Physical activity in cancer patients

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The secret of a long life? 

No sports!
Traditional approach

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 syndrome 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

Workload

Supercompensation

Tiredness
Applying supercompensation

- Workload
- Improvement
- Tiredness
Overtraining

- Workload
- Improvement
- Tiredness
Lack of improvement

Workload

Improvement

Tiredness
Cancer-related fatigue

Why does fatigue persist for a long time?

- Lack of physical activity
- Deconditioning
- 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

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| Training intensity: 80% of maximal HR, 3 ± 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
- 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
- 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
- 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!
“Now is not the end.  
It is not even the beginning of the end.  
But it is, perhaps,  
the end of the beginning”