Nutrition and Wound Care

Erin Tucholke, RD, LD, CDE
Disclosures:

- No financial relationships to disclose.
Objectives:

- Define the role of nutrition in wound healing
- Identify ways to measure the impact of nutrition intervention
- Review ways of impacting nutrition/healing through the use of nutrition supplements and vitamins/minerals
Outline

- Nutrition Assessment
  - Interpreting nutrition-related lab values

- Nutrition prescription
  - Goals for protein, calories, CHO for healing
  - Wound healing nutrients
    - Vitamins & minerals
    - Other supplements

- Implementation strategies: helping patients help themselves.
Nutrition Assessment

Interpreting Lab Values

- **Albumin**
  - Negative acute-phase reactant (levels decrease in response to inflammation)
  - Half-life: ~20 days

- **Prealbumin (transthyretin)**
  - Negative acute-phase reactant (levels decrease in response to inflammation)
  - Half-life: 2-3 days

- **C-reactive protein**
  - Positive acute-phase reactant (levels increase in response to inflammation)
  - Half-life: 19 hours
## Nutrition Assessment

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<th>Decreased with</th>
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<td>Albumin (Alb)</td>
<td>Dehydration, Chronic malnutrition (marasmus)</td>
<td>Overhydration/fluid excess (edema, ascites), inflammation, surgery, protein malnutrition, zinc deficiency, cancer, liver failure</td>
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<tr>
<td>Prealbumin (PAB)</td>
<td>Renal failure (pre-dialysis)</td>
<td>Surgery, liver disease, inflammation/infection, hyperglycemia, renal failure (dialysis)</td>
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<td>C-Reactive Protein (CRP)</td>
<td>Inflammation/infection: Rheumatoid Arthritis, wounds, lupus, IBS, overweight/obesity, uncontrolled DM, smoking, CAD, Inflammatory diet</td>
<td>Weight loss, exercise, BS control, BP control, Anti-inflammatory foods</td>
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Nutrition Assessment

Take Home Message:

- Nutrition status is *more than just a lab value*
- Malnutrition *cannot* be diagnosed by albumin or prealbumin alone
- Repeat prealbumin levels are helpful so that *trends* can be reviewed over time
- Consider current weight, weight loss, meal composition, ability to prepare and eat regular meals, appetite, and disease process when evaluating nutrition status.
Nutrition Rx: Protein

About Protein

- Required for all stages of wound healing and tissue repair
- 9 essential amino acids
  - Phenylalanine, Valine, Threonine, Tryptophan, Isoleucine, Methionine, Histidine, Leucine, Lysine
- Conditionally Essential
  - Arginine, cysteine, glycine, glutamine, tyrosine, ornithine, proline, serine
**Nutrition Rx: Protein**

<table>
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<tr>
<th>Protein Requirement (per actual or adjusted weight*)</th>
<th>Condition</th>
<th>Daily Goal (150# person)</th>
</tr>
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<tr>
<td>.8g /kg</td>
<td>RDA (minimum) “healthy adults”</td>
<td>55 g/day</td>
</tr>
<tr>
<td>1-1.1 g /kg</td>
<td>Older adults</td>
<td>70-75 g/day</td>
</tr>
<tr>
<td>1.2-1.5 g /kg</td>
<td>Nutritionally depleted non-stressed stage I-II ulcers</td>
<td>80-100 g/day</td>
</tr>
<tr>
<td>1.5-2.0 g /kg</td>
<td>Nutritionally depleted Stressed stage III-IV ulcers V.A.C. Therapy</td>
<td>100-135 g /day</td>
</tr>
</tbody>
</table>

*For patients >125% IBW (HAMWI): [(actual weight – IBW) x .25] + IBW*
Protein

- Example: 80 grams of high-quality protein
  - 3 servings, 3 oz lean protein (size of deck of cards)
  - 1-2 high protein snacks
    - Yogurt
    - Milk
    - Cottage cheese
    - String cheese
    - Small protein shake

TIP: Every ounce of meat or cheese contains about 7-9 grams of protein.
Nutrition Rx: Protein

High-Quality Protein

- For wound healing, should make up majority of protein intake
  - Meat, Fish, eggs, reduced-fat cheese, lowfat dairy, soy
- Get peanut butter out of the protein category
  - 6 Tbsp PB equals the same amount of protein as a 3 oz lean meat, but is nearly 600 calories!
- Avoid recommending beans as a protein source for those with poor appetites
  - Can lead to gas, bloating and early satiety
  - Need 1 1/2 cups to equal the same amount of protein as a 3 ounces lean meat
Nutrition Rx: Protein

Protein Supplements

- Whey, soy, egg white protein powders all acceptable
  - Many inexpensive protein powders available.
- Avoid use of commercial high-calorie supplements, unless weight **gain** is the goal:
  - Ensure Plus
    - 350 calories, 13 g protein
  - Glucerna
    - 220 calories, 10 g protein
  - Boost
    - 240 calories, 10 g protein
  - Boost Glucose Control
    - 190 calories, 16 g protein
Nutrition Rx: Calories

Calorie Goals:

- Focus on protein adequacy, consistent carbohydrate intake for blood sugar control, and avoiding weight gain
- If calorie intake is too low, protein intake will be used for calorie needs instead of tissue repair
  - 30-35 kcals/kg actual or adj. weight
    - 150# person (68 kg) = 2050-2400 kcal
- Weight loss: Once wound has healed
  - WOMEN: 1200-1500 kcal/day
  - MEN: 1500-1800 kcal/day
# Nutrition Rx: Carb

<table>
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<tr>
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<th>Carbohydrate Requirement (per MEAL)</th>
<th>Grams (per MEAL)</th>
</tr>
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<tbody>
<tr>
<td><strong>MEN</strong></td>
<td>5-6 carb choices (50-60% 1800 kcal diet)</td>
<td>75-90</td>
</tr>
<tr>
<td><strong>WOMEN</strong></td>
<td>3-4 carb choices (45-60% 1200 kcal diet)</td>
<td>45-60</td>
</tr>
<tr>
<td><strong>Weight Loss</strong></td>
<td>3-4 carb choices (most from whole fruit, whole grains, lowfat milk and yogurt)</td>
<td>45-60</td>
</tr>
</tbody>
</table>
Nutrition Rx: Vits and Mins

Multivitamin w/ minerals

- **Why:**
  - Ensures basic micronutrient needs are covered
  - Consider for all wounds and most patients with sub-optimal food choices

- **What:**
  - **One tablet per day**
  - 2 MVI /day recommended with Hx of RNY gastric bypass or Sleeve gastrectomy

*Note: gummy vitamins do not contain iron*
Nutrition Rx: Vits and Mins

**Vitamin C**

- **Why**
  - promotes collagen synthesis, improves wound healing

- **What**
  - **250 mg/day**
    - poor PO intake or poor food choices, smokers, ETOH Hx, *stage I-II ulcers*
  - **1000 mg/day (500 mg BID)**
    - Poorly healing wounds, *stage III-IV ulcers*

Precaution: Do not exceed 2000 mg/day d/t potential for GI distress.
Nutrition Rx: Vits and Mins

Zinc

■ Why
  ■ Protein and collagen synthesis, immune function

■ What
  ■ Check for serum zinc level
  ■ If low: 220 mg Zinc Sulfate (50 mg elemental) for 2-3 weeks
    ■ Stage III-IV pressure ulcers, open surgical wounds, chronic wounds

Precaution: extended zinc supplementation can result in copper deficiency. Avoid supplementing over 6 wks.
Nutrition Rx: Vits and Mins

Vitamin A

- **Why**
  - Cellular differentiation and growth, collagen synthesis, protects against infection/stimulates immune system, enhances epithelialization

- **What**
  - **10,000 IU for ten days**
    - Large poorly healing wounds,
    - multiple pressure ulcers (stage III-IV)

Note: Vitamin A content varies between brands. Typical “one-a-day” vitamins can contain around 2500 – 4000+ per tablet.
Glutamine/Arginine:

- Why
  - Conditionally essential amino acids
  - Consider with large poorly healing wounds, multiple pressure ulcers (stage III-IV)

Pros:
- Few drug interactions for healthy individuals (essentially the same as protein in foods)
- Very palatable

Cons:
- Expensive for name-brand products
Nutrition Rx: Specialty Supplements

What

- **Glutamine**
  - 20-30 gm/day
  - 2 pkts/day (15 g ea)

- **Arginine**
  - 18 mg/day (4.5 g QID)

- **Combination product**
  - Juven
  - 2 pkts/day

$4.00/day

$1.00/day

$1.00/day

$5.50/day
Wound Care: Creating a Plan

- Tight Blood Sugar Control
- Protein
- Weight loss or maintenance
- Supplements
Surprising nutrition quotes:

“Juice has calories? Even grapefruit juice?”

PhD student, DM for >10 years with recent 6 months of dietary counseling, gained 7# in one week drinking ½ gallon of juice a day and lost 10# in 1 week by eliminating juice

“I’m positive spinach has lots of protein, even more than chicken!”

Pt using weight instead of serving size

“My doctor told me not to have over 2 grams of sodium a day. I bought a food scale so I could measure it”

Pt on a low sodium and low oxalate diet (urologist), diabetic diet (PCP/diabetes clinic), low calorie/refined starch diet (bariatric clinic)
Helpful Reminders:

- Many people do not understand what grams, mg, ounces, or calories mean in terms of foods allowed
- Prescribing “more” or “less” may be confusing
- Label reading (if done at all) is a common source of confusion
  - Serving size
  - Ingredient lists
- Most people need visuals if nutrition goals are recommended
Blood Sugar Control

Blood sugar goals

- **Pre-prandial**: 90-130 mg/dL
- **Post-prandial**: <180 mg/dL
- **A1C**
  - <7% (ADA) = eAG <154 mg/dL
  - <6.5% (AACE) = eAG <140 mg/dL

Each episode of blood sugar out of range can delay wound healing.

Blood sugar control

■ Diet-related barriers
  ■ Inability or failure to read a label
  ■ Overestimating portion size
  ■ Not counting fruit, juice, ETOH, milk
  ■ Not counting snacks, “bites”, or tastes
  ■ Overeating to correct low blood sugar
  ■ Lack of control in hospital

■ Non-Diet related barriers
  ■ No coverage for test strips
  ■ Lack of glucometer (lost, broken, or outdated)
  ■ Skipping medications to save money
  ■ Inability to stand to make meals
Helpful Nutrition Tools:

Calorie/Carb control

Consider use of frozen meals

- Cost-effective
- Pre-portioned, teaches portion sizes
- Encourage healthier versions:
  - SmartOnes
  - Lean Cuisine
  - Healthy Choice
Calorie/Carb control

Online food journaling programs can be helpful:

- **Benefits:**
  - Many are free
  - Large food database (can look up food items)
  - Often have food plans, recipes and weight loss programs included

- **Available programs**
  - Sparkpeople.com
  - FitDay.com
  - LiveStrong.com
  - my-calorie-counter.com
  - myfitnesspal.com
## Improving Patient Compliance

<table>
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<tr>
<th>Product</th>
<th>Complaint</th>
<th>Solution</th>
</tr>
</thead>
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<td>Protein shakes/supplements</td>
<td>Chalky, gritty, bitter, too sweet</td>
<td>Use whey protein and mix with milk instead of water for smooth, less gritty texture; use unflavored versions if too sweet</td>
</tr>
<tr>
<td>Mutivitamin/mineral supplements</td>
<td>Nausea, vomiting</td>
<td>Take WITH FOOD, at the end of a meal</td>
</tr>
<tr>
<td>Arginine/glutamine</td>
<td>Too sweet, “artificial tasting”</td>
<td>Use unflavored versions and mix with food</td>
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**Reminder for patients:** *Does it taste better than being sick feels?*
Dietitian Role:

What we CAN do:

- Assess nutrition needs
  - Calorie, carbohydrate, and protein goals, micronutrient needs

- Nutrition Instruction
  - Carbohydrate-containing foods, appropriate meal patterns, meal planning, grocery shopping list, food plans
Dietitian Role:

What we CAN’T do:

- Make people eat right
  - Improving blood sugars, losing weight, healing all have to be goals important to the patient.
  - Depression often needs to be managed before patients can change
    - Consider counseling and medication as part of treatment.
Need to contact a dietitian?

- **Inpatient:**
  - 541-222-1262

- **Outpatient:**
  - **DEMS (Diabetes, Endocrinology, Metabolism Services)**
    - 1200 Hilyard Street, Eugene, OR
    - 541-686-7029
  - **Cascade Health Solutions**
    - 2630 Suzanne Way, Ste. 106 Eugene, OR
    - 541-228-3020
  - **Oregon Bariatric Center**
    - 3377 RiverBend Dr. Springfield, OR
    - 541-222-2700
Resources

- [www.diabeteseducator.org/](http://www.diabeteseducator.org/)
- [www.learningaboutdiabetes.org/](http://www.learningaboutdiabetes.org/)
  - Great low-literacy education handouts, most in Spanish
- [http://crossroads/sc_foodservices_phor/nutritioneducationmaterials.htm](http://crossroads/sc_foodservices_phor/nutritioneducationmaterials.htm)
  - SHMC Clinical Nutrition handouts
References

References, Cont.