Metabolomics Alterations Macro- and Micronutrients In Geriatric Oncology

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Outline

1. Background
2. Malnutrion in eldery cancer patients
3. Metabolomics alteration of macro- and micronutrients in elderly cancer patients
4. Conclusion

1. Background

1.1 Incidence of cancer most in elderly people

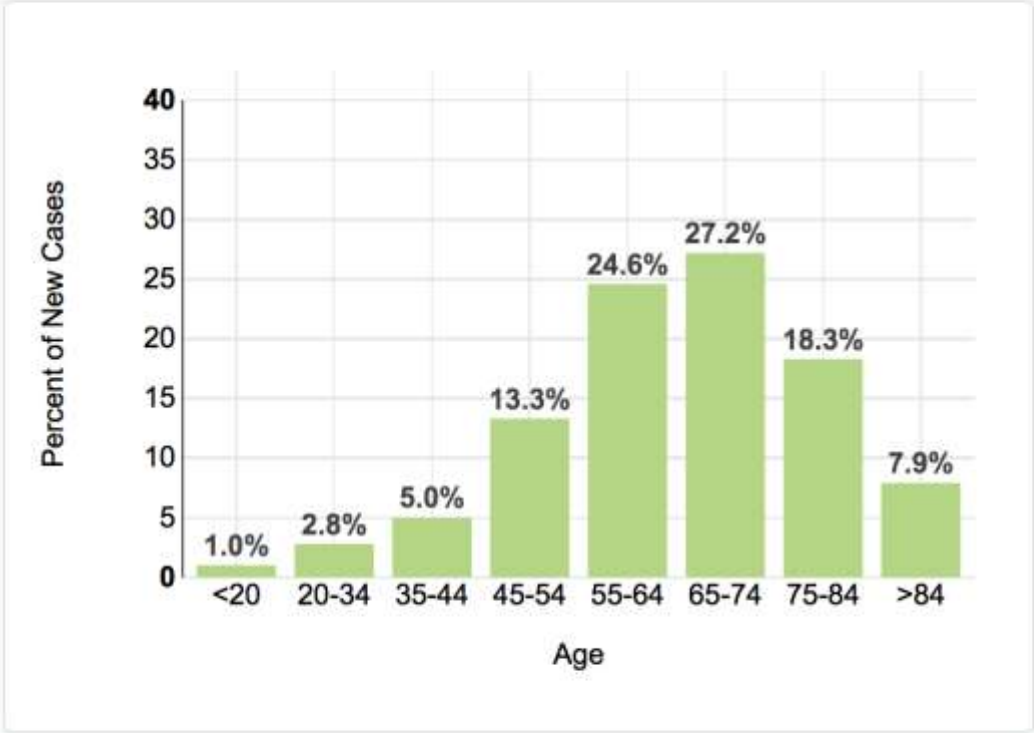
People >65 years are 11 times more likely to develop cancer than those 25-44

Incidence of all cancer combined has been increasing since 1970s – but biggest increase has been in 75 and over group

Incidence increases with age until 80-84 then begins to decline 85+!

1.2 Age-spesific incidence rates for all cancers

Percent of New Cases by Age Group: Cancer of Any Site



Cancer of any site is most frequently diagnosed among people aged 65-74.

Median Age At Diagnosis

66

SEER 18 2011-2015, All Races, Both Sexes

1.3 Clinicopathology Features Young Indonesian Breast Cancer

Breast cancer in Indonesian young women **<47y showed**:

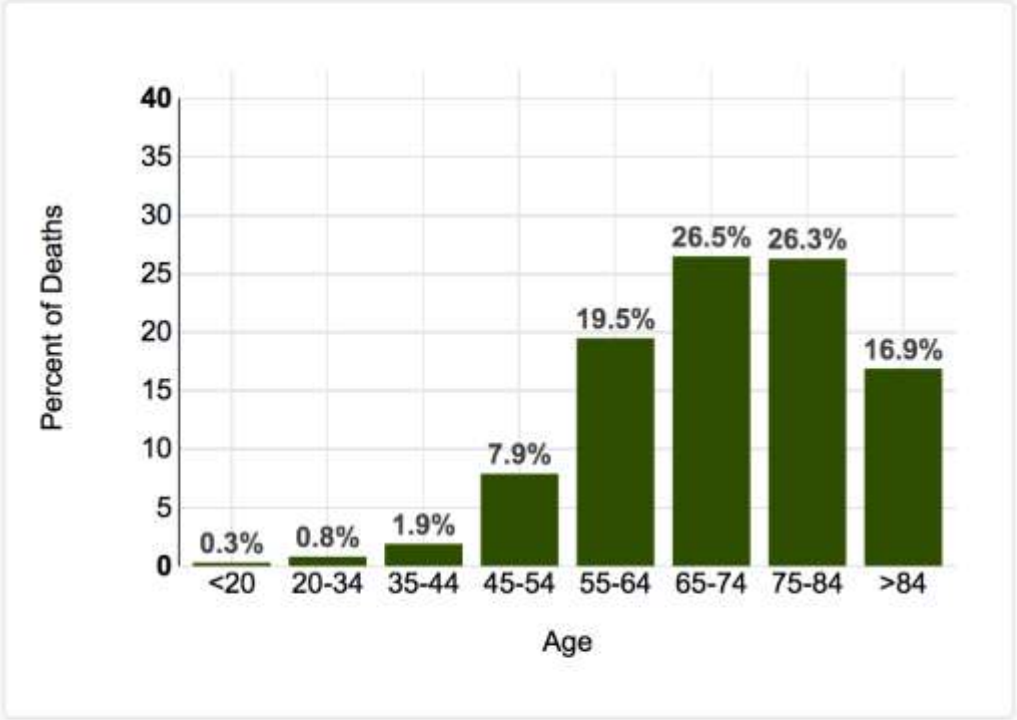
- ✧more aggressive phenotype than inelderly patients,
- ✧larger tumor size
- ✧more lymph node involvement
- ✧higher c-erbB2 and p53 expression

1.4 Mortality

- Mortality rates rise with advancing age, and continue to rise in oldest group
- Overall survival rates improving but at slower rate in older people -> so widening gap
- UK worse outcomes than other Europe/US

1.5 Age-specific mortality for all cancers

Percent of Deaths by Age Group: Cancer of Any Site

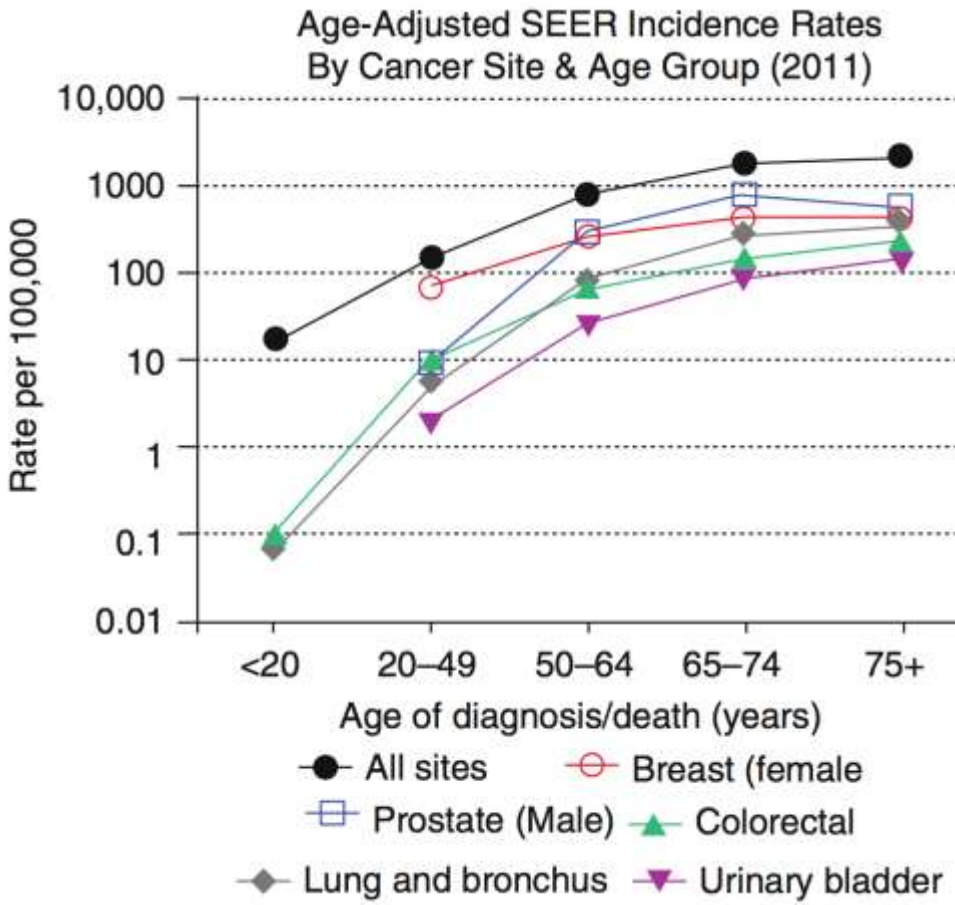


The percent of cancer of any site deaths is highest among people aged 65-74.

Median Age At Death
72

U.S. 2011-2015, All Races, Both Sexes

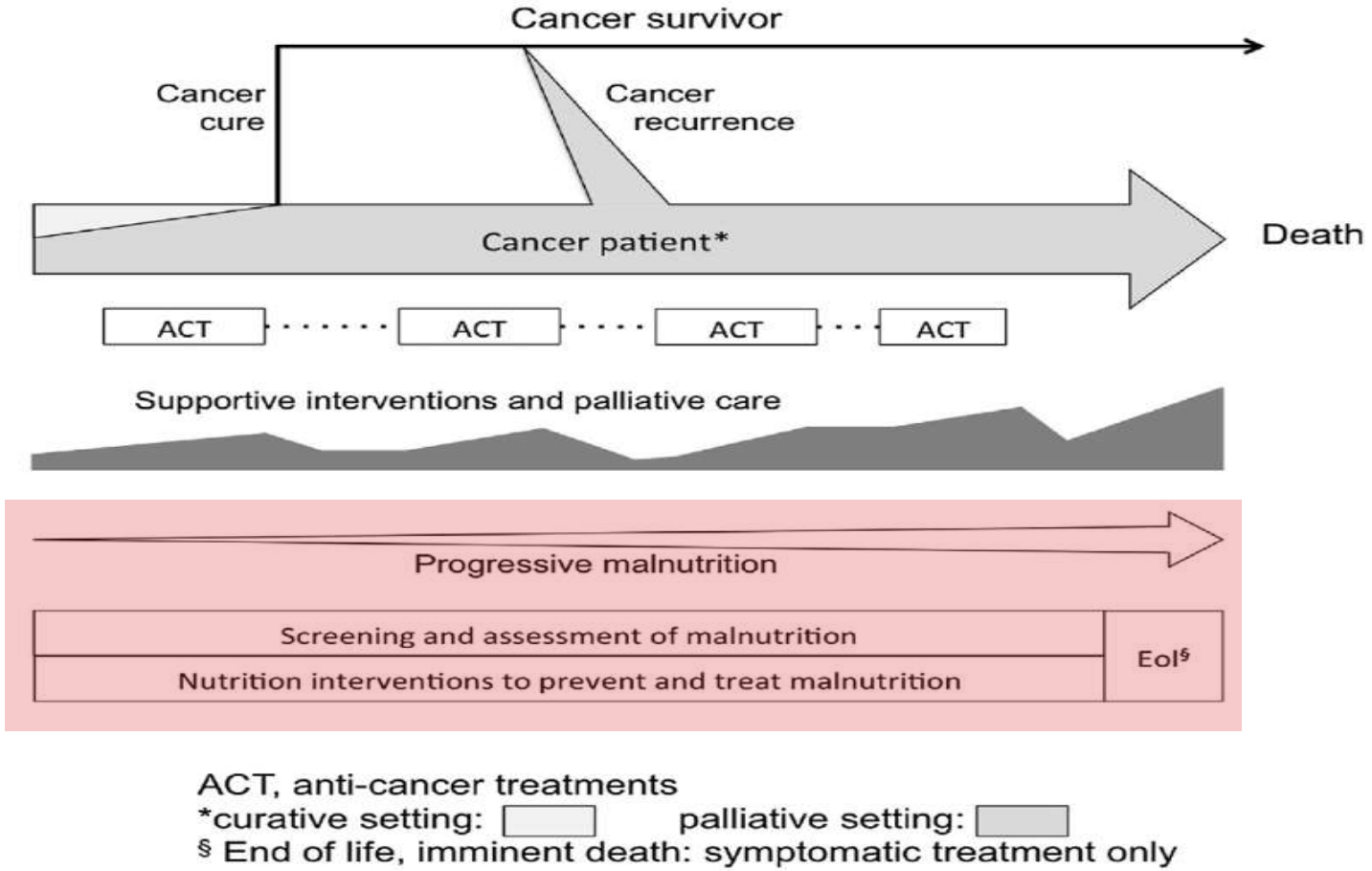
1.6 Age-specific mortality rates for all cancers



Shenghui He and Norman E. Sharpless, 2016

2. Malnutrition in Elderly Cancer Patients

2.1 Cancer patient is facing progressive malnutrition condition



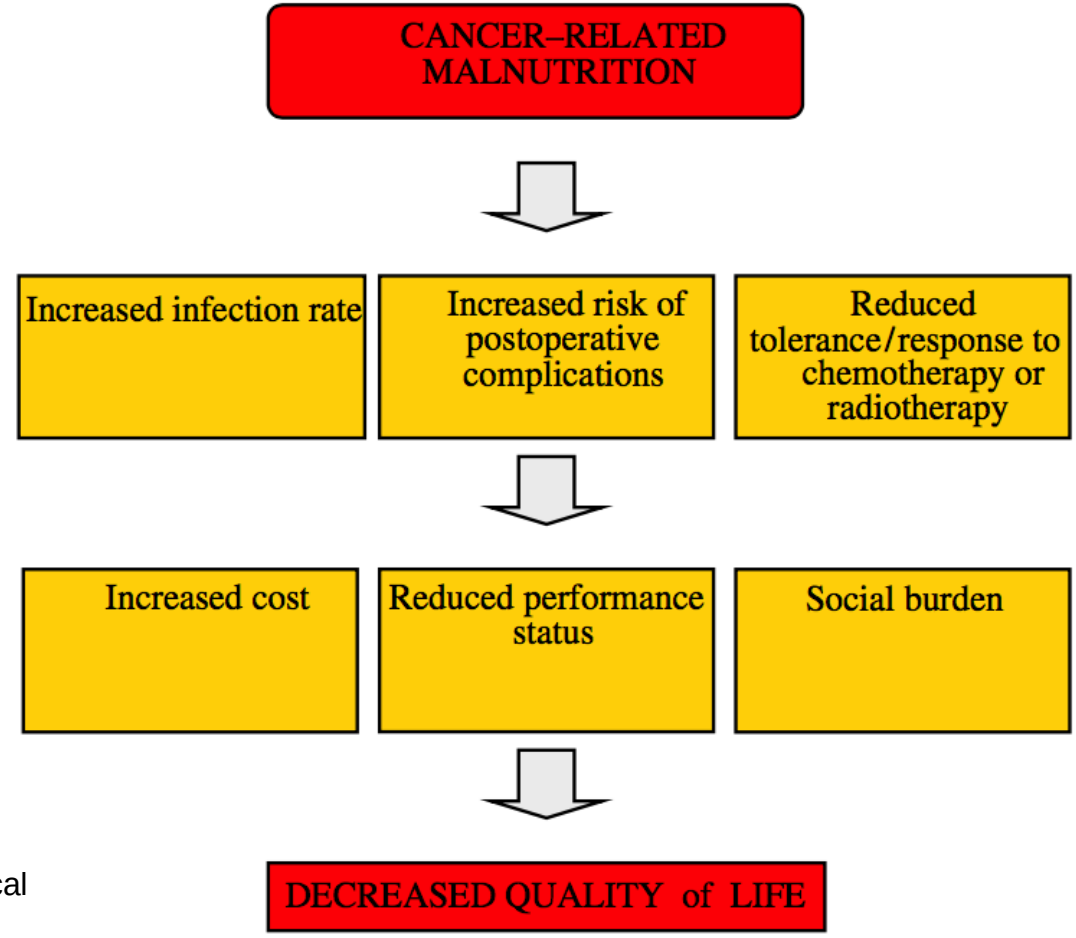
J. Arends et al. / Clinical Nutrition 36 (2017) 11-48

2.2 Prevalence of Malnutrition at various cancer site

Tumor Site	Prevalence of Malnutrition
Pancreas	80-85%
Stomach	65-85%
Head & Neck	65-75%
Esophagus	60-80%
Lung	45-60%
Colon/Rectum	30-60%
Gynecological	15%
Urological	10%

Stratton et al, eds. Disease-Related Malnutrition: An Evidence-Based Approach to Treatment. CABI Publishing; Wallingford:2003.

2.3 Cancer-related malnutrition has a major impact on clinical evolution and socioeconomics, and reduces quality of life



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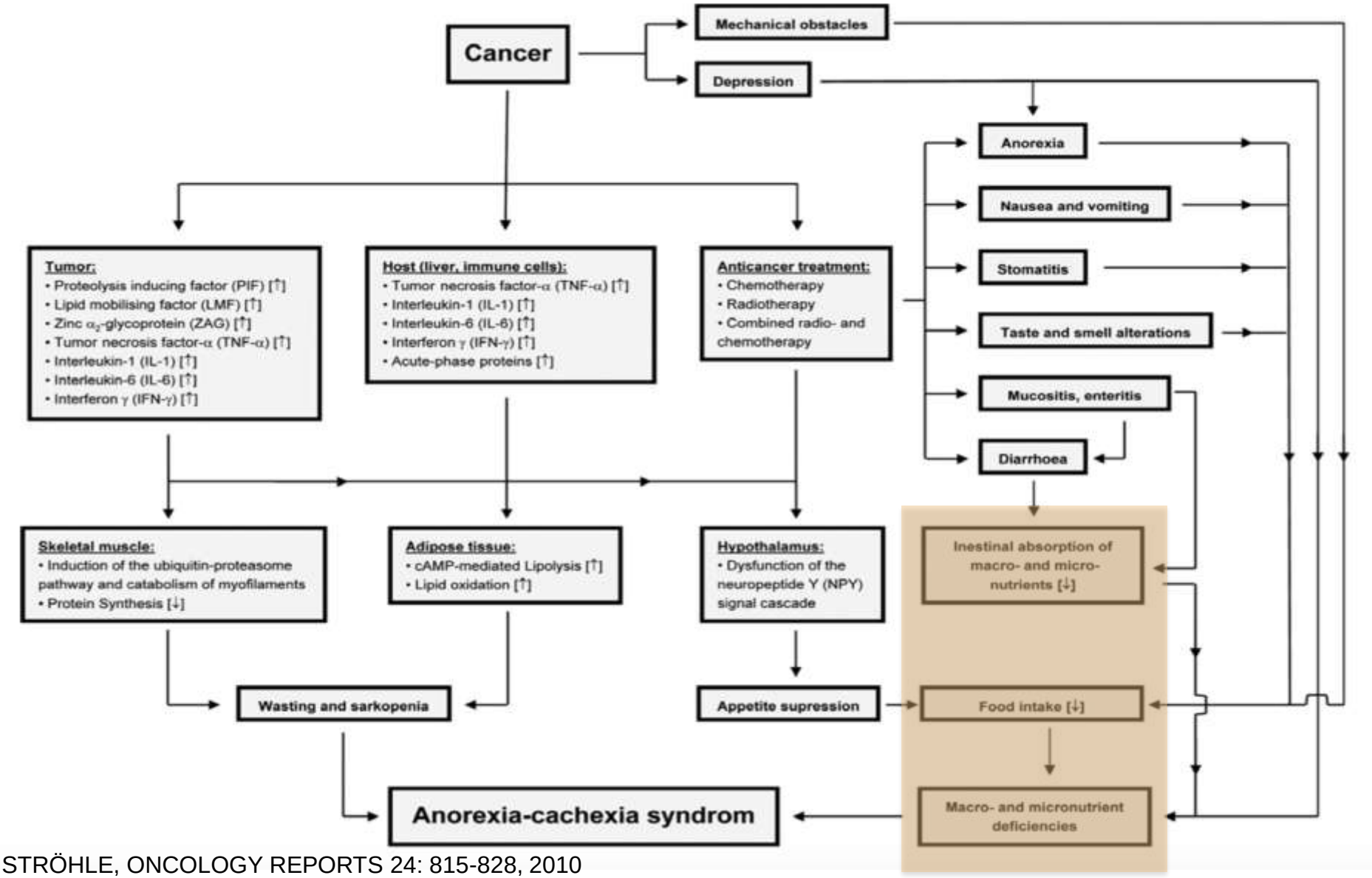
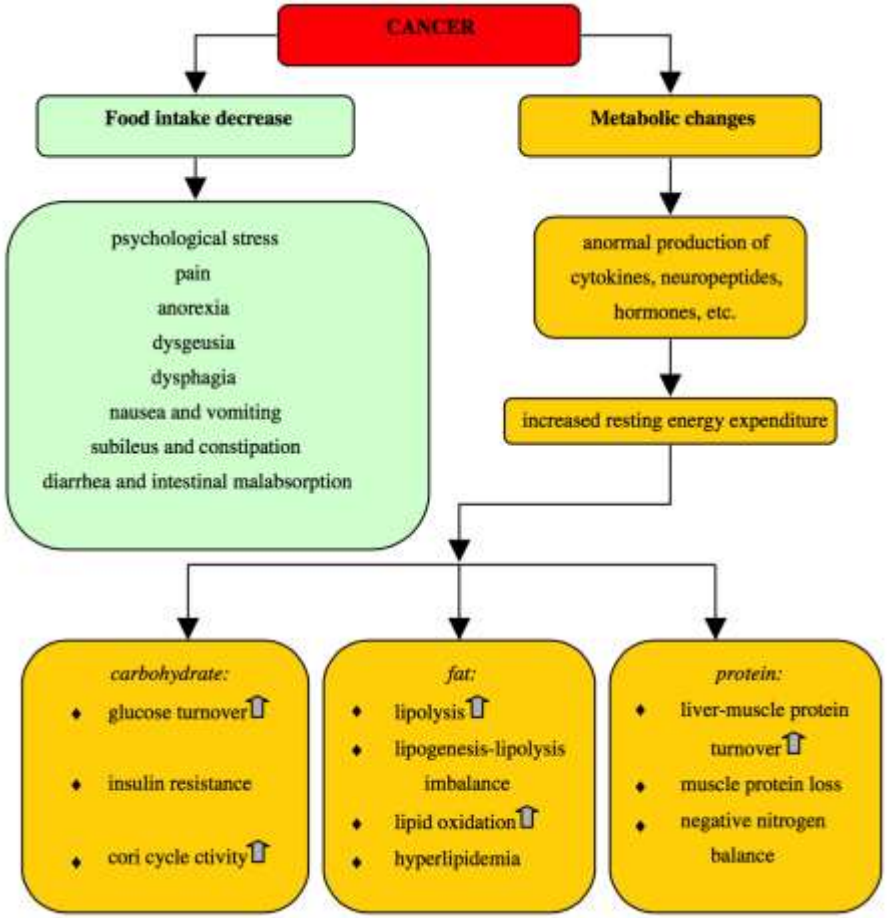
3 Metabolomic Alteration

3.1 Multifactorial genesis of tumor-associated malnutrition and cachexia



STRÖHLE, ONCOLOGY REPORTS 24: 815-828, 2010

3.2 Metabolic abnormalities in cancer patients



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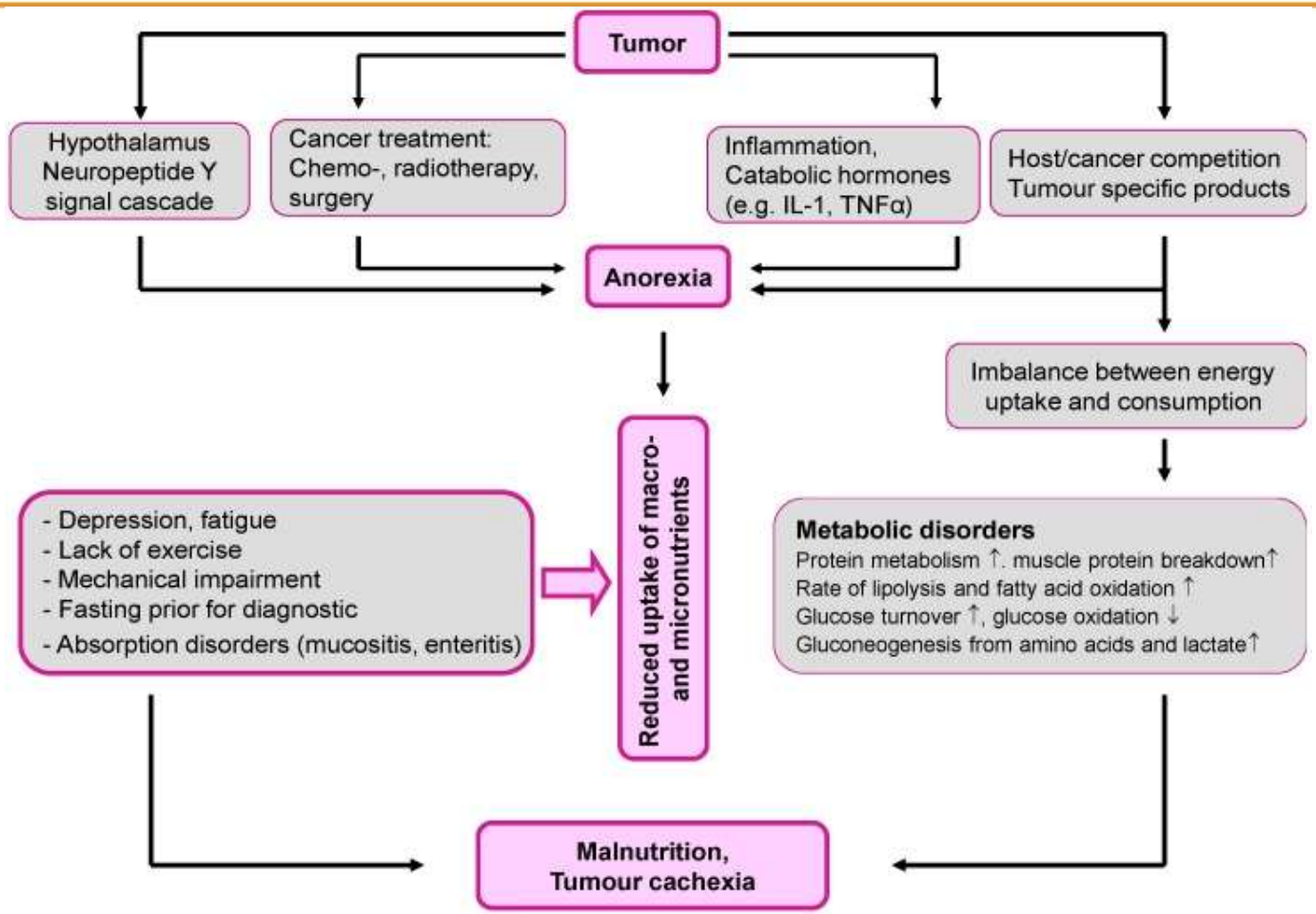
3.3 Causes of macro- and micronutrient deficiencies in cancer



M.M. Marin Caro et al. , Clinical Nutrition (2007) 26, 289–301

3.4 Micronutrients deficits in cancer patients

Micronutrients Defeciency	Metabolic effects
Vitamin A	• Weakening the skin-mucosa barrier and increasing infection risk • Proliferation and cytotoxicity of T-lymphocytes ↓ • Antigen-specific response ↓ • Proinflammatory effect (TNF-synthesis ↑) • Change in TH1:TH2 ratio in favor of TH1
Vitamin E	• Antigen-specific response ↓ • Proliferation and cytotoxicity of T-lymphocytes ↓ • Phagocytosis ↓
Vitamin B_6	• Lymphocyte maturation and proliferation ↓ • T-lymphocyte activity ↓ • Antibody formation ↓ • Interleukin-2 synthesis of T-helper cells ↓
Folic acid	• Thymus weight ↓ • Neutrophil activity↓ • Cytotoxicity of T-lymphocytes ↓ • Antibody formation ↓ • L ymphocyte proliferation ↓ • Activity of natural killer cells ↓

Cont…3.4 Micronutrients deficits in cancer patients

Micronutrients Defeciency	Metabolic effects
Vitamin B_{12}	•Neutrophil activity ↓ • Activity of natural killer cells ↓
Iron	• Secretion of interferon-Á, TNF-· and interleukin 2 ↓ • Activity of natural killer cells ↓ • T-cell proliferation ↓ • Bactericidal activity of macrophages ↓
Zinc	• Interferon-Á and interleukin 2 synthesis ↓ • Activity of natural killer cells ↓ • Macrophage activity↓ (phagocytosis ↓; bactericidal effect ↓, chemotaxis ↓) • T-cell activity ↓ • Thymus atrophy
Selenium	• Proinflammatory eicosanoid synthesis ↑ • Antibody formation ↓ • Lymphocyte proliferation ↓ • Cytotoxicity of immune competent cells ↓

3.5 Nutritional suggestion for geriatic oncology patients based on metabolic alterartion

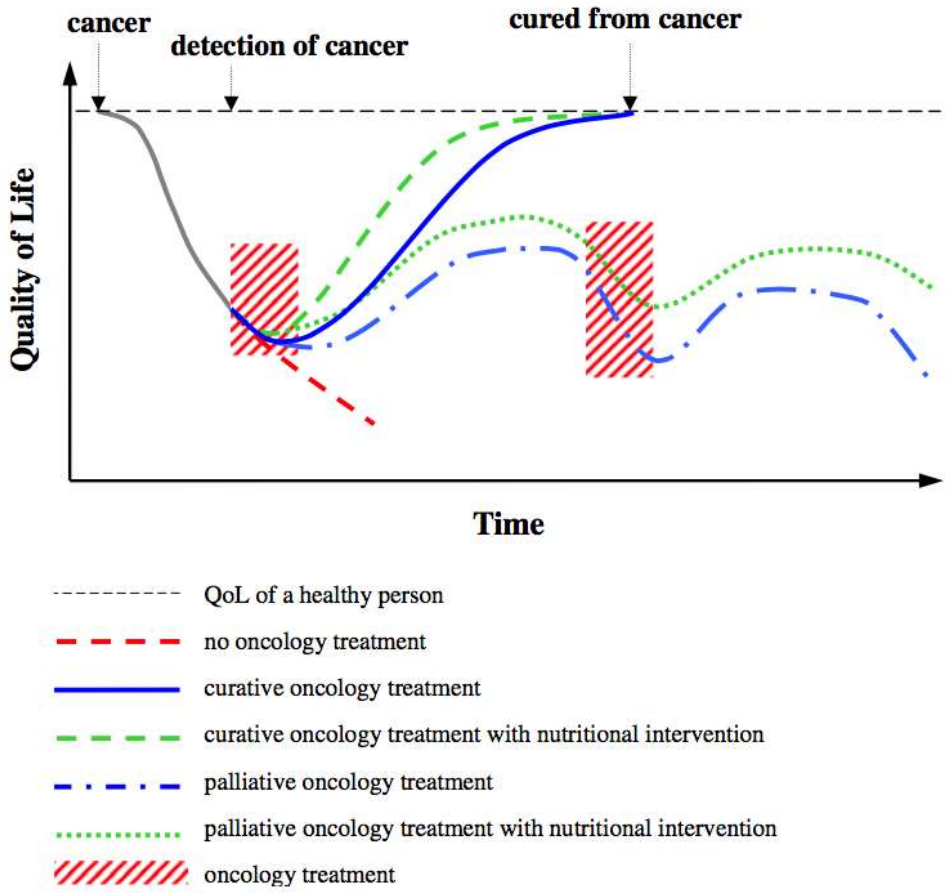
Macronutriens

Increased carbohydrate intake and reduced the intake of animal products, inducing far lower levels of protein and fat as proportions of the total caloric intake and relatively higher carbohydrate intakes related to better prognosis for elderly Asian cancer patients.

Micronutrients

Increased micronutrient supply is recommended like vitamin C, vitamin A, vitamin B6, folic acid, zinc, copper to improve postoperative wound healing. Administration long-chain omega-3 fatty acids recommended improving weight loss and tumor cachexia. Application a multi- vitamin-multimineral supplement in physiological doses is a useful but avoided the use of single high-dose micronutrients.

3.6 Combination of nutritional support and oncology treatments promotes the quality of life



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Conclusion

1. Cancer induced weight loss results in:
   - Decreased quality of life
   - Increased complications
   - Poorer response to therapy
2. Malnutrion and cachexia in geriatric oncology patients caused by Multifactorial
3. Macronutrient and micronutrients profiles is related to daily dietary
4. Micronutrients supplementation have beneficial way to support wound healing; to counteract tumor cachexia; and in the longer term to improve the patient's quality of life and prognosis.
5. Combination of nutritional support, palliative and oncology treatments increased quality of life elderly cancer patients


Thank you