
e
nuove raccomandazioni per specifiche patologie

ESERCIZIO & FASI PATOLOGIA ONCOLOGICA

https://www.salute.gov.it/portale/news/p3_2_1_1_1.jsp?lingua=italiano&menu=notizie&p=dalministero&id=5693

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PRINCIPALI BENEFICI /IMPATTO CLINICO DELL'ESERCIZIO NELLE VARIE FASI DELLA PATOLOGIA ONCOLOGICA

PRINCIPALI BENEFICI /IMPATTO CLINICO	SOGGETTO SANO	Riabilitazione PRIMA di intervento chirurgico elettivo	FASE ACUTA (post chirurgico, chemioterapia, radioterapia)	SHORT TERM SURVIVORS	LONG TERM SURVIVORS (no ripresa malattia)	LONG TERM (ripresa malattia)
▪ Prevenzione di alcune forme di neoplasie (mammella, colon, endometrio, vescica, esofago, rene, stomaco)	✓		✓	✓	✓	✓
▪ Miglioramento della sopravvivenza in alcune forme di neoplasia (mammella, colon, prostata)			✓	✓	✓	
▪ Miglioramento stato funzionale per meglio affrontare chirurgia oncologica		✓				✓
▪ Miglioramento outcome chirurgico		✓				✓
▪ Miglioramento composizione corporea (riduzione massa grassa e mantenimento/miglioramento massa muscolare)		✓	✓	✓	✓	✓
▪ Riduzione rischio cardiometabolico			✓	✓	✓	
▪ Gestione di alcuni effetti collaterli di terapie adiuvanti			✓	✓		✓
▪ Miglioramento profilo lipidico (riduzione colesterolo,trigliceridi)			✓	✓	✓	✓
▪ Miglioramento del profilo glucidico			✓	✓	✓	✓
▪ Miglioramento della salute dell'osso			✓	✓	✓	✓
▪ Riduzione linfedema			✓	✓		✓
▪ Gestione algie muscolari/articolari/tendinee			✓	✓		✓
▪ Miglioramento/ripresa dello stato funzionale			✓	✓	✓	✓
▪ Riduzione della fatica			✓	✓	✓	✓
▪ Riduzione ansia/depressione			✓	✓	✓	✓
▪ Miglioramento benessere psicologico		✓	✓	✓	✓	✓
▪ Miglioramento qualità del sonno			✓	✓	✓	✓
▪ Miglioramento della qualità della vita			✓	✓	✓	✓
▪ Attenuazione cachessia oncologica						✓
▪Altri benefici non correlati alla patologie neoplastica	✓		✓	✓	✓	✓

OBIETTIVI & FASE PATOLOGIA

DIAGNOSI PREHABILITATION

- Miglioramento capacità esercizio
- Riduzione rischio chirurgico
- Riduzione ospedalizzazione/infezioni, ecc
- Miglioramento benessere psicologico
- Miglioramento stato di forma in genere

FASE POSTCHIRURGICA CHEMIOTERAPIA RADIOTERAPIA

- Miglioramento stato di forma
- Attenuazione effetti collaterali terapia
- Preparazione alla fase successiva

SURVIVORS TERAPIA ORMONALE, ECC

- Miglioramento capacità di esercizio, forza flessibilità muscolare
- Riduzione recidive
- Gestione effetti collaterali farmaci
- Riduzione rischio cardiometabolico
- Miglioramento benessere psicologico/ripresa in mano della propria vita
- Miglioramento composizione corporea/ ottimizzazione peso

SECONDARISMI CHEMIOTERAPIA

- Gestione effetti collaterali farmaci
- riduzione rischio cardiometabolico
- Miglioramento benessere psicologico
- Miglioramento capacità di esercizio
- **Miglioramento della prognosi**

DETERMINAZIONE E DISCUSSIONE DEGLI OBIETTIVI CON IL SOGGETTO E' PARTE INTEGRANTE DEL PROCESSO DI PRESCRIZIONE

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EXERCISE IS A DRUG…

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International Journal of
Environmental Research and Public Health

MDPI

Review

Exercise Prescription to Foster Health and Well-Being: A Behavioral Approach to Transform Barriers into Opportunities

Daniela Lucini [1,2,*] and Massimo Pagani [1]

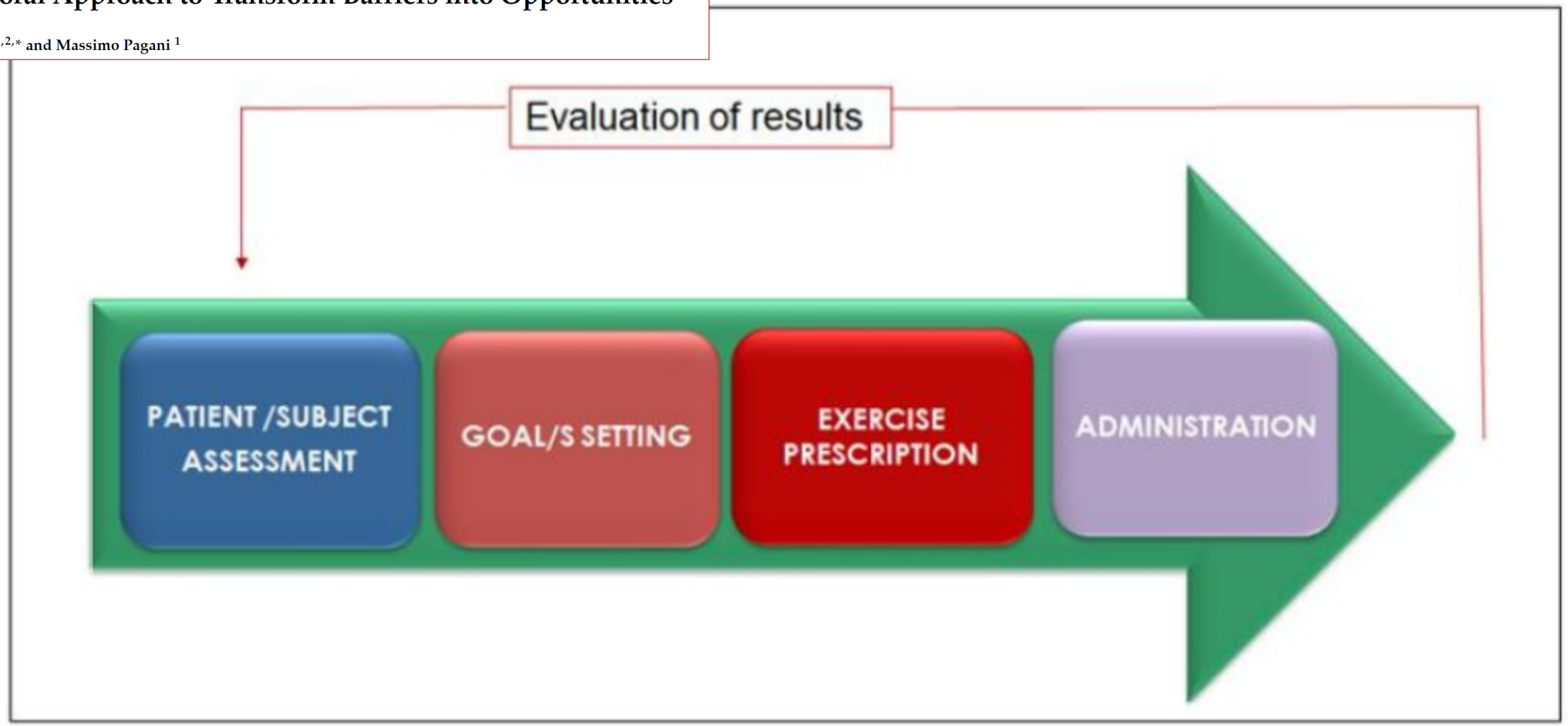

Figure 1. Process.

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MEDICAL ASSESSMENT

TABLE 2. Preexercise medical assessments and exercise testing.

Cancer Site	Breast	Prostate	Colon	Adult Hematologic (No HSCT)	Adult HSCT	Gynecologic
General medical assessments recommended before exercise	Recommend evaluation for peripheral neuropathies and musculoskeletal morbidities secondary to treatment regardless of time since treatment. If there has been hormonal therapy, recommend evaluation of fracture risk. Individuals with known metastatic disease to the bone will require evaluation to discern what is safe before starting exercise. Individuals with known cardiac conditions (secondary to cancer or not) require medical assessment of the safety of exercise before starting. There is always a risk that metastasis to the bone or cardiac toxicity secondary to cancer treatments will be undetected. This risk will vary widely across the population of survivors. Fitness professionals may want to consult with the patient's medical team to discern this likelihood. However, requiring medical assessment for metastatic disease and cardiotoxicity for all survivors before exercise is not recommended because this would create an unnecessary barrier to obtaining the well-established health benefits of exercise for the majority of survivors, for whom metastasis and cardiotoxicity are unlikely to occur.					
Cancer site–specific medical assessments recommended before starting an exercise program	Recommend evaluation for arm/shoulder morbidity before upper body exercise.	Evaluation of muscle strength and wasting.	Patient should be evaluated as having established consistent and proactive infection prevention behaviors for an existing ostomy before engaging in exercise training more vigorous than a walking program.	None	None	Morbidly obese patients may require additional medical assessment for the safety of activity beyond cancer-specific risk. Recommend evaluation for lower extremity lymphedema before vigorous aerobic exercise or resistance training.
Exercise testing recommended	No exercise testing required before walking, flexibility, or resistance training. Follow ACSM guidelines for exercise testing before moderate to vigorous aerobic exercise training. One-repetition maximum testing has been demonstrated to be safe in breast cancer survivors with and at risk for lymphedema.					
Exercise testing mode and intensity considerations	As per outcome of medical assessments and following ACSM guidelines for exercise testing.					
Contraindications to exercise testing and reasons to stop exercise testing	Follow ACSM guidelines for exercise testing.					

Medicine & Science in Sports & Exercise 2010;42(7):1409-1426

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ATTENZIONE!
NON DIMENTICARE DI VALUTARE, LO STATO DI ALLENAMENTO!

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Int. J. Environ. Res. Public Health **2021**, *18*, 968

Review

Exercise Prescription to Foster Health and Well-Being: A Behavioral Approach to Transform Barriers into Opportunities

Daniela Lucini [1,2,*] **and Massimo Pagani** [1]

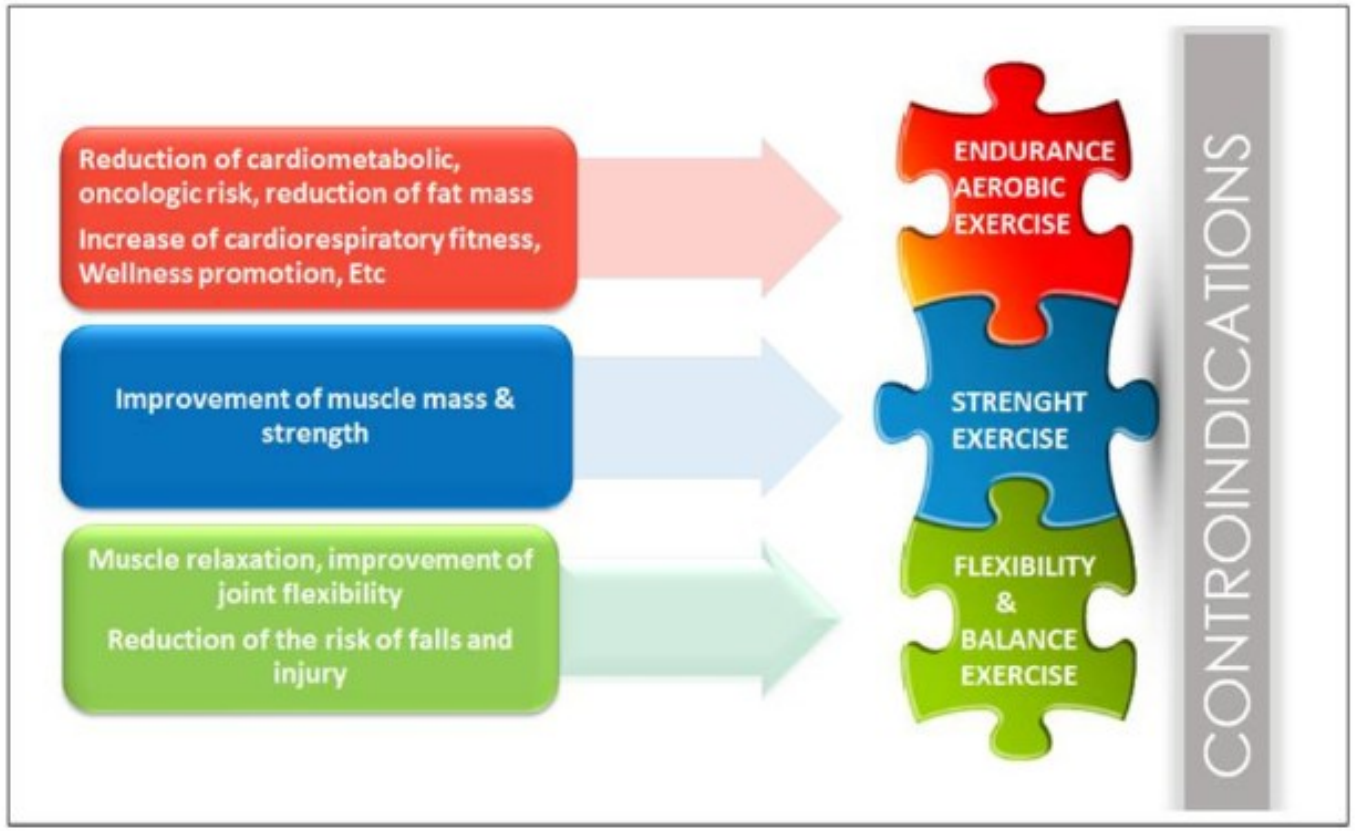

Figure 2. Exercise modalities needed to reach the main clinical goals.

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COSA FARE?

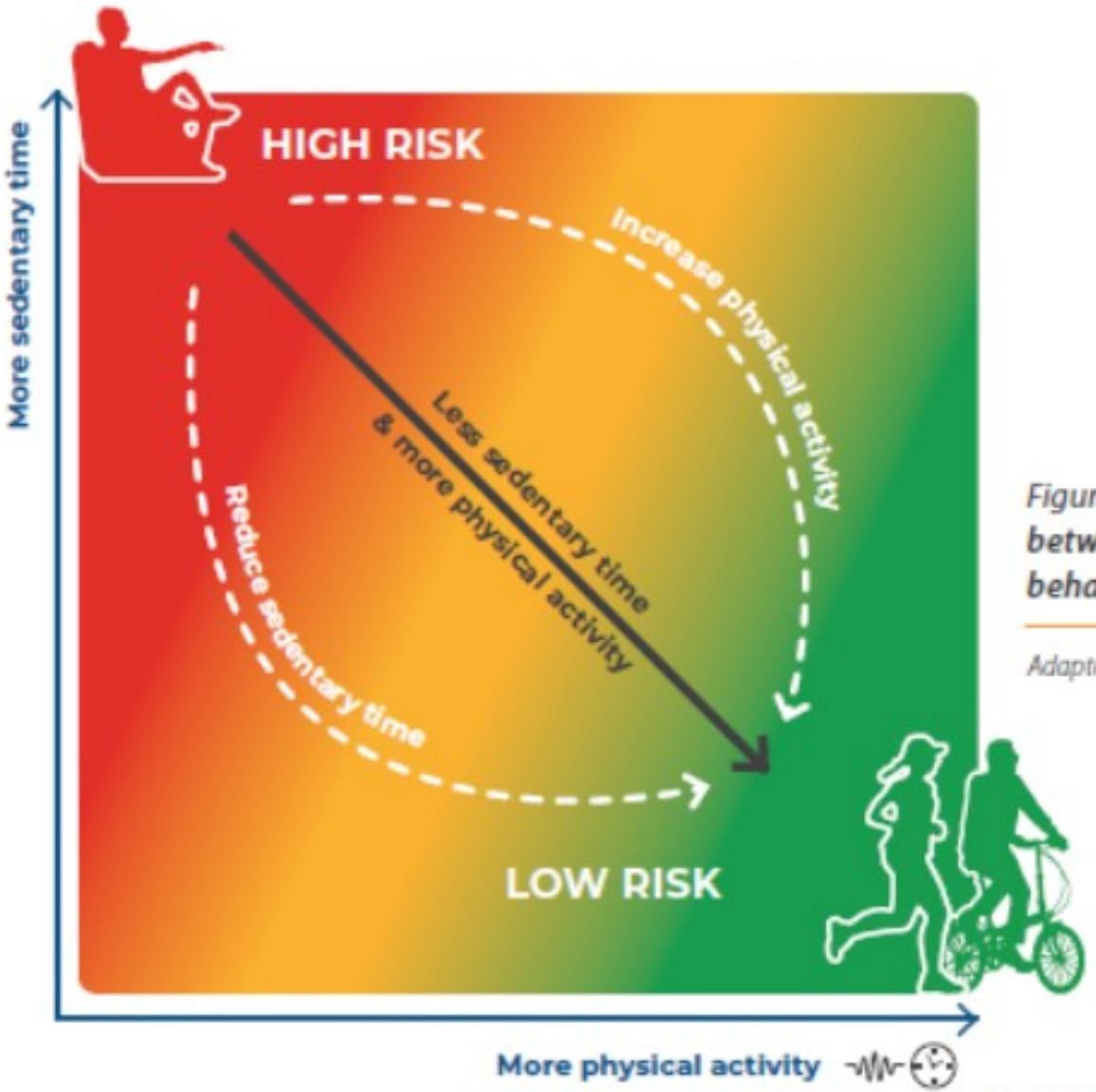
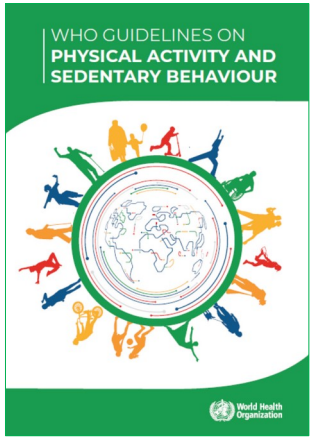


Figure 2: ***The relationship between levels of sedentary behaviour and physical activity***

Adapted from PAGAC



Bull FC, *et al*. *Br J Sports Med* 2020;**54**:1451–1462. doi:10.1136/bjsports-2020-102955

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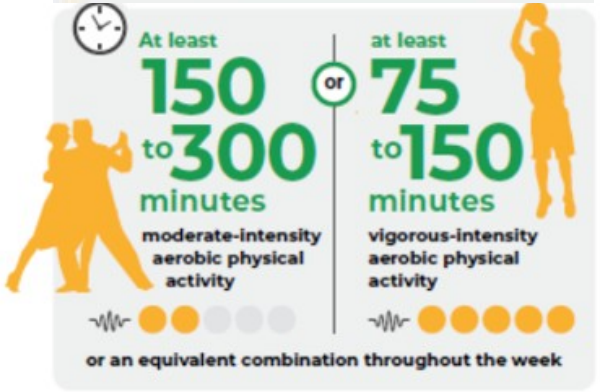
COSA FARE?

- Limitare il più possibile il tempo dedicato ad attività sedentarie

- Almeno150-300 min alla settimana (o meglio, 30-60 min al giorno) di esercizio fisico di tipo endurance aerobico ad intensità moderata; oppure 75-150 min alla settimana di esercizio fisico di tipo endurance aerobico ad intensità vigorosa

- Esercizi di forza/stretching almeno 2-3 volte alla settimana ad intensità moderata



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at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week.

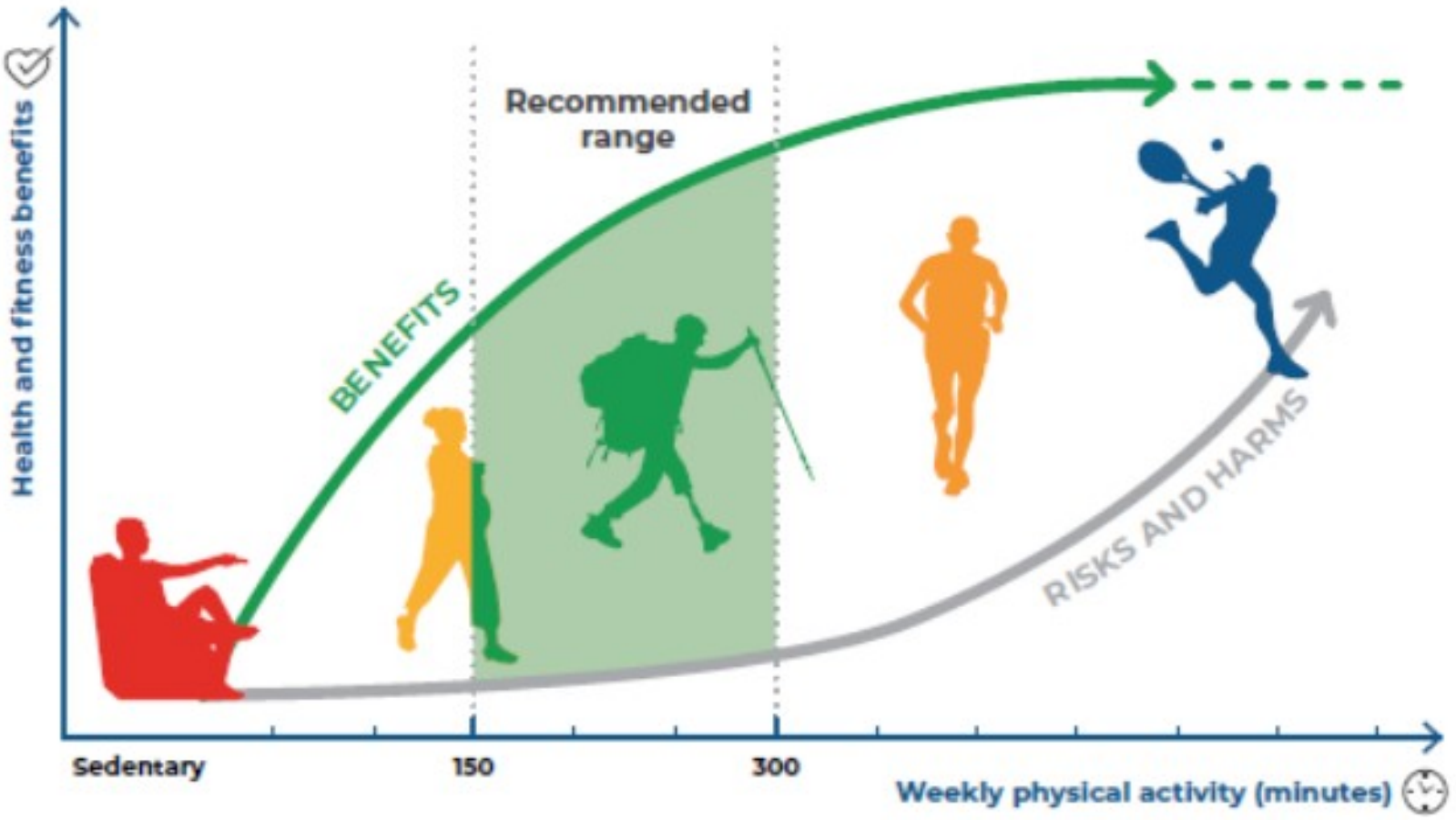

Figure 1: Dose response curve

Bull FC, *et al*. *Br J Sports Med* 2020;**54**:1451–1462. doi:10.1136/bjsports-2020-102955

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Sustainability **2020**, *12*, 7671; doi:10.3390/su12187671

sustainability

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Article

A Simple Home-Based Lifestyle Intervention Program to Improve Cardiac Autonomic Regulation in Patients with Increased Cardiometabolic Risk

Daniela Lucini [1,2,*], Mara Malacarne [1,2], Wolfgang Gatzemeier [3] and Massimo Pagani [1]

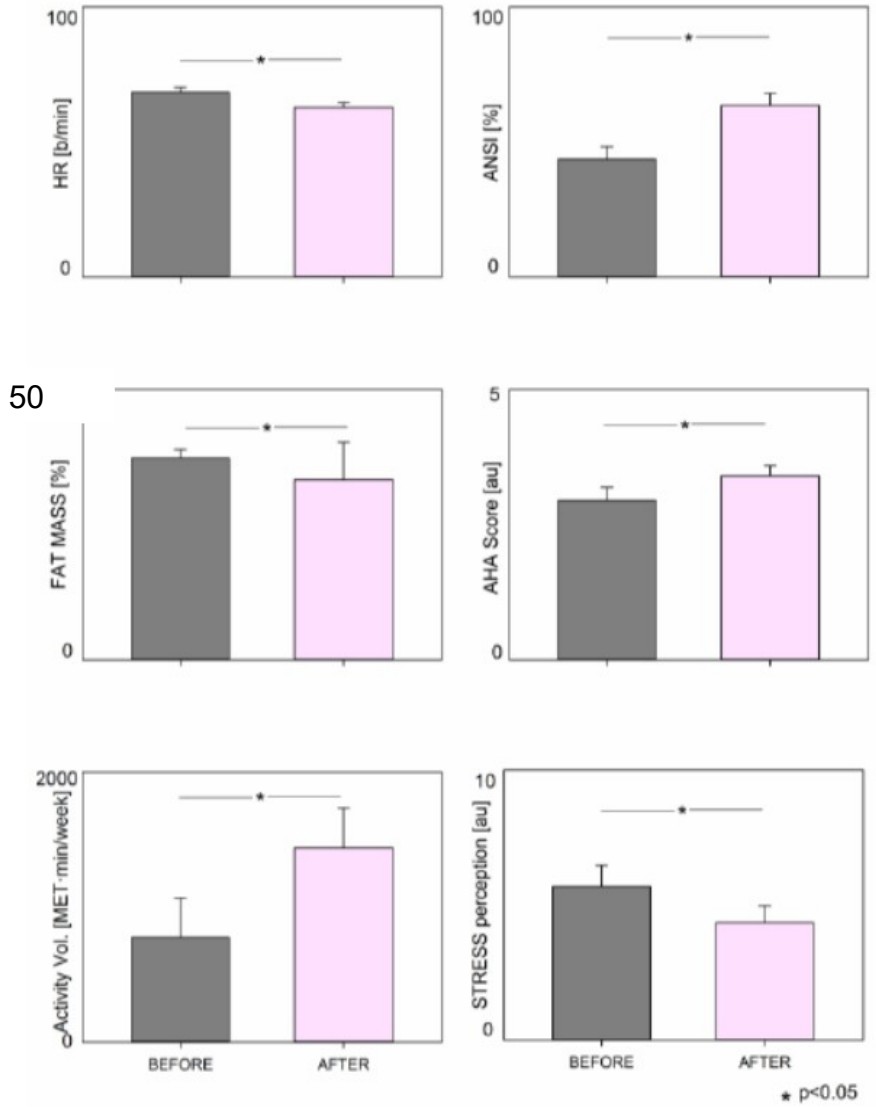

Figure 1. Schematic representation of the differences in selected metabolic, behavioral, hemodynamic and autonomic indices before and after lifestyle modification program in patients with increased cardiometabolic risk.

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Study. *J. Pers. Med.* **2022**, *12*, 273.
https://doi.org/10.3390/
jpm12020273

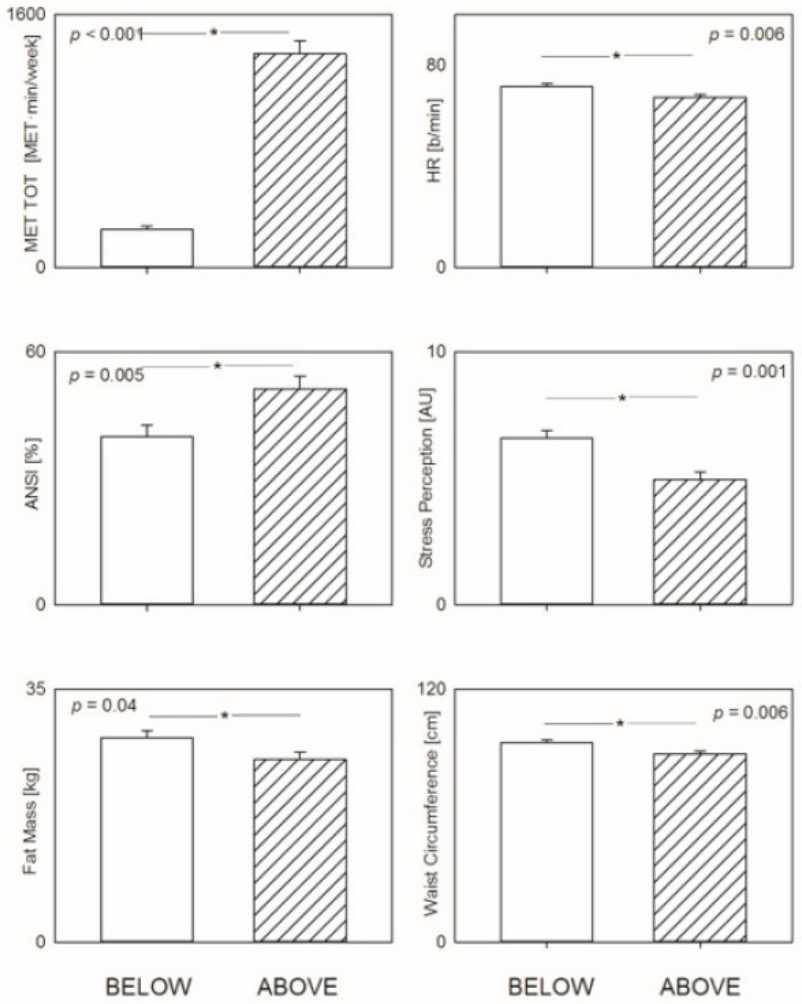

Figure 2. Differences in the main selected parameters between breast cancer survivors who spontaneously met (ABOVE) current physical activity goals and those who did not (BELOW). Physically active patients showed a better autonomic, metabolic and psychological profile. ET TOT = total weekly activity volume, * = *p* significance.

Journal of *Personalized Medicine*

MDPI

Article

Evidence of Better Autonomic, Metabolic and Psychological Profile in Breast Cancer Survivors Meeting Current Physical Activity Recommendations: An Observational Study

Daniela Lucini [1,2,*], Mara Malacarne [1,2], Wolfgang Gatzemeier [3], Eleonora Pagani [4], Giuseppina Bernardelli [5], Gianfranco Parati [6,7] and Massimo Pagani [2]

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Article

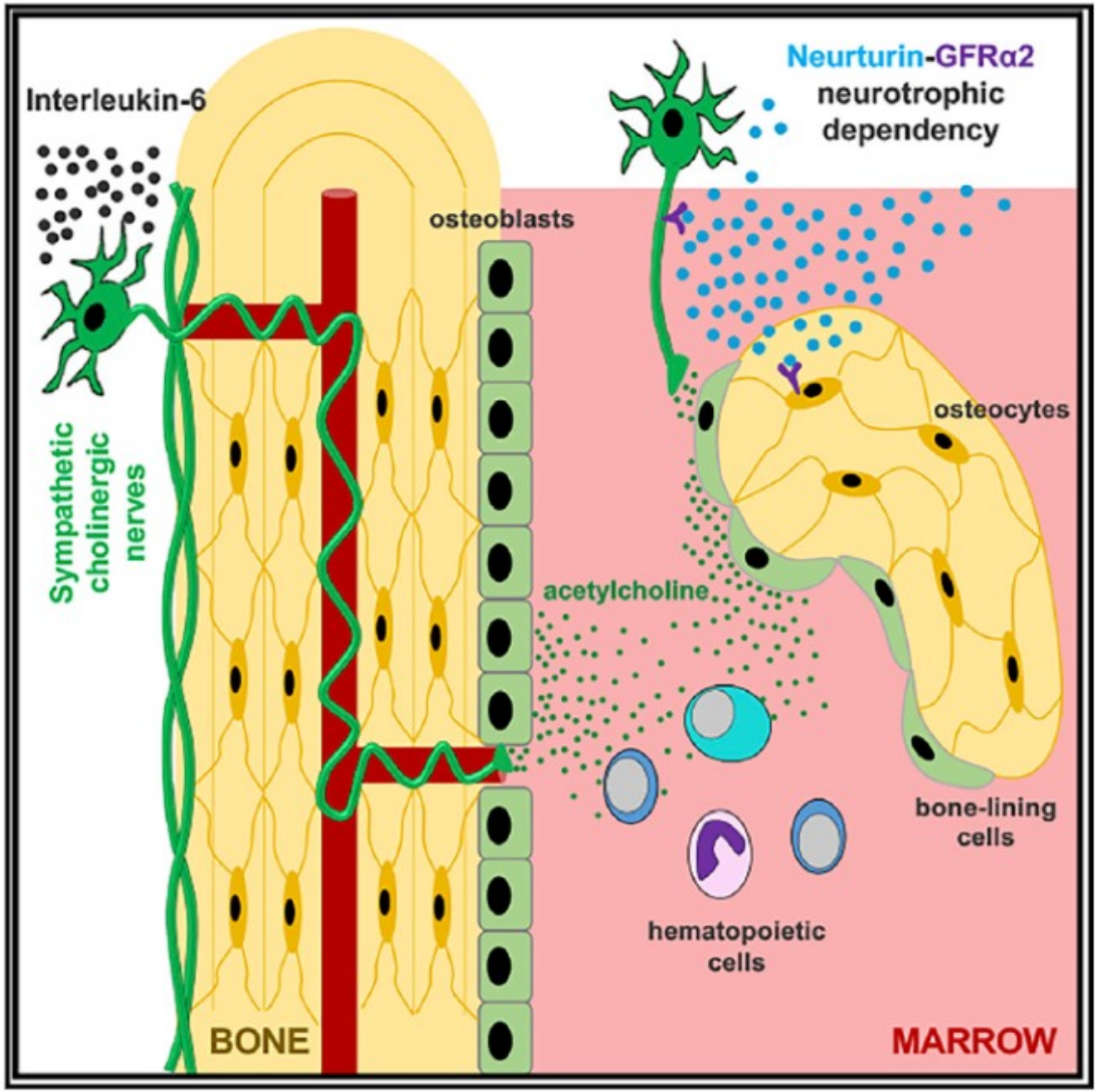
Cell Stem Cell

A cholinergic neuroskeletal interface promotes bone formation during postnatal growth and exercise

In brief

Gadomski et al. describe a neuro-osteocyte interface whereby sympathetic cholinergic neurons support bone-embedded osteocytes through the GFRα2 neurotrophic pathway. Developmentally, these sympathetic neurons undergo a neurotransmitter switch from adrenergic to cholinergic—a process that is induced by interleukin-6 and is dynamically enhanced by physical activity to increase bone mass.

Gadomski et al., 2022, Cell Stem Cell 29, 528–544
April 7, 2022 © 2022 The Author(s). Published by Elsevier Inc.
https://doi.org/10.1016/j.stem.2022.02.008



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Grazie per l'attenzione

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