Wat is de impact van tijdig voeden bij de oncologische patiënt?

Elisabeth De Waele MD, PhD
Intensivist/Surgeon/Head of Nutrition Team

Optimaal Parenteraal
Why is nutrition important in cancer?

- Malnutrition is a frequent problem
- Leads to:
  - prolonged hospitalization
  - Higher degree of treatment-related toxicity
  - Reduced response to treatment
  - Impaired quality of life
  - Worse overall prognosis

Caccialanza, R. et al. (2016) Nutritional support in cancer patients: A position paper from the Italian Society of Medical Oncology (AIOM) and the Italian Society of Artificial Nutrition and Metabolism (SINPE) *J Cancer.*
Why is nutrition important in cancer?

- Many cancer patients receive inadequate nutritional support.
- Treatment includes personalized dietary counseling and/or artificial nutrition.

Caccialanza, R. et al. (2016) Nutritional support in cancer patients: A position paper from the Italian Society of Medical Oncology (AIOM) and the Italian Society of Artificial Nutrition and Metabolism (SINPE) *J Cancer*. 
1. Introduction: cachexia

Fearon, K. et al. (2011) Definition and classification of cancer cachexia: an international consensus
*Lancet Oncol*
Figure 3: Management algorithm for cancer cachexia

Fearon, K. et al. (2011) Definition and classification of cancer cachexia: an international consensus

Lancet Oncol
Cachexia in cancer patients

Fearon, K. et al. (2012) Understanding the mechanisms and treatment options in cancer cachexia
Fearon, K. et al. (2012) Understanding the mechanisms and treatment options in cancer cachexia
Sarcopenia

Fearon, K. *et al.* (2012) Understanding the mechanisms and treatment options in cancer cachexia
Body composition

Fearon, K. *et al.* (2012) Understanding the mechanisms and treatment options in cancer cachexia
Dual contribution to cachexia

For example, a patient with small-cell lung cancer and severe B-type symptoms (such as pyrexia, sweating) and cachexia mainly due to hypermetabolism.

Metabolic change

Reduced food intake

For example, a patient with pharyngeal cancer and cachexia mainly due to reduced food intake secondary to dysphagia.

Fearon, K. et al. (2012) Understanding the mechanisms and treatment options in cancer cachexia

Body composition

- Muscle depletion

  - Myopenia: reduced muscle mass
  - Myosteatosis: increased infiltration by intermuscular and intramuscular fat

6 months
Body composition

This slide shows a CT image from a cancer patient who underwent 16 weeks of first line platinum doublet chemotherapy for lung cancer. Only the intramuscular adipose tissue is shown in color.
Body composition

- Presence of fat in muscle reveals
  - Poor prognosis
  - Different types of morbidity

- Resistance exercise appears to combat muscle loss

- Aerobic exercise modifies fat content of the muscle
Nutritional Support in Cancer Patients: A Position Paper from the Italian Society of Medical Oncology (AIOM) and the Italian Society of Artificial Nutrition and Metabolism (SINPE)

Riccardo Caccialanza, Paolo Pedrazzoli, Emanuele Cereda, Cecilia Gavazzi, Carmine Pinto, Agostino Paccagnella, Giordano Domenico Beretta, Mariateresa Nardi, Alessandro Laviano and Vittorina Zagonel

Journal of Cancer 2016
Recommendations

- Nutritional screening should be performed using validated tools (NRS 2002, MUST, MST, MNA) upon diagnosis and systematically repeated at regular time points in patients with cancer type, stage or treatment potentially affecting nutritional status.

- Patients at nutritional risk should be promptly referred for comprehensive nutritional assessment and support to clinical nutrition services or medical personnel with documented skills in clinical nutrition, specifically for cancer patients.

Caccialanza, R. et al. (2016) Nutritional support in cancer patients: A position paper from the Italian Society of Medical Oncology (AIOM) and the Italian Society of Artificial Nutrition and Metabolism (SINPE) J Cancer.
- Nutritional support should be actively managed and targeted for each patient according to nutritional conditions, clinical status, planned treatment and expected outcome. It should comprise nutritional counseling with the possible use of oral nutritional supplements and/or artificial nutrition (enteral nutrition, total or supplemental parenteral nutrition) according to spontaneous food intake, tolerance and effectiveness.

Caccialanza, R. et al. (2016) Nutritional support in cancer patients: A position paper from the Italian Society of Medical Oncology (AIOM) and the Italian Society of Artificial Nutrition and Metabolism (SINPE) *J Cancer.*
**B2 - 1  Energy requirements**

<table>
<thead>
<tr>
<th>Strength of recommendation</th>
<th>We recommend, that total energy expenditure of cancer patients, if not measured individually, be assumed to be similar to healthy subjects and generally ranging between 25 and 30 kcal/kg/day.</th>
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</thead>
<tbody>
<tr>
<td>Level of evidence</td>
<td>Low</td>
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<table>
<thead>
<tr>
<th>B2 - 2</th>
<th><strong>Protein requirements</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Strength of recommendation</strong></td>
<td><strong>STRONG</strong></td>
</tr>
<tr>
<td><strong>We recommend that protein intake should be above 1 g/kg/day and, if possible up to 1.5 g/kg/day.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Level of evidence</strong></td>
<td><strong>Moderate</strong></td>
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</table>

Enteral and Parenteral Nutrition

→ Compare outcomes of enteral and parenteral nutrition in cancer patients
→ Increased risk of infection with PN
→ No prolongation of survival

Chow, R. et al. (2016) Enteral and parenteral nutrition in cancer patients: a systematic review and meta-analysis
Ann Palliat Med
Enteral and Parenteral Nutrition

→ EN and PN have specific indications and contraindications

→ EN and PN are NOT competitors in the choice of route for delivering nutrition support


Ann Palliat Med
Research report

Nutrition therapy in cachectic cancer patients. The Tight Caloric Control (TiCaCo) pilot trial

Elisabeth De Waele a,1, Sabrina Mattens b, Patrick Honoré a,1, Herbert Spapen a,1, Jacques De Grève c,1, Joeri J. Pen d,*,1

a Department of Intensive Care, UZ Brussel, Brussels, Belgium
b Department of Nutrition, UZ Brussel, Brussels, Belgium
c Department of Medical Oncology, UZ Brussel, Brussels, Belgium
d Department of Internal Medicine, UZ Brussel, Brussels, Belgium
The tight calorie control study (TICACOS): a prospective, randomized, controlled pilot study of nutritional support in critically ill patients


*Intensive Care Med.*
Tight Caloric Control

→ To determine whether nutritional support guided by repeated measurements of resting energy requirements improves the outcome of critically ill patients.

→ Prospective RCT

→ Enteral or parenteral nutrition with an energy target determined by indirect calorimetry (intervention group) or 25 kcal/kg/day (control group)
Tight Caloric Control

- Actively supervised nutritional intervention
- Near target energy requirements based on energy measurements
  - was achievable
  - May be associated with lower hospital mortality
Tight Caloric Control: Strict measurements and patient-tailored approach in Critically Ill Patients

Tight caloric control: Strict measurements and patient-tailored approach in Oncology Patients
Research report

Nutrition therapy in cachectic cancer patients. The Tight Caloric Control (TiCaCo) pilot trial

Elisabeth De Waele a,1, Sabrina Mattens b, Patrick Honoré a,1, Herbert Spapen a,1, Jacques De Grève c,1, Joeri J. Pen d,*,1

a Department of Intensive Care, UZ Brussel, Brussels, Belgium
b Department of Nutrition, UZ Brussel, Brussels, Belgium
c Department of Medical Oncology, UZ Brussel, Brussels, Belgium
d Department of Internal Medicine, UZ Brussel, Brussels, Belgium
Oncologic diagnosis

screening

Cachexia

Staging

• BW ↓ < 5%
• Anorexia
• Metabolic change

• BW ↓ > 5% 6 months
OR
• BMI < 20 + BW ↓ > 2%
OR
• Appendicular skeletal muscle index consistent with sarcopenia + BW ↓ > 2%

Pre-cachexia

Cachexia

• Cachexia
• Procatab. Cancer
• Not responsive therapy
• Low performance score WHO score 3 or 4
• < 3 months expected survival

Refractory cachexia
Oncologic diagnosis

- Screening
- Staging
- Assessment

Pre-cachexia

Cachexia

Refractory cachexia

- Severity: ongoing loss of weight + BMI
- Phenotype:
  - Anorexia: causes? Food intake: booklet
  - Catabolic drive: CRP, REE, TEE: lab, indirect cal., sensewear armband
  - Muscle mass: BIA
  - Function: Karnofsky score, activity meter: sensewear
  - QOL: questionnaire

Management

Multimodal

According to phenotype
Tools

NRS-2002 nutritional risk score
History: patient’s information
Performance: WHO score
QOL: SF 36 questionnaire

Parameters: body weight, length : scale, measuring rod
Nutritional intake: Food diary

Basal energy expenditure: Indirect Calorimeter
Total energy expenditure: sensewear armband
Body Composition: Bioelectrical Impedance

Physical activity/ sleep efficiency/ stress level: sensewear armband
Indirect calorimetry
Indirect calorimetry → metabolism

To burn 1 calorie you need 208.06 milliliter oxygen
### ENERGY EXPENDITURE

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tr>
<td>Age</td>
<td>60</td>
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<tr>
<td>Gender</td>
<td>Male</td>
</tr>
<tr>
<td>Race</td>
<td>Caucasian</td>
</tr>
<tr>
<td>Height(cm)</td>
<td>176</td>
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<tr>
<td>Body Mass Index</td>
<td>29.98</td>
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<tr>
<td>BSA</td>
<td>2.13</td>
</tr>
<tr>
<td>Normal Weight(kg)</td>
<td>72.5</td>
</tr>
<tr>
<td>Weight(kg)</td>
<td>95.0</td>
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**Urinary N2:**
- Serum Albumin: 
- Oral cal: 
- IV cal: 
- N2 Intake: 
- N2 Balance: 
- Substrate: 
- PEEP: 
- P Ventilator: 
- Vt Ventilator: 
- Ventilator Mode: 
- PIP: 
- FIO2 Ventilator: 

**VO2:** 0.416 L/min  
**VO2/kg:** 4.4 mL/kg/min  
**VCO2:** 0.317 L/min  
**Respiratory Quotient (RQ):** 0.76  
**Measured Resting Energy Expenditure (REE):** 2867 Kcal/day  
**Predicted Basal Metabolic Rate (BMR):** 1858 Kcal/day  
**REE (%Predicted):** 154 %

**NON-PROTEIN RQ (NPR):**

<table>
<thead>
<tr>
<th>ESPEN 20</th>
<th>1900 Kcal/day</th>
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<tbody>
<tr>
<td>ESPEN 30</td>
<td>2850 Kcal/day</td>
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</table>
Galvanic Skin Response
When you sweat, your skin becomes more electrically conductive. This measurement helps to see how active you are.

Skin Temperature
Measures the surface temperature of your body.

Heat Flux
Measures the rate at which heat is dissipating from your body.

3-axis Accelerometer
Measures your motion and steps taken.

SenseWear Armband
### Voedingsdagboekje

Gelieve de hoeveelheid te omcirkelen of te noteren wat de patiënt heeft gegeten.

#### Ontbijt

<table>
<thead>
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<th>Datum</th>
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<td>Boterhammen (wit / grijs)</td>
<td>½ 1 1½ 2 3 wet / gris</td>
<td>½ 1 1½ 2 3 wet / gris</td>
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<tr>
<td>Sandw / piccolo / pistolet</td>
<td>½ 1 1½ 2 (SW / PIC / PIST)</td>
<td>½ 1 1½ 2 (SW / PIC / PIST)</td>
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<tr>
<td>Koeken</td>
<td>½ 1 1½ 2</td>
<td>½ 1 1½ 2</td>
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<tr>
<td>Minarine/boter</td>
<td>Minarine/boter</td>
<td>Minarine/boter</td>
</tr>
<tr>
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<td>½ 1 portie</td>
<td>½ 1 portie</td>
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<tr>
<td></td>
<td>platte kaas</td>
<td>½ 1 portie</td>
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<tr>
<td></td>
<td>sneetjes kaas</td>
<td>½ 1 portie</td>
</tr>
<tr>
<td></td>
<td>kaasschotel</td>
<td>½ 1 portie</td>
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<td>Zoet beleg:</td>
<td>½ 1 1½ 2 3</td>
<td>½ 1 1½ 2 3</td>
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<td></td>
<td>confituur</td>
<td>½ 1 1½ 2 3</td>
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<tr>
<td></td>
<td>chooco</td>
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<td></td>
<td>speculaas</td>
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<td></td>
<td>peperkoek</td>
<td>1 2 stuks</td>
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<td>Vlees:</td>
<td>½ 1 1½ 2 3</td>
<td>½ 1 1½ 2 3</td>
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<tr>
<td>Koffie/thee/water</td>
<td>½ 1 tas(sen)</td>
<td>½ 1 tas(sen)</td>
</tr>
<tr>
<td>Melk</td>
<td>½ 1 zakje(s) / potje(s) *</td>
<td>½ 1 zakje(s) / potje(s) *</td>
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<tr>
<td>Suiker</td>
<td>½ 1 zakje(s)</td>
<td>½ 1 zakje(s)</td>
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<td>½ 1 zakje(s)</td>
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<tr>
<td>Chocolademelk</td>
<td>½ 1 brijs(s)</td>
<td>½ 1 brijs(s)</td>
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<tr>
<td>Fruitsap</td>
<td>½ 1 doosje(s)</td>
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<tr>
<td>Yoghurt (mager / volle) *</td>
<td>½ 1 potjes (mager / volle)</td>
<td>½ 1 potjes (mager / volle) *</td>
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<tr>
<td>Fruityoghurt (mager / volle) *</td>
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<tr>
<td>Bijvoedingen: Nutridrink Fortimel</td>
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#### Middagmaal

<table>
<thead>
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<th>Menu</th>
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<tbody>
<tr>
<td>Aardappelen/risotto/pasta</td>
<td>niks ½ ½ ½ alles</td>
<td>niks ½ ½ ½ alles</td>
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<tr>
<td>Lasagne</td>
<td>niks ½ ½ ½ alles</td>
<td>niks ½ ½ ½ alles</td>
</tr>
<tr>
<td>Vlees/vis/omelet/gebak</td>
<td>niks ½ ½ ½ alles</td>
<td>niks ½ ½ ½ alles</td>
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<tr>
<td>Bereid gerecht (vb. stoompotje)</td>
<td>niks ½ ½ ½ alles</td>
<td>niks ½ ½ ½ alles</td>
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<tr>
<td>Groenten/appelmoes</td>
<td>niks ½ ½ ½ alles</td>
<td>niks ½ ½ ½ alles</td>
</tr>
<tr>
<td>Saus</td>
<td>niks ½ ½ ½ alles</td>
<td>niks ½ ½ ½ alles</td>
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<tr>
<td>Vleesbastaard</td>
<td>niks ½ ½ ½ alles</td>
<td>niks ½ ½ ½ alles</td>
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<tr>
<td>Dessert</td>
<td>niks ½ ½ ½ alles</td>
<td>niks ½ ½ ½ alles</td>
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<tr>
<td>Andere:</td>
<td></td>
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#### Avondmaal

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<tr>
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<tr>
<td>Kaas: platte kaas</td>
<td>½ 1 1½ 2 3</td>
<td>½ 1 1½ 2 3</td>
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<tr>
<td>Sneetjes kaas</td>
<td>½ 1 1½ 2 3</td>
<td>½ 1 1½ 2 3</td>
</tr>
<tr>
<td>Kaasschotel</td>
<td>½ 1 1½ 2 3</td>
<td>½ 1 1½ 2 3</td>
</tr>
<tr>
<td>Vleeswaren</td>
<td>½ 1 1½ 2 3</td>
<td>½ 1 1½ 2 3</td>
</tr>
<tr>
<td>American</td>
<td>½ 1 ½ alles</td>
<td>½ 1 ½ alles</td>
</tr>
<tr>
<td>Salades (kip tonijn...)</td>
<td>½ 1 ½ alles</td>
<td>½ 1 ½ alles</td>
</tr>
<tr>
<td>Zoet beleg: confituur</td>
<td>½ 1 1½ 2 3</td>
<td>½ 1 1½ 2 3</td>
</tr>
<tr>
<td>Dessert:</td>
<td>niks ½ 1</td>
<td>niks ½ 1</td>
</tr>
<tr>
<td>Andere:</td>
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</tr>
<tr>
<td>Koffie/thee</td>
<td>½ 1 tas(sen)</td>
<td>½ 1 tas(sen)</td>
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<td>Melk</td>
<td>½ 1 zakje(s) / potje(s) *</td>
<td>½ 1 zakje(s) / potje(s) *</td>
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<td>Andere:</td>
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### Food diary
CANCER CACHEXIA

NUTRITIONAL INTERVENTION
ORAL / EN / PN

ENERGY REQUIREMENTS
• INDIRECT CALORIMETRY
• SENSEWEAR ARMBAND

ENERGY REQUIREMENTS
20 – 25 kcal/kg/d
ESPEN GUIDELINES

TiCaCOnco

control
Study protocol: Treatment arms

**Intervention**
- Cancer Diagnosis
  - Screening
  - Assessment
  - Nutrition Therapy
- Cancer Treatment
  - Nutrition Therapy
- Follow-up
  - Standard Dietary counseling

**Control**
- Cancer Diagnosis
  - Screening
  - Assessment
  - Standard Dietary counseling
- Cancer Treatment
  - Standard Dietary counseling
- Follow-up
  - Standard Dietary counseling
Endpoints

- ENERGY BALANCE
- Body fat, skeletal muscle
- FUNCTION IMPROVEMENT
- QOL (SF 36)
- OUTCOME
Results

Tight caloric control: Strict measurements and patient-tailored approach in Oncology Patients
Average weight loss in cancer patients with cachexia
Morbidity in cancer patients with cachexia

**

P = 0.0072
Mortality in cancer patients with cachexia

Survival proportions: Mortality

Percent survival

months

P = 0.0039

Nutrition Therapy
Control

Not powered!
Thank you