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

<table>
<thead>
<tr>
<th>ICD-10 Code: E43 Unspecified Severe Protein-Calorie Malnutrition</th>
<th>Severe Malnutrition in context of Acute Illness/Injury</th>
<th>Severe Malnutrition in context of Chronic Illness</th>
<th>Severe Malnutrition in the context of Social/Behavioral/Environmental Circumstances</th>
</tr>
</thead>
</table>
| **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 |

### Weight Loss

- **Acute Illness/Injury**
  - > 2% in 1 week
  - > 5% in 1 month
  - > 7.5% in 3 months
- **Chronic Illness**
  - > 5% in 1 month
  - > 7.5% in 3 months
  - > 10% in 6 months
  - > 20% in 12 months
- **Social/Behavioral/Environmental Circumstances**
  - > 5% in 1 month
  - > 7.5% in 3 months
  - > 10% in 6 months
  - > 20% in 12 months
**Adult Criteria for Moderate Malnutrition**

<table>
<thead>
<tr>
<th>ICD-10 Code: E44.0 Moderate protein-calorie malnutrition</th>
<th>Non-Severe Malnutrition in context of Acute Illness/Injury</th>
<th>Non-Severe Malnutrition in context of Chronic Illness</th>
<th>Non-Severe Malnutrition in the context of Social/Environmental Circumstances</th>
</tr>
</thead>
<tbody>
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<td>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.</td>
<td>Weight Loss 1-2% in 1 week 5% in 1 month 7.5% in 3 months</td>
<td>Weight Loss 5% in 1 month 7.5% in 3 months 10% in 6 months 20 % in 12 months</td>
<td>Weight Loss 5% in 1 month 7.5% in 3 months 10% in 6 months 20 % in 12 months</td>
</tr>
<tr>
<td>Intake - RD obtains diet history and estimates energy needs. Suboptimal intake is determined as a percentage of estimated needs over time.</td>
<td>Energy Intake &lt; 75 % energy intake compared to estimated energy needs for &gt; 7 days</td>
<td>Energy Intake &lt; 75% energy intake compared to estimated energy needs for ≥ 1 month</td>
<td>Energy Intake &lt; 75% energy intake compared to estimated energy needs for ≥ 3 months</td>
</tr>
<tr>
<td>Physical Assessment – loss of subcutaneous fat i.e. orbital, triceps, fat overlying ribcage.</td>
<td>Body Fat Mild depletion</td>
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<td>Physical Assessment – loss of muscle i.e. temples, clavicles, shoulders, scapula, thigh and calf</td>
<td>Muscle Mass Mild depletion</td>
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<td>Fluid Accumulation Mild</td>
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<tr>
<td>Functional Assessment – based on standards supplied manufacturer of dynamometer</td>
<td>Reduced Grip Strength Not applicable</td>
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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


- 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