

Supportive Care in Cancer

Miroslav Tomáška

Internal Medicine, Block 4
5th year students



Supportive care in oncology

- **Antiemesis**
- **Treatment of cancer pain**
- **Management of hematological toxicity**
- **Infectious complications**
- **Metabolic complications**
- **Nutrition support**
- **Psychosocial support**





Antiemesis

Chemotherapy Induced Nausea and Vomiting
CINV



Types of CINV

CINV type	Description
Acute	0-24 h
Delayed	25-120 h (Day 2-5)
Anticipated	prior further chemo cycle
Breakthrough	despite prophylaxis
Refractory	not responding to treatment



Risk factors for CINV

Cytotoxic agents

Emetogenic drug

Higher dose of the drug

Combination of drugs

Patient-based factors

Young age < 50 yr

Female gender

History of vomiting

CINV after prior chemo cycle

Anxiety

Alcohol abstinence



Classification of cytotoxic drug emetogenicity

Classes of emetogenicity	Probability of CINV without prophylaxis
High	> 90 %
Moderate	30-90 %
Low	10-30 %
Minimal	< 10 %

Generally emetogenic means the risk of CINV > 30 %



Antiemetic drugs

Class	Generic names	Half life <i>hours</i>
5HT₃R inhibitors	ondansetron granisetron palonosetron	3 9 40
NK₁R inhibitors	aprepitant netupitant rolapitant	9 96 120
Corticosteroids	dexametasone	
Atypical antipsychotic	olanzapin	
Prokinetic agents	metoclopramide	
Anxiolytics	alprazolam lorazepam	



Rules for antiemetic prophylaxis

in chemotherapy treated patients

- **Prevention from the 1st cycle**
 - in emetogenic chemotherapy (moderate to high risk)
- **Use of full defined doses of antiemetics**
 - do not reduce the dose
- **Combined antiemesis recommended**
 - dexamethasone is a routine part of combination
 - add anxiolytics in anxious patients
 - monotherapy for low-risk patients
- **Oral formulation sufficient for prevention**
- **Modern antiemetics with long half life**
 - potentially 1 dose for the whole cycle of chemotherapy



Combined antiemetic prophylaxis

regimens used according to total CINV risk of the patient

Routine 2-drug regimen for moderate risk patients

5HT₃-inhibitor

dexamethasone

5HT₃-inhibitor

dexamethasone

alprazolam

Three drug regimen for high risk of CINV

5HT₃-inhibitor

NK₁-inhibitor

dexamethasone

5HT₃-inhibitor

NK₁-inhibitor

dexamethasone

alprazolam

Olanzapin regimen as an alternative

palonosetron

olanzapin

dexamethasone

Potencial regimen for the highest emetic risk / after failure

palonosetron

NK₁-inhibitor

olanzapin

dexametha



Akynzeo[®] capsules

netupitant 300 mg / palonosetron 0.5 mg

- **First fixed 2-drug combination**
 - both components with long half life
- **Inhibits two main pathways** of emesis after CT
 - covers both acute and delayed period, highly effective
- **1 capsule 1 hr prior** to the start of CT
 - effective for the whole cycle
- **Improves compliance** with antiemetic regimen
 - solves known gaps between guidelines and reality
 - decreases the risk of mistake
- **Cost-effective** despite of high charges





Cancer pain management

principles of therapy



Chronic cancer pain characteristics

two patterns: continuous or intermittent

■ **Multidimensional phenomenon**

- complex interaction between many factors
- includes psychological factors
- causes syndrome (rather than symptom in acute pain)

■ **Chronic pain may be a pathogen itself**

- can facilitate progression of metastatic disease
- negative predictor of survival
- worsens quality of life

■ **Neuropathic pain**

- damage to the nerves and surrounding tissues
- pathological persisting type of pain, hyperesthesia
- maladaptive response



Principles of cancer pain management

- **Drug therapy is the cornerstone**
- **Prescription on an around-the-clock basis**
 - using analgesic ladder
 - use combinations of analgesic drugs
- **Strong opioids for increasing and moderate to severe pain**
- **Specific treatment for neuropathic pain**
 - antiepileptics, anticonvulsants
- **Rescue doses for breakthrough pain**
 - rapidly acting formulations



Analgesic ladder

for cancer pain management

■ STEP 1

■ Non opioid analgetics

- paracetamol
- NSAIDs

■ Adjuvant (co-analgetics)

- antidepressants, anxiolytics
- anticonvulsants, gabapentinoids
- corticosteroids
- cannabinoids

■ STEP 2

- Weak opioids (+- non-opioid / adjuvant)

■ STEP 3

- Strong opioids (+- non-opioid / adjuvant)



Weak opioids

for cancer pain

■ Tramadol

- injection i.v., i.m., s.c.
- oral drops, short acting, dosed by 4-6 hrs
- oral slow-release tablets, dosed bid
- combined with paracetamol in tablets

■ Codein

- short-acting, dosed by 4-6 hrs

■ Dihydrocodein

- DHC Continus prolonged release tablets, dosed bid

■ Oxycodon low dose



Strong opioids

for cancer pain management

■ Morphine

- injection s.c., i.m.
- oral immediate-release morphine (bioavailability 20-40 %)
- slow-release tablets / capsules, dosed bid

■ Fentanyl

- TD patch (transdermal), be changed by 72 hrs
- buccal tablets (rapid resorption) for breakthrough pain
- intranasal spray (very rapid resorption)

■ Buprenorfin TD

■ Hydromorhone oral (dosed bid, by 12 hrs)

■ Oxycodone oral (dosed bid, by 12 hrs)



Recommendations for opioid therapy

distinct pharmaco-dynamic differences between individuals

- **Effective dose is very individual**
 - no ceiling effect to opioid dosing
 - side effects are usually limiting
- **Dose of opioids needs to be titrated**
 - morphine provide similar pain control as newer opioids
 - tolerance and physical dependence is predictable
 - different from psychological dependence
- **Undertreatment is common**
 - uncontrolled pain may decrease cognition, similar to opioid side-effect (for drivers)
- **Risk of opioid accumulation in renal failure**
 - buprenorfin kinetics preserved in renal insufficiency



Recommendations for opioid therapy

distinct pharmaco-dynamic differences between individuals

- **Opioids should be combined with**
 - non-opioids (paracetamol, NSAIDs)
 - adjuvant drugs (antidepressants and others)
- **Opioid rotation**
 - switch to different opioid in case of tolerance or side effects to improve effect and/or lower risk of toxicity
 - equianalgesic dose calculation
- **Prophylactic laxatives**
 - useful for many patients (allow opioid continuation)
 - combination of opioid with oral naloxone
- **Use of multiple opioids simultaneously is inappropriate**



Dose-limiting side effects of strong opioids

no defined maximal doses for strong opioids

- **Respiratory depression**
 - risk is minimal in adequate dose titration
- **Constipation and dry mouth**
 - independent of dose
- **Nausea and vomiting**
 - usually transient, resolve within days
- **Sedation, sleepiness, dizziness**
- **Delirium, confusion**
 - dose-limiting side-effect
- **Cutaneous pruritus**





Febrile neutropenia

Management of sepsis



Febrile neutropenia (FN)

severe neutropenia increases the risk of infection

Fever

+ Neutropenia

> 38.5 °C

< 0.5 *10⁹/L

> 38.0 °C > 1 hr

severe neutropenia

Not in all FN cases there is an infection.

Criteria of FN may be fulfilled in other causes of fever, like drug fever etc, but infection cannot be excluded in limited time.

Treatment should cover potential causes of infection (risk of rapid progression of infection within hours).



Different risks of febrile neutropenia

fulfilling one or more characteristic features

■ High risk

- hematological patients (leukemia)
- expected to continue for more than 5 days
- very severe neutropenia $< 0.1 \cdot 10^9/L$

Hospital stay, i.v. broad spectrum antibiotics

■ Low risk

- solid cancer patients
- short period of neutropenia < 5 days
- not very severe (above $0.1 \cdot 10^9/L$)

Outpatient, oral antibiotics



Empirical antibiotic therapy

in high-risk febrile neutropenia and sepsis

- **Start immediately after diagnosis**
 - up to 1 hr after diagnosis
 - just after collection of blood for culture (2 sets)
- **Broad spectrum antibiotics i.v.**
 - full dose recommended for severe infection

cefepime + amikacin

1st choice in this dept

add vancomycin if indicated

risk of G+ infection

meropenem + vancomycin

in hemodynamic instability



Antifungal therapy

in high risk febrile neutropenia and sepsis

■ Empirical antifungals

- in high risk FN
- persisting fever despite empirical antibiotics day 5-7
- progressive signs of infection

casprofungin *or* micafungin

Echinocandin class

■ Treatment of **possible/probable** fungal infection

- high-resolution CT of lungs (hallo sign)
- dynamic increase in serum galactomannan
 - suspicion for invasive pulmonary aspergillosis

voriconazole

Azole antifungal class



Diagnosis of sepsis

positive blood culture not required

Infection + SIRS

Documented

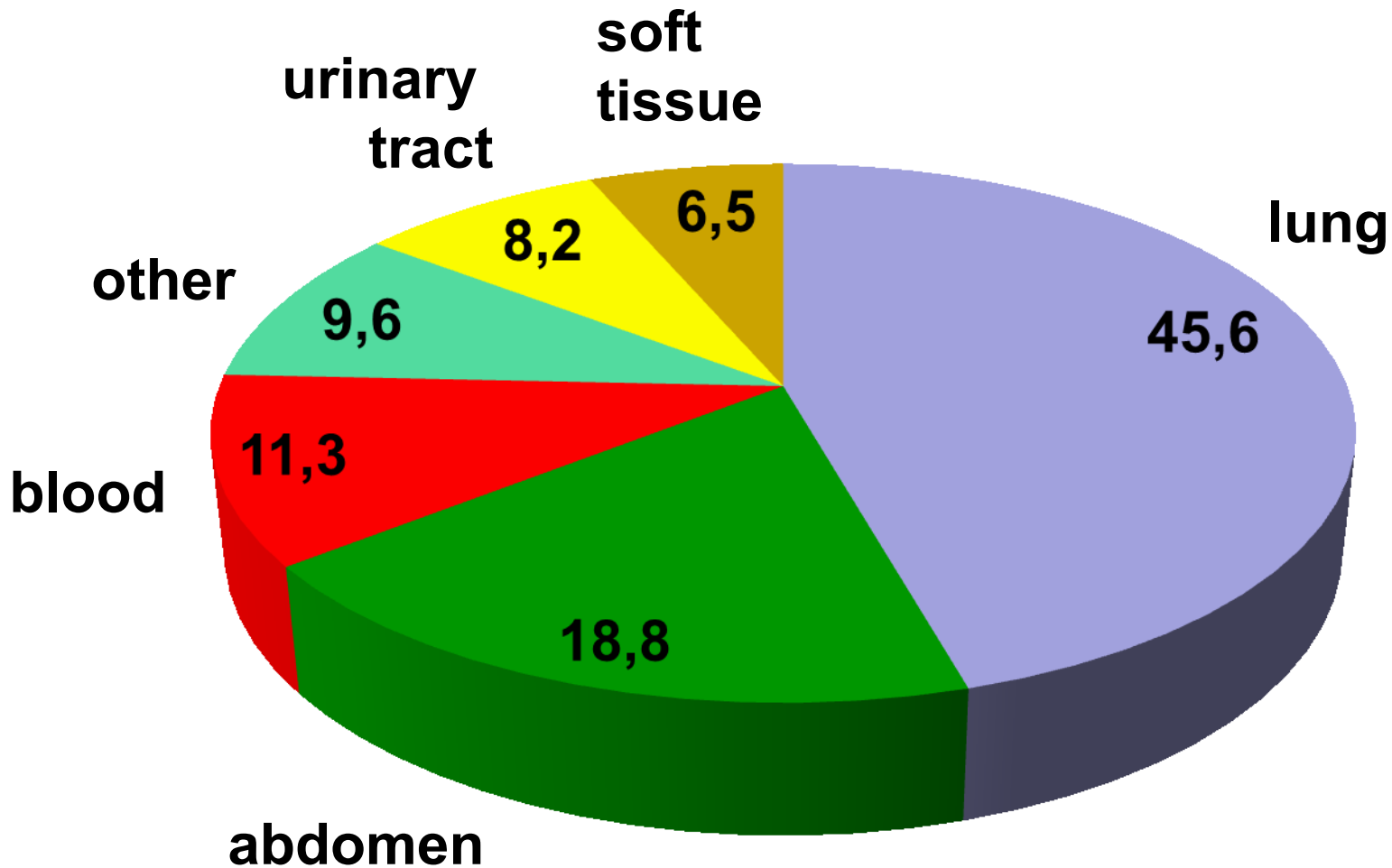
- microbiologically
 - blood stream infection
 - urinary tract infection
- clinically
 - pneumonia
 - soft tissue infection

- Fever / hypothermia
 - > 38.3°C / < 36°C
- Tachycardia > 90/min.
 - in fever >100/min.
- Tachypnea > 20 bpm
 - $p\text{CO}_2 < 4.2 \text{ kPa}$
- Leukocytosis
 - or leucopenia



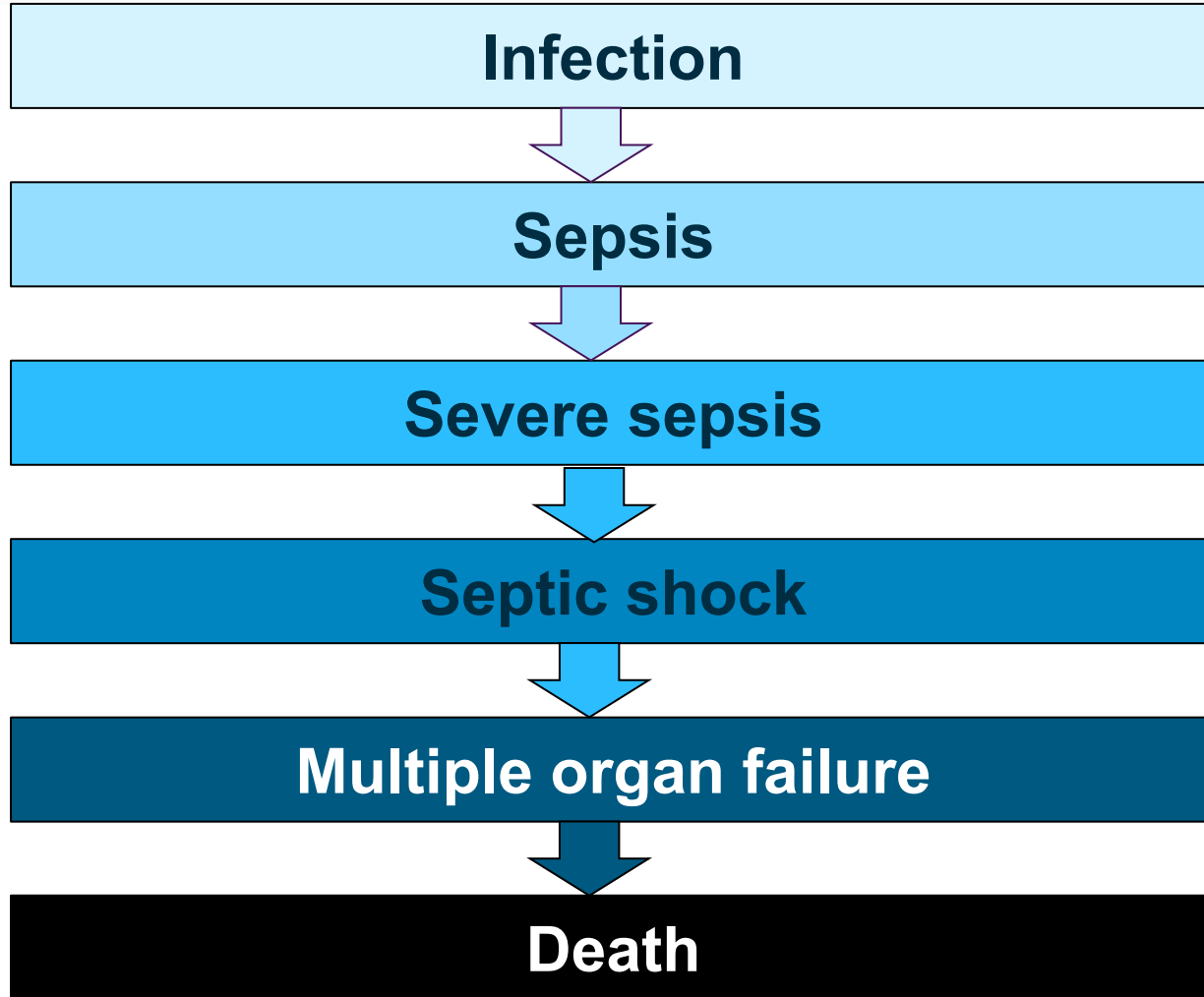
Primary site of infection in sepsis

14,364 patients, 28 ICUs, 8 countries



Sepsis continuum

in disease progression



Diagnosis of severe sepsis

require signs of tissue hypoperfusion

- **Hypotension responsive to i.v. hydration**
 - systolic arterial pressure < 90 mmHg
 - mean arterial pressure, MAP < 65 mmHg
- **Serum lactate > 4 mmol/L**
 - normal range 0-2
 - partially depending on liver function
- **Organ dysfunction**
 - kidney function: oliguria < 0.5 ml/kg/hr (< 100 ml/3 hr)
 - lung function: hypoxia, dyspnea
 - central nervous system: delirium, somnolence, confusion



Diagnosis of septic shock

definition

- **Sepsis induced hypotension, persisting after i.v. hydration**
 - initial hydration at least 30 mL/kg for 3 hrs
 - 2100 mL for 70 kg person in 3 hrs
- **The goal in lactate elevation is to decrease lactate level** (improve tissue perfussion)
- **Vasopressors necessary for septic shock**
 - norepinephrin is the first choice
 - MAP > 65 mmHg is the goal



Central venous + arterial cannula

1.

CVP
< 10 cmH₂O

Crystalloids

Goal 10-16 cmH₂O

2.

MAP
< 65 mmHg

Vasopressors

Goal 65-90 mmHg

3.

ScvO₂
< 70 %

Red cell transfusion
Dobutamine

Goal > 70 %

Reached goals in sepsis





Metabolic complications in oncology



Tumor lysis syndrome, TLS

characteristics

- **Aggressive malignancy**
 - Burkitt lymphoma
 - acute leukemia
 - many other aggressive/chemosensitive tumors
- **Bulky disease** (large tumor volume)
 - high lactate-dehydrogenase (LD)
- **Clinical situations**
 - mostly occurs after first doses of chemotherapy
 - chemosensitive malignancies
 - even after corticosteroids (ALL, high-grade lymphoma)
 - rarely spontaneous TLS



Diagnosis of TLS

laboratory monitoring

- **Hyperuricemia**
 - uric acid is final metabolite of nucleic acids
 - uric acid precipitation in (in low pH)
- **Renal failure**
 - rapid onset within hours
- **Hyperkalemia**
 - may rapidly increase from morning to evening
 - bradyarrhythmia, heart arrest, sudden death
- **Hyperphosphatemia**
 - calcium phosphate precipitation (in high pH)
- **Hypocalcemia**



Prevention of TLS

before starting chemotherapy

■ Prehydration

- start at least 12 hrs before
- 3-6 L/day (orally + intravenously)
- high urine output (> 100 mL/hr) prior to chemo
- combined with furosemide in older/cardiac patients

■ Allopurinol pretreatment

- start 24 hrs before starting chemo
- 300-600 mg/day (reduction in renal insufficiency)
- does not treat preexisting hyperuricemia
- risk of drug-drug interactions
- risk of xanthine nephropathy



Urate oxidase enzyme in TLS

rasburicase, recombinant urate-oxidase

- **Conversion of uric acid to allantoin**
 - 10times more soluble than uric acid
- **Reduces preexisting hyperuricemia**
 - in contrast to allopurinol
- **Rasburicase i.v. infusion**
 - plasma uric acid level rapidly decreases within 4 hrs
 - single dose 6 mg commonly sufficient
 - repeat as necessary
 - risk of anaphylaxis (< 1 %)



Monitoring of TLS

according to the risk

- **Twice daily in patients at high risk**
 - diuresis (goal > 100 mL/hr)
 - biochemistry (kreatinin, K, P, Ca)
- **Asymptomatic hypocalcemia should not be treated**
 - risk of calcium-phosphate precipitation
 - alcalinisation of urine not recommended



Hypercalcemia in malignancy

characteristics

■ Pathophysiology in oncology

- osteolytic metastases (osteoclast activity)
- parathormone-related protein produced by cancer

■ Symptoms

- osmotic diuresis causing dehydration
- anorexia, nausea, vomiting
- constipation, sometimes severe
- confusion, central nervous system dysfunction



Treatment of hypercalcemia

in malignancy at ICU

■ Intravenous hydration

- saline infusion 200-300 mL/hr
- hypovolemia exacerbates hypercalcemia

■ Calcitonin

- rapidly acting in 4-6 hrs, tachyphylaxis after 48 hrs

■ Bisphosphonates (more potent than calcitonin)

- zoledronate, pamidronate
- maximal effect in 48-96 hrs (2-4 days)
- potential nephrotoxicity
- used up to kreatinin 400 $\mu\text{mol/L}$

■ Disease-specific approach

- treatment of underlying disease



SIADH in oncology

Syndrome of inappropriate ADH secretion

■ Pathophysiology

- ADH caused water retention (usually mild)
- secondary increase of natriuresis (natriuretic hormones)
- euvolemic hyponatremia

■ Laboratory abnormalities

- hyponatremia (may be asymptomatic)
- low plasma osmolality (hypoosmolar hyponatremia)
- urine Na concentration > 20 mmol/L (natriuresis)

■ Clinical features

- asymptomatic hyponatremia is a common feature
- appetite loss, headache, dizziness, muscle weakness
- no oedema



Etiology of SIADH in oncology

■ Underlying cancer

- lung cancer (SCLC)
- mesothelioma
- oropharyngeal, gastric, pancreatic cancer
- malignant lymphoma

■ Drugs as a side effect

- antidepressants (mainly SSRI)
- antiepileptics
- antipsychotic agents
- cyclophosphamide, ifosfamide, vincristin



Treatment of SIADH

- **Water restriction**
 - to 800-1000 mL daily
- **Furosemide**
 - eliminates more water than sodium
- **Sodium chloride infusion**
 - normal saline (0.9 % solution)
 - slow gradual correction of natremia
 - not faster than by 0.5-1 mmol Na in 1 hour
 - rarely hypertonic saline (3% solution)
- **Vasopresin receptor antagonists**
 - acting on renal tubuli blocking V_2R





Nutrition support in cancer



Diagnosis of malnutrition

is based on simple clinical findings

- **Unwanted **weight loss** > 10 % per 6 months**
 - prognostically different from weight reduction
 - also applies to overweight and obese patients
- **Decreased **BMI****
 - interpretation depends on age and gender
- **Insufficient **food intake****
 - less than 60 % of usual intake more than 10 days
- **Nutrition impact symptoms**
 - increase risk and probability of reduced food intake
- **Serum albumin is not a reliable marker**



Median overall survival in cancer patients

in months, according to baseline weight loss and BMI
n=8160

		BMI 28	25	22	20		
WL	2.5 %	21.5	19.9	15.7	13.5	8.4	17.3
	6 %	14.2	11.9	10.5	10.6	7.8	11.3
	11 %	10.7	9.2	6.8	6.7	4.7	7.5
	15 %	8.1	8.1	6.2	5.4	4.4	6.2
		7.1	4.8	4.7	3.7	4.1	4.4
		13.1	10.2	8.1	6.1	4.7	

Martin L...Baracos V. *J Clin Oncol* 2015; 33:90-99.



Grading of weight loss in cancer patients

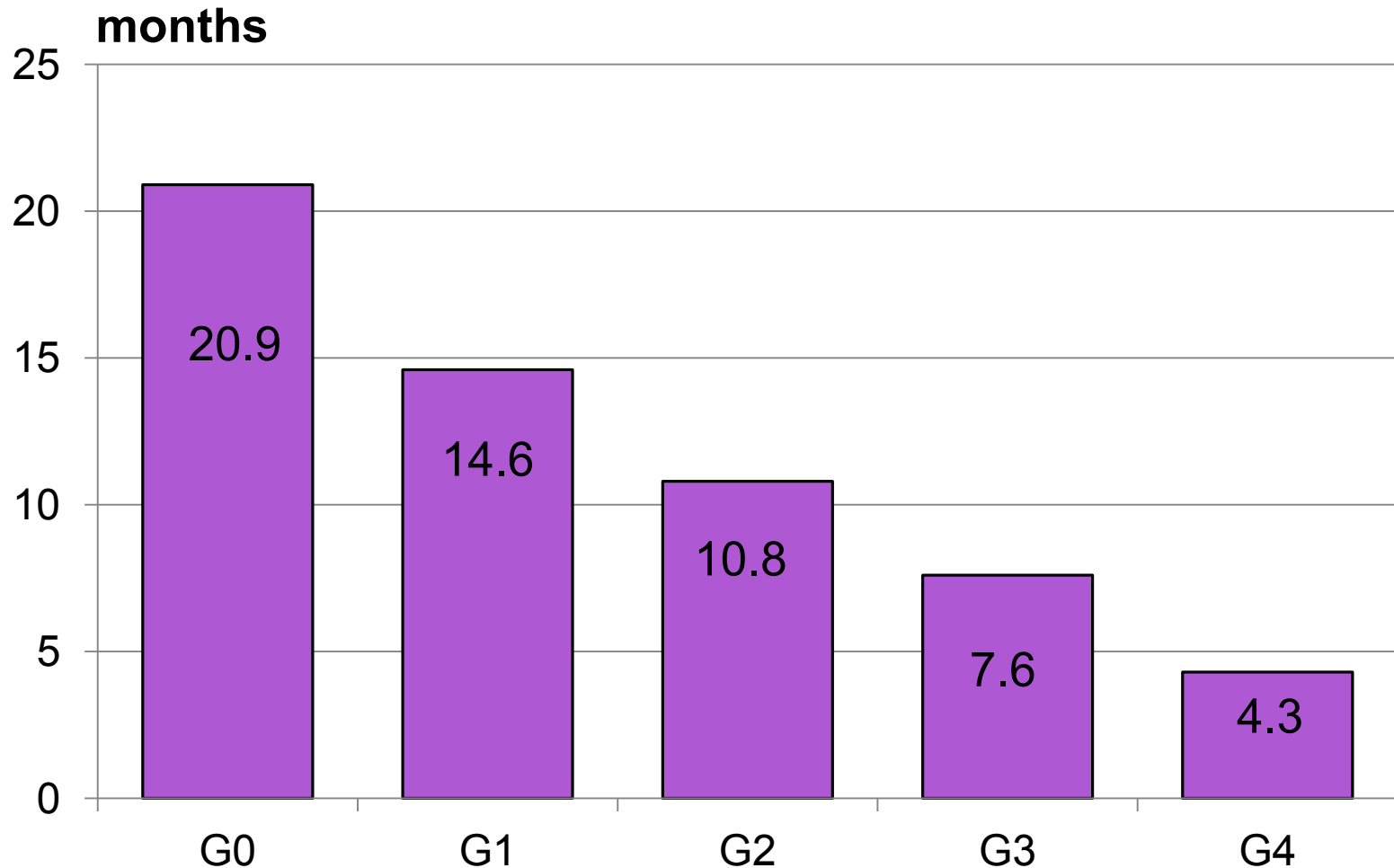
worsening prognosis through grades 1-4

		BMI 28 25 22 20						
WL 2.5 % 6 % 11 % 15 %	0	0	1	1	3	WL 2.5 % 6 % 11 % 15 %		
	1	2	2	2	3			
	2	3	3	3	4			
	3	3	3	4	4			
	3	4	4	4	4			
		BMI 28 25 22 20						

Martin L...Baracos V. J Clin Oncol 2015; 33:90-99.



Median overall survival in cancer patients by grading of weight loss, n=8160



Interpretation of BMI for diagnosis of underweight

low BMI alone should not be classified as malnutrition

	Age 18-25 <i>yr</i>	Age 25-65 <i>roků</i>	Age > 65 <i>roků</i>
BMI muži	19.0	20.5	22.0
BMI ženy	18.5	20.0	22.0

Example: BMI below 22 kg/m² in seniors is in the range of underweight and may support the diagnosis of malnutrition



High correlation of Mid Arm Circumference, MAC with BMI, n=1561

**Arm Circumference
cm**

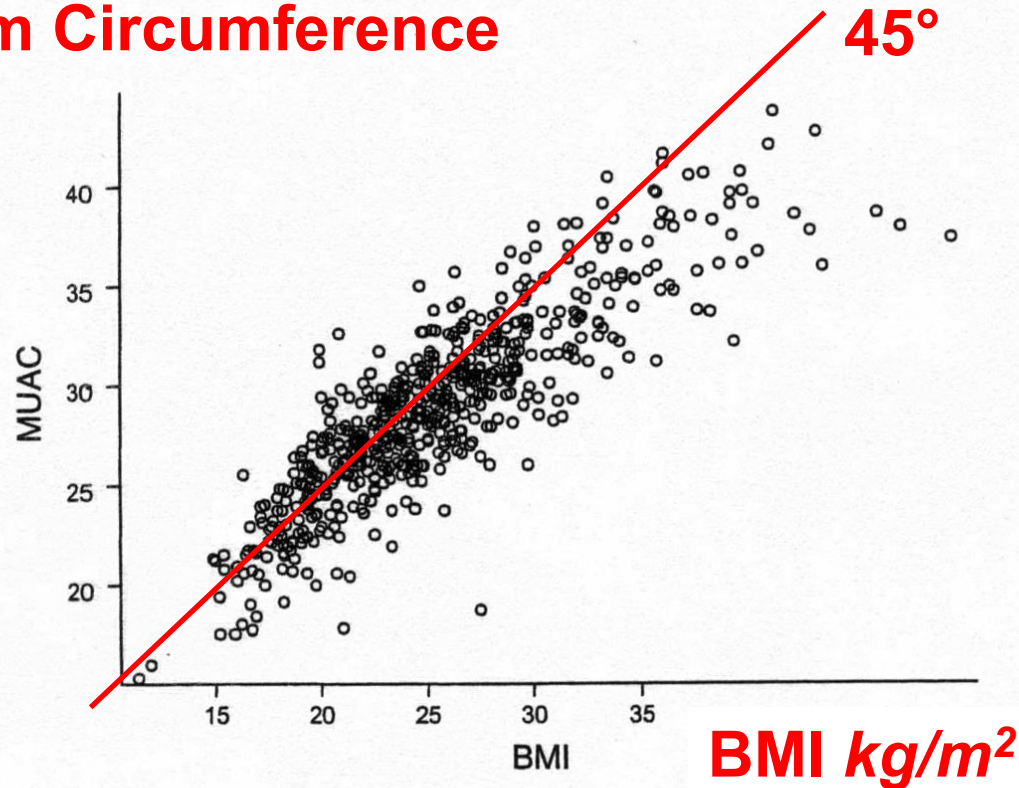


Fig. 1. MUAC vs BMI—all patients.

Change of 1 BMI unit
(3 kg for 173 cm height)
reflects 1 cm of MAC

3 mm change of MAC
reflects change 1 kg
in body weight

Applies to mid stature
173 cm ($1.73^2 = 3,0$)

There is approx. 5 unit
difference
between MAC and BMI



Mid Arm Circumferencer, MAC

cut-off values for diagnosis of malnutrition

OP	Normal (median) <i>cm</i>	Mild malnutrition <i>cm</i>	Severe malnutrition <i>cm</i>
Males	31.0	26.0	23.0
Females	30.0	25.0	22.0

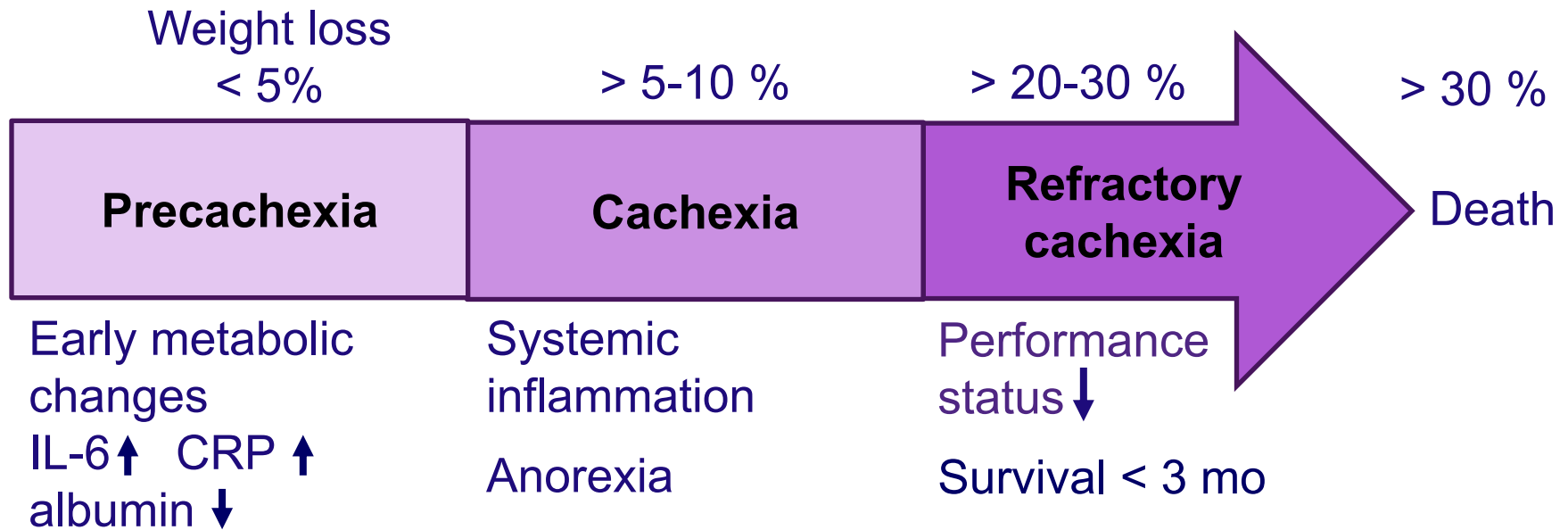
Applies to mid stature around 173 cm.

Excellent parameter in fluid retention, edema, ascites.



Cancer cachexia

is characterized by metabolic abnormalities with systemic inflammation in many, but not all patients, progressive loss of skeletal muscle mass is crucial



Glasgow Prognostic Score, GPS, range 0-2 points

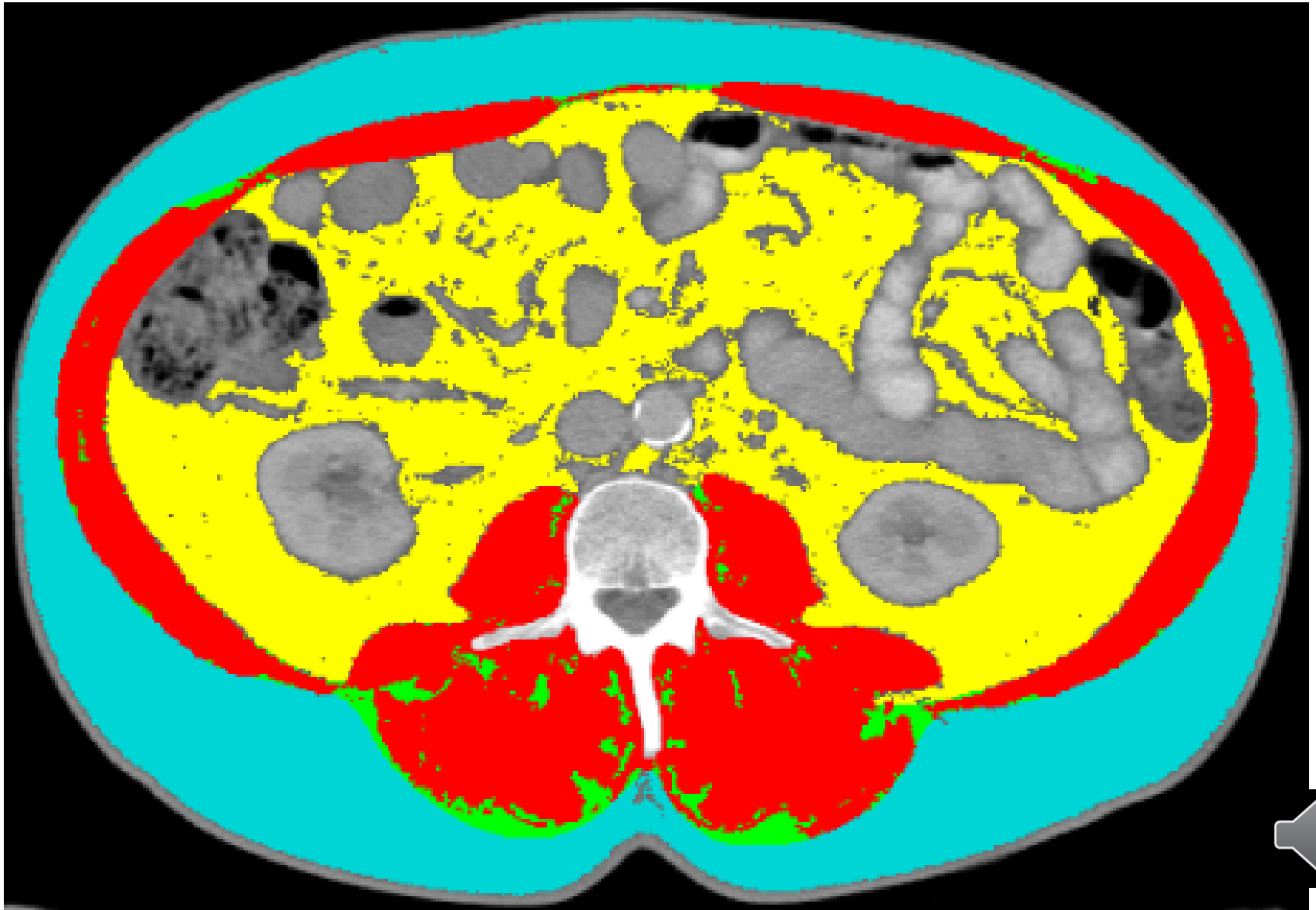
CRP > 10 mg/L
Albumin < 35 g/L

Score 1-2 points (in the absence of infection) reflects systemic inflammation, cancer cachexia and poor prognosis



Muscle area by CT at L3 level

enables calculation of total body muscle mass



Total energy requirements in cancer patients

Common low physical activity	25-30 kcal/kg/Day
	1.4 * BEE
Higher physical activity mostly younger pts. and males	30-35 kcal/kg/Day
	1.5 * BEE
Malnutrition, after weight loss mostly younger pts. and males	35-40 kcal/kg/Day
	1.6 * BEE

Expression per kilo BW applies to normal weight patients (normal BMI).
Corrected weight is used for overweight and underweight (to the middle
between Ideal BW (BMI 22 for mid age, 24 for seniors) and Actual BW.



Protein requirements in cancer patients

delivery of increased needs in cancer is safe

Mild / moderte malnutrition	1.2-1.5 g/kg/Day
Severe malnutrition	1.5-2.0 g/kg/Day
Renal isufficiency	1.0-1.2 g/kg/Day

Expression per kilo BW applies to normal weight patients (normal BMI). Corrected weight is used for overweight and underweight (to the middle between Ideal BW (BMI 22 for mid age, 24 for seniors) and Actual BW.



Dietary counselling

in cancer patient with anorexia/nausea

- **Relieve unnecessary dietary restrictions**
- **Treat nutrition impact symptoms**
 - pain, nausea, anorexia, diarrhea, constipation
- **Eat small portions 5-6 times a day**
- **Keep variety of foods**
- **Take energy dense foods**
 - increase fat intake
- **Increase protein intake**
- **Easy access to food snacks**
- **Attractive serving of meals**



Oral Nutritional Supplements, ONS

ready to use for sipping, 125-300 mL/can

- **Complete formulas for oral intake**
 - high content of energy, proteins, vitamins
 - specific composition (omega-3 fatty acids)
- **Liquid or creme consistency**
- **Cans 125 ml, 200 ml, 220 ml, 300 ml**
- **Many different tastes**
- **Easy used in dental and swallowing problems**
- **Easily digestible**
- **Success with ONS depends on adequate motivation and individual approach**



Classification of ONS

Category	Characteristic
High Protein	20 g proteins / can
High Energy	2 kcal / mL
Small volume	125 ml, concentrated up to 3.2 kcal / ml
Large volume	300 ml, up to 600 kcal / can
Diabetic formula	low glycemic index
Omega-3 PUFA	0.75-1 g EPA / can
Muscle support	HMB, high protein / vitamin D





Fine bore NG tube

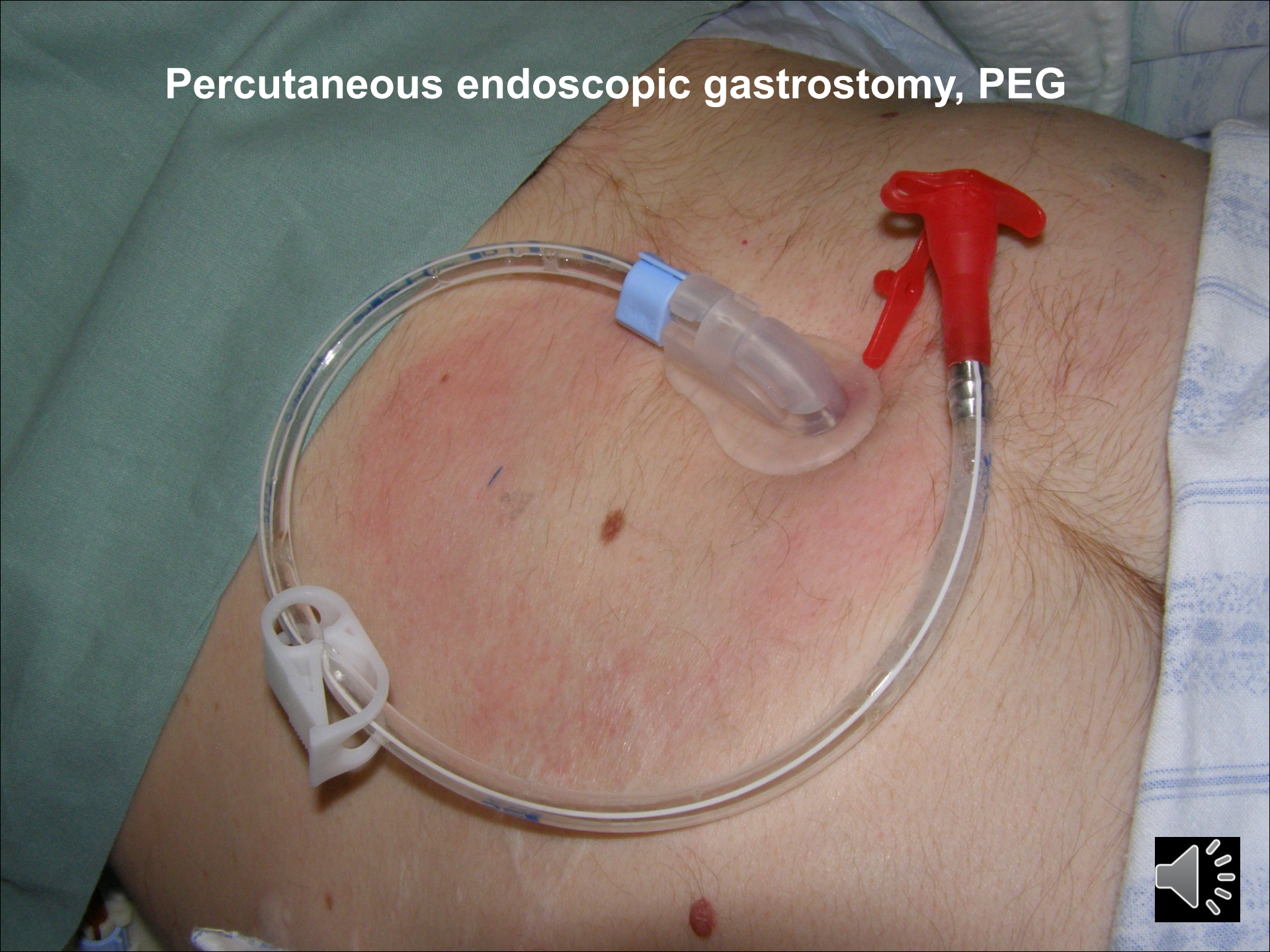
introduced by guidewire
for nasogastric feeding

Importance of fixation
to face


Polyuretan material
for use up to 3 months



Percutaneous endoscopic gastrostomy, PEG



Classification of products for tube feeding

Category	Characteristic	Signed
Standard	1.0 kcal / mL	Standard
Energy	1.5 kcal / mL (2 kcal / mL) 1500-2000 kcal / 1 L	Energy
High Protein	75-100 g proteins / 1 L	HP
Containing fibre	15 g fibre / 1L	Fibre
Diabetic formula	low glycemic index contains soluble fibre	Dia-, Dib- Glu-
Omega-3 PUFA	2 g EPA / daily dose of energy	
Muscle support	hydroxy-methyl-butyrate, HMB high protein and vitamin D	

Total parenteral nutrition (TPN)

in cancer patients

- **Enteral nutrition cannot be used**
 - bowel obstruction and other contraindications
- **Survival is more limited by malnutrition than progression of cancer**
- **Life expectancy > 3 months**
 - only patients surviving more than 2 mo profit from PN
- **Performance status KPSI > 50, ECOG 0-2**
 - ability to walk even upstairs
- **Family consensus, good background**
- **Start only after meticulous deliberation**
 - decision should not come from despair
 - PN should not prolong suffering



Supplemental parenteral nutrition, Suppl PN

new modality of nutrition support in cancer patients

Potential indication

■ Insufficient food intake

- inability to deliver more nutrients through GI tract
- signs of malabsorption (diarrhea)

■ Continuing weight loss

- despite oral nutritional intervention with ONS

■ Malnutrition has not been severe so far

■ Advanced cancer, but death is not imminent

- cancer is not rapidly progressive

■ For multimodal palliative care



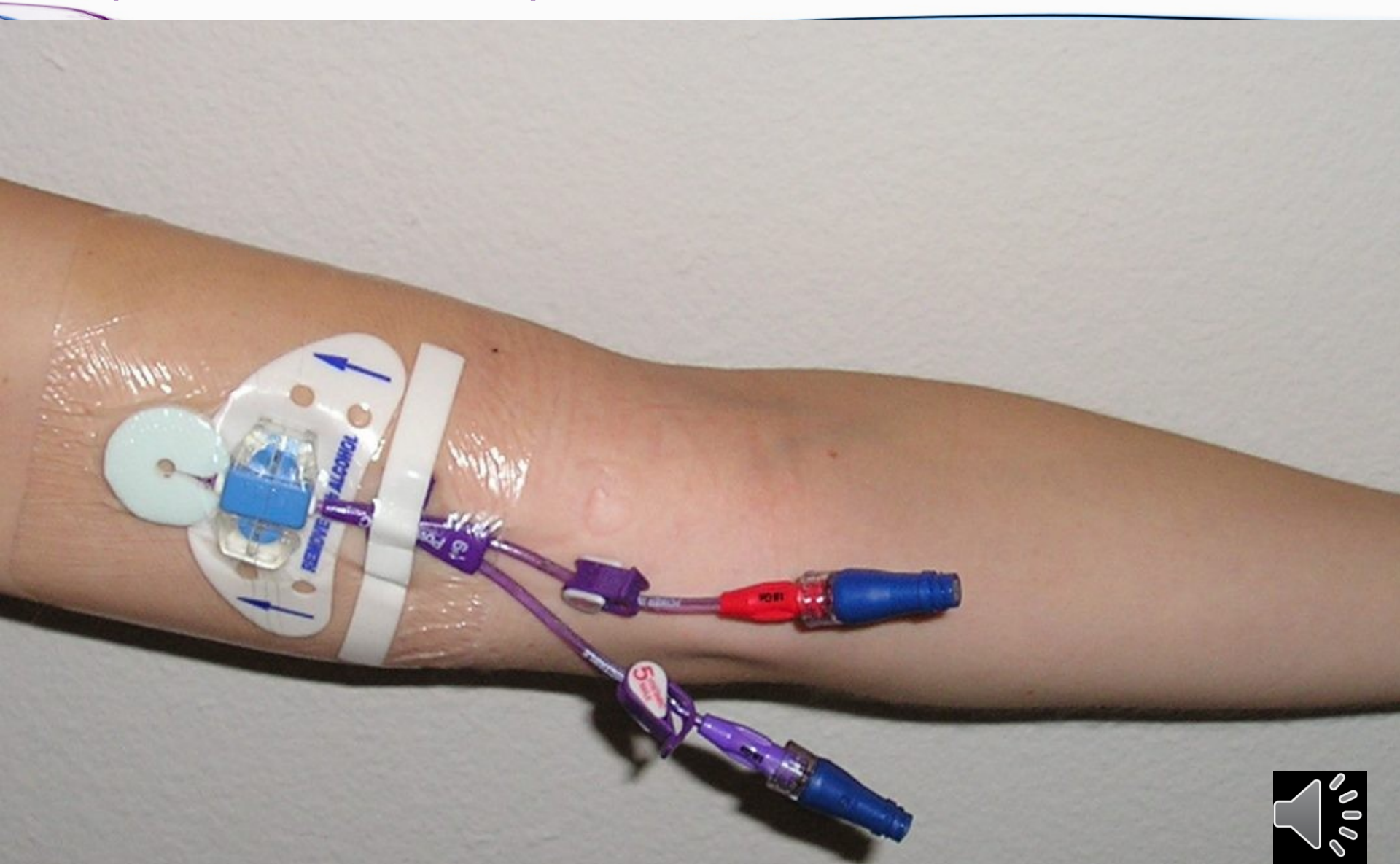
Advantages of supplemental PN

- **Partially preserved enteral intake**
 - supporting bowel function
- **Lower amount of i.v. nutrients**
 - lower side effects (hyperglycemia etc.)
 - lower risk of canulla infection
 - shorter time of delivery
- **Patient need not take PN each day**
 - depending on oral intake and body weight
 - free days from PN
- **Helps to keep body weight / muscle mass**
- **Improvement of Quality of Life**



PICC, Peripherally Inserted Central Catheter

tip of catheter in superior vena cava





Nutriflex Omega Special 1250 ml

3-chamber bag

1475 kcal

6100 kJ

Aminoacids 70 g

Glucose 180 g

Fat 50 g

EPA+DHA 3.1 g



SMOF Kabiven 986 ml

for supplemental PN



Content

1100 kcal

4600 kJ

AA 50 g

Glucose 125 g

Fat 38 g

**4-component
fat emulsion**

S **soya**

M **MCT**

O **oliv oil**

F **fish oil**



Preparation of „All in one“ admixture in hospital pharmacy





Lékárna FN BRNO, Jihlavská 20, Brno 62500
 Rodné č.: 986209/4594 Č. objedn.: 10 684
 Jméno: Gráfová Pavla Objem (ml): 1 620
 Odd.: IHOK ASEPT.J, Mudr. Tomiška

Neonutrin 15%	700.0 ml
Glukóza 40%	500.0 ml
Smoflipid 20%	350.0 ml
KCl 7.45%	20.0 ml
KH ₂ PO ₄ 13.6%	20.0 ml
Ca gluconicum 10%	20.0 ml
MgSO ₄ 10%	10.0 ml

Složení vaku:

Calcium [mmol]:	4,5	Natrium [mmol]:	0,0
H ₂ PO ₄ [mmol]:	20,0	Chloride [mmol]:	20,0
Magnesium [mmol]:	4,1	P org. [mmol]:	0,0
Kalium [mmol]:	40,0		

Obsah dusíku [g]:	15,6	Osmol. [mOsm/l]:	1 296,6
Cukry [g]:	200,0	Energie [kcal]:	1 897,6
Tuky [g]:	70,0	Konc. M+ [mmol/l]:	24,7
Bílkoviny [g]:	104,3	Konc. M++ [mmol/l]:	5,3

*** POUŽIT POUZE DO CENTRÁLNÍ ŽILY ***

Připravil: Burianová
 Kontrolovala: Mgr. Jana Pečivová
 Vytvořil: Mgr. Jana Pečivová
 Datum přípravy: 25.6.2018 Použitelné do: 2.7.2018
 Uchovávat při teplotě +2 °C až +8 °C, chránit před světlem
 Potřeba ručně přidat složky:

Lékárna FN BRNO, Jihlavská 20, Brno 62500

Rodné č.: 986209/4594 Č. objedn.: 10 684
 Jméno: Gráfová Pavla Objem (ml): 1 620
 Odd.: IHOK ASEPT.J, Mudr. Tomiška

Neonutrin 15%	700.0 ml
Glukóza 40%	500.0 ml
Smoflipid 20%	350.0 ml
KCl 7.45%	20.0 ml
KH ₂ PO ₄ 13.6%	20.0 ml
Ca gluconicum 10%	20.0 ml
MgSO ₄ 10%	10.0 ml

Složení vaku:

Calcium [mmol]:	4,5	Natrium [mmol]:	0,0
H ₂ PO ₄ [mmol]:	20,0	Chloride [mmol]:	20,0
Magnesium [mmol]:	4,1	P org. [mmol]:	0,0
Kalium [mmol]:	40,0		

Obsah dusíku [g]:	15,6	Osmol. [mOsm/l]:	1 296,6
Cukry [g]:	200,0	Energie [kcal]:	1 897,6
Tuky [g]:	70,0	Konc. M+ [mmol/l]:	24,7
Bílkoviny [g]:	104,3	Konc. M++ [mmol/l]:	5,3

*** POUŽIT POUZE DO CENTRÁLNÍ ŽILY ***

Připravil: Burianová
 Kontrolovala: Mgr. Jana Pečivová

Vytvořil: Mgr. Jana Pečivová
 Datum přípravy: 25.6.2018 Použitelné do: 2.7.2018
 Uchovávat při teplotě +2 °C až +8 °C, chránit před světlem
 Potřeba ručně přidat složky:

AiO bag, individualized dose of nutrients for 24 hr



New mixture of vitamins Viant®

contains all 13 vitamins

Vitamin		Unit	Requirement iv.	Viant lag.
B ₁	Thiamine	mg	6	6
B ₂	Riboflavin	mg	3.6	3.6
B ₃	Nikotinamidum	mg	40	40
B ₅	Ac.pantothenicum	mg	15	15
B ₆	Pyridoxin	mg	6	6
B ₇	Biotin	µg	60	60
B ₉	Acidum folicum	µg	600	600
B ₁₂	Cyanokobalamin	µg	5	5
C	Ascorbic acid	mg	200	200



New mixture of vitamins Viant[®]

contains all 13 vitamins

Vitamin		Unit	Requirement iv.	Viant lag.
A	Retinol equivalent	μg	800-1000	1000
D₃	Cholecalciferol	μg	20	5
E	Tocopherol-α equival.	mg	10	9.1
K₁	Phytomenadion	μg	150	150



Nutryelt®

new composition contains 9 trace elements

Trace element		Unit	Requirement iv.	Nutryelt
Zn	Zink	mg	3-6.5	10
Se	Selenium	µg	60-100	70
Fe	Iron	mg	1,2	1
Cu	Copper	µg	300-500	300
Mn	Manganese	µg	60-100	55
F	Fluor	µg	950	950
I	Iodine	µg	130	130
Mo	Molybdenum	µg	19	20
Cr	Chromium	µg	10-20	10





The end

