La cardio-oncologie :

Quels sont les bénéfices non cardiovasculaires de l'activité physique chez les cancéreux

M. Lamotte PhD

HUB – Erasme – Bruxelles - Belgique

Je déclare n’avoir aucun conflit d’intérêt en rapport à cette présentation

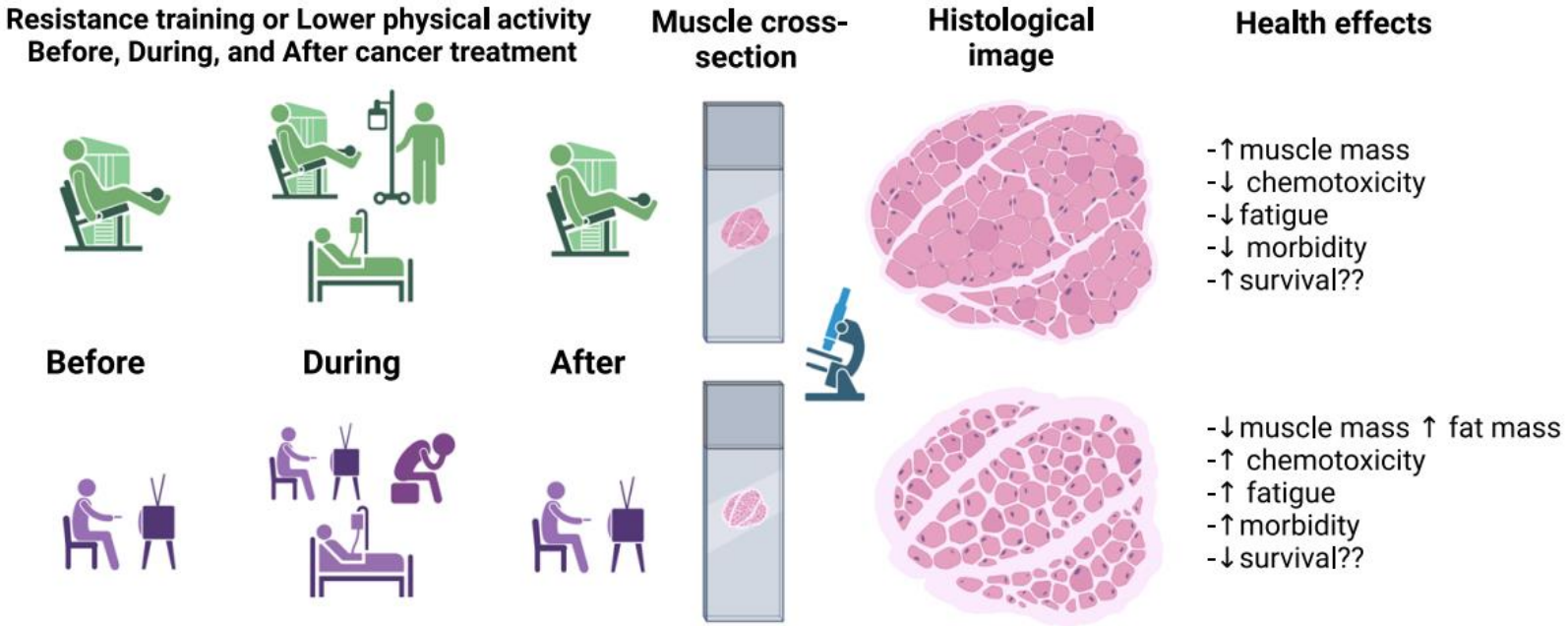


Figure 3. Impact of resistance training to enhance physical function, quality of life, and cancer survivorship.

Préhabilitation **Phase I** **Phase II (III)**

Swan, Exer Sport & Mov 2023

The benefits of exercise in cancer patients and the criteria for exercise prescription in cardio-oncology

Flavio D'Ascenzi[1,2], Francesca Anselmi[1], Caterina Fiorentini[1], Roberta Mannucci[3], Marco Bonifazi[4] and Sergio Mondillo[1]

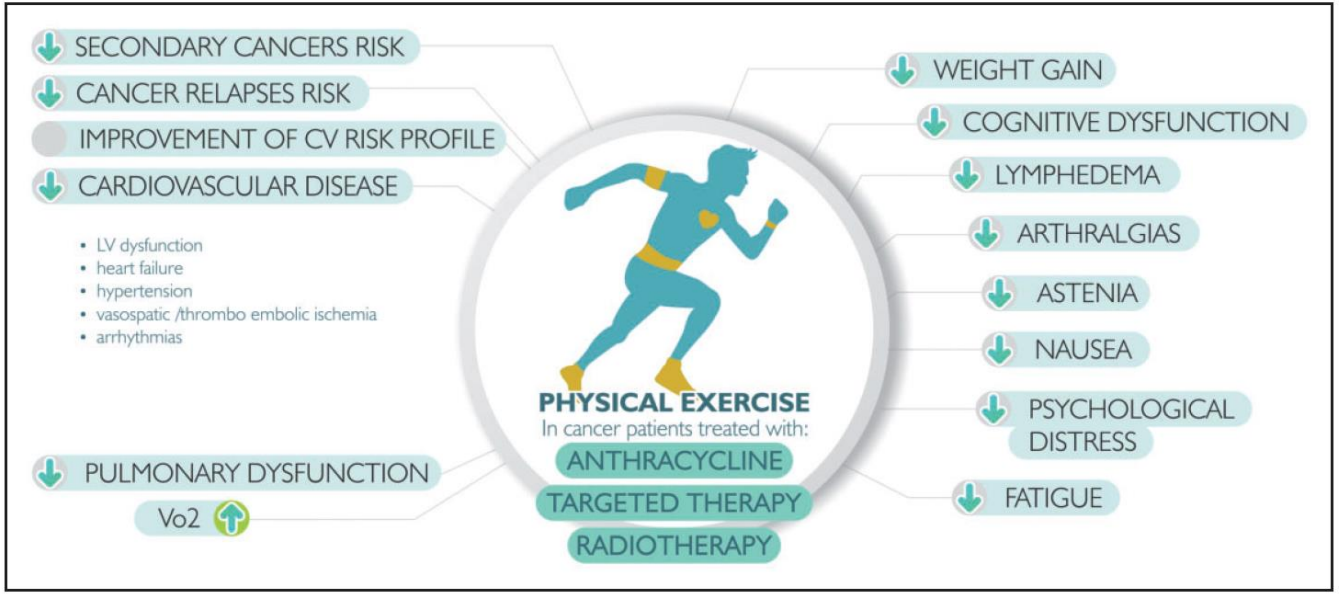


Figure 2. Beneficial effects of physical exercise in cancer patients undergoing oncological treatment. LV: left ventricular; Vo2: peak oxygen uptake.

Eur J Prev Cardiol 2019

The benefits of exercise in cancer patients and the criteria for exercise prescription in cardio-oncology

Flavio D'Ascenzi[1,2], Francesca Anselmi[1], Caterina Fiorentini[1], Roberta Mannucci[3], Marco Bonifazi[4] and Sergio Mondillo[1]

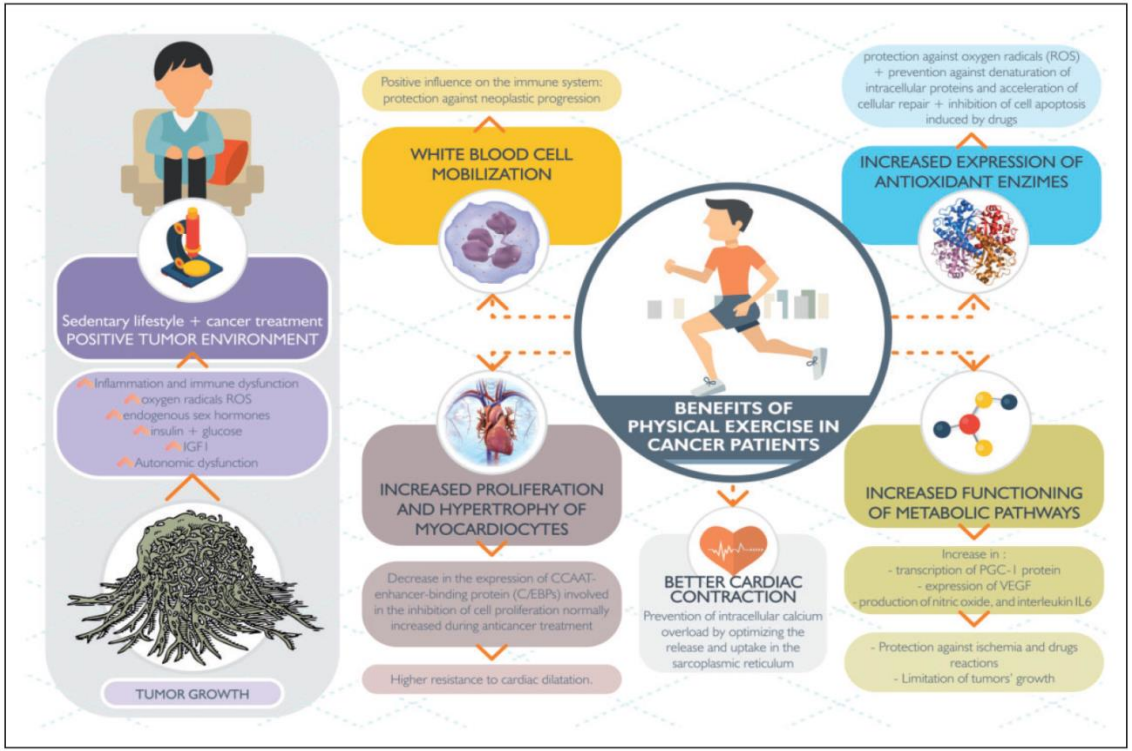


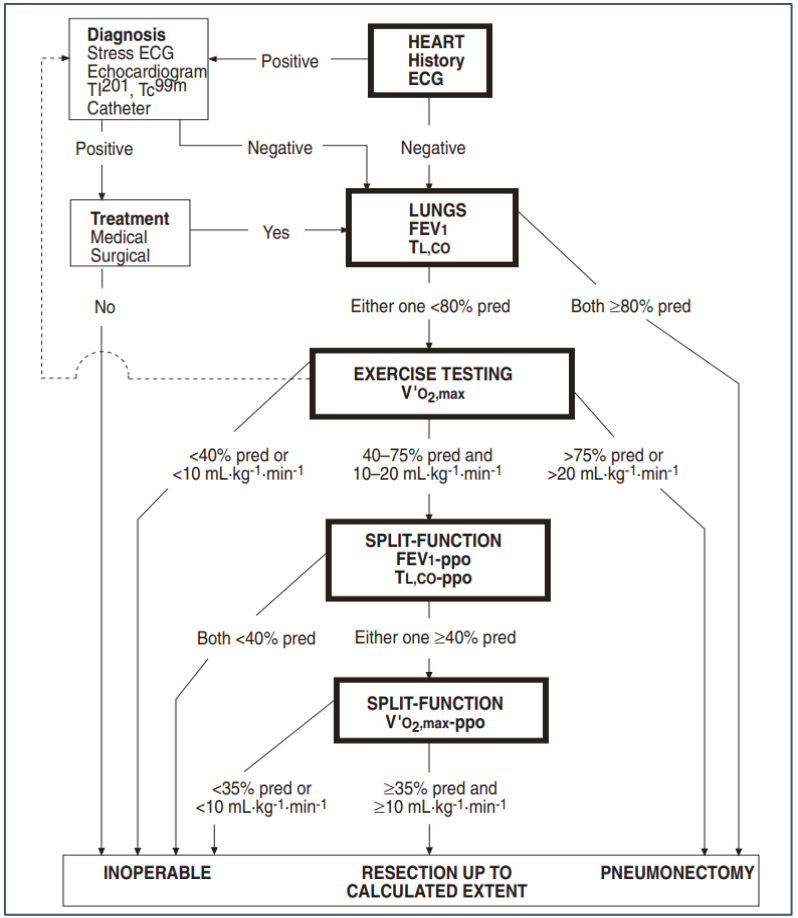
Figure 1. Pathophysiological mechanisms responsible for the benefits of exercise. Comparison between active vs sedentary lifestyle in cancer patients. CCAAT-enhancer-binding proteins: cytosine-cytosine-adenosine-adenosine-thymidine enhancer-binding proteins; IGF1: insulin-like growth factor; PGC1: peroxisome proliferator-activated receptor γ coactivator 1; ROS: reactive oxygen species; VEGF: vascular endothelial growth factor.

Eur J Prev Cardiol 2019

Préhabilitation

Functional evaluation of the lung resection candidate

C.T. Bolliger, A.P. Perruchoud



Eur Resp J 1998

Functional and postoperative outcomes after preoperative exercise training in patients with lung cancer: a systematic review and meta-analysis

Raquel Sebio Garcia[a,*], Maria Isabel Yáñez Brage[b], Esther Giménez Moolhuyzen[c], Catherine L. Granger[d] and Linda Denehy[d]

Table 2: Description of interventions included in the studies

Study	Setting	Timing	Type of intervention					Intensity	Duration of session (AT)	Frequency	Length of intervention	Adherence
			AT	ST	BE	IMT	Other[a]					
Sekine *et al.* [31]	Supervised + unsupervised	Pre- + postoperative	–			–	–	NR	45′ (30′)	Everyday	2 weeks	NR
Jones *et al.* [32], Peddle *et al.* [34] and Jones *et al.* [35]	Supervised	Preoperative	–		–	–	–	Continuous and interval: 60–100% of VO^{a}_{2peak}	20–30′	5/week	4–10 weeks	72, 88 and 78%, respectively
Cesareo *et al.* [33]	Supervised	Preoperative	–			–		80% Wmax	3 h (NR)	5/week	4 weeks	NR
Bobbio *et al.* [14]	Supervised + unsupervised	Preoperative				–		50–80% of WMax	90′ (40′)	5/week	4 weeks	80%
Pehlivan *et al.* [36]	Supervised	Pre- + postoperative	–			–	–	%maxHR (Karvonen formula)	NR	3/day	1 week	NR
Benzo *et al.* [12] (Study 2)	Supervised + unsupervised	Preoperative					–	Borg scale	NR (20′)	5/week	2 weeks (10 sessions)	100%
Harada *et al.* [37]	Supervised	Preoperative	–			–		Borg scale	NR	CHPR: 2/week CVPR: 1/week	2–5 weeks	NR
Bagan *et al.* [38]	Supervised	Pre- + postoperative				–		Continuous: 20–30 weeks	NR (30′)	Daily	2 weeks	NR
Stefanelli *et al.* [43]	Supervised	Preoperative	–			–	–	Continuous: at least 70% Wmax	3 h (30)	5/week	3 weeks	NR
Fang *et al.* [40]	Supervised	Preoperative	–			–	–	Interval: 60–80% Wmax	NR (40′)	5/week	2 weeks	NR
Divisi *et al.* [41]	Supervised	Preoperative	–				–	Incremental up to 100% of Wmax	90′ (40′)	6/week	4–6 weeks	NR
Morano *et al.* [29] and Morano *et al.* [44]	Supervised	Preoperative			–			80% Wmax	NR (30′)	5/week	4 weeks	NR
Bradley *et al.* [28]	Supervised	Pre- and postoperative				–	–	Up to 60% Wmax	60′ (NR)	2/week	Variable	NR
Coats *et al.* [42]	Home-based	Preoperative			–	–	–	Continuous (60–80% Wmax)	NR (30′)	3–5/week	4 weeks	75%
Li *et al.* [43]	Supervised	Preoperative	–			–		NR	NR	NR	NR	NR
Mujovic *et al.* [45]	Supervised	Preoperative	–			–		NR	45′ (NA)	3/day; 5/week	2–4 weeks	NR
Gao *et al.* [46]	Supervised	Preoperative		–		–	–	Borg scale (5–7)	1.5–2 h (30–40′)	2/day	3–7 days	NR
Tarumi *et al.* [47]	Supervised (in-patient)	Pre- and postoperative		–		–		?	NR (45′)	5/week	10 weeks	NR

AT: aerobic training; ST: strength training; BE: breathing exercises; NR: not reported; CHPR: comprehensive preoperative pulmonary rehabilitation; CVPR: conventional preoperative pulmonary rehabilitation; VO_{2peak}: oxygen consumption peak; Wmax: maximal workload; maxHR: maximal heart rate; IMT: inspiratory muscle training; COPD: chronic obstructive pulmonary disease; PF: pulmonary function; PEF: peak expiratory flow; PR: pulmonary rehabilitation; CPT: conventional physical therapy.
[a]Education, relaxation, stretching and/or nutritional support.

Interactive Cardiovasc and thoracic Surgery 2016

Functional and postoperative outcomes after preoperative exercise training in patients with lung cancer: a systematic review and meta-analysis

Raquel Sebio Garcia[a,*], Maria Isabel Yáñez Brage[b], Esther Giménez Moolhuyzen[c], Catherine L. Granger[d] and Linda Denehy[d]

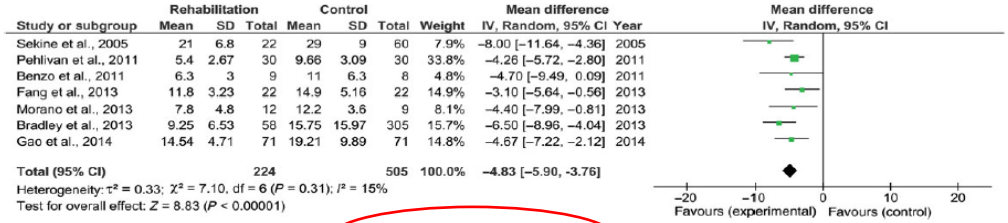


Figure 3: Meta-analysis and pooled estimated effect size for postoperative length of stay in the intervention and control group. 95% CI: 95% confidence interval; SD: standard deviation.

5 jours d'hospitalisation en moins !

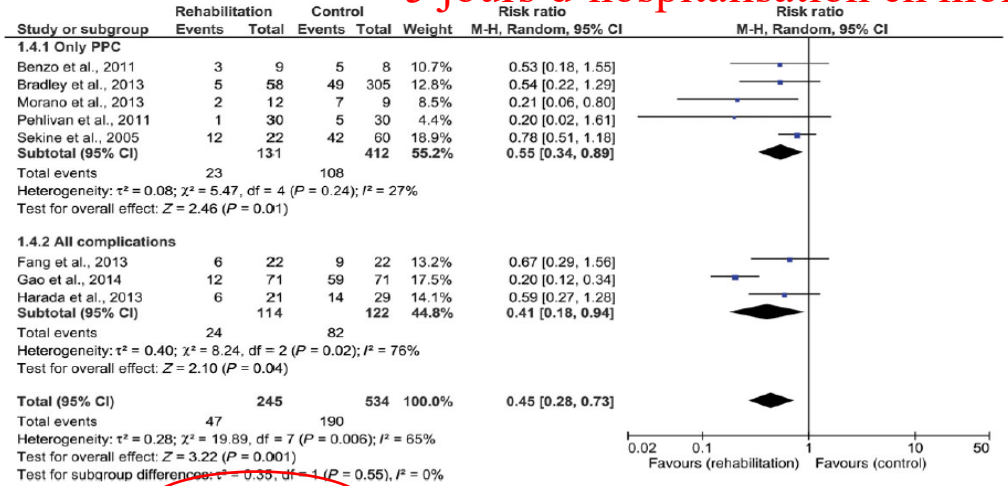


Figure 4: Subgroup analysis for postoperative complications (pulmonary versus all complications). 95% CI: 95% confidence interval; SD: standard deviation; STD: standardized; PPCs: postoperative pulmonary complications.

45 à 59 % de complications en moins !

Interactive Cardiovasc and thoracic Surgery 2016

The Impact of Prehabilitation on Post-operative Outcomes in Oesophageal Cancer Surgery: a Propensity Score Matched Comparison

Laura J. Halliday[1] · Emre Doganay[1] · Venetia A. Wynter-Blyth[2] · George B. Hanna[1] · Krishna Moorthy[1]

50 % de complications en moins

3 jours d'hospitalisation en moins

Table 2 Comparison of study outcomes in both unmatched and propensity score matched analysis

	Unmatched groups			Matched groups		
	PREPARE	Controls	*p* value	PREPARE	Controls	*p* value
Any complication, *n* (%)	46 (68%)	31 (79%)	0.089	24 (63%)	31 (82%)	0.073
Pulmonary complication, *n* (%)	26 (36%)	26 (67%)	0.002	12 (32%)	26 (68%)	0.001
Post-operative pneumonia, *n* (%)	24 (33%)	25 (64%)	0.002	10 (26%)	25 (66%)	0.001
Severe complications, *n* (%)a	17 (24%)	18 (46%)	0.015	12 (32%)	18 (47%)	0.159
Length of stay (days), median (IQR)	10 (8–17)	13 (11–20)	0.019	10 (8–17)	13 (11–20)	0.018
30-day readmission, *n* (%)	13 (18%)	3 (8%)	0.138	9 (24%)	3 (8%)	0.059
Enhanced recovery protocol compliance						
Mobilisation, *n* (%)	24 (33%)	14 (36%)	0.679	11 (29%)	13 (34%)	0.449
NGT removal, *n* (%)	40 (56%)	13 (33%)	0.053	23 (61%)	13 (34%)	0.046
Drain removal, *n* (%)	34 (47%)	11 (28%)	0.048	16 (42%)	11 (29%)	0.179
Oral intake, *n* (%)	28 (39%)	12 (31%)	0.442	15 (39%)	12 (32%)	0.583
Fluid balance, *n* (%)	3 (4%)	4 (10%)	0.203	1 (3%)	4 (11%)	0.144
Pain control, *n* (%)	41 (57%)	23 (59%)	0.656	21 (55%)	23 (61%)	0.362
Day 0 extubation, *n* (%)	51 (71%)	28 (72%)	0.905	27 (71%)	27 (71%)	> 0.999

[a] Severe complications was defined as Clavien Dindo grade 3 or higher

IQR, inter quartile range; *NGT*, nasogastric tube

J. of Gastrointestinal Surg 2021

Phase I : Pendant les traitements (lourds)

Effects of supervised exercise on cancer-related fatigue in breast cancer survivors: a systematic review and meta-analysis

José Francisco Meneses-Echávez[1*], Emilio González-Jiménez[2] and Robinson Ramírez-Vélez[1]

Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Campbell et al. 2005	-0.776	0.476	0.227	-1.710	0.158	-1.629	0.103
Cantarero et al. 2013	-0.468	0.260	0.068	-0.978	0.041	-1.802	0.072
Courneya et al. 2003	-0.912	0.292	0.085	-1.484	-0.339	-3.120	0.002
Ergun et al. 2013	-0.158	0.317	0.100	-0.779	0.462	-0.500	0.617
Milne et al. 2008	-1.169	0.284	0.081	-1.726	-0.612	4.114	0.000
Mutrie et al. 2007	-0.071	0.152	0.023	-0.368	0.227	-0.465	0.642
Saarto et al. 2012	-0.148	0.090	0.008	-0.324	0.028	-1.651	0.099
Segal et al. 2001	-1.273	0.297	0.089	-1.856	-0.690	-4.279	0.000
Winters et al. 2012	-0.123	0.245	0.060	-0.603	0.358	-0.500	0.617
	-0.511	0.151	0.023	-0.807	-0.215	-3.386	0.001

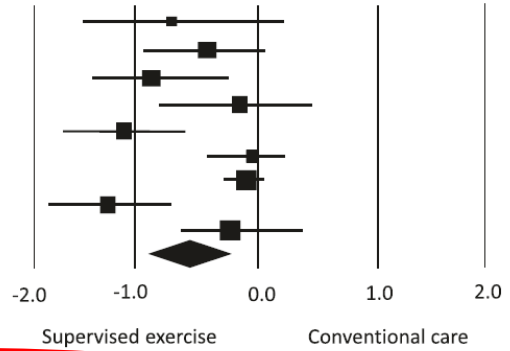


Figure 2 Metaanalysis for the effect estimate of supervised exercise on CRF in Breast cancer survivors. Standardized mean difference (SMD) was calculated for the Random effects model of metaanalysis. IV, Inverse of variance; CI, confidence interval.

BMC Cancer 2015

Effects of supervised exercise on cancer-related fatigue in breast cancer survivors: a systematic review and meta-analysis

José Francisco Meneses-Echávez[1*], Emilio González-Jiménez[2] and Robinson Ramírez-Vélez[1]

Stage of treatment	Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Active	Campbell et al. 2005	-0.776	0.476	0.227	-1.710	0.158	-1.629	0.103
Active	Courneya et al. 2003	-0.912	0.292	0.085	-1.484	-0.339	-3.120	0.002
Active	Milne et al. 2008	-1.169	0.284	0.081	-1.726	-0.612	4.114	0.000
Active	Mutrie et al. 2007	-0.071	0.152	0.023	-0.368	0.227	-0.465	0.642
Active	Saarto et al. 2012	-0.148	0.090	0.008	-0.324	0.028	-1.651	0.099
Active	Segal et al. 2001	-1.273	0.297	0.089	-1.856	-0.690	-4.279	0.000
Active		-0.662	0.216	0.047	-1.086	-0.238	-3.059	0.002
After	Cantarero et al. 2013	-0.468	0.260	0.068	-0.978	0.041	-1.802	0.072
After	Ergun et al. 2013	-0.158	0.317	0.100	-0.779	0.462	-0.500	0.617
After	Winters et al. 2012	-0.123	0.245	0.060	-0.603	0.358	-0.500	0.617
After		-0.255	0.155	0.024	-0.559	0.050	-1.640	0.101

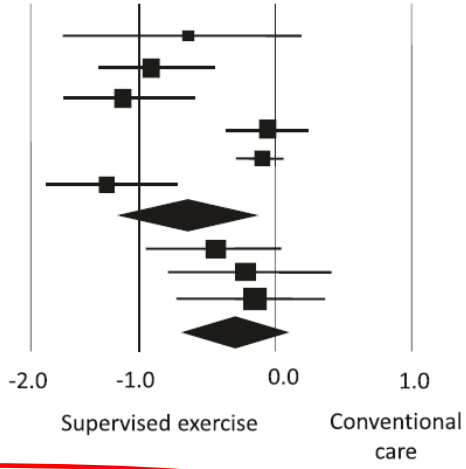


Figure 5 Metaanalysis for the effect estimate of supervised resistance training on CRF in Breast cancer survivors according to the anti-cancer treatment stage. Standardized mean difference was (SMD) calculated for the Random effects model of metaanalysis. IV, inverse of variance; CI, confidence interval.

BMC Cancer 2015

Physical activity reduces fatigue in patients with cancer and hematopoietic stem cell transplant recipients: A systematic review and meta-analysis of randomized trials

Sapna Oberoi[a], Paula D. Robinson[a], Danielle Cataudella[b], S. Nicole Culos-Reed[c], Hailey Davis[d], Nathan Duong[d], Faith Gibson[e], Miriam Götte[f], Pamela Hinds[g,h], Sanne L. Nijhof[i], Deborah Tomlinson[d], Patrick van der Torre[i], Sandra Cabral[a], L. Lee Dupuis[d,j], Lillian Sung[d,k,*]

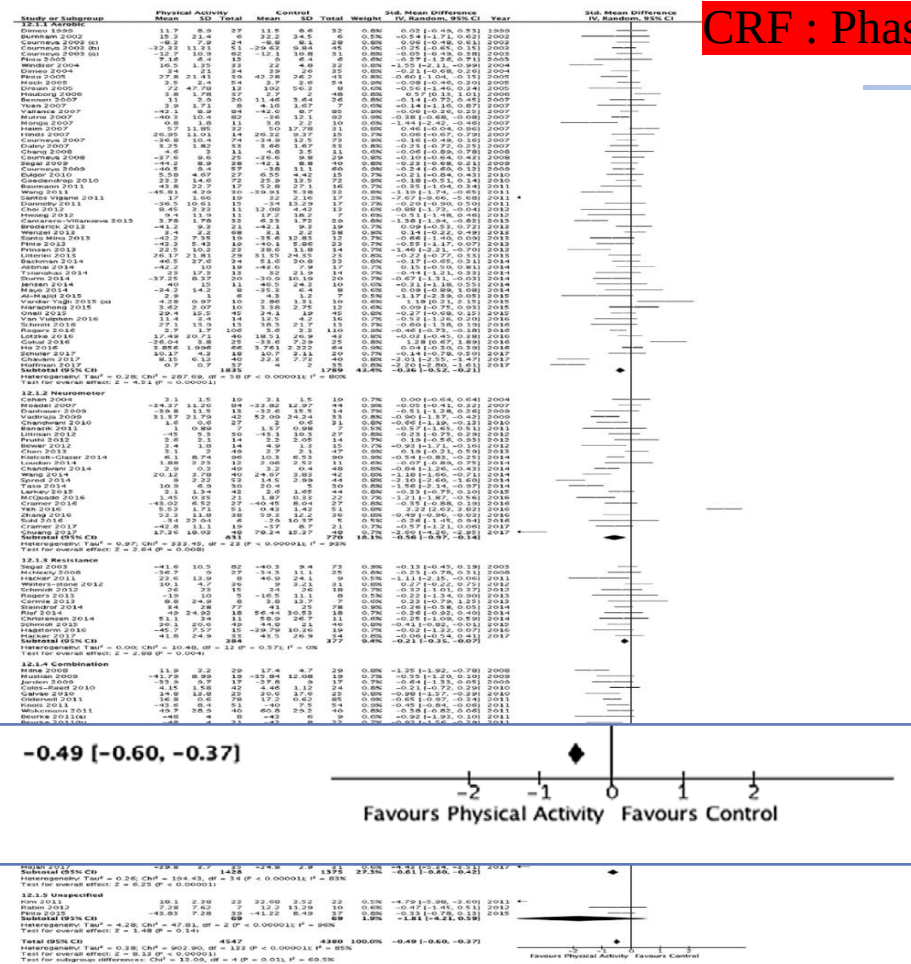


Fig. 2. Forest plot of studies comparing all physical activity interventions vs. all controls stratified by type of physical activity intervention. Squares to the left of the vertical line mean that the physical activity is better than control. Horizontal lines through the squares represent 95% confidence intervals (CIs). The size of the squares reflects each study's relative weight, and the diamond represents the aggregate standardized mean difference (SMD) and 95% CI.

Crit Review in Oncology 2018

Effects of Exercise on Chemotherapy Completion and Hospitalization Rates: The OptiTrain Breast Cancer Trial

Sara Mijwel,[a] Kate A. Bolam,[a] Jacob Gerrevall,[b] Theodoros Foukakis,[c,d] Yvonne Wengström,[a,d] Helene Rundqvist[b]

240 cancers du seins, 16 sem, 2x/sem

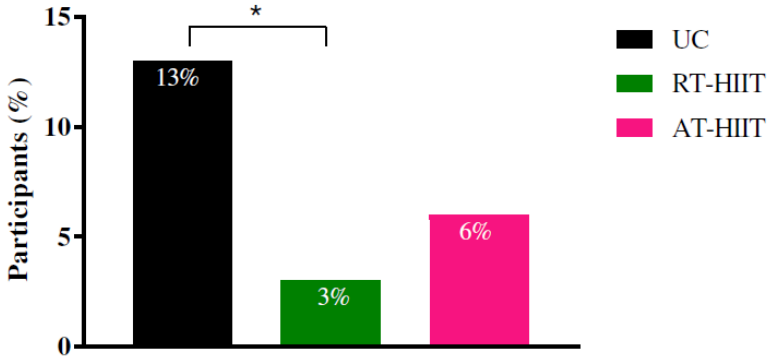


Figure 3. Percentage of each group being hospitalized in the RT-HIIT, AT-HIIT, and UC groups. * indicates $p < .05$ between groups. Abbreviations: AT-HIIT, moderate-intensity aerobic and high-intensity interval training; RT-HIIT, resistance and high-intensity interval training; UC, usual care.

→ pas de différence concernant l'achèvement optimal (doses) de la chimiothérapie
(autres études en faveur de l'exercice)

→ nette différence de ré-hospitalisation en cours de chimio

The oncologist 2020

Highly favorable physiological responses to concurrent resistance and high-intensity interval training during chemotherapy: the OptiTrain breast cancer trial

Sara Mijwel[1,2] · Malin Backman[2,8] · Kate A. Bolam[2,3] · Emil Olofsson[4] · Jessica Norrbom[1] · Jonas Bergh[5,6] · Carl Johan Sundberg[1,7] · Yvonne Wengström[2,8] · Helene Rundqvist[4]

240 cancers du seins, 16 sem, 2x/sem

→ Effets sur la VO2, force, poids corporel

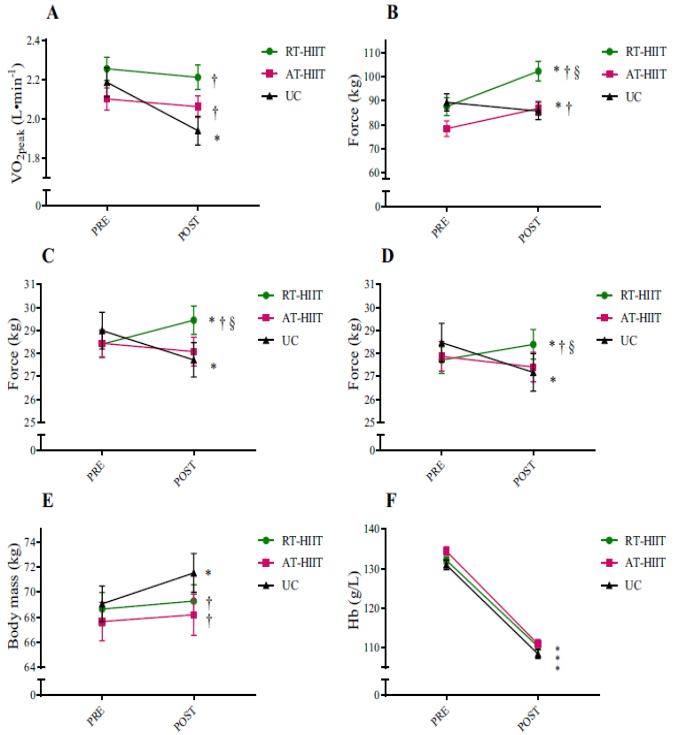


Fig. 1 Effects of concurrent resistance and high-intensity interval training (RT-HIIT) and moderate-intensity aerobic and high-intensity interval training (AT-HIIT) versus usual care (UC) on physiological outcomes: **a** estimated VO_{2peak}, **b** isometric mid-thigh pull, **c** handgrip strength surgery side, **d** handgrip strength non-surgery side, **e** body mass, and **f** hemoglobin levels. $^{*}p < 0.05$ at post versus pre measurement; $^{\dagger}p < 0.05$ compared to UC; $^{\S}p < 0.05$ between RT-HIIT and AT-HIIT. Data is presented as mean and standard error of the mean. No statistically significant differences were found at baseline between groups

Breast Cancer Research and Treatment 2018

Highly favorable physiological responses to concurrent resistance and high-intensity interval training during chemotherapy: the OptiTrain breast cancer trial

Sara Mijwel[1,2] · Malin Backman[2,8] · Kate A. Bolam[2,3] · Emil Olofsson[4] · Jessica Norrbom[1] · Jonas Bergh[5,6] · Carl Johan Sundberg[1,7] · Yvonne Wengström[2,8] · Helene Rundqvist[4]

240 cancers du seins, 16 sem, 2x/sem

→ Effets sur la douleur

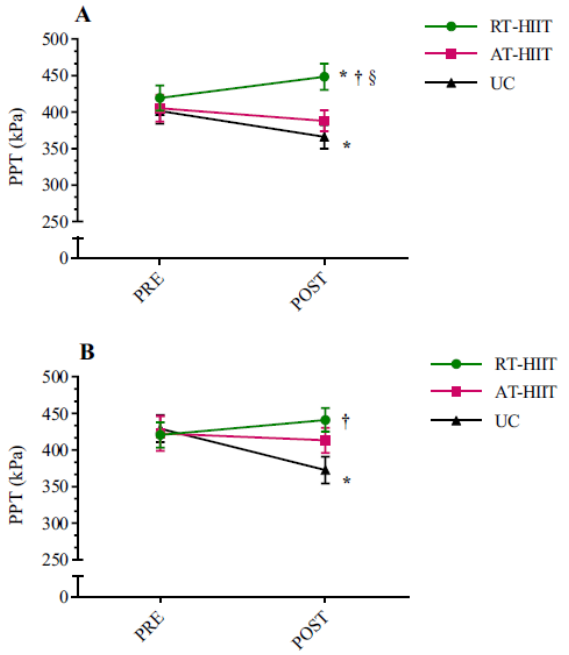


Fig. 2 Pressure-pain thresholds (PPT) for **a** trapezius muscle, **b** gluteus muscle. *RT-HIIT* resistance and high-intensity interval training, *AT-HIIT* moderate-intensity aerobic and high-intensity interval training, *UC* usual care. $^{*}p < 0.05$ at post versus pre measurement; $^{\dagger}p < 0.05$ compared to UC; $^{\S}p < 0.05$ between RT-HIIT and AT-HIIT. Data is presented as mean and standard error of the mean. No statistically significant differences were found at baseline between groups

Breast Cancer Research and Treatment 2018

Adding high-intensity interval training to conventional training modalities: optimizing health-related outcomes during chemotherapy for breast cancer: the OptiTrain randomized controlled trial

Sara Mijwel[1,2] · Malin Backman[2,9] · Kate A. Bolam[2,3] · Anna Jervaeus[2] · Carl Johan Sundberg[1,4] · Sara Margolin[5,6] · Maria Browall[2,7] · Helene Rundqvist[8] · Yvonne Wengström[2,9]

240 cancers du seins, 16 sem, 2x/sem

→ Effets sur la fatigue et symptômes

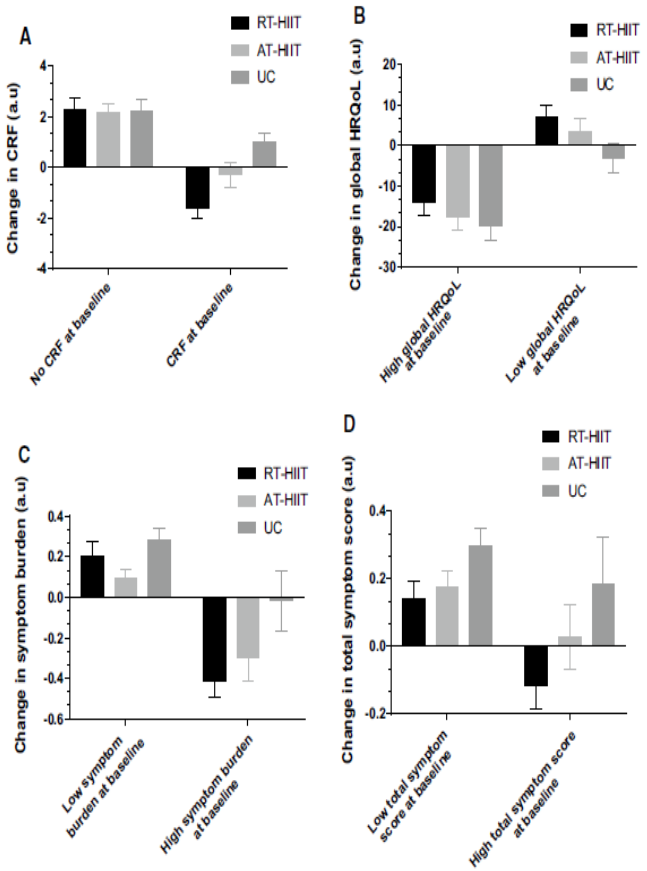


Fig. 2 Baseline status and change after 16 weeks for the outcomes. **a** CRF (assessed by the Piper fatigue scale), **b** global HRQoL (assessed by the European Organization for Research and Treatment of cancer quality of life questionnaire), **c** symptom burden (assessed by the Memorial symptom assessment scale), and **d** total symptom score (assessed by the Memorial symptom assessment scale). *CRF* cancer-related fatigue, *HRQoL* health-related quality of life, *CRF* cancer-related fatigue, *HRQoL* health-related quality of life, *RT–HIIT* resistance and high-intensity interval training, *AT–HIIT* moderate-intensity aerobic and high-intensity interval training, *UC* usual care

Breast Cancer Research and Treatment 2018

Phase I

Effects of Exercise during Adjuvant Chemotherapy on Breast Cancer Outcomes

KERRY S. COURNEYA[1], ROANNE J. SEGAL[2], DONALD C. MCKENZIE[3], HUIRU DONG[1], KAREN GELMON[3,4], CHRISTINE M. FRIEDENREICH[5], YUTAKA YASUI[1], ROBERT D. REID[6], JENNIFER J. CRAWFORD[1], and JOHN R. MACKEY[1,7]

1ère étude randomisée (n=242)

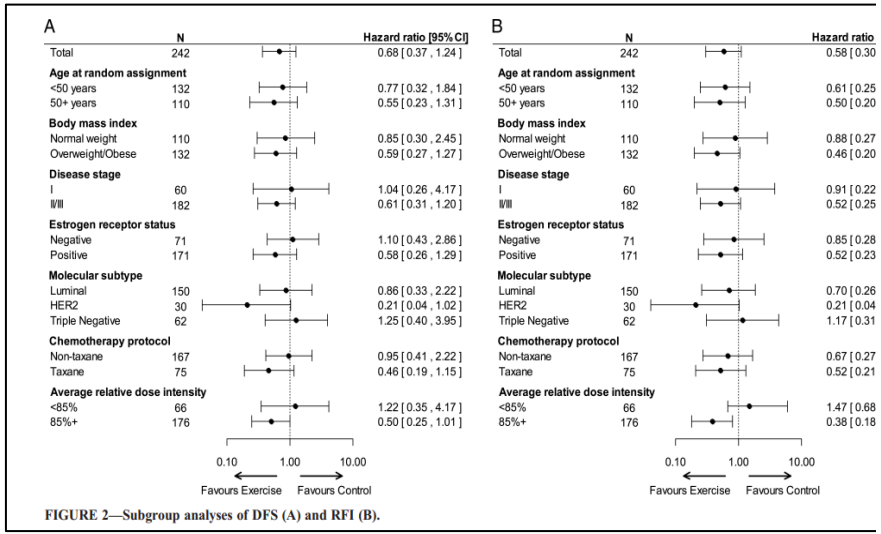


FIGURE 2—Subgroup analyses of DFS (A) and RFI (B).

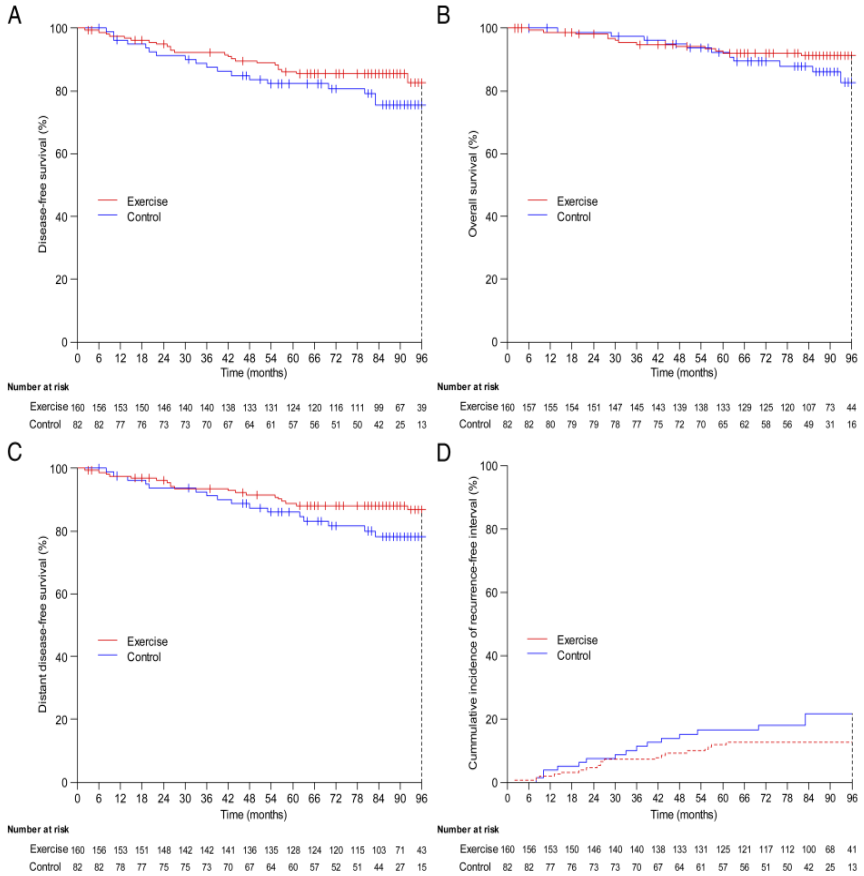


FIGURE 1—DFS (A), OS (B), DDFS (C), and RFI (D) by randomized group assignment.

MSSE 2014

Cardiotoxicité

Phase I

Aerobic Exercise Training as a Potential Cardioprotective Strategy to Attenuate Doxorubicin-Induced Cardiotoxicity

Samir A. Kouzi[1] and Mohammad Nasir Uddin[2]

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[2] Department of Pharmaceutical Sciences, College of Pharmacy, Larkin Health Sciences Institute, Miami, Florida, USA.

Received, October 17, 2016; Revised, October 24; Accepted, October 25, 2016, Published October 25, 2016.

ABSTRACT - Doxorubicin is one of the most commonly used cytotoxic anticancer drugs against several cancers. Although a highly effective anticancer drug, the clinical use of doxorubicin is severely limited by its cardiotoxicity which results in morbidity, poor quality of life, and premature mortality. Only very few clinically accepted methods to minimize doxorubicin-induced cardiac injury are available today, but none of them have proven to be completely successful. Due to limited alternative strategies, a number of potential cardioprotective therapies are currently being investigated for treating and/or preventing doxorubicin-induced cardiotoxicity. Of these potential strategies, aerobic exercise training is the only nonpharmacologic strategy that shows a great deal of promise. Although there are no published human clinical trials, evidence from numerous animal studies suggests that aerobic exercise training, administered prior to, during and/or following doxorubicin therapy, is protective against doxorubicin-induced cardiac injury. Protective properties of exercise training against the cardiotoxicity of doxorubicin have been attributed to a number of potential molecular mechanisms including: enhancing the production of endogenous antioxidant machineries; regulating proapoptotic signaling; stimulating the release, mobilization and homing of cardiac progenitor cells; limiting myocyte turnover; eliciting favorable adaptations in myocardial calcium handling and preventing calcium overload; modulating cardiac AMPK activity; downregulating cardiac autophagy/lysosomal signaling; and reducing myocardial doxorubicin accumulation. Further preclinical and clinical research is needed to decipher and refine the molecular mechanisms underlying the cardioprotective effects of exercise training, as well as to define the nature and magnitude of the effect of exercise on doxorubicin-induced cardiotoxicity in cancer patients.

J Pharm Pharm Sci. 2016

Effects of an Exercise Program in Colon Cancer Patients undergoing Chemotherapy

JONNA K. VAN VULPEN[1], MIRANDA J. VELTHUIS[2], CHARLOTTE N. STEINS BISSCHOP[1], NOÉMIE TRAVIER[3,4], BRAM J. W. VAN DEN BUIJS[5], FRANK J. G. BACKX[5], MAARTJE LOS[6], FRANS L. G. ERDKAMP[7], HAIKO J. BLOEMENDAL[8], MIRIAM KOOPMAN[9], MARNIX A. J. DE ROOS[10], MARLIES J. VERHAAR[11], DAAN TEN BOKKEL-HUININK[12], ELSKEN VAN DER WALL[13], PETRA H. M. PEETERS[1], and ANNE M. MAY[1]

PURPOSE: Fatigue is a common problem among colon cancer patients and typically increases during chemotherapy. Exercise during chemotherapy might have beneficial effects on fatigue. To investigate the short- and long-term effects of an exercise program in colon cancer patients during adjuvant treatment, the Physical Activity During Cancer Treatment study was conducted.

METHODS: In this multicenter randomized controlled trial, 33 colon cancer patients undergoing chemotherapy (21 men and 12 women) were randomly assigned to either a group receiving an 18-wk supervised exercise program (n = 17) or to usual care (n = 16). The primary outcome was fatigue as measured by the Multidimensional Fatigue Inventory and the Fatigue Quality List. Secondary outcomes were quality of life, physical fitness, anxiety, depression, body weight, and chemotherapy completion rate. Outcome assessment took place at baseline, postintervention (18 wk) and at 36 wk.

RESULTS: Intention-to-treat mixed linear model analyses showed that patients in the intervention group experienced significantly less physical fatigue at 18 wk and general fatigue at 36 wk (mean between group differences, -3.2; 95% confidence interval [CI], -6.2 to -0.2; effect size [ES], -0.9 and -2.7; 95% CI, -5.2 to -0.1; ES, -0.8, respectively), and reported higher physical functioning (12.3; 95% CI, 3.3-21.4; ES, 1.0) compared with patients in the usual care group.

CONCLUSION: The Physical Activity During Cancer Treatment trial shows that an 18-wk supervised exercise program in colon cancer patients during chemotherapy is safe and feasible. **The intervention significantly reduced physical fatigue at 18 wk and general fatigue at 36 wk**. Considering the number of patients included in the present study, replication in a larger study population is required.

→ Amélioration des scores de fatigue, différents items de qualité de vie et capacité d'effort

Phase II : Après les traitements lourds (chir, chimio, radio)

Gestion du poids, morphologie

Activités et capacité d’effort

Fatigue, dépression, qualité de vie

Mortalité spécifique

Mortalité globale (modifications du mode de vie + traitements)

(Cardiotoxicité)

« Quelles sont les principales difficultés que vous avez rencontrées au cours du dernier mois »

Onco-séno

	Fréquence	
	n	%
Chimiothérapie	162	95
Mobilité	**355**	**88**
Détresse psychologique	319	84
Radiothérapie	54	84
Dysfonctions sexuelles	157	73
Anxiété médicale	271	71
Douleurs	237	62
Intérêt sexuel	190	51
Adhésion aux traitement	37	49
Communication conjugale	120	40

Dia originale : I. Meerckaert

The Influence of Body Mass Index on Survival in Breast Cancer Patients

Irene Cantarero-Villanueva, Noelia Galiano-Castillo, Carolina Fernández-Lao, Lourdes Diaz-Rodríguez, Antonio Manuel Fernández-Pérez, María J. Sánchez, Manuel Arroyo-Morales

Pluridisciplinarité !

Table 3 Psychological and Physiological Values Expressed as Mean ± SD (95% CI)

Group	Body Mass Index <25 (n = 55)	Body Mass Index 25-29.9 (n = 67)	Body Mass Index ≥30 (n = 25)	*P*
Systolic Blood Pressure, mm Hg	115.76 ± 14.93 (111.60-119.92)	124.09 ± 14.55 (120.48-127.69)[a]	125.56 ± 14.42 (119.32-131.80)[a]	.004[b]
Diastolic Blood Pressure, mm Hg	77.01 ± 8.93 (74.53-79.50)	82.78 ± 9.08 (80.53-85.03)[a]	85.34 ± 9.6 (81.16-89.53)[a]	<.001[b]
Heart Rate, Beats per Minute	73.57 ± 10.21 (70.73-76.42)	76.80 ± 11.34 (73.99-79.61)	79.52 ± 12.73 (74.01-85.03)[a]	.08
Waist Circumference	79.69 ± 7.4 (77.52-81.86)	91.83 ± 5.87 (90.36-93.29)[a]	102.32 ± 9.20 (98.34-106.30)[a]	<.001[b]
Affected Side Circumference				
At 10 cm	22.09 ± 1.78 (21.55-22.63)	23.78 ± 1.63 (22.37-24.18)[a]	25.14 ± 2.27 (24.16-26.13)[a]	<.001[b]
At 5 cm	24.04 ± 1.63 (23.54-24.53)	25.65 ± 1.71 (25.22-26.08)[a]	26.96 ± 2.29 (25.97-27.95)[a]	<.001[b]
Nonaffected Side Circumference				
At 10 cm	22.05 ± 1.56 (21.58-22.53)	23.79 ± 1.64 (23.38-24.20)[a]	24.33 ± 2.42 (23.28-25.38)[a]	<.001[b]
At 5 cm	23.90 ± 1.34 (23.49-24.30)	25.50 ± 1.25 (25.19-25.81)[a]	26.13 ± 2.16 (25.20-27.07)[a]	<.001[b]
Fatigue Piper Score				
Behavioral/severity	5.03 ± 2.58 (4.32-5.74)	5.28 ± 2.72 (4.61-5.95)	5.70 ± 2.43 (4.65-6.76)	.587
Affective/meaning	5.77 ± 2.8 (4.99-6.54)	5.90 ± 2.64 (6.25-6.55)	5.47 ± 2.84 (4.24-6.70)	.806
Sensory	5.28 ± 2.55 (4.58-5.98)	5.45 ± 2.47 (4.84-6.06)	5.54 ± 2.65 (4.39-6.68)	.900
Cognitive/mood				
Total fatigue score				

[a]Bonferroni post hoc compared with normal w
[b]*P* < .05 for the group by time interaction (re

Table 2 Physical Values Expressed as Mean ± SD (95% CI)

Group	Body Mass Index <25 (n = 55)	Body Mass Index 25-29.9 (n = 67)	
Handgrip Strength			
Affected side	19.84 ± 17.17 (17.60-22.08)	19.01 ± 6.52 (17.37-20.6	
Nonaffected side	21.34 ± 5.77 (19.54-23.14)	20.00 ± 6.41 (18.38-21.6	
6-Minute Walk Test	462.76 ± 169.65 (413.50-512.02)	428.33 ± 156.86 (387.45-46	
Isometric Endurance of Trunk Flexor Test	34.22 ± 27.31 (26.54-41.90)	33.23 ± 24.98 (26.89-39.5	
Multiple Sit-to-Stand Test	26.15 ± 6.3 (24.35-27.96)	25.57 ± 4.1 (24.51-26.62)	27.35 ± 6.1 (24.68-30.0

[a]*P* < .05 for group by time interaction (repeated analysis of covariance test).
[b]*P* < .05 for group by time interaction (Kruskal-Wallis test).
[c]Mann–Whitney *U* test compared with normoweight group (*P* < .05).
[d]Bonferroni post hoc compared with normoweight group (*P* < .05).

→ Effets de l'obésité sur la capacité d'effort, certains paramètres anthropométriques et l'état cardio-vasculaire

Clinical Breast Cancer 2015

Effects of a Structured Exercise Program on Physical Activity and Fitness in Colon Cancer Survivors: One Year Feasibility Results from the CHALLENGE Trial

Kerry S. Courneya[1], Janette L. Vardy[2], Christopher J. O'Callaghan[3], Christine M. Friedenreich[4], Kristin L. Campbell[5], Harry Prapavessis[6], Jennifer J. Crawford[1], Patti O'Brien[3], Haryana M. Dhillon[2], Derek J. Jonker[7], Neil S. Chua[8], Sasha Lupichuk[9], Michael S. Sanatani[10], Sharlene Gill[11], Ralph M. Meyer[12], Stephen Begbie[13], Tony Bonaventura[14], Matthew E. Burge[15], Jane Turner[2], Dongsheng Tu[3], and Christopher M. Booth[16]

Table 4. Effects of the structured exercise program on physical activity and health-related fitness at 1 year in the CO.21 (CHALLENGE) Trial

Variable	Baseline M (SD)	1 Year M (SD)	Mean change M (95% CI)	Group difference in mean change M (95% CI)	*P* value
Self-reported recreational physical activity, MET hours/week					
Exercise program ($n = 106$)	16.5 (22.4)	32.1 (30.7)	+15.6 (+9.9–+21.4)	+10.5 (+3.1–+17.9)	0.002
Health education ($n = 105$)	16.6 (19.2)	21.7 (20.2)	+5.1 (+0.4–+ 9.9)		
Predicted VO_{2max}, mL/kg/min					
Exercise program ($n = 86$)	33.2 (24.5)	34.8 (10.9)	+1.6 (−3.6–+6.8)	+2.2 (−4.6–+9.1)	0.068
Health education ($n = 76$)	32.9 (19.1)	32.3 (8.9)	−0.6 (−5.0–+3.8)		
Weight, kg					
Exercise program ($n = 115$)	82.8 (19.6)	84.0 (20.1)	+1.2 (0.0–+2.3)	+1.3 (−0.5–+3.1)	0.38
Health education ($n = 112$)	79.7 (18.1)	79.5 (16.4)	−0.2 (−1.5–+1.2)		
Hip circumference, cm					
Exercise program ($n = 99$)	107.7 (11.8)	107.8 (10.8)	+0.2 (−0.9–+1.2)	−0.1 (−1.5–+1.4)	0.90
Health education ($n = 99$)	105.2 (9.2)	105.4 (9.1)	+0.2 (−0.8–+1.2)		
Waist circumference, cm					
Exercise program ($n = 99$)	100.0 (15.1)	99.2 (14.4)	−0.7 (−2.1–+0.6)	−1.2 (−3.2–+0.8)	0.31
Health education ($n = 99$)	97.5 (14.2)	97.9 (13.7)	+0.4 (−1.1–+1.9)		

Abbreviations: CI, confidence interval; M, mean; MET, metabolic equivalent task; n, sample size; SD, standard deviation.

Cancer Epidemiol 2016 (n=273)

Prostate cancer progression and mortality: a review of diet and lifestyle factors

Sam F. Peisch[1], Erin L. Van Blarigan[2,3], June M. Chan[2,3], Meir J. Stampfer[1,4,5], and Stacey A. Kenfield[2,4]

Pluridisciplinarité !

Abstract

Purpose—To review and summarize evidence on the role of diet and lifestyle factors and prostate cancer progression, with a specific focus on habits after diagnosis and the risk of subsequent disease recurrence, progression, or death.

Methods—Given the well-documented heterogeneity of prostate cancer and the long survivorship of the majority of diagnoses, our goal was to summarize and describe modifiable risk factors for clinically relevant prostate cancer. We focused where possible on epidemiologic studies of post-diagnostic habits and prostate cancer progression, defined as recurrence (e.g., PSA risk, secondary treatment), metastasis, or death. Where data were limited, we also describe evidence on risk factors and indicators of prostate cancer aggressiveness at diagnosis.

Results—A variety of dietary and lifestyle factors appear to affect prostate cancer progression. Several generally widely recommended lifestyle factors such as not smoking, maintaining a healthy body weight, and regular vigorous physical exercise also appear to affect prostate cancer progression. Several dietary factors, such as tomato sauce/lycopene, cruciferous vegetables, healthy sources of vegetable fats, and coffee, may also have a role in reducing risk of prostate cancer progression.

Selected risk factors and risk of prostate cancer progression

Increased risk	Decreased risk
BMI****	Physical activity****
Smoking****	Fish**
Dairy/calcium**	Tomatoes/lycopene**
Processed red meat *	Vegetable fat**
Eggs/choline *	Cruciferous vegetables**
Poultry (w/skin) *	Coffee *
Animal fat/saturated fat *	Soy *
Selenium supplementation *	Tea *

Conclusion—Diet and lifestyle factors, in particular exercise and smoking cessation, may reduce the risk of prostate cancer progression and death. These promising findings warrant further investigation, as their overall impact might be large.

World J Urol 2017

Physical activity for cancer survivors: meta-analysis of randomised controlled trials

Daniel Y T Fong,[1] Judy W C Ho,[2] Bryant P H Hui,[3] Antoinette M Lee,[4] Duncan J Macfarlane,[5] Sharron S K Leung,[1] Ester Cerin,[5] Wynnie Y Y Chan,[6] Ivy P F Leung,[7] Sharon H S Lam,[8] Aliki J Taylor,[9] Kar-keung Cheng[9]

OBJECTIVE To systematically evaluate the effects of physical activity in adult patients after completion of main treatment related to cancer.

DESIGN Meta-analysis of randomised controlled trials with data extraction and quality assessment performed independently by two researchers.

CONCLUSIONS Physical activity has positive effects on physiology, body composition, physical functions, psychological outcomes, and quality of life in patients after treatment for breast cancer. When patients with cancer other than breast cancer were also included, physical activity was associated with reduced BMI and body weight, increased peak oxygen consumption and peak power output, and improved quality of life.

BMJ 2012

Physical activity for cancer survivors: meta-analysis of randomised controlled trials

Daniel Y T Fong,[1] Judy W C Ho,[2] Bryant P H Hui,[3] Antoinette M Lee,[4] Duncan J Macfarlane,[5] Sharron S K Leung,[1] Ester Cerin,[5] Wynnie Y Y Chan,[6] Ivy P F Leung,[7] Sharon H S Lam,[8] Aliki J Taylor,[9] Kar-keung Cheng[9]

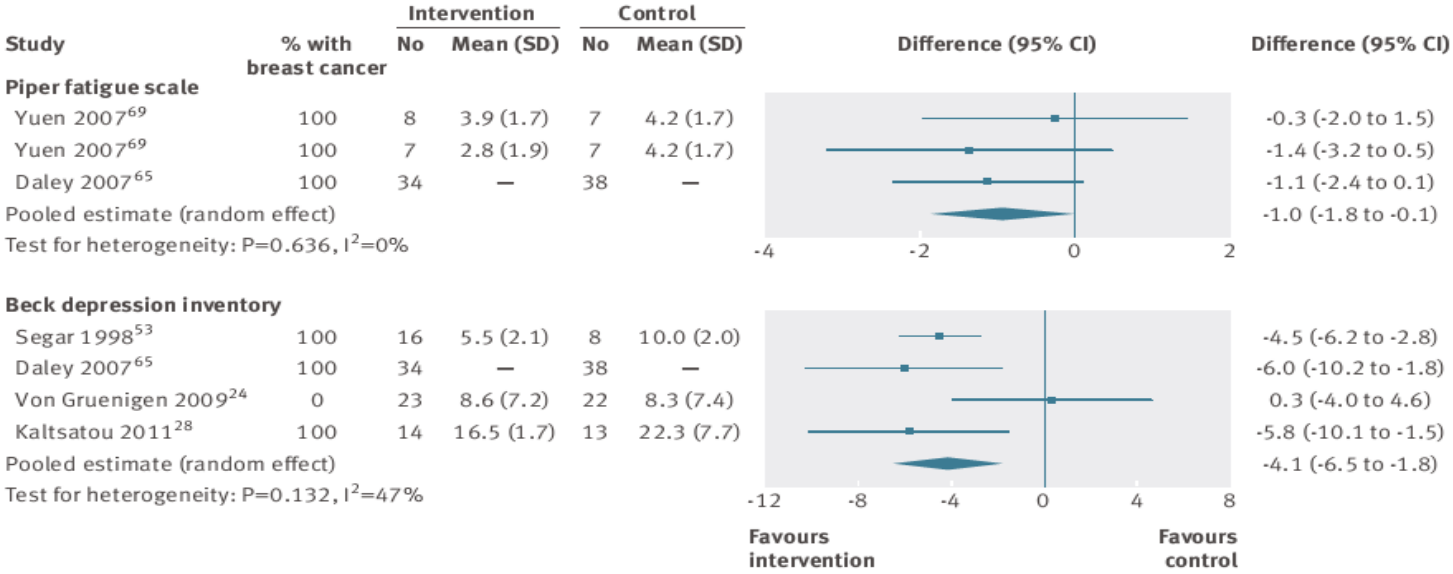

Fig 5| Association between physical activity and fatigue and depression in patients with cancer

BMJ 2012

Physical activity for cancer survivors: meta-analysis of randomised controlled trials

Daniel Y T Fong,[1] Judy W C Ho,[2] Bryant P H Hui,[3] Antoinette M Lee,[4] Duncan J Macfarlane,[5] Sharron S K Leung,[1] Ester Cerin,[5] Wynnie Y Y Chan,[6] Ivy P F Leung,[7] Sharon H S Lam,[8] Aliki J Taylor,[9] Kar-keung Cheng[9]

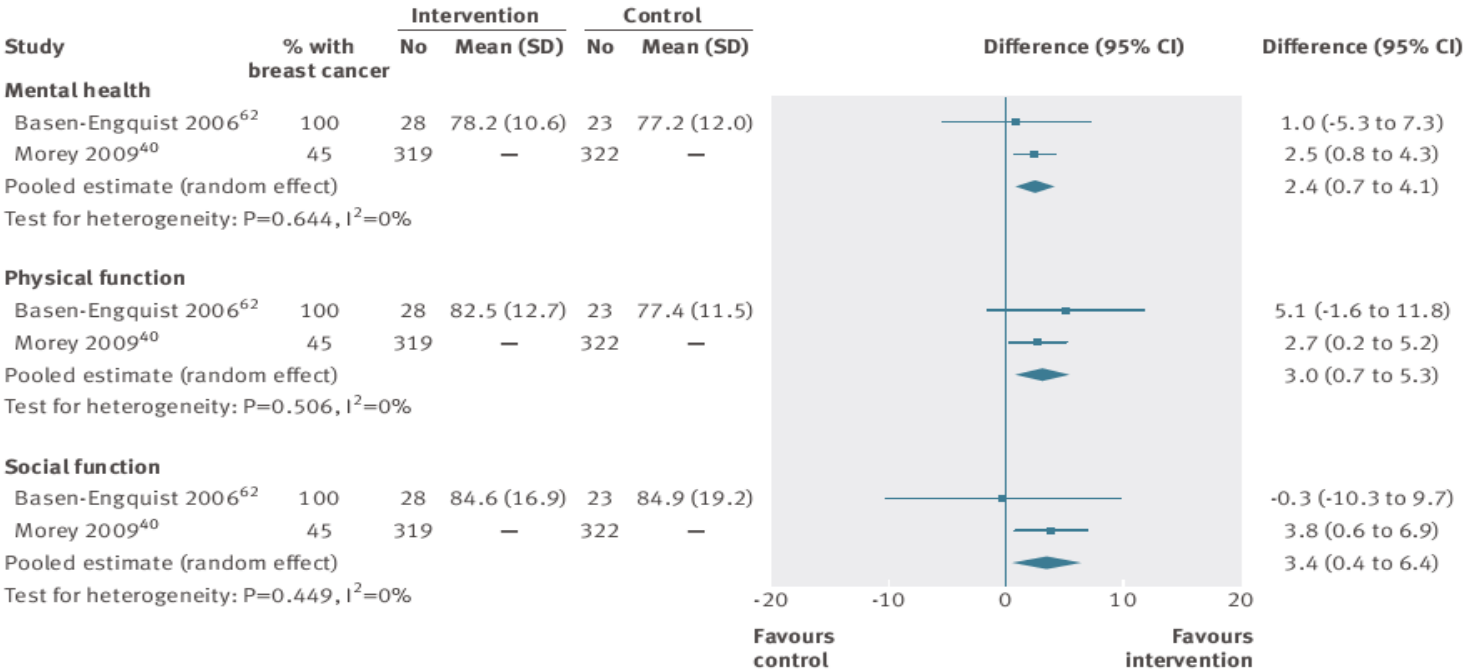

Fig 6| Association between physical activity and markers of quality of life (measured by SF-36) in patients with cancer

BMJ 2012

Post-diagnosis physical activity and survival after breast cancer diagnosis: the Long Island Breast Cancer Study

Patrick T. Bradshaw · Joseph G. Ibrahim · Nikhil Khankari · Rebecca J. Cleveland · Page E. Abrahamson · June Stevens · Jessie A. Satia · Susan L. Teitelbaum · Alfred I. Neugut · Marilie D. Gammon

→ Importance de l'activité physique développée après le diagnostic,
sur la mortalité spécifique ou globale,
d'autant plus si précoce,
d'autant plus si BMI <

Table 3 Posterior HRs (and 95 % CrIs) for the association between all-cause and breast cancer-specific mortality and yearly post-diagnosis PA levels, stratified by time since diagnosis and pre-diagnosis BMI, among 1,436 women diagnosed with a first primary breast cancer in 1996–1997 on Long Island, NY, and followed through December 31, 2009

Post-diagnosis PA	HR[a] (95 % CrI)			
	All-cause mortality (420 deaths/1,436 subjects)		Breast cancer mortality (195 deaths/1,436 subjects)	
	Time since diagnosis		Time since diagnosis	
	0–2 years	2+ years	0–2 years	2+ years
Yearly MET h/week				
0	1.0	1.0	1.0	1.0
0.1–9.0	0.39 (0.11, 1.09)	0.39 (0.14, 0.88)	0.24 (0.03, 0.97)	0.20 (0.03, 0.77)
>9.0	0.14 (0.03, 0.44)	0.37 (0.25, 0.55)	0.18 (0.05, 0.59)	0.30 (0.16, 0.56)
	Hormone receptor status		Hormone receptor status	
	ER− or PR−	ER+ and PR+	ER− or PR−	ER +and PR+
Yearly MET h/week				
0	1.0	1.0	1.0	1.0
0.1–9.0	0.77 (0.31, 1.64)	0.16 (0.03, 0.52)	0.47 (0.12, 1.33)	0.07 (0.00, 0.44)
>9.0	0.46 (0.29, 0.70)	0.25 (0.14, 0.42)	0.38 (0.19, 0.72)	0.18 (0.08, 0.36)
	BMI 1 year before diagnosis		BMI 1 year before diagnosis	
	<25	≥25	<25	≥25
Yearly MET h/week				
0	1.0	1.0	1.0	1.0
0.1–9.0	0.19 (0.03, 0.67)	0.64 (0.26, 1.37)	0.09 (0.00, 0.62)	0.33 (0.08, 1.02)
>9.0	0.24 (0.13, 0.42)	0.43 (0.26, 0.69)	0.18 (0.08, 0.42)	0.33 (0.16, 0.65)

[a] Models adjusted for age, pre-diagnosis BMI, chemotherapy treatment, and tumor size. Assumes missing data mechanism of Model 1 from Table 1

Breast Cancer Res Treat 2014

Physical activity and breast cancer survival: results from the Nurses' Health Studies

Renée Turzanski Fortner, PhD,[1,2*] Kristen D. Brantley, PhD,[3,4] Shelley S. Tworoger, PhD,[5] Rulla M. Tamimi, ScD,[4,6] Bernard Rosner, PhD,[3,4,7] Maryam S. Farvid, PhD,[4,8] Michelle D. Holmes, MD, DrPH,[3,4] Walter C. Willett, MD, DrPH,[3,4,9] A. Heather Eliassen, ScD[3,4]

Table 2. Association between postdiagnosis overall and moderate and vigorous physical activity and survival following breast cancer diagnosis: NHS (1986-2016) and NHSII (1989-2017)[a]

	MET hours of physical activity per week[b]					
Activity type and outcome	**<3 HR (95% CI)**	**3 to <9 HR (95% CI)**	**9 to <18 HR (95% CI)**	**18 to <27 HR (95% CI)**	**≥27 HR (95% CI)**	**P_{trend}**
Total physical activity						
Breast cancer–specific death (n = 891)						
No./person-years	122/10 012	251/29 982	240/34 483	130/19 605	146/23 363	
Multivariable adjusted	Referent	0.79 (0.59 to 1.06)	0.74 (0.55 to 0.99)	0.68 (0.49 to 0.95)	0.69 (0.50 to 0.95)	.04
Multivariable adjusted + prediagnosis PA[c]	Referent	0.73 (0.54 to 1.00)	0.64 (0.45 to 0.89)	0.56 (0.38 to 0.84)	0.56 (0.38 to 0.84)	.02
Overall death (n = 1973)						
No./person-years	278/10 012	567/29 982	559/34 483	290/19 605	277/23 363	
Multivariable adjusted	Referent	0.73 (0.61 to 0.88)	0.67 (0.55 to 0.80)	0.65 (0.53 to 0.81)	0.51 (0.41 to 0.63)	<.001
Multivariable adjusted + prediagnosis PA[c]	Referent	0.73 (0.60 to 0.88)	0.65 (0.53 to 0.80)	0.62 (0.49 to 0.79)	0.47 (0.36 to 0.61)	<.001

n = 9308 femmes, décès : n = 1973

JNCI Cancer Spectrum, 2023

Physical Activity and Survival After Colorectal Cancer Diagnosis

Jeffrey A. Meyerhardt, Edward L. Giovannucci, Michelle D. Holmes, Andrew T. Chan, Jennifer A. Chan, Graham A. Colditz, and Charles S. Fuchs

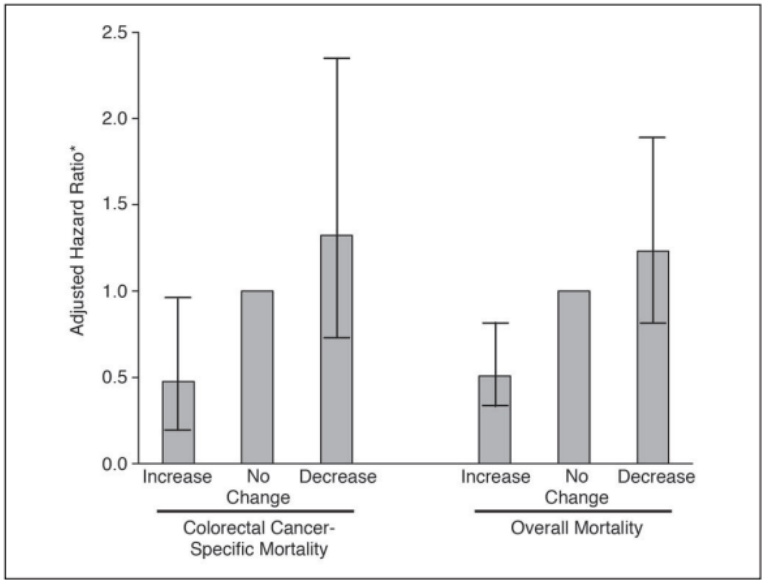

Fig 3. Impact of change of physical activity before and after colorectal cancer diagnosis. *Compared with no change. Adjusted for body mass index, stage of disease (I, II, III), grade of tumor differentiation, colon or rectal primary, age at diagnosis, year of diagnosis, receipt of chemotherapy (yes, no, unknown), time from diagnosis to physical activity measurement, change in body mass index, smoking status (current, past, never).

Prospectif, 573 femmes

J. Clin Oncol 2006

Physical Activity and Survival After Prostate Cancer Diagnosis in the Health Professionals Follow-Up Study

Stacey A. Kenfield, Meir J. Stampfer, Edward Giovannucci, and June M. Chan

Table 3. Age- and Multivariable-Adjusted HRs According to Physical Activity Category After Prostate Cancer Diagnosis

Measure	Total Activity					*P* for Trend
	< 3 MET-h/wk	3 to < 9 MET-h/wk	9 to < 24 MET-h/wk	24 to < 48 MET-h/wk	≥ 48 MET-h/wk	
Median MET-hours per week on first postdiagnosis questionnaire	0.6	5.7	16	33.4	71.0	
All deaths (n = 548)						
No. of deaths	125	99	143	116	65	
Age-adjusted HR	1.00	0.79	0.63	0.57	0.33	< .001
95% CI		0.60 to 1.04	0.49 to 0.80	0.44 to 0.73	0.24 to 0.45	
Multivariable-adjusted HR*	1.00	0.81	0.70	0.66	0.40	< .001
95% CI		0.61 to 1.07	0.54 to 0.90	0.51 to 0.87	0.29 to 0.54	
Multivariable-adjusted HR†	1.00	0.80	0.69	0.65	0.38	< .001
95% CI		0.61 to 1.06	0.53 to 0.90	0.49 to 0.86	0.27 to 0.53	
Prostate cancer deaths (n = 112)						
No. of prostate cancer deaths	21	21	25	30	15	
Age-adjusted HR	1.00	0.90	0.61	0.85	0.41	.02
95% CI		0.49 to 1.67	0.34 to 1.10	0.48 to 1.50	0.21 to 0.80	
Multivariable-adjusted HR‡	1.00	0.96	0.65	0.93	0.46	.04
95% CI		0.51 to 1.80	0.36 to 1.20	0.51 to 1.68	0.23 to 0.92	
Multivariable-adjusted HR§	1.00	0.91	0.60	0.83	0.42	.04
95% CI		0.48 to 1.73	0.32 to 1.11	0.44 to 1.55	0.20 to 0.88	

NOTE. Physical activity was updated over follow-up. Men were alive for at least 4 years after their postdiagnosis physical activity assessments, and we only used activity information from 4 to 6 years before death.

Abbreviations: HR, hazard ratio; MET, metabolic equivalent task.

*Adjusted for age at diagnosis, months since diagnosis, clinical stage, Gleason score, treatment, parental history of myocardial infarction at age 60 years or younger, high blood pressure, elevated cholesterol, and diabetes status from the prediagnostic questionnaire; smoking status, body mass index, and alcohol intake from the first postdiagnostic questionnaire; and comorbidities (coded as yes if participant reported any of the following: myocardial infarction, coronary artery bypass or coronary angioplasty, stroke, Parkinson's disease, and emphysema or chronic bronchitis). This variable was updated over follow-up, and comorbidity status was applied one cycle prior to physical activity exposure.

†Additionally adjusted for prediagnosis physical activity.

‡Adjusted for age at diagnosis, months since diagnosis, clinical stage, Gleason score, treatment, and postdiagnosis body mass index.

§Additionally adjusted for prediagnosis physical activity.

2705 hommes, 548 décès / 4 ans (20 % spécifique)

J. Clin Oncol 2011

Conclusions

Préhabilitation

Phase I

Phase II

Phase III

La cardio-oncologie

Quels sont les bénéfices non cardiovasculaires de l'activité physique chez les cancéreux

The benefits of exercise in cancer patients and the criteria for exercise prescription in cardio-oncology

Flavio D'Ascenzi[1,2], Francesca Anselmi[1], Caterina Fiorentini[1], Roberta Mannucci[3], Marco Bonifazi[4] and Sergio Mondillo[1]

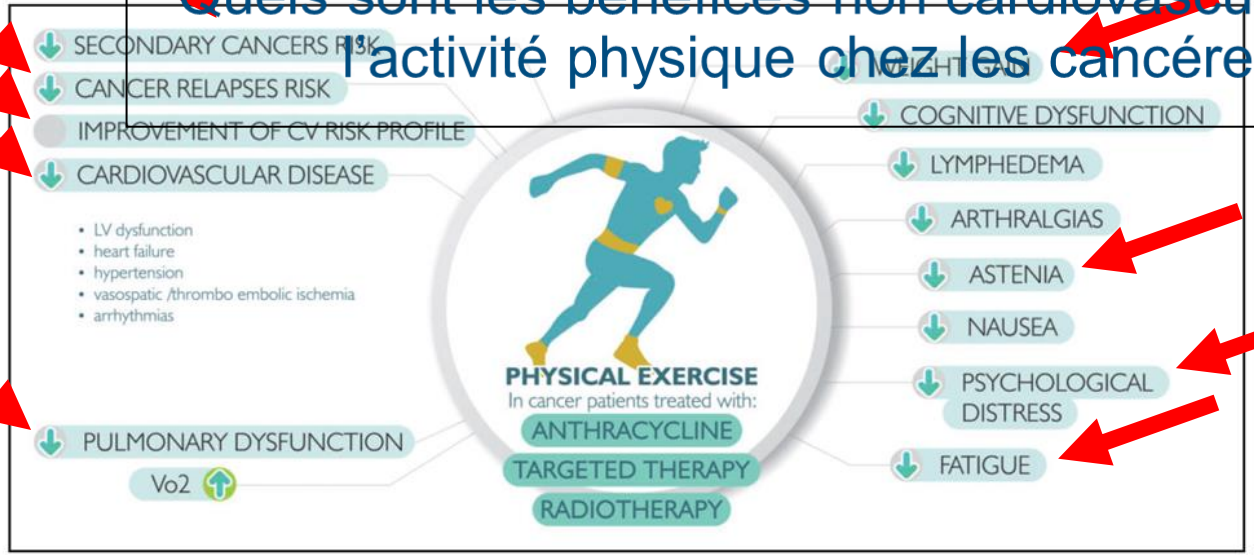

Figure 2. Beneficial effects of physical exercise in cancer patients undergoing oncological treatment. LV: left ventricular; Vo2: peak oxygen uptake.

Eur J Prev Cardiol 2016

Merci de votre attention !

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