NUTRITION CHALLENGES IN PEDIATRIC PATIENTS WITH CANCER

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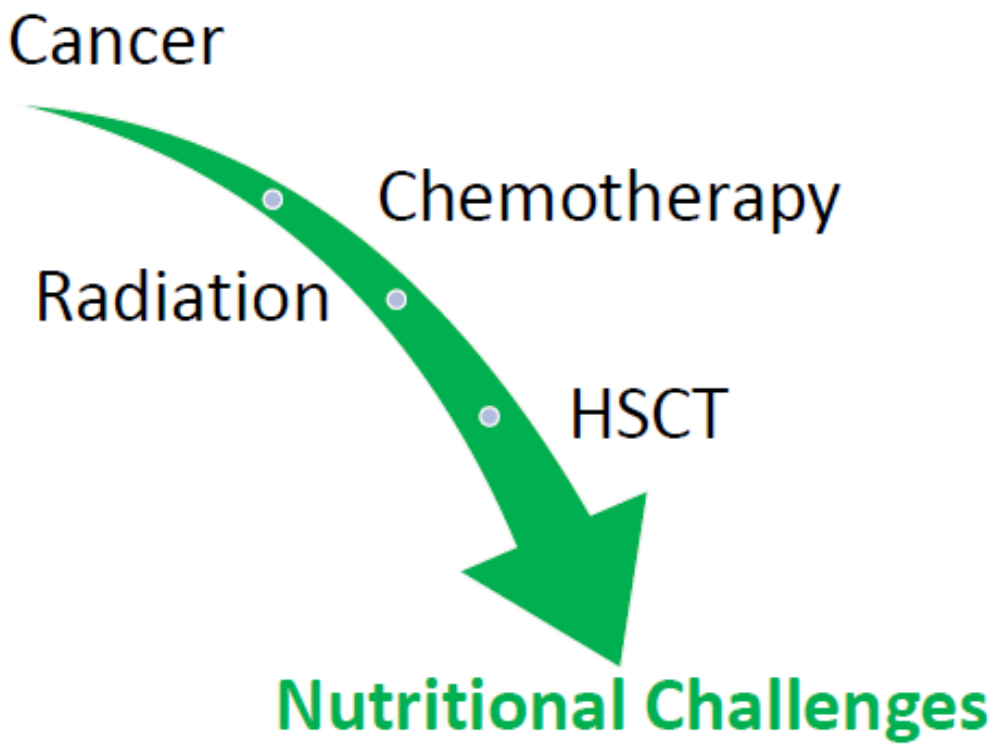
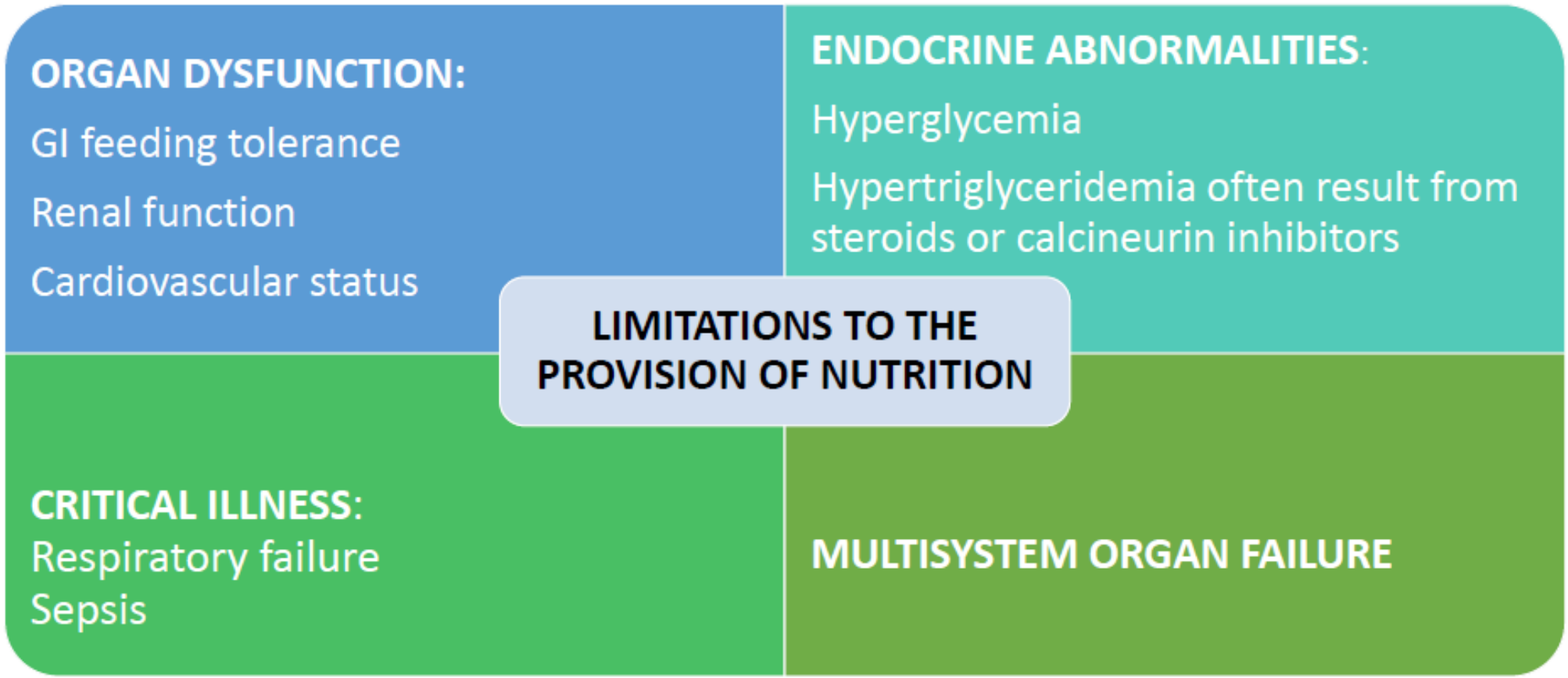

Cancer
Chemotherapy
Radiation
HSCT
Nutritional Challenges


ORGAN DYSFUNCTION:
GI feeding tolerance
Renal function
Cardiovascular status
ENDOCRINE ABNORMALITIES:
Hyperglycemia
Hypertriglyceridemia often result from steroids or calcineurin inhibitors
LIMITATIONS TO THE PROVISION OF NUTRITION
CRITICAL ILLNESS:
Respiratory failure
Sepsis
MULTISYSTEM ORGAN FAILURE

NUTRITIONAL STATUS

- The prevalence of malnutrition in pediatric and adult patients with hematological malignancies ranges from 30 to 55%.

NUTRITIONAL STATUS

- Disease itself
- Chemotherapy or radiotherapy
- Side effects of medications, including nausea, vomiting, diarrhea, mucositis
- Complications of HSCT like the development of graft-versus-host disease after allogeneic HSCT

NUTRITIONAL STATUS

- Certain diagnoses are more likely to be associated with malnutrition at the time of diagnosis and during therapy

TUMOR TYPES ASSOCIATED WITH MALNUTRITION

High risk factor for undernourishment	Moderate risk factor for undernourishment	High risk factor for fat accumulation
Solid tumors with advanced stages Wilms tumors Neuroblastoma stage III and IV Rhabdomyosarcoma Ewing sarcoma Medulloblastoma Multiple relapsed leukemia and lymphoma Head and neck tumors Post stem cell transplantation (graft vs. host-disease) Diencephalic tumors	Nonmetastatic solid tumors Uncomplicated acute lymphoblastic leukemia Advanced diseases in remission during maintenance treatment	Acute lymphoblastic leukemia receiving cranial irradiation Craniopharyngeoma Malignancies with large and prolonged doses of corticosteroid therapy or other drugs increasing body fat stores Total body or abdominal or cranial irradiation

NUTRITIONAL STATUS - UNDERNOURISHED PATIENT

- ↑ Risk for treatment-related complications
- ↓ Tolerance to therapy
- Altered drug metabolism
- ↑ Susceptibility to infection
- Poorer treatment outcome

NUTRITIONAL STATUS – OBESE PATIENT

- Greater treatment-related mortality
- ↑ Relapse rates,
- Inferior survival
- ↑ Comorbidities (hyperlipidemia, hypertension, coronary heart disease, stroke, high blood pressure, diabetes, and other chronic diseases)
- Underdosing or overdosing medications

NUTRITIONAL STATUS

- Prevention of malnutrition and preservation of nutrition status is vital for better treatment outcomes.

NUTRITIONAL STATUS

- Children may be at particularly higher risk of acute malnutrition due to limited nutrient stores and increased demand for growth.
- No specific nutrition protocols exist for pediatric oncology

NUTRITION-FOCUSED PHYSICAL EXAMINATION

- Assessment of overall appearance,
- Vital signs,
- Assessment of hydration status,
- Presence of edema, ascites,
- Presence of cachexia,
- Bowel history,
- Signs and symptoms of macronutrient deficiencies,

NUTRITION-FOCUSED PHYSICAL EXAMINATION

- Assessment of wounds and wound healing
- Signs and symptoms of micronutrient deficiencies;
- Appearance of the skin, nails, and hair;
- Presence of dry mucous membranes,
- Oral and dysphagia assessment;
- Presence of glossitis, stomatitis, and cheilosis
- Presence of petechia or ecchymosis,

BIOCHEMICAL AND HEMATOLOGICAL DATA

- Albumin, prealbumin, retinol-binding protein, and transferrin
- Blood glucose levels
- Lipid profiles
- Hemoglobin, hematocrit
- Total lymphocyte count
- White blood cell counts
- Neutrophils

NEEDS

ENERGY NEEDS

- Patients are in a hypermetabolic state with increased catabolism and metabolic rate due to:
  - Chemotherapy regimen
  - Mucositis,
  - Fever,
  - Tissue repair,
  - Marrow regeneration,
  - Post treatment complications
  - ✓……

PROTEIN NEEDS

- Protein requirements are increased to:
  - 1.Minimize loss of lean body mass
  - 2.Promote tissue repair.

FLUID NEEDS

- Increased need with:
  - Fever,
  - GI losses (eg, vomiting, diarrhea),
  - Mucositis,
  - Open skin wounds,
  - ✓……..

VITAMIN AND MINERAL NEEDS

- If oral intake or enteral nutrition support does not meet the vitamin and mineral needs, then an iron-free multivitamin and mineral supplement should be provided.
- Generally, iron supplementation is not required in patients
  - because they receive frequent blood transfusions

- The risk of vitamin and mineral deficiency is particularly higher in:
  - Diarrhea,
  - Vomiting,
  - Malabsorption.

VITAMIN K

- Vitamin K deficiency:
  - Inadequate intake,
  - Antibiotic use,
  - Malabsorption.
- Prothrombin time is a good indicator of significant vitamin K deficiency.
- Vitamin K supplementation of 1 mg should be provided weekly.

VITAMIN D

- Altered bone metabolism:
  - Methotrexate,
  - Steroids,
  - Cyclosporine,
  - Total body irradiation,
  - Physical activity limitation,
  - Lack of sun exposure,
  - Nutrition problems.
  - Osteopenia, osteoporosis.
  - pathologic fractures.
- Vitamin D as an important immune-modulator.
- Vitamin D3 might be able to maintain and improve the patient's immune balance and epithelial barrier function.

ZINC

- In patients with severe chronic diarrhea, zinc losses may be significant and supplementation may be necessary.
- Zinc plays an important role in thymic function and immune homeostasis.

VITAMIN B12

- The mucosal damage potentially leads to an impaired production of intrinsic factor and vitamin B12 absorption.

FOLIC ACID

- Support hematopoietic recovery.

OMEGA-3 FATTY ACID

- Omega 3 fatty acid plays a role as an immunomodulatory factor.
- Theoretically, omega 3 fatty acid might mitigate the cytokine storm and contribute to a reduced incidence of complications.

COMPLICATIONS OF TREATMENT

NAUSEA VOMITING

- Small frequent meals,
- High carbohydrate content
- Non-acidic beverages,
- Cold clear foods and beverages,
- Avoid extreme temperatures and highly seasoned items,
- Avoid high-fat content items

Anorexia

- Small frequent meals,
- Nutrient-dense foods and supplements,
- Carbohydrate and protein modulars,
- Create a pleasant atmosphere,
- Dine with the child, vary colors/flavors/textures of foods

Diarrhea

- Low fat,
- Room temperature foods,
- Avoid caffeine,
- Encourage adequate fluid intake

Dysgeusia

- Herbs, spices, and marinades,
- Cold non-odorous foods,
- Fruit-flavored beverages,
- Good oral hygiene,
- Mint mouthwashes,
- Lemon-flavored beverages
- Sour candies

Mucositis

- Soft diet,
- Smooth bland moist foods,
- Frozen slushes/ices/ice cream,
- High-calorie liquid beverages

Xerostomia

- Moist foods,
- Encourage liquids with meals,
- Add sauces/gravy/butter/broth,
- Add vinegar and lemons to stimulate saliva,
- Good oral hygiene

CANCER CACHEXIA

- Protein-energy malnutrition and Loss of adipose tissue and lean body mass as a result of:
  - 1) Inadequate intake
  - 2) Increased stress and catabolism of disease
  - 3) Side effects of anticancer treatment

CANCER CACHEXIA

- Decreased functional capacity
- Decrease in BUN
- Decrease in serum albumin level
- Increased toxicity of antineoplastic treatment
- Increased length of stay
- Increased risk of nosocomial infections.
- Negative nitrogen balance

Glycemic control is important

- increase the risk of infectious diseases
- impaired neutrophil and other immune cells.
- endothelial dysfunction
- elevation of proinflammatory cytokines
- catabolism of muscle and fat.

NEW RECOMMENDATIONS

NEW RECOMMENDATIONS

- FDA-published guidelines, which promote safe food handling to prevent food contamination in these patients, should be followed in inpatient and outpatient settings.

NEW RECOMMENDATIONS

- These guidelines allow for fresh fruits and vegetables as long as they have been adequately washed.
- Cleaning (cleaning the lids of canned foods before opening, hand washing)
- Separating raw meats from other foods
- Cooking to the right temperature (cooking eggs until the yolk and white are firm),
- Chilling/refrigerating food appropriately are strongly emphasized.

GENERAL RECOMMENDATIONS

- Buy food safely: Choose foods, where possible, that are packaged in individual/small portions.
- Store food safely: Store food in small individual packets if possible.
- Avoid high-risk foods i.e. foods which are potential sources of food poisoning.
- When eating away from home choose good quality restaurants and avoid takeaways, food sold from street vendors, market places, salad bars, buffets, and ice-cream vans until you are off immunosuppressant medications.

NEW RECOMMENDATIONS

- The use of packaged food (which can be eaten after opening within 24 h) and allow family members to bring self-prepared food.

NEW RECOMMENDATIONS

- The inclusion of fiber-rich fruits and vegetables might also be beneficial for the gut microbiota by providing the substrate for production of short chain fatty acids supporting immune reconstitution.

NEW RECOMMENDATIONS

- In patients with intestinal GvHD, lactose- and fat-free/reduced food in the acute phase, can be beneficial.

- A lactose-free diet possibly limits Enterococcus growth within the gut microbiota of HSCT patients and thereby may reduce the severity of GvHD.

THANKS…


When diet
is wrong, medicine is of no use.
When diet is right, medicine is
of no need.