

Physical activity in cancer patients

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The secret of a long life?



Cancer patients...

- should rest, reduce activity and avoid intense efforts
- do not tolerate physical effort
- can be harmed by physical effort
- are passive witnesses of disease and treatment

What is the main problem of cancer patients?

What do patients feel, what do caregivers believe? (Vogelzang et al, 1997)

- 419 cancer patients (mostly breast and prostatic cancer)
- 200 general practitioners, 197 oncologists.
- Questionnaires about patient's complaints and physicians' conduct.
- 78% of patients experienced fatigue, 32% of them severe.
- Most important problem for the doctors:
 - Pain (61%).
 - **Fatigue (37%).**
- Most disturbing symptom for the patients:
 - **Fatigue (61%).**
 - Pain (19%).
- 50% of patients did not discuss the issue with their doctors.
- **73% of doctors did not recommend a therapy for fatigue.**

What is cancer-related fatigue?

Uncommon, persistent tiredness which appears during or after cancer treatment, affects the physical and mental performance and is not improved by rest or sleep.

A syndrom with three characteristics:

Frequent:

- It affects about 70% of patients during treatment and more than 30% after therapy.

Persistent:

- It may be present for months or even years after treatment.

Severe:

- It impairs patients' ability to work or to carry out usual daily activities.

Causes of fatigue in cancer patients

Effects of cancer and therapy on physical performance

Chronic inflammation, chemotherapy, radiation

- Impairment of hematopoiesis, anemia

Anthracyclines, high-dose cyclophosphamide, anti Her2/neu

- Reduction of the ejection fraction

Glucocorticoids, Cyclosporin-A

- Myopathy, Sarcopenia

Lung cancer, metastasis, pleural effusion, fibrosis

- Reduction of the vital capacity

Lack of activity

- Loss of muscle mass, impaired muscle blood flow, fewer mitochondriae, lower concentration of muscle enzymes

Result:

Loss of physical performance



Conditions leading to catabolism in patients with chronic diseases

Activation of the ubiquitin/proteasome pathway

Treatment with glucocorticoids

Immune suppression

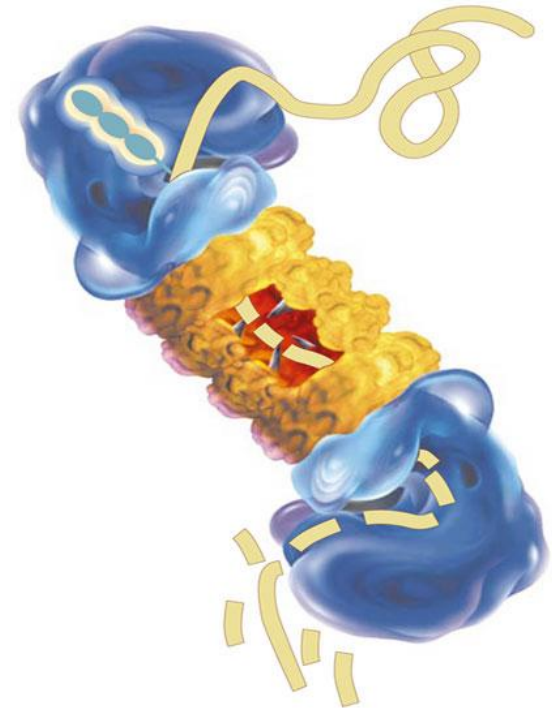
Uremia

Increased concentration of TNF- α

- Chronic inflammation
- Sepsis

Lack of physical activity

- Immobilisation
- Bed rest

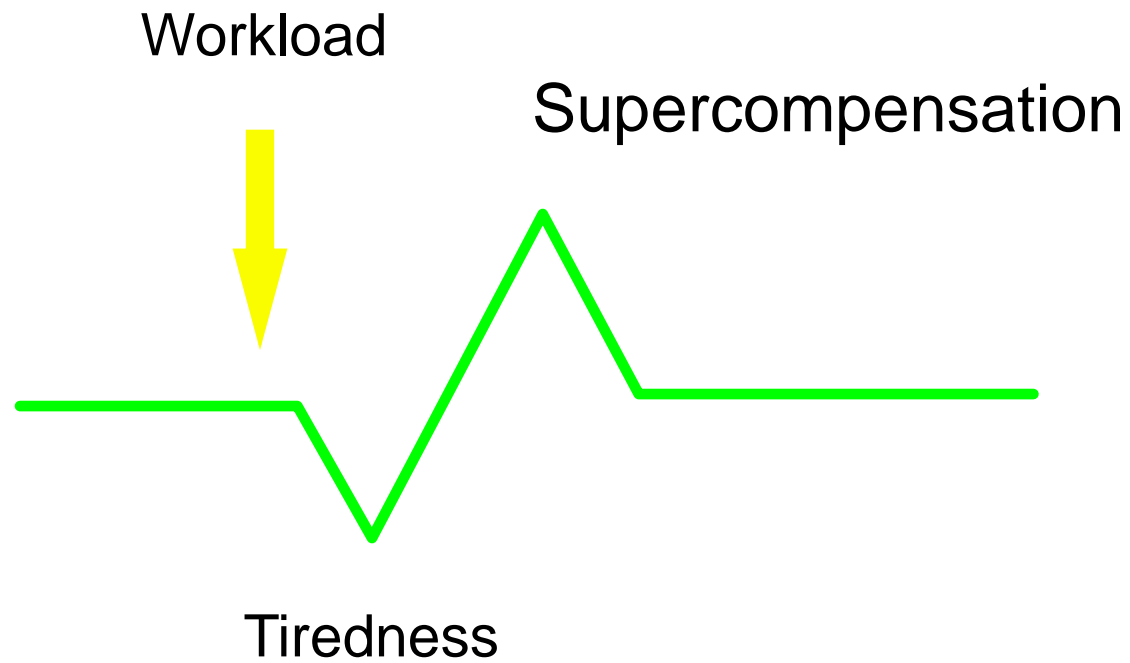


Back to the basic principles

- If you use it, it grows
- If you don't use it, it wastes
- If you overuse it, it breaks



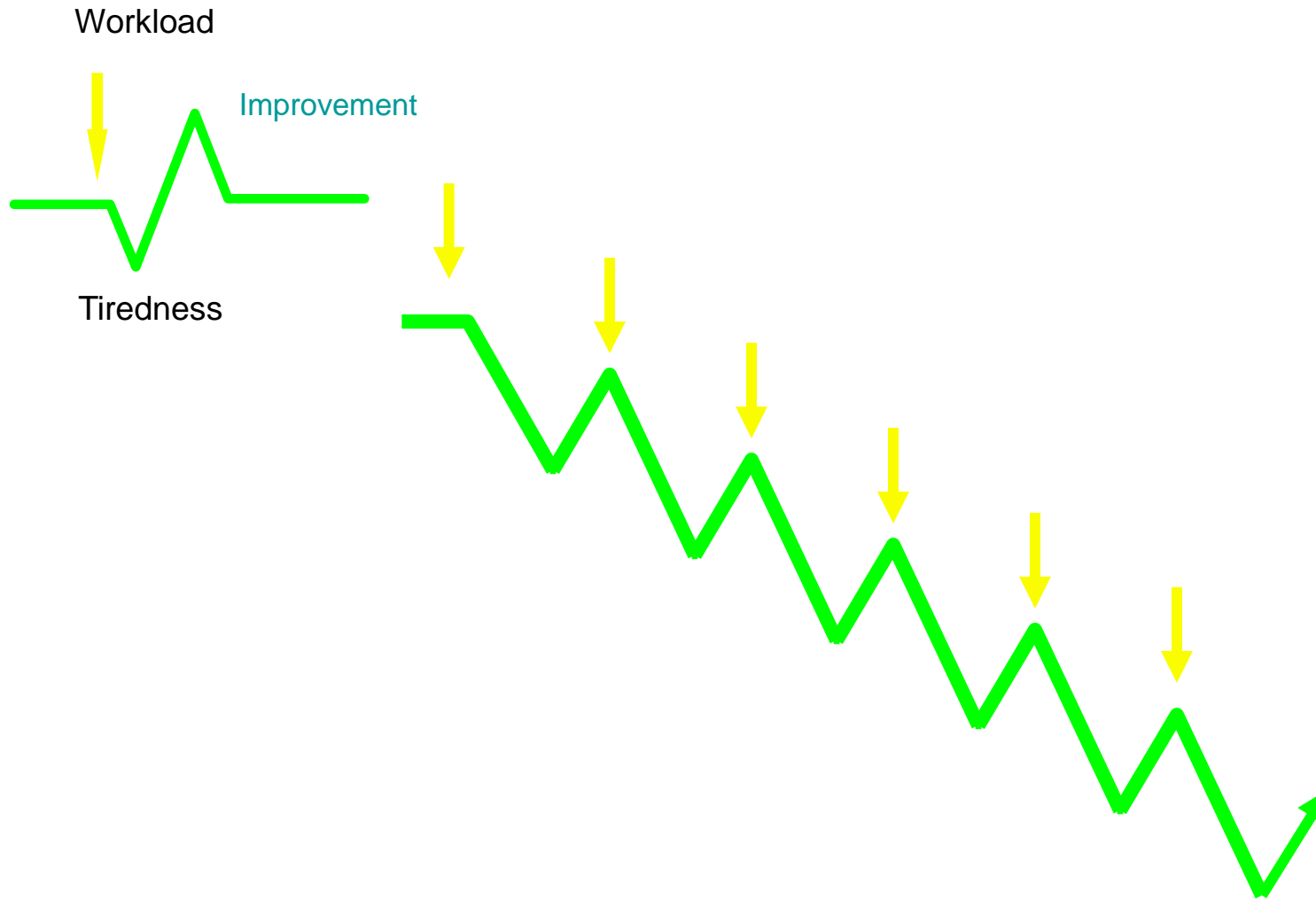
Supercompensation



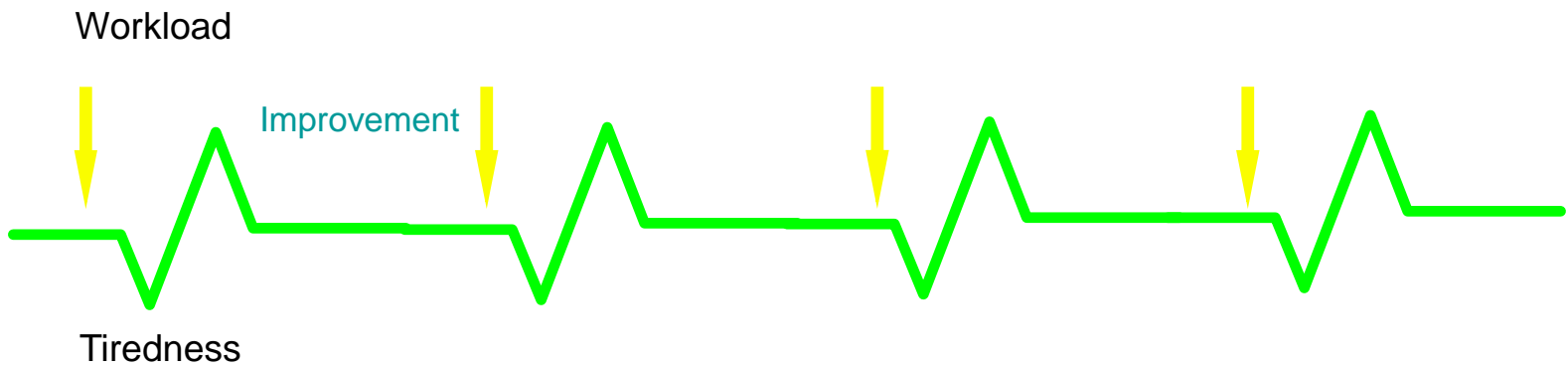
Applying supercompensation



Overtraining



Lack of improvement



Cancer-related fatigue

Why does fatigue persist for a long time?



Deconditioning

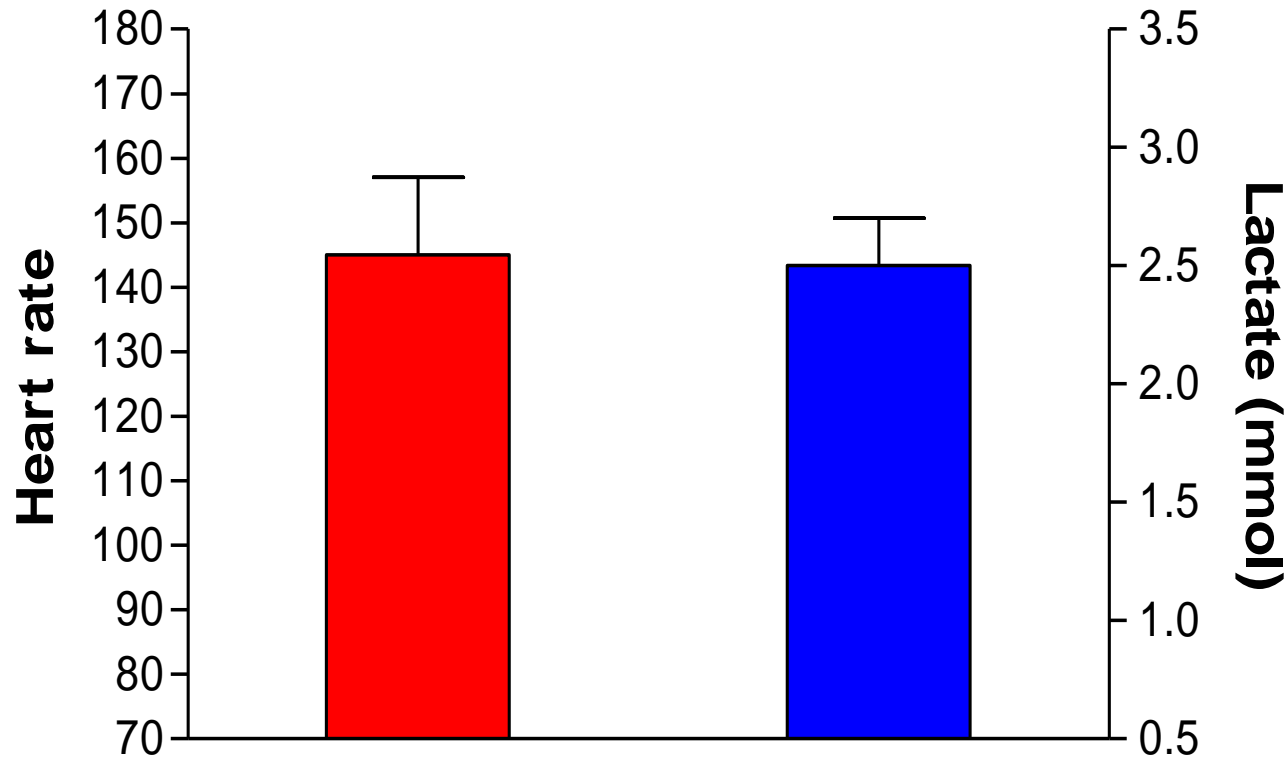
Lack of physical activity

Fatigue

Excessive rest

Exhaustion

Cardiorespiratory distress during submaximal workload



(Dimeo et al, Med Sci Sports Exerc 19979)

Effects of physical activity on physical performance

- Anemia → • ↑ Hb concentration
- Cardiotoxicity, ↓ EF → • ↑ Cardiac reserve
- Myopathy, ↓ muscle mass → • ↑ Muscle mass and strength
- Lung fibrosis → • ↑ Vital capacity
- ↓ Plasma volume → • ↑ Plasma volume
- ↓ Cardiorespiratory fitness → • ↑ cardiorespiratory fitness
- ↓ [] Muscle enzymes → • ↑ [] Muscle enzymes

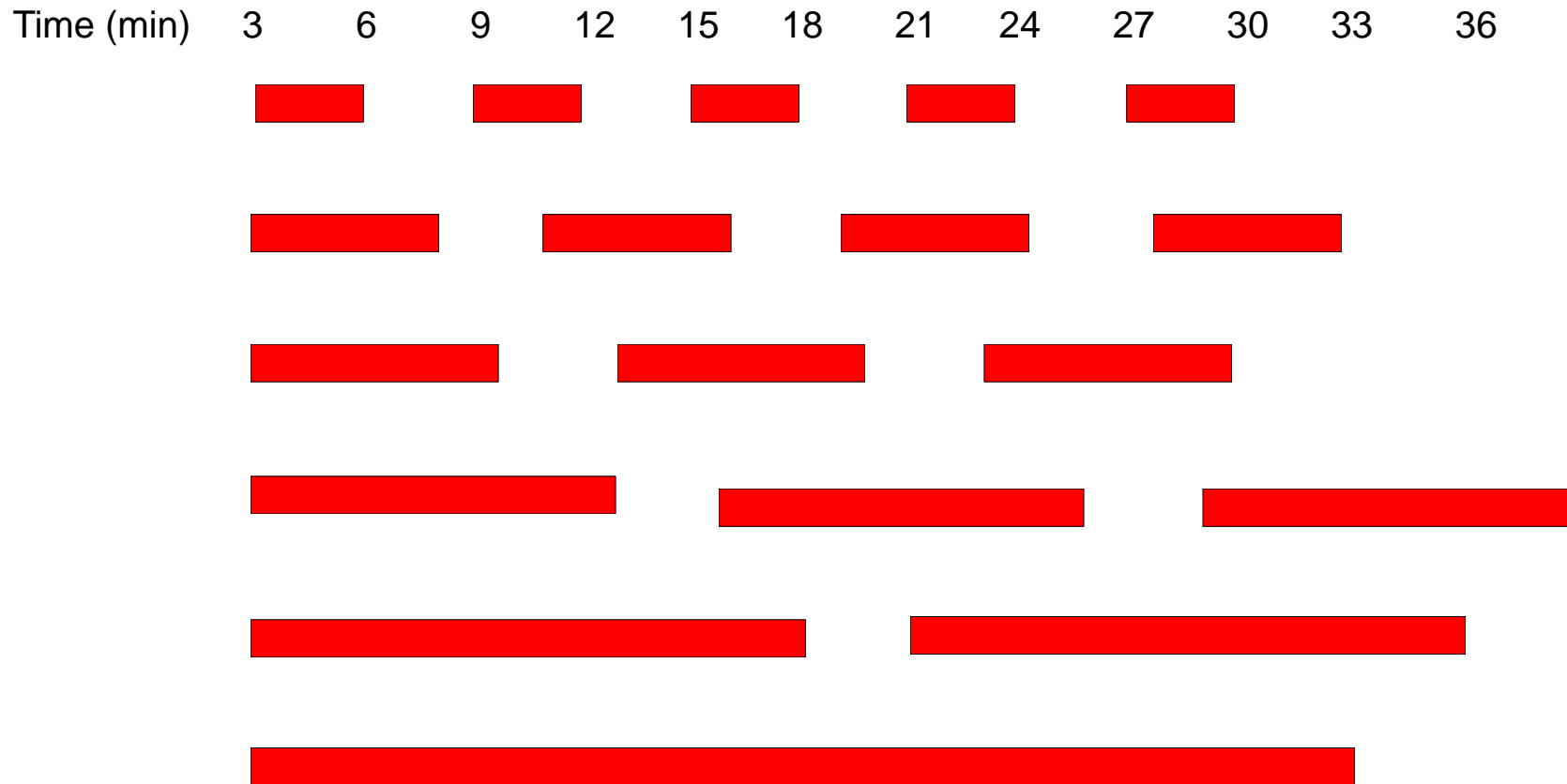


A new approach

Cancer patients...

- do need physical activity.
- do need a goal.
- will not be harmed by physical effort.
- are active participants in the rehabilitation process.

An aerobic training program for cancer patients

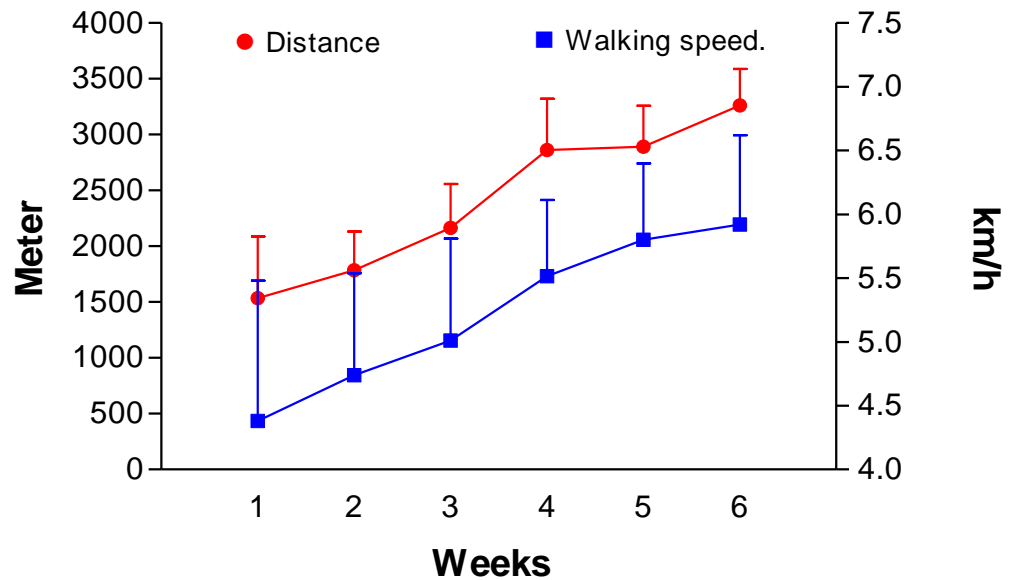


Training intensity: 80% of maximal HR, $3 \pm 0,5$ mmol lactate/l

Endurance training after allogeneic PBSCT/BMT



Improvement of physical performance during the training programme



(Dimeo et al, Bone Marrow Transp, 1996)

Trials on the effects of exercise in cancer patients



Reduced secondary effects of treatment in patients with breast cancer

- MacVicar et al, Nurs Res 1989
- Mock et al, Oncol Nurs Forum 1994
- Schwartz et al, Cancer Pract 2000
- Schwartz et al, Med Sci Sports Exerc 2001
- Segal et al, J Clin Oncol 2001

Reduced fatigue during radiation in breast cancer patients

- Mock et al, Oncol Nurs Forum 1997

Improved physical performance and quality of life after chemotherapy for breast cancer

- Courneya et al, J Clin Oncol 2003
- Milne et al, Breast Cancer Res Treat 2007
- Ohira et al, Cancer 2006
- Kim et al, Cancer Nursing 2006

Shorter aplasia, reduced fatigue, better performance after auto/allo PBSCT

- Dimeo et al, Blood 1997
- Dimeo et al, Cancer 1997
- Dimeo et al, Cancer 1999
- Hayes et al, Bone Marrow Transplant 2003
- Wilson et al, Bone Marrow Transplant 2005
- Defor et al, Biol Blood Marrow Transplant 2007

Less secondary effects of chemotherapy

- Adamsen et al, Support Care Cancer 2006

Improved quality of life after colon and breast cancer

- Courneya et al, Eur J Cancer Care 2003
- Daley et al, JCO 2007

Reduction of the chronic fatigue

- Dimeo et al, Med Sci Sports Exer 1998
- Carlson et al, Bone Marrow Transplant 2006
- Dimeo et al, Annals of Oncology 2008

Conserved performance status in patients with leukaemia/lymphoma during chemotherapy

- Dimeo et al, Support Care Cancer 2003
- Chang et al, J Pain Symptom Manage 2008

Reduced fatigue during palliative care

- Porock et al, J Palliat Care 2000

Reduced fatigue during therapy with IFN-alpha

- Schwartz et al, Oncol Nurs Forum 2002

Increased muscle strength in patients with prostatic cancer

- Segal et al, J Clin Oncol 2003
- Galvao et al, Med Science Sport Exerc 2006

Reduced relapse risk in breast and colon cancer

- Holmes et al, JAMA 2005
- Meyerhardt et al, JCO 2006

Increased physical performance before pulmonary surgery

- Jones et al, Cancer 2007

Improved mood and physical performance during chemotherapy

- Courneya et al, JCO 2007

Does exercise reduce the risk of relapse?

Nurses Health Study (121.700 women)

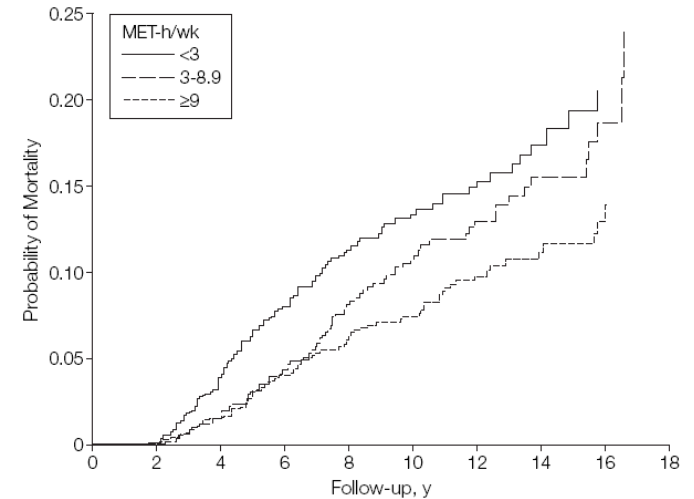
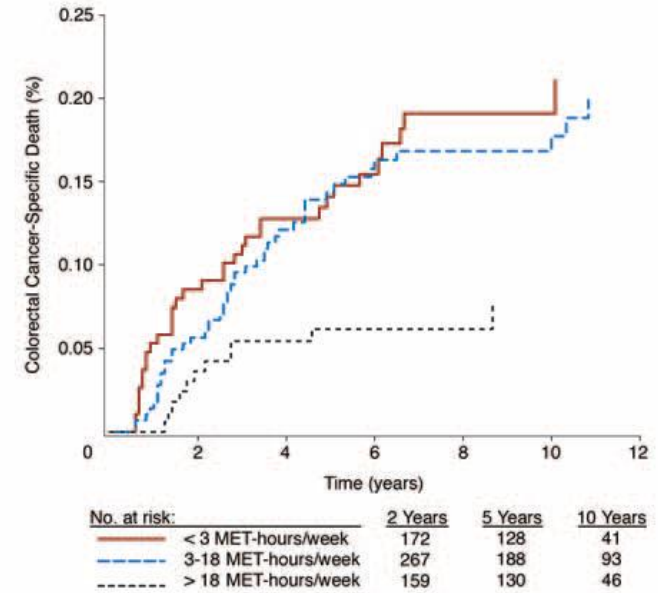
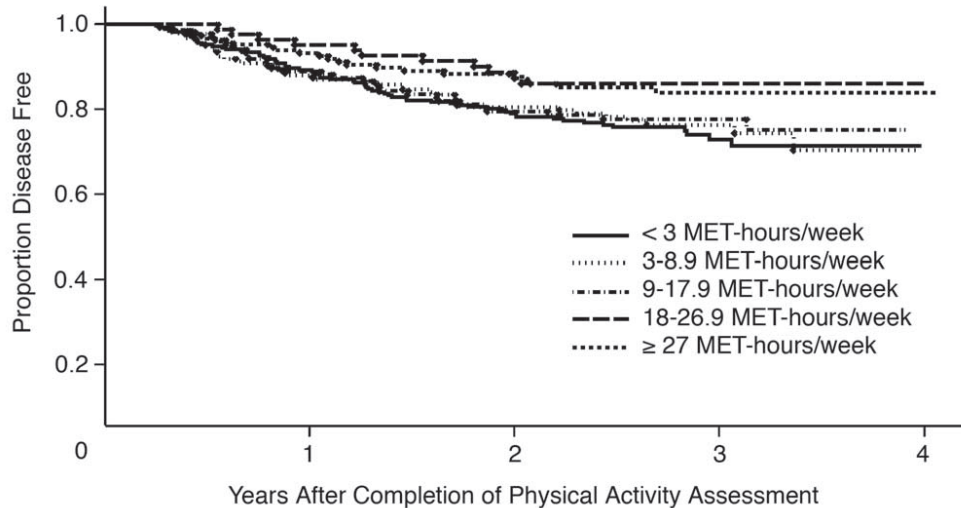
- Colorectal cancer (573 patients)
- Breast cancer (2987 patients)

Men and women (832 patients)

Exercisers had a lower relapse risk (Walking) ≥ 5 -6 hours weekly

- Dose-response relationship?

(Holmes et al, JAMA, May 25, 2005; 293: 20; Meyerhardt et al, JCO, August 1, 2006; 24: 22, 3535-41 & 3527-33)



Conclusions

- As long as physical effort is not contraindicated, cancer patients can exercise
- Exercise reduces the secondary effects of therapy and increases performance status of cancer patients
- Exercise requires team work!



Where are we going?

***“Now is not the end.
It is not even the beginning of the end.
But it is, perhaps,
the end of the beginning”***

