

Malnutrition differential diagnosis

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3rd Medical dpt

VFN

Nutritional disorders

- 1. Definition
- 2. Types of malnutrition
- 3. Differencial diagnosis of malnutrition
- 4. Therapy of malnutrition

Nutritional disorders

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Malnutrition- definition

Malnutrition is a pathologic status caused by decreased nutrients intake or increased catabolism.

Malnutrition- definition

- 20-90% in- patients
- 30% develops in the hospital
- 3-4% patients are critically imperil by malnutrition
- 44% malnourished patients have longer time and cost of stay in hospital

Malnutrition- definition



Malnutrition- definition



Malnutrition- definition



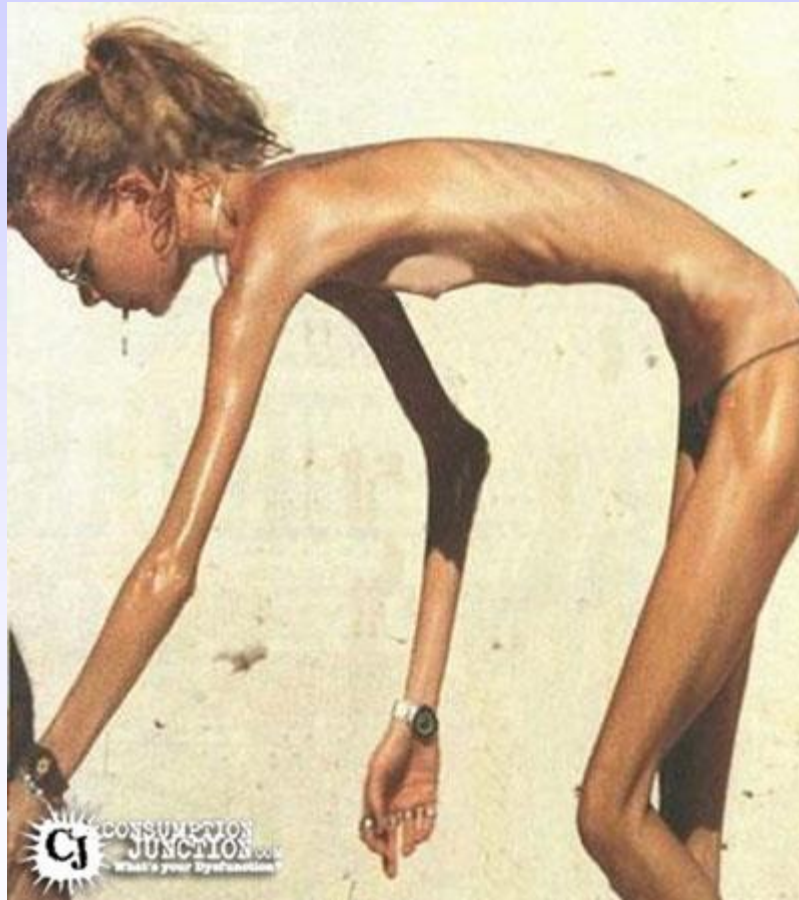
Nutritional disorders

- 1. Definition
- 2. **Types of malnutrition**
- 3. Differential diagnosis of malnutrition
- 4. Therapy of malnutrition

Types of malnutrition

- **Marasmus** = simple starving
 - absence of protein and energy
- **Kwashiorkor**
 - stressed starving
 - Decreased protein stores
- Combination of both

Types of malnutrition - marasmus



Types of malnutrition - marasmus

- Easy to recognize
- Gradual decrease of body weight
- Loss of muscles and fat tissues
- Laboratory OK

Types of malnutrition - kwashiorkor



Types of malnutrition - kwashiorkor

- Deficiency of protein in nutrition
- Appears in stress
- Accelerated catabolism
 - body proteins pool decreased
 - Fat stores intact
 - Marked hypalbuminemia
 - Extracellular fluid retention, swellings

Types of malnutrition - kwashiorkor

- Protein catabolism results
 - Musculature loss (300 g/24 hours)
 - Breath muscles attenuation (hypoventilation, hypoxia, bronchopneumonia)
- Albumin depletion under 30,0 g/l
 - fluids distribution disturbances (in interstitial and intravascular spaces)
- Transport protein depletion
 - Cortisol, trace elements, medication transport defects
- Decreased immunoglobulin levels
 - Immunity problems

Comparison

Marasmus

- energetic need
hypometabolism
- primary cause
decreased food intake
- development
months, years
- clinical findings
cachexy

Kwashiorkor

- hypermetabolism
(sepsis, polytrauma)
- decreased protein intake
catabolism
hormonal regulators
stress hormones, cytokines
- days, weeks
- well-nourished looking
oedemas, hair loss

Comparison

Marasmus

- Laboratory findings

within standards

- Clinical course

adequate reaction to
short-term stress

- lethality

low

Kwashiorkor

↓ albumin, transferin, lymphocytes

infections, reparation problems, decubital
ulcers, skin lesions, breath and heart
failure

high

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Differential diagnosis

- 1. IS the patient malnourished?
- 2. What is the REASON for malnutrition?



Differential diagnosis

- 1. IS the patient malnourished?
- 2. What is the REASON for malnutrition?

IS the patient malnourished?

- Anamnesis
- Clinical examination
- Laboratory findings

Malnutrition diagnosis

- Anamnesis
 - Weight loss - 1 M 5%, 6 M 10%
 - Appetite
 - Food intake
- Clinical finding
 - body weight, BMI
 - skin fold thickness (triceps)
 - muscle atrophy (arm circumference, hand grip)
 - oedemas
 - skin hypersensitivity tests (anergy)
 - vitamin carency

Malnutrition diagnosis

- Laboratory finding

- Serum albumin 30 g/l
- transferrin 2,0 g/l
- prealbumin 0,2 g/l
- lymphocytes < 1300 mm

Nutritional screening

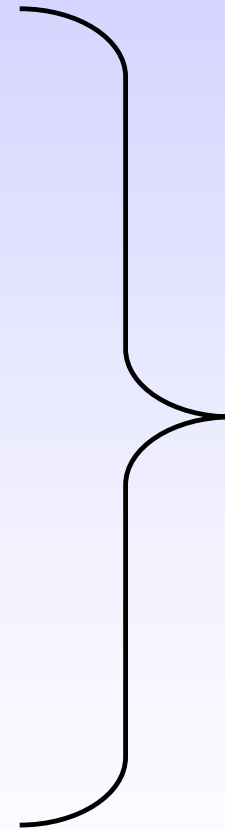
- **SGA**- subjective global assessment
 - Basal anthropometry, weight loss in 6 months, food intake, GIT symptoms
- **PNI**- prognostic nutritional index
 - anthropometry, skin hypersensitivity tests, serum protein concentrations
- **NRI**- nutrition risk index
 - Dietary habits, restrictions, diseases, feeding changes
- **MNA**- mini nutritional assessment ->

Mini nutritional assessment

- 18 questions - classification on points
- Basic screening: appetite, weight loss, moveability, psychic state, acute sickness, dementia, BMI
- Detail evaluation: social situation, pills, decubital ulcers, dietary habits (food amount, milk products, eggs, fruits, vegetable, fluids), arm circumference
- Result: malnutrition, malnutrition risk, good nutritional status

IS the patient malnourished?

- Anamnesis
- Clinical examination
- Lab findings



YES

NO

Differential diagnosis

- 1. IS the patient malnourished?
- 2. What is the REASON for malnutrition?

Etiology of malnutrition

1. Inadequate income

- Swallowing problems
- GIT obstructions
- GIT motility failure
- Consciousness derangement
- Food allergy
- Poverty
- Anorexia nervosa

Etiology of malnutrition

2. Digestion impairment

- gastrectomia
- Pancreato-biliar insufficiency
- Enzyme defects

Etiology of malnutrition

3. Resorption impairment

- Short bowel syndrome
- fistulas
- enteritis
- pharmacotherapy

Etiology of malnutrition

4. Metabolic malfunction

- Liver failure
- Renal insufficiency
- Respiratory insufficiency
- Intermedial metabolism impairment

Etiology of malnutrition

5. Increased loss and need

- Abscesses
- fistulas
- diabetes mellitus
- infections
- katabolic status, trauma, operation
- endocrinopathy
- Malignity

The reason of malnutrition – 1st step

- Anamnesis
 - PH: active tumor, GIT disease, previous surgery, food allergy, malabsorption, DM, ORL, stomatology, anorexia nervosa
 - Actual: appetite, swallowing problems, abdominal pain, dyspnea, diarrhoe, GIT complaining
- Clinical findings
 - Abdominal scars, fistulas, abdominal tumors
 - Ikterus
 - demency, hyperthyreosis

The reason of malnutrition – 2nd step

- Laboratory
 - Proteins, liver tests, renal functions, CRP
 - blood count
 - Tumor markers
 - Fe, LD, elfo, hormons
- Other methods
 - Ultrasound, X rays, CT, ECHO
 - Endoskopy
- Psychiatrists, gerontologists, neurologists

Nutritional disorders

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- 3. Differencial diagnosis of malnutrition
- 4. **Therapy of malnutrition**

Therapy of malnutrition – the goal

- Optimal nutrients and energy intake
- Compensate hydration and mineral dysbalances
- Vitamin deficiencies.

Therapy of malnutrition – WHOM?

To patients with imminent or present malnutrition.

Therapy of malnutrition

When choosing the nutritional support we try to find the most physiological way.

- No contraindications – select enteral way.
- Parenteral nutrition just in case that enteral nutrition is contraindicated.

Therapy of malnutrition

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Artificial nutrition

ENTERAL

PARENTERAL

Administration of enteral nutrition

1. Peroral

- sipping



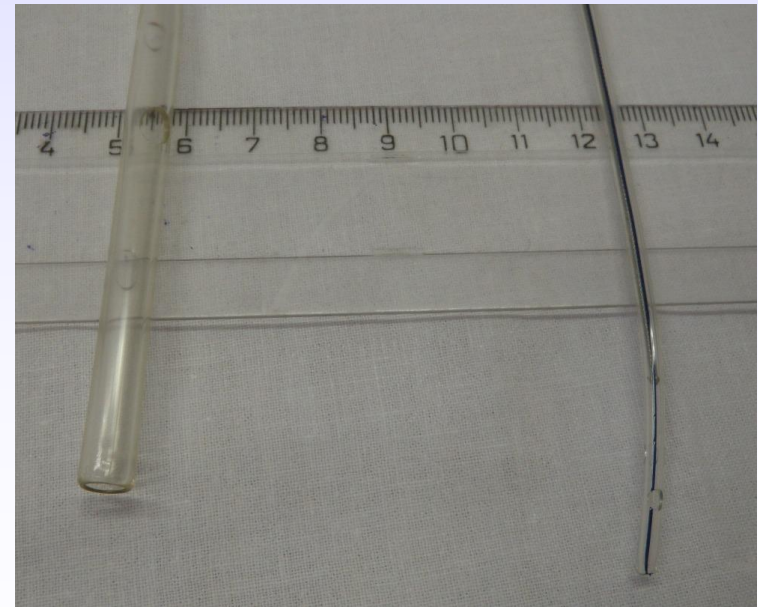
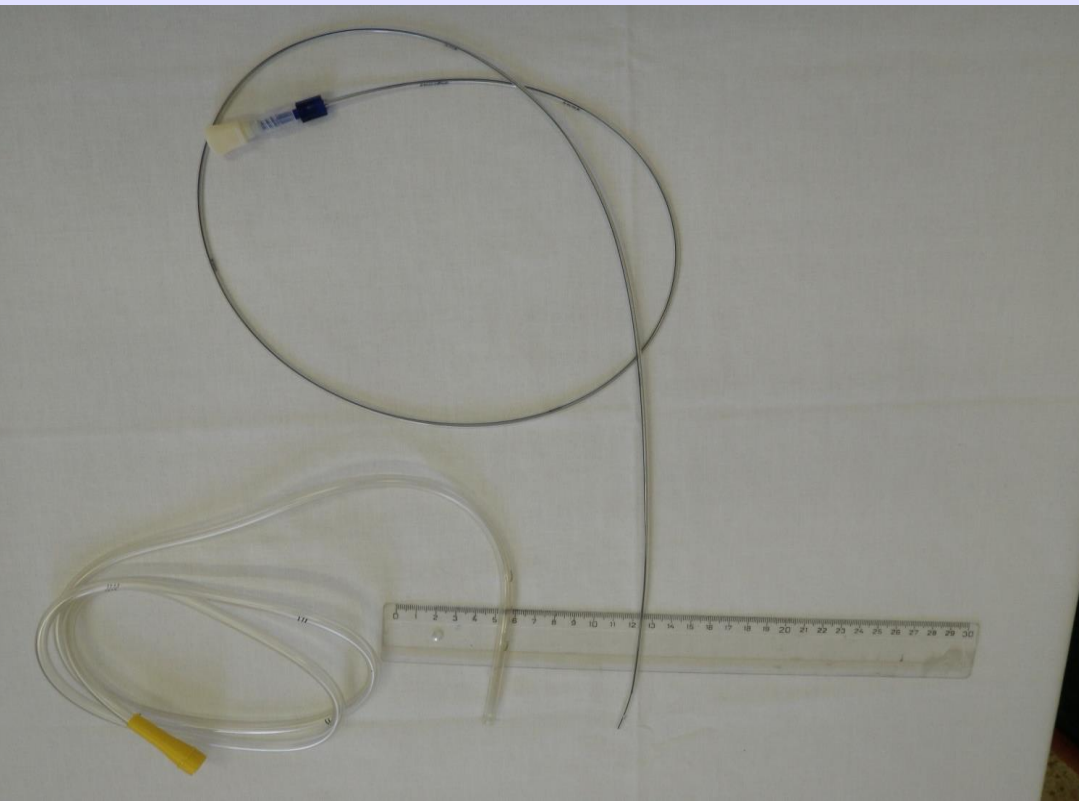
- Modular dietetics



Administration of enteral nutrition

2. Tubes (short-time, up to 6 w.)

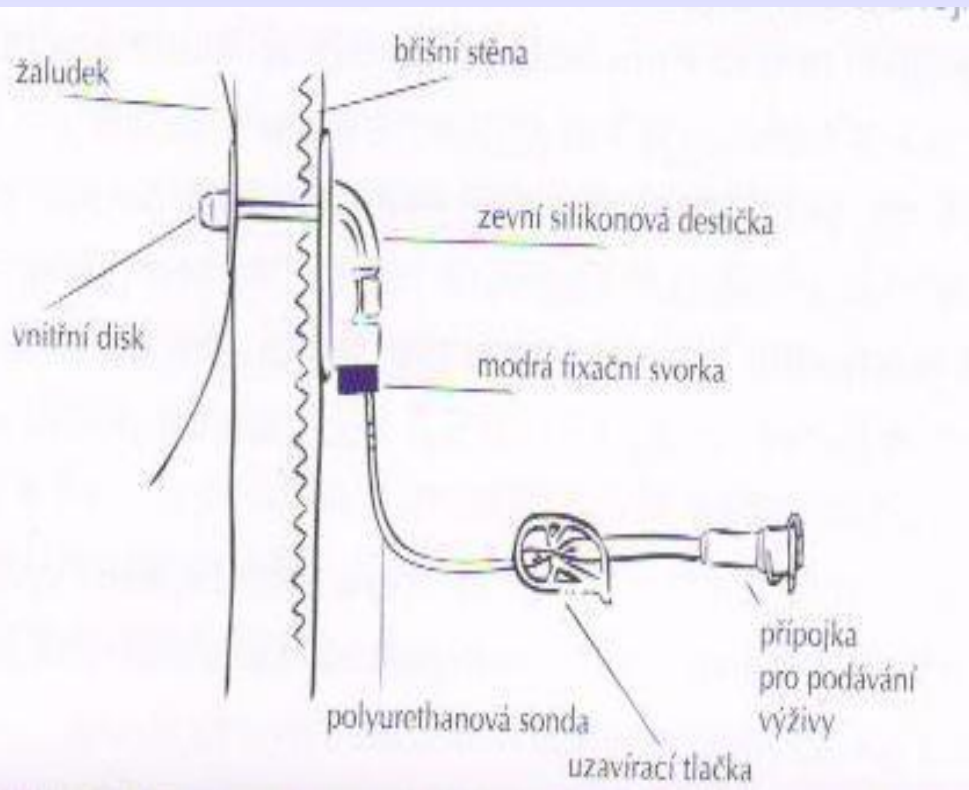
- Nasogastric tube
- Nasojejun tube



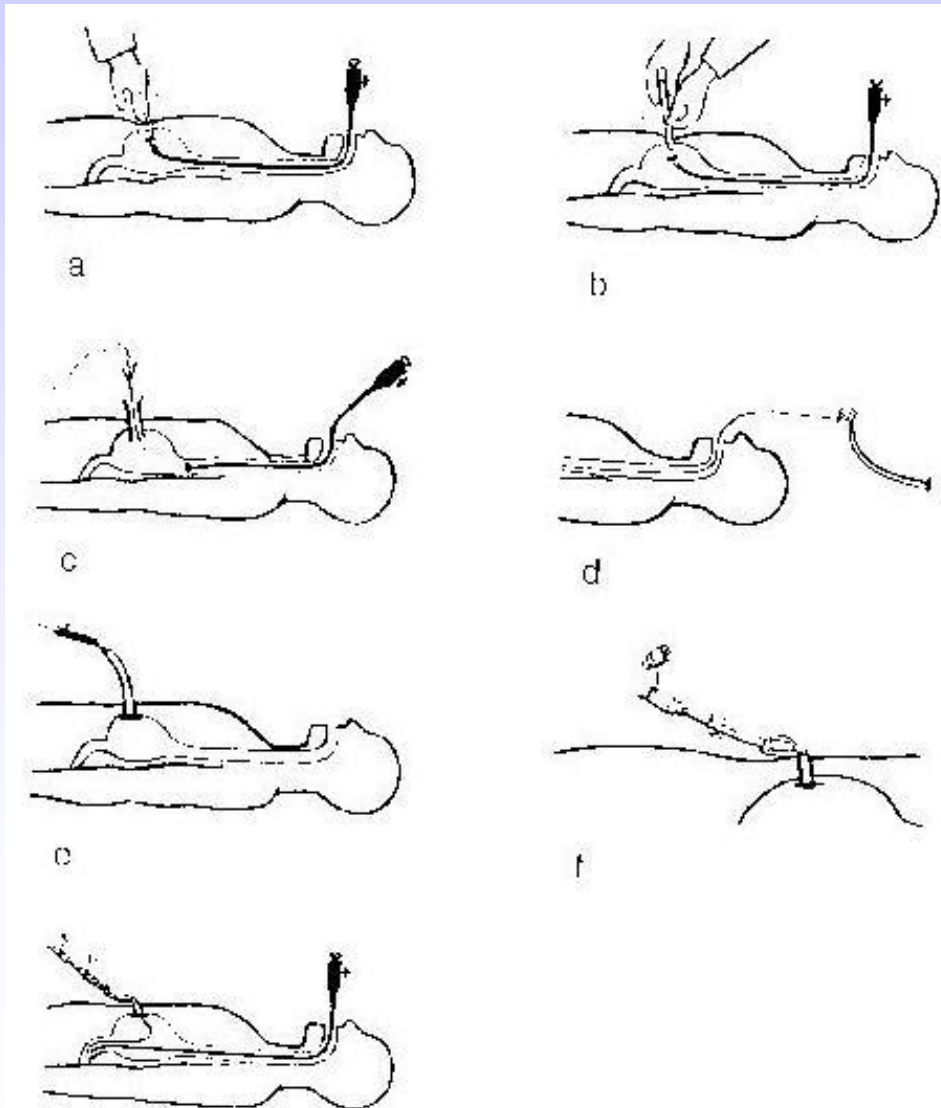
Administration of enteral nutrition

3. PEG (percutaneous endoscopic gastrostomy)

4. Jejunostomia



PEG insertion





GE Healthcare
Healthcare
GE Healthcare
GE Healthcare
GE Healthcare
GE Healthcare
GE Healthcare
GE Healthcare
GE Healthcare
GE Healthcare

30301

Administration technique

- continuously
 - Pump
 - 60 – 140 ml/h
- bolus
 - 250-400 ml



Polymeric enteral nutrition

- Contains: defined energy (1-2 kcal/ml), nutrients, minerals, vitamins and trace elements amount
- No cholesterol, no glutamine
- With/without fiber
- Lower osmolarity than oligomeric EN
- Tasty

Oligomeric enteral nutrition

- Chemically defined energy (1-2 kcal/ml), nutrients, minerals, vitamins and trace elements amount
- amino acids, oligo, mono a disaccharides, esterificated FA
- No need of digestive enzymes
- Jejunal tube
- No cholesterol, no glutamine, no gluten, no lactose, no fiber
- Higher osmolarity than polymeric EN (hyperperistaltics, diarrhea and dehydration risk)
- Lower palatability

EN advantages

- Physiological way for food intake
- Enteral mucosa cells nutrition (atrophy prevention, perfusion improvement, less infections)
- Bowel motility improvement
- Peptic ulcer prevention
- Hepatobiliary system maintain
- GIT hormones production stimulation
- Economical aspects

Artificial nutrition

ENTERAL

PARENTERAL

Parenteral nutrition indications

- When enteral nutrition contraindicated
- Combination EN and PN !!!

Parenteral nutrition administration

- Peripheral canulas

- Short-term PN
- Vessels inflammation (under 900 mosmol/l)



- Central venous line

- Long-term PN
- Home PN

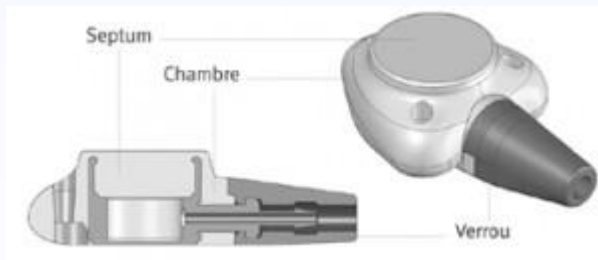


Central venous line accesses

- Tunnel catheters
 - Home PN



- Portcatheters



Způsoby podávání parenterální výživy

- Single infusions
- Multiple bottle system

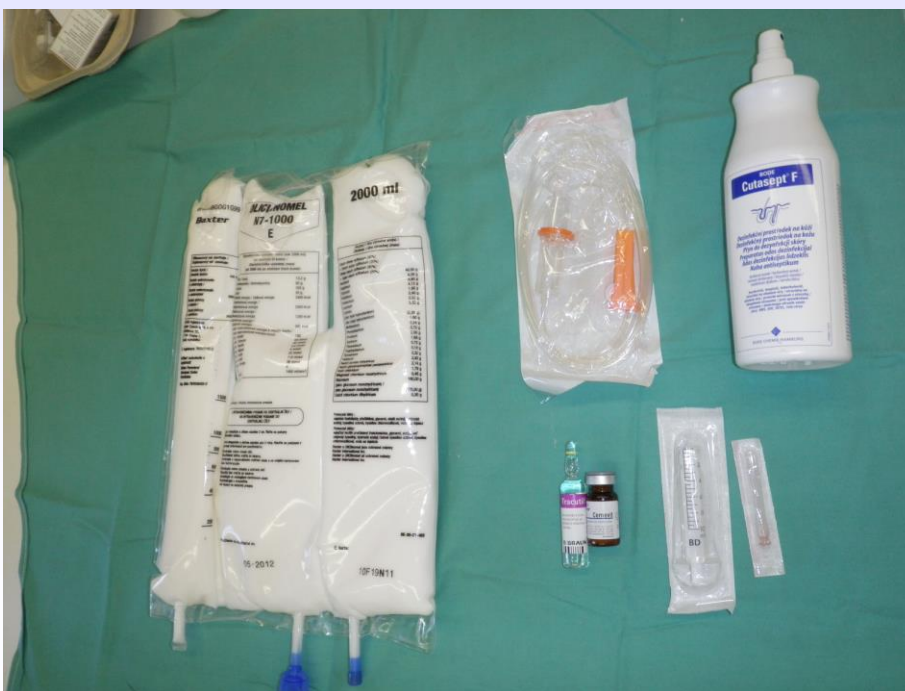
- All in one

- Commercial sacks



- Magistraliter prepared sacs





Parenteral nutrition complications

- Metabolic complications
 - hyperglycemia, hypoglycemia, electrolyte dysbalance
 - Vitamin or trace elements deficiency
 - Acute liver steatosis, cholecystolithiasis
- Catheter complications
 - sepsis
 - Air embolism
 - Trombo-embolism

Energy expenditure

$$\text{TEE} = \text{BEE} \times \text{AF} \times \text{IF} \times \text{TF}$$

- BEE – basal energy expenditure
- AF – activity factor
- IF – injury factor
- TF – thermic factor

Basal energy expenditure

$$(TEE = BEE \times AF \times IF \times TF)$$

- Using charts
- Indirect calorimetry
- Calculation – Harris-Benedict equation

$$\text{Men: BMR} = (66,47 + 13,75 \times W + 5 \times H - 6,75 \times A) \times 1,3$$

$$\text{Women: BMR} = 655,09 + 9,6 \times W + 1,86 \times H - 4,86 \times A$$

W- weight

H- height

A- age

Activity factor

$$(TEE = BEE \times AF \times IF \times TF)$$

- In bed - immobilized 1,1
- In bed - mobile 1,2
- Mobile out of a bed 1,3
- ALV 0,9

Injury factor

$$(TEE = BEE \times AF \times IF \times TF)$$

- Without complications 1,0
- Postoperative 1,1
- Fracture 1,2
- Sepsis 1,3
- Peritonitis 1,4
- Polytrauma 1,4
- Polytrauma + sepsis 1,6
- Burn injury 30-70% 1,7-1,8
- Burn injury 70-90% 2,0

Thermic factor

$$(TEE = BEE \times AF \times IF \times TF)$$

- TT 38° C 1,1
- TT 39° C 1,2
- TT 40° C 1,3
- TT 41° C 1,4

