Short Bowel Syndrome and Nutrition

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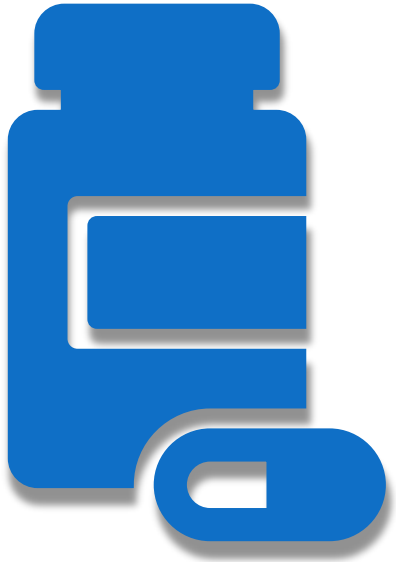
Short Bowel Syndrome and Nutrition

- All patients are at high risk of malnutrition, nutrient deficiencies and electrolyte imbalances, decreased quality of life [1-3]
- Importance of remaining anatomy in prognosis
  - Length and function of the remaining small bowel
  - Presence of residual colon and ileocecal valve in continuity
- *Enteral autonomy is always the goal in intestinal adaptation*

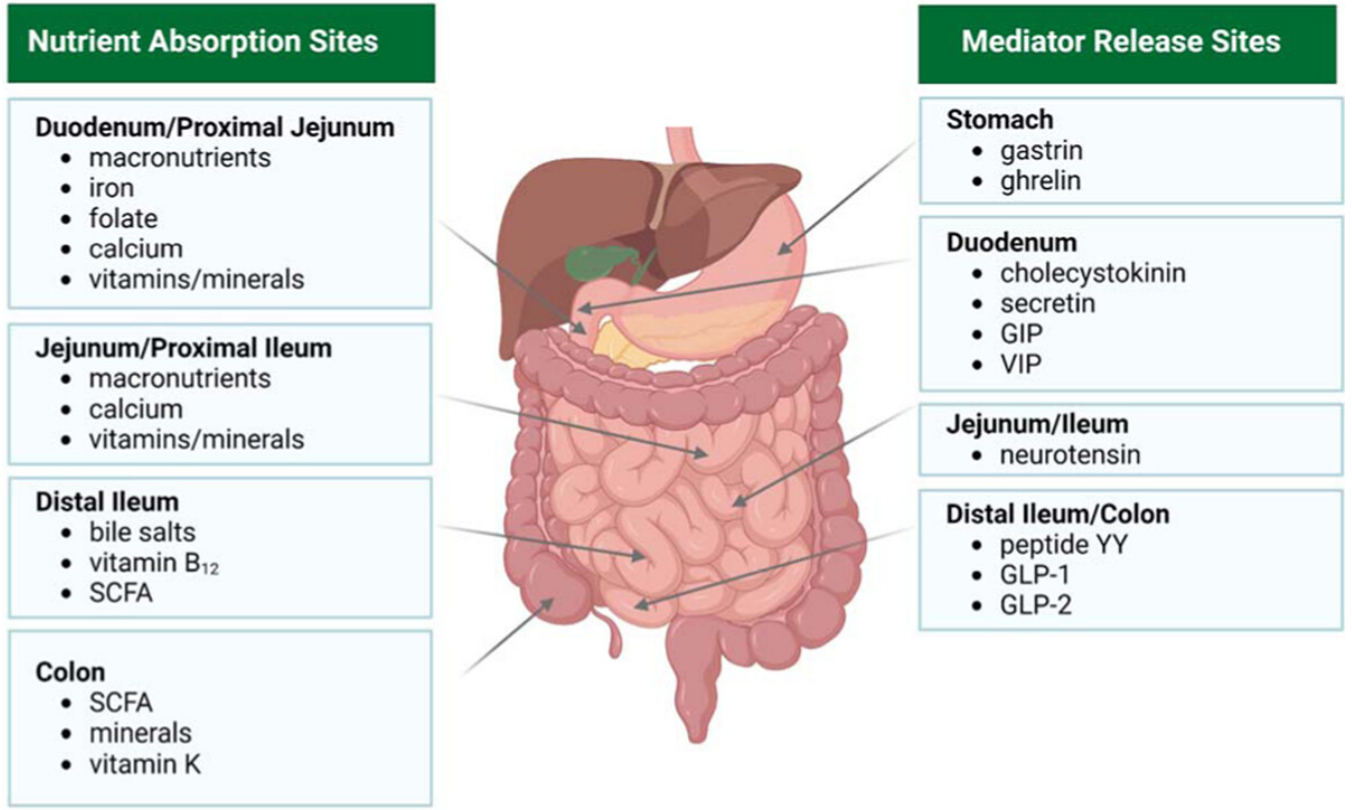
Nutrition Assessment [1]

- Biochemical markers
  - Electrolytes: sodium, potassium, magnesium, phosphorus
- Vitamin and mineral deficiencies
  - Vitamin B 12, Folate, Iron, Fat soluble vitamins, Zinc, Copper, Selenium
- Blood urea nitrogen, creatinine
- Urinary collection
- Stool collection: color/ consistency/ volume
- Body weight
- 2 – 3-day dietary recall
- Nutrition focused physical exam



Anatomy matters

- < 200 cm functional small bowel = SBS
- High risk of dependence on parenteral nutrition: < 30 cm small bowel with the colon intact, < 60 cm of jejunum and partial colon intact, < 115 cm small bowel with no colon [1]



Source: Tappenden K, Nutrition in Clinical Practice, 2023

Oral diet recommendations [1,4]

- Small meals every 2 – 3 hours throughout the day
- Separate liquids from solid food
- Eat slowly and chew foods thoroughly
    - Blended, chopped or mashed foods may be easier to tolerate
- Protein: whole foods should be encouraged without restriction; focus on high biological value
- Complex carbohydrates: soluble fiber, low fermentable fiber
    - Colon in continuity: can stimulate bacterial fermentation and produce short-chain fatty acids which are a key energy source; can also help manage diarrhea, improve stool consistency
- Limit intake of added sugar, including oral nutrition supplements

Oral diet recommendations [1,4]

- Fat
  - Colon in continuity: reduce fat intake including limiting fried/ greasy foods
  - No colon: eat liberally

  MCT oil in both cases: 1 – 3 tablespoons, spread out during the day
- Oxalates
  - Colon in continuity: limit if there is a kidney stone and if urine output < 2 L/day; low fat diet; adequate hydration
  - No colon: no restrictions
- Sodium: use salt liberally

Micronutrient Deficiencies [1]

Nutrient	Deficiency symptoms	On TPN	Off TPN
Vitamin A	Night blindness, immune dysfunction	Monthly: established deficiency, high dose supplement required 3 – 12 months if normal	6 – 12 months **more frequently if ongoing fat malabsorption*
Vitamin D	Osteomalacia, bone pain, muscle weakness, fractures	Monthly: established deficiency, high dose supplement required 3 – 12 months if normal	6 – 12 months **more frequently if ongoing fat malabsorption*
Vitamin E	Neuropathy, muscle weakness/ cramps	Monthly: established deficiency, high dose supplement required 3 – 12 months if normal	6 – 12 months **more frequently if ongoing fat malabsorption*
Vitamin K	Easy bruising, bleeding gums, delayed clotting	Monthly: established deficiency, high dose supplement required 3 – 12 months if normal	6 – 12 months **more frequently if ongoing fat malabsorption*
Vitamin B 12	Numbness/ tingling in hands and feet, muscle weakness, confusion, anemia	Monthly: established deficiency, high dose supplement required 3 – 12 months if normal	*6 – 12 months* **may check more frequently if ileum is resected*

Micronutrient deficiencies [1]

Nutrient	Deficiency symptoms	On TPN	Off TPN
Folate	Anemia, fatigue, weakness, sore mouth and tongue	Monthly: established deficiency, high dose supplement required 3 – 12 months if normal	6 – 12 months
Copper	Anemia, fatigue, weakness, pale skin, bone pain/ fractures, neuropathy	Monthly: established deficiency, high dose supplement required 3 – 12 months if normal	6 – 12 months **more frequently if ongoing diarrhea or high zinc intake*
Zinc	Delayed wound healing, impaired taste and smell, hair loss, slowed cognitive function	Monthly: established deficiency, high dose supplement required 3 – 12 months if normal	6 – 12 months **more frequently if ongoing diarrhea*
Iron	Fatigue, pallor, brittle nails, dizziness, tachycardia, fatigue	Monthly: established deficiency, high dose supplement required 3 – 12 months if normal	6 – 12 months **more frequently if anemia is present or iron-rich food intake is low*
Electrolytes: Na, K, Mg, P	Dehydration, weakness, lethargy	1 – 2 weeks	1 – 3 months

Hydration[1]

- Colon versus no colon
- Hypertonic liquids: can draw water out of the body's cells and into the intestinal lumen, exacerbating dehydration and causing negative fluid balance
  - Fruit juices, sodas, sweet teas, syrup, honey, sugar alcohols, oral nutrition supplements with high sugar content
- Hypotonic liquids: inadequate in sodium; can draw water into the bowel lumen from the bloodstream, increasing the fluid load in the intestines which may not be properly absorbed leading to diarrhea or watery stools
  - Water, unsweetened tea/ coffee, diet drinks, diluted fruit drinks, etc.

Hydration[1]

Oral Rehydration Solutions (ONS)	Examples
Commercial	DripDrop, Liquid IV hydration multiplier, Trioral, WHO packet, CeraLyte, Gatorlyte
Homemade Gatorade/ Powerade	1 ½ cups Gatorade or Powerade, 2 ½ cups water, ½ teaspoon salt
Water	32 oz water, ½ teaspoon salt, 2 tablespoons sugar

Recommended to sip liquids in-between meals

Transitioning off TPN

Reduction of both volume and macro/micronutrients

Reducing weekly infusion days or reducing daily PN volume and nutrient concentration

Gradual diet advancement of enteral/ oral intake

TPN weaning based on:

- Weight stability
- Adequate hydration and urine output
- Absence of electrolyte abnormalities
- Calorie counts

Conclusion

- Anatomy dictates tolerance and deficiencies
- Dietary strategies: small, frequent meals; adjust fat/ carbohydrate balance
- Long-term monitoring for micronutrient deficiencies and bone health
- TPN is lifesaving, but weaning is the goal when possible

References

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