

# **Optimal Nutrition in Prehabilitation** April 2021 - Sjors Verlaan

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### Recovery from a surgery is a marathon



### ....and it starts with a optimal preparation



## **Optimal nutrition**

- Protein
- Fat
- Carbohydrates
- Fibers
- Vitamins and Minerals





Verlaan et al., 2016



### **Muscle** is essential for physical function, resilience and metabolism

### **Physical function**

- Daily activities
- Exercise
- Rehabilitation Movements of posture
- Mobility

### Resilience

- Immune system
- Wound healing
- Complications Reserve poor
  - Recovery

### **Metabolic function**

Burn energy

• Uptake and oxidation of carbs and fat

amino acids

Glucose control and insulin sensitivity



# Low **muscle** mass, strength and nutritional status at hospital admission predict short-term and long-term **mortality**

The Journal of Frailty & Aging@

ORIGINAL RESEARCH

#### MUSCLE MEASURES AND NUTRITIONAL STATUS AT HOSPITAL ADMISSION PREDICT SURVIVAL AND INDEPENDENT LIVING OF OLDER PATIENTS – THE EMPOWER STUDY

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JAMDA

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Original Study

Sarcopenia, Low Handgrip Strength, and Low Absolute Muscle Mass Predict Long-Term Mortality in Older Hospitalized Patients: An Observational Inception Cohort Study

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no no yes **Probable sarcopenia** 1.00.8**Cumulative survival** 0.6 0.40.21 2 3 4 Sarcopenia 1.00.8 **Cumulative survival** 0.6 0.40.21 2 3 4

Follow up (years)

![](_page_4_Picture_17.jpeg)

<sup>&</sup>lt;sup>a</sup> Departmen Netherlands

## Loss of muscle mass and strength during hospitalization

![](_page_5_Figure_1.jpeg)

10 day bedrest in healthy elderly:~ 15% loss of muscle strength

![](_page_5_Picture_3.jpeg)

#### 'Horrifying loss' of muscle mass should serve as wake-up call, academic

By Elaine Watson, 28-Jun-2011

Related topics: Research, Dairy-based ingredients, Proteins, peptides, amino acids

Bed rest studies revealing a "*horrifying*" loss of muscle mass in older people after just a few days of inactivity should serve as a wake-up call for industry to put tackling sarcopenia higher up the priority list, scientists have argued.

![](_page_5_Picture_8.jpeg)

![](_page_6_Picture_0.jpeg)

# Muscle loss is associated with worsened **health outcomes**

![](_page_6_Figure_2.jpeg)

![](_page_6_Picture_3.jpeg)

![](_page_7_Picture_0.jpeg)

### Physical Activity & Nutrition required to build and maintain muscle

### (Resistance) Exercise + Protein

![](_page_7_Picture_3.jpeg)

Gelders dagblad 31/3/2021

Quantity

- 0.8 g/kg BW/d for adults
- Expert recommendations for elderly and patients: 1.0-1.5 g/kg/d

### Quality

- Essential amino acids including Leucine
- Digestibility

![](_page_7_Picture_11.jpeg)

### Protein intake in older patients is often inadequate for optimal recovery

![](_page_8_Figure_1.jpeg)

![](_page_8_Picture_2.jpeg)

Weijzen et al., 2020

# Multiple moments of high quality protein intake distributed evenly over the day maximizes **muscle protein synthesis**

![](_page_9_Figure_1.jpeg)

Intake of **30 grams of high quality protein** per meal required to maximize muscle protein synthesis in older patients

![](_page_9_Picture_3.jpeg)

### Patients and elderly need more high-quality protein per meal

Schematic representation of muscle protein metabolism in response to anabolic stimuli (exercise and/or amino acid ingestion) in young and elderly

![](_page_10_Figure_2.jpeg)

![](_page_10_Figure_3.jpeg)

Elderly require higher levels of essential amino acids including Leucine to stimulate muscle protein synthesis (MPS): anabolic resistance

![](_page_10_Picture_5.jpeg)

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### Targets are challenging: opportunities for products rich in high-quality protein?

![](_page_11_Figure_1.jpeg)

Paddon Jones et al., 2009

![](_page_11_Figure_3.jpeg)

![](_page_11_Figure_4.jpeg)

![](_page_12_Figure_0.jpeg)

# Medical Nutrition is targeting Disease Related Malnutrition

![](_page_13_Picture_1.jpeg)

- High in energy
- High in (high-quality) protein
- Complete micronutrient profile
- `sole source of nourishment'

Reimbursed

![](_page_13_Picture_6.jpeg)

ESPEN Endorsed Recommendation

GLIM criteria for the diagnosis of malnutrition – A consensus report from the global clinical nutrition community \*

Phenotypic Criteria <sup>g</sup>		
Weight loss (%)	Low body mass index (kg/m <sup>2</sup> )	Reduced muscle mass <sup>a</sup>
>5% within past 6 months, or >10% beyond 6 months	<20 if < 70 years, or <22 if >70 years Asia: <18.5 if < 70 years, or <20 if >70 years	Reduced by validated body composition measuring techniques <sup>a</sup>

- Main drivers: weight loss and reduced muscle mass
- Protein-energy malnutrition/undernutrition

![](_page_13_Picture_12.jpeg)

### FrieslandCampina Ingredients

![](_page_14_Picture_1.jpeg)

- Provide product prototypes as clinical study products for prehabilitation clinical trials
- Nutritional value of dairy proteins

# Outrition to get the most out of life. Always. Image: Performance Nutrition Image: Performance Nutrition

### Conclusions and next steps

- Prehabilitation combining exercise with optimal nutrition – including high-quality protein – prepares people for their surgery
- **Optimal nutrition**: Diet + Supplements

Questions:

- Implementation of prehabilitation in practice: multidisciplinary
- Who will provide diet and/or supplements?
- What kind of diets/concepts/formats/products?
- Dietary support and education?
- Who will pay for it? Business models?

![](_page_15_Picture_9.jpeg)

![](_page_15_Picture_10.jpeg)