



HOW DOES NUTRITION IMPROVE RADIOTHERAPY OUTCOMES?

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Objectives

- Discuss the role of nutrition during radiation treatment and how malnutrition alters the ability to tolerate radiation therapy
- Discuss macronutrient needs in the radiation patient population.
- Be able to discuss GI specific side-effects of radiation therapy and the nutrition management of these side-effects
- Discuss types of feeding tubes and prophylactic vs reactive tube placement



Disclosure

- I have no conflicts of interest to report.

Why is nutrition important?

- Prevents muscle wasting and weight loss
- Improves management of side effects
- Less trips to EC for hydration
- Avoid missing treatments
- Improved quality of life and performance status
- Less fatigue
- Shortened recovery time post treatment
- Decreases infections, morbidity, and mortality

“Let food be thy medicine and medicine be thy food.”

-Hippocrates

Cancer-Related Metabolic Changes

- Alteration of enzyme activity and immune system
- Changes in energy expenditure and basal metabolism
- Changes in carbohydrate, lipid, protein metabolism
- Depletion of fat, protein, water, and mineral stores
- Cachexia

Nutrition Assessment

- Diet history
- Energy and protein intake
- Changes in food and fluid/beverage intake
- Adequacy and appropriateness of nutrient intake or nutrient administration
- Intake from enteral nutrition
- Changes in type, texture, or temperature of food and liquids
- Use of fortified nutrition beverages
- Food avoidance and intolerances
- Meal or snack pattern changes
- Factors affecting access to food
- Medical history
- Labs
- Medications
- Anthropometrics
- Nutrition Impact Symptoms (NIS)
- Functional capacity
- Nutrition focused physical exam

Nutrition Goals

- Maintain weight
- Adequate calorie/protein/fluid intake
- Manage/minimize treatment related side effects
- Generally recommend plant based diet with some low-fat/lean animal proteins unless diet modification needed with treatment related side effects

Calorie Goals

- Individualized for each patient based on height, weight, age, physical activity level, acuity of disease and treatment
- Goal is to **MAINTAIN** weight during treatment and recovery
- Often more calories are required during and after treatment
- Encourage patient to increase calories by “power packing” tolerated foods or utilizing fortified nutrition drinks.



Protein Goals

- **GOAL-** to consume adequate amounts of protein to spare lean muscle tissue while repairing damage from radiation
- Encourage each meal or snack contain a source of protein



- **Animal Sources:**

- Red Meats : beef, pork, lamb, goat (limit)
- Poultry : chicken, turkey, duck
- Fish & Seafood
- Eggs or Egg Substitutes
- Dairy Foods : milk, yogurt, cheese, cottage cheese



Protein Goals

- **Plant Sources:**

- Soy Foods : tofu, soy nuts, soy milk, miso, edamame
- Nuts and Nut Butters
- Beans and Legumes
- Grains: quinoa, bulger, amaranth



- **Other Protein Sources**

- Protein Powders : whey, soy, pea, peanut, hemp, rice
- Protein Bars
- Protein Supplement Drinks



Fluid Goals

- Hydration effects bowel movements, nausea, kidney function, serum electrolytes, heart function
- Non-caffeinated and non-alcoholic fluids
- Water, sports drinks, juices, milks, broth, Jello, popsicles

Nutrition Impact Symptoms

- Anorexia and early satiety
- Constipation
- Diarrhea
- Gas
- Nausea and vomiting
- Mucositis and esophagitis
- Dysphagia
- Dysgeusia and ageusia
- Xerostomia and excessive thick secretions
- Weight loss
- Malabsorption
- Fatigue

Managing Side Effects

- **Mucositis/Esophagitis**

- Choose soft, moist foods
- Avoid rough textures, acidic, tart, spicy foods
- Cut foods into small bites and chew well
- Puree foods in a blender adding milk or broth
- Add non-acidic sauces and gravies to foods
- Avoid temperature extremes
- Drink adequate amounts of fluids
- Practice good oral hygiene
- Speak with medical team regarding medications



Managing Side Effects



- **Changes in Taste and Smell**
 - Good mouth care
 - Metallic taste- use plastic utensils, avoid canned foods
 - Salty/Bitter taste- combat with sweet flavors
 - Sweet taste- increase salty and tart flavors
 - Add seasonings that you may not normally use
 - Marinate and cook meats in sweet juices, fruits, acidic dressings
 - Clear taste buds with sugar-free gum, peppermints, pickles, lemon drops, lemon/lime sorbet, frozen fresh fruits
 - Zinc
 - “Tincture of time”

Managing Side Effects

- **Nausea/Vomiting:**

- Nausea medication 30 minutes before meals
- Small frequent meals/snacks to keep something on your stomach
- Avoid favorite foods
- Avoid greasy or spicy foods; foods with strong smells; cold/bland foods may be best
- Suck on lemon drops, mints, ginger candy, tart foods
- Fluids between meals; use cup with lid and straw if smells trigger nausea
- Clear liquids: soup, broth, gelatin, lemonade, popsicles, tea, ginger ale

Managing Side Effects

- **Diarrhea**

- Increase fluid intake
- Electrolytes lost with diarrhea; increase consumption of high potassium and sodium foods/fluids
- Small frequent meals
- Limit high fiber foods
- Limit high fat foods
- Avoid alcohol, caffeine, spicy foods, hot liquids
- Avoid hot fluids
- Limit or avoid dairy foods if these make diarrhea worse
- Limit sugar-free foods/fluids that contain sugar-alcohols
- Take antidiarrheal medications as prescribed

Managing Side Effects

- **Constipation**

- Gradually add fiber
- Increase fluid intake
- Prune juice followed by large glass warm water
- Hot beverages
- Regular moderate exercise (as tolerated)
- Consider stool softeners and laxatives
- Probiotics



Malnutrition

- The Academy of Nutrition and Dietetics and American Society for Parenteral and Enteral Nutrition (ASPEN) recommends classification of adult malnutrition by etiology:
 - Starvation-related malnutrition
 - Chronic disease-related malnutrition
 - Acute disease or injury-related malnutrition
- Additionally, they recommend that two or more of the following six characteristics would be needed for diagnosis of malnutrition:
 - Insufficient energy (caloric) intake
 - Weight loss
 - Loss of muscle mass*
 - Loss of subcutaneous fat*
 - Localized or generalized fluid accumulation that may mask weight loss*
 - Diminished functional status as measured by hand grip strength

*NFPA used to assess

Malnutrition

- Contributes to increased morbidity and mortality
- Decreased function, quality of life, and independence
- Increased frequency and length of hospital stay
- Higher healthcare costs
- Poor wound healing/increased risk of post-op complications
- Increased infection rate
- Reduced tolerance to treatment

Nutrition Focused Physical Assessment

- Head to Toe Assessment
- Subcutaneous Fat Loss
 - Orbital region
 - Upper arm region
 - Thoracic and Lumbar region

Nutrition Focused Physical Assessment

- Subcutaneous Muscle Loss
 - Temple region
 - Clavicle bone region
 - Clavicle and Acromion bone region
 - Scapular bone region
 - Dorsal hand
 - Patellar region
 - Anterior thigh region
 - Posterior calf region

Adult Criteria for Severe Malnutrition

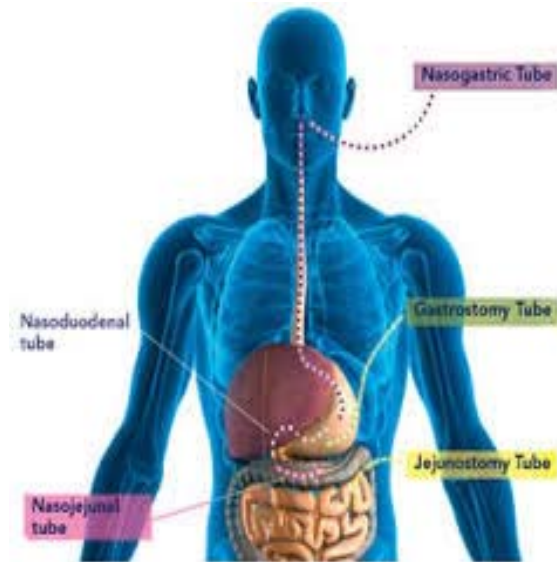
ICD-10 Code: E43 Unspecified Severe Protein-Calorie Malnutrition	Severe Malnutrition in context of Acute Illness/Injury	Severe Malnutrition in context of Chronic Illness	Severe Malnutrition in the context of Social/Behavioral/Environmental Circumstances
Weight Loss - is evaluated in light of other clinical findings including hydration. Weight change over time is reported as a percentage of weight lost from baseline.	Weight Loss > 2% in 1 week > 5% in 1 month > 7.5% in 3 months	Weight Loss > 5% in 1 month > 7.5% in 3 months > 10% in 6 months > 20 % in 12 months	Weight Loss > 5% in 1 month > 7.5% in 3 months > 10% in 6 months > 20 % in 12 months
Intake - RD obtains diet history and estimates energy needs. Suboptimal intake is determined as a percentage of estimated needs over time.	Energy Intake ≤ 50% energy intake compared to estimated energy needs for ≥ 5 days	Energy Intake ≤ 75% energy intake compared to estimated energy needs for ≥ 1 month	Energy Intake ≤ 50% energy intake compared to estimated energy needs for ≥ 1 month
Physical Assessment – loss of subcutaneous fat i.e. orbital, triceps, fat overlying ribcage.	Body Fat Moderate depletion	Body Fat Severe depletion	Body Fat Severe depletion
Physical Assessment – loss of muscle i.e. temples, clavicles, shoulders, scapula, thigh and calf	Muscle Mass Moderate depletion	Muscle Mass Severe depletion	Muscle Mass Severe depletion
Physical Assessment – general or local fluid accumulation i.e. extremities, ascites or vulvar/scrotal edems	Fluid Accumulation Moderate to Severe	Fluid Accumulation Severe	Fluid Accumulation Severe
Functional Assessment – based on standards supplied manufacturer of dynamometer	Reduced Grip Strength Not recommended in Intensive Care Setting	Reduced Grip Strength Measurably reduced for age and gender	Reduced Grip Strength Measurably reduced for age and gender

Adult Criteria for Moderate Malnutrition

ICD-10 Code: E44.0 Moderate protein-calorie malnutrition	Non-Severe Malnutrition in context of Acute Illness/Injury	Non-Severe Malnutrition in context of Chronic Illness	Non-Severe Malnutrition in the context of Social/Environmental Circumstances
Weight Loss - is evaluated in light of other clinical findings including hydration. Weight change over time is reported as a percentage of weight lost from baseline.	Weight Loss 1-2% in 1 week 5% in 1 month 7.5% in 3 months	Weight Loss 5% in 1 month 7.5% in 3 months 10% in 6 months 20% in 12 months	Weight Loss 5% in 1 month 7.5% in 3 months 10% in 6 months 20% in 12 months
Intake - RD obtains diet history and estimates energy needs. Suboptimal intake is determined as a percentage of estimated needs over time.	Energy Intake < 75% energy intake compared to estimated energy needs for > 7 days	Energy Intake < 75% energy intake compared to estimated energy needs for ≥ 1 month	Energy Intake < 75% energy intake compared to estimated energy needs for ≥ 3 months
Physical Assessment – loss of subcutaneous fat i.e. orbital, triceps, fat overlying ribcage.	Body Fat Mild depletion	Body Fat Mild depletion	Body Fat Mild depletion
Physical Assessment – loss of muscle i.e. temples, clavicles, shoulders, scapula, thigh and calf	Muscle Mass Mild depletion	Muscle Mass Mild depletion	Muscle Mass Mild depletion
Physical Assessment – general or local fluid accumulation i.e. extremities, ascites or vulvar/scrotal edems	Fluid Accumulation Mild	Fluid Accumulation Mild	Fluid Accumulation Mild
Functional Assessment – based on standards supplied manufacturer of dynamometer	Reduced Grip Strength Not applicable	Reduced Grip Strength Not applicable	Reduced Grip Strength Not applicable
Reference	White J et al. Consensus Statement: Academy of Nutrition and Dietetics and American Society for Parenteral and Enteral Nutrition: Characteristics Recommended for the Identification and Documentation of Adult Malnutrition (Undernutrition) JPEN 2012;36(1):275-283.		

Feeding Tubes

- Multiple types – PFG, PEG, NGT/DHT, J-tube, G-J tube
- May be placed prophylactically or reactively
- Pros
 - Patients able to meet nutrition and hydration goals
 - Administer medications
 - Decreases weight loss
 - Fewer treatment interruptions
 - Improved QOL
- Cons
 - Infection/Bacterial contamination
 - Aspiration
 - Dependence



Nasogastric/Nasojejunal Tubes

- Short term therapy (<4 weeks)
- NGT is inserted through the nares and placed either in the stomach or small bowel
- Placement is confirmed with X-ray
- Feeding Method: Gravity, Pump, Bolus

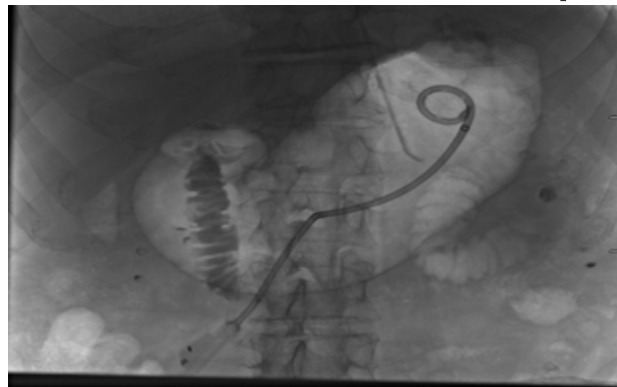
Percutaneous Endoscopic Gastrostomy (PEG)

- Considered when long term access is needed (>4 weeks)
- Placed endoscopically
- The tube is kept within the stomach by either a balloon or a retention dome
- Feeding Method: gravity, pump, bolus
- TF can be administered 3 hours after placement
- Usually replace every year



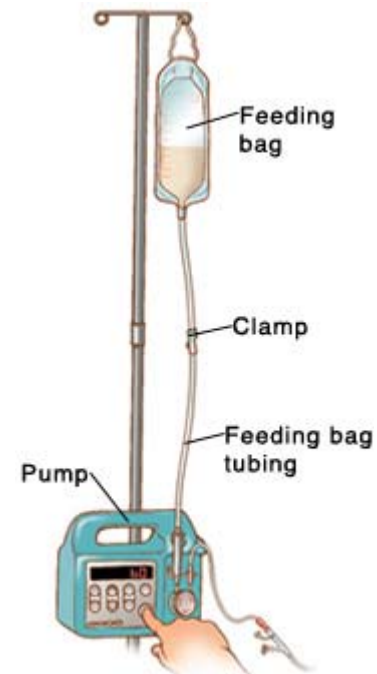
Percutaneous Fluoroscopic Gastrostomy (PFG)

- Considered for long term access (>4 weeks)
- Placed in Interventional Radiology
- A small tube is temporarily inserted from the nose down into the stomach. The stomach is then inflated with air to assist in visualization and tube insertion. A tube is then inserted through the skin into the stomach
- Feeding method: Gravity, pump
- TF can be administered 3 hours after placement



Jejunostomy (J-tube)

- Surgically inserted into the Jejunum
- Can be used 12 hours after placement
- Feeding Method: PUMP ONLY
- Highest pump rate is 125mL/hr



Prophylactic Feeding Tubes

NCCN Guidelines Version 1.2016

- Severe weight loss prior to treatment (5% in 1 month, 10% in 6 months)
- Ongoing dehydration or dysphagia, anorexia, or pain interfering with the ability to eat/drink adequately
- Significant comorbidities that may be aggravated by poor tolerance of dehydration, lack of caloric intake, or difficulty swallowing necessary medications
- Severe aspiration, or mild aspiration in elderly patients who have compromised cardiopulmonary function
- Patients for whom long-term swallowing dysfunction is likely, including those anticipated to receive large fields of high-dose radiation to the mucosa and adjacent connective tissues

- Registered Dietitian = Nutrition Expert



- **How is an RD different than a nutritionist?**

- The "RD" credential is a legally protected title that can only be used by practitioners who are authorized by the Commission on Dietetic Registration of the Academy of Nutrition and Dietetics.

- **RDs provide:**

- The highest level of nutrition counseling
- Medical nutrition therapy in treatment and prevention of disease
- Personally tailored advice

MD Anderson Radiation Dietitians



Resources

- American Cancer Society
- American Institute for Cancer Research
- Academy of Nutrition and Dietetics
- AND Oncology Dietetic Practice Group
- National Cancer Institute
- The Cancer-Fighting Kitchen