Management Challenges of the Gastrointestinal Tract (GIT) in Systemic Sclerosis (SSc)

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The gastrointestinal tract is the largest immune compartment of the human body.

The major function of the intestinal immune cells is to maintain the integrity of the body at the huge interface between external stimuli:

- Medications
- Nutrition
- Intestinal microflora
- Brain-gut axis
SSc IS A PROGRESSIVE DISEASE OF THE MICROVASCULATURE

- Vascular dysfunction
- Swelling
- Decreased oxygen and nutrient delivery to tissues
- Tissue death
- Immune dysregulation
- Scarring
## 2013 ACR / EULAR Criteria For The Classification Of Systemic Sclerosis (Scleroderma)*

<table>
<thead>
<tr>
<th>Item</th>
<th>Sub-items(s)</th>
<th>Weight/score †</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin thickening of the fingers of both hands extending proximal to the metacarpophalangeal joints (sufficient criterion)</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>Skin thickening of the fingers (only count the higher score)</td>
<td>Puffy fingers</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Sclerodactyly of the fingers (distal to the metacarpophalangeal joints but proximal to the proximal interphalangeal joints)</td>
<td>4</td>
</tr>
<tr>
<td>Fingertip lesions (only count the higher score)</td>
<td>Digital tip ulcers</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Fingertip pitting scars</td>
<td>3</td>
</tr>
<tr>
<td>Telangiectasia</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Abnormal nailfold capillaries</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Pulmonary arterial hypertension and/or interstitial lung disease (maximum score is 2)</td>
<td>Pulmonary arterial hypertension</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Interstitial lung disease</td>
<td>2</td>
</tr>
<tr>
<td>Raynaud’s phenomenon</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>SSc-related autoantibodies (anticentromere, anti–topoisomerase I (anti–Scl-70), anti–RNA polymerase III) (maximum score is 3)</td>
<td>Anticentromere 3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Anti–topoisomerase I</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anti–RNA polymerase III</td>
<td></td>
</tr>
</tbody>
</table>

* The criteria are not applicable to patients with skin thickening sparing the fingers or to patients who have a scleroderma-like disorder that better explains their manifestations (e.g., nephrogenic sclerosing fibrosis, generalized morphea, eosinophilic fasciitis, scleroderma diabeticum, scleromyxedema, erythromyelalgia, porphyria, lichen sclerosis, graft-versus-host disease, diabetic cheiroarthropathy).

† The total score is determined by adding the maximum weight (score) in each category. **Patients with a total score of ≥ 9 are classified as having definite scleroderma.**

Sensitivity 91% Specificity 92%
SSc CHANGES OVER TIME

VASCULAR CHANGES

FIBROSIS

Skin thickness

Joint contractures, GI, lungs, heart, kidneys

Intermediate

Late

Pulmonary hypertension, malabsorption

Diffuse cutaneous

Limited cutaneous

Disease duration (years)

5

10

20
SYSTEMIC SCLEROSIS (SSc)-GIT: BASICS

*At the University of Utah, 99%.

PREVALENCE OF MALNUTRITION IN SSc

- Cereda Et al (N=160): 24.4%
- Baron et al (N=586): 18%
- Rosato et al (N=94): 20%
- Murtaugh and Frech (N=24): 25%

SSc study populations
PERSONALIZED MEDICINE

CURRENT PRACTICE

IDEAL PRACTICE

Drug to benefit

Biomarkers and the diagnostic process

Diagnostic test negative
Unresponsive to therapy

Patient

Samples of tissues, blood or other bodily liquids

Analysis and identification of biomarkers

Choice of personalized medicine according to biomarkers

Standard Therapy

Few patients respond to therapy

Most patients fail therapy

Inadequate response

No response

Develop resistance

Toxic but beneficial
Upper tract and lower tract
- The GIT is 30 feet long

Digestion
- Mechanical digestion
- Chemical digestion
- Detoxification system
- All the chemicals (neurotransmitters) found in the brain, are also found in the GIT.

Immune Function
- The largest immune organ in the body.
- Continually exposed to substances from the outside world.
- Has extremely thin lining providing the barrier between the internal body and the external world.
LIMITATIONS OF CLINICAL ASSESSMENT

- Questionnaires
- Physical Exam
- Procedural Based Diagnostics
# The UCLA SCTR GIT 2.0 Questionnaire

The following questions ask about your gastrointestinal (gut, GI) symptoms and how they affected your life over the last 7 days. Answer every question by selecting the answer as indicated. Most questions have 4 choices: "No Days", "1-2 Days", "3-4 Days", or "5-7 Days". Questions 15 and 31 have 2 choices only: "Yes" or "No". If you are unsure about how to answer a question, please give the best answer you can.

In order to score the instrument, all questions must be answered.

## Reflux

<table>
<thead>
<tr>
<th>Question</th>
<th>No Days</th>
<th>1-2 Days</th>
<th>3-4 Days</th>
<th>5-7 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In the past week, how often did you have difficulty swallowing solid food?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. In the past week, how often did you have an unpleasant stinging or burning sensation in your chest (heartburn)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. In the past week, how often did you have a sensation of bitter or sour fluid coming up from your stomach into your mouth (acid reflux)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. In the past week, how often did you have heartburn on eating 'acidic' foods such as Tomatoes &amp; Oranges?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. In the past week, how often did you regurgitate (throw up or bring up small amounts of previously eaten food)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. In the past week, how often did you sleep in a 'raised' or a 'L shaped' position?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. In the past week, how often did you feel like vomiting or throwing up?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. In the past week, how often did you vomit or throw up?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Soilage

<table>
<thead>
<tr>
<th>Question</th>
<th>No Days</th>
<th>1-2 Days</th>
<th>3-4 Days</th>
<th>5-7 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. In the past week, how often did you accidentally soil (dirty) your underwear before being able to get to a bathroom?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Diarrhea

<table>
<thead>
<tr>
<th>Question</th>
<th>No Days</th>
<th>1-2 Days</th>
<th>3-4 Days</th>
<th>5-7 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. In the past week, how often did you have loose stools (diarrhea)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. In the past week, have you noticed your stools becoming watery?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Constipation

<table>
<thead>
<tr>
<th>Question</th>
<th>No Days</th>
<th>1-2 Days</th>
<th>3-4 Days</th>
<th>5-7 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. In the past week, have you noticed your stools becoming harder?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. In the past week, how often were you constipated or unable to empty your bowels?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. In the past week, how often did you have hard stools?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. In the past week, how often did you have pain while passing your stools?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Social Function

<table>
<thead>
<tr>
<th>(Check one response for each question)</th>
<th>No Days</th>
<th>1-2 Days</th>
<th>3-4 Days</th>
<th>6-7 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the past one week, how often did nausea interfere with social activities such as visiting friends or relatives?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In the past one week, how often did vomiting interfere with social activities such as visiting friends or relatives?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In the past one week, how often did stomach aches or pain interfere with social activities such as visiting friends or relatives?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In the past one week, how often did diarrhea interfere with social activities such as visiting friends or relatives?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In the past one week, how often did the fear of accidentally soiling your underwear interfere with social activities such as visiting friends or relatives?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In the past one week, how often did bloated sensations interfere with social activities such as visiting friends or relatives?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

### Emotional Well-Being

<table>
<thead>
<tr>
<th>(Check one response for each question)</th>
<th>No Days</th>
<th>1-2 Days</th>
<th>3-4 Days</th>
<th>6-7 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the past one week, how often did you feel worried or anxious about your bowel problems?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In the past one week, how often did you feel embarrassed because of your bowel symptoms?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In the past one week, how often did you have problems with sexual relations because of your bowel symptoms?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In the past one week, how often did you fear not being able to find a bathroom?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In the past one week, how often did you feel depressed or discouraged due to your bowel symptoms?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In the past one week, how often did you avoid or delay traveling because of your bowel symptoms?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In the past one week, how often did you feel angry or frustrated as a result of your bowel symptoms?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In the past one week, how often did you have problems with your sleep as a result of your bowel symptoms?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In the past one week, how often did you feel ‘stress’ or an upset mood worsen your bowel symptoms?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

The UCLA SCTC GIT 2.0 Questionnaire

Your total GIT score is **1.008**. Your individual section scores are detailed in the table below and after each section in the questionnaire.

Click here for a printable version of your results.

<table>
<thead>
<tr>
<th>Category</th>
<th>Low</th>
<th>Quality of Life Impairment</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reflux</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distension/Bloating</td>
<td>1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saliage</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diarrhea</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constipation</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Function</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional Well-Being</td>
<td>0.56</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GIT Score: **1.008**
Severity of GIT involvement: **Severe-to-Very Severe**

Reflux Score: **1.5**
Severity of GIT involvement: **Severe-to-Very Severe**

Distension/Bloating Score: **1**
Severity of GIT involvement: **None-to-Low**

Saliage Score: **1**
Severity of GIT involvement: **None-to-Low**

Diarrhea Score: **1**
Severity of GIT involvement: **Moderate**

Constipation Score: **1**
Severity of GIT involvement: **Moderate**

Social Function Score: **1**
Severity of GIT involvement: **Moderate**

Emotional Well-Being Score: **0.556**
Severity of GIT involvement: **Moderate**
PHYSICAL EXAM: CAN IT HELP US?

Oral
- Exam can guide referrals
- Dental
- Speech and swallow

Abdominal
- Exam is limited
- Pain
- Distention

Rectal
- Exam is usually only performed for prostate assessment
INVESTIGATIONAL PROCEDURES: UPPER GIT

Esophageal Motility
- Modified barium swallow
- Manometry
- Impedance
- pH monitoring
- Scintigraphy

Tissue Evaluation
- Endoscopy
  - Traditional
  - Capsule
- Scintigraphy
- Electrogastrography
- Gastric Emptying
- Breath test
- Single Photon Emission CT
- Wireless pH monitoring
- MRI

Stomach Motility
- Tissue evaluation
  - Endoscopy
  - Traditional
  - Capsule
Modified Barium Swallow

Manometry

Impedance-pH monitoring

Capsule

Endoscopy

Aliment Pharmacol Ther 2009
SMALL INTESTINE BACTERIAL OVERGROWTH TESTING

- Breath Testing
  - Abnormal glucose hydrogen breath test
  - Abnormal lactulose hydrogen breath test

- Endoscopy
  - Jejunal aspiration

- Small bowel motility study
INVESTIGATIONAL PROCEDURES: LOWER GIT

**Small Bowel Motility**
- Manometry
- Scintigraphy
- Breath Testing
- MRI
- Tissue Evaluation
  - Enteroscopy
  - Capsule
- Radio-opaque Markers
- Scintigraphy
- Wireless Motility Capsule
- MRI

**Large Bowel Motility**
- Manometry
- Endosonography
- Scintigraphy
- Electromyography
- Dynamic MRI
- Defecography
- Balloon Expulsion Test
- Tissue Evaluation
  - Colonoscopy

**Anorectal**
- Manometry
- Endosonography
- Scintigraphy
- Electromyography
- Dynamic MRI
- Defecography
- Balloon Expulsion Test
- Tissue Evaluation
  - Colonoscopy
Anorectal manometry

Anal endosonography

Electromyography

MR fluoroscopic and scintigraphic defecography
THE PROBLEM WITH GIT PROCEDURES

- Invasive
- Expensive
- Often times do not provide guidance:
  - “Findings consistent with Systemic Sclerosis”
- Empiric treatments often the standard of care
## Behavioral
- Smaller meals
- No eating 4 hours before bedtime
- Elevate head of the bed
- Avoid esophageal irritants
- Avoid tight fitting clothes
- Avoid alcohol
- Avoid tobacco

## Invasive
- Medications
  - Coating
    - Sucralfate/carafate
  - Acid neutralization
  - Acid suppression
  - Pro-motility

Procedure:
- Partial Nissen
ANTACIDS

Na Bicarbonate

Other Antacids:
- CaCO₃ (H⁺ binds w/ CO₃²⁻)
- Mg (OH)₂ (H⁺ binds w/ OH⁻)
- Al (OH)₃ (H⁺ binds w/ OH⁻)

Rapidly Neutralized acid

NOTE:
- Mg has laxative effects (laxatives w/ Mg are used prior to endoscopy)
- Al causes constipation
- Antacids combining Al & Mg are used to lower stomach acid w/o producing undesirable constipation or diarrhea

Adapted from Lullmann H et al. (2005)
<table>
<thead>
<tr>
<th>Product</th>
<th>Alkaline ion</th>
<th>Aluminum</th>
<th>Calcium</th>
<th>Magnesium</th>
<th>Potassium</th>
<th>Sodium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alka-selzer</td>
<td>bicarbonate</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Andrews Antacid</td>
<td>bicarbonate</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equate</td>
<td>bicarbonate</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Maalox (liquid)</td>
<td>bicarbonate</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maalox (tablet)</td>
<td>bicarbonate</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk of Magnesia</td>
<td>hydroxide</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Pepto-Bismol</td>
<td>bicarbonate</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rennie (tablets)</td>
<td>bicarbonate</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>Rolaids</td>
<td>bicarbonate</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Tums</td>
<td>carbonate</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mylanta</td>
<td>hydroxide</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Eno</td>
<td>bicarbonate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Gaviscon</td>
<td>bicarbonate</td>
<td></td>
<td></td>
<td>X</td>
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<tr>
<td>Droxygel</td>
<td>hydroxide</td>
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<td>X</td>
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</tr>
<tr>
<td>Gelusil</td>
<td>hydroxide</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ACID SUPPRESSION: PPI

Proton Pump Inhibitors
- Omeprazole (Prilosec, Zegrid)
- Lansoprazole (Prevacid)
- Dexlansoprazole (Dexilant)
- Esomeprazole (Nexium)
- Pantoprazole (Protonix)
- Rabeprazole (Acidphex)

Cautions
- Gastric acid is important for breakdown of food and release of micronutrients.
- High dose and/or long-term use, increased risk of bone fractures.
- Small bacterial overgrowth.

Indications
- Symptomatic GERD
- Peptic ulcer disease
- As part of Helicobacter pylori eradication therapy
- Barrett’s esophagus
- Eosinophilic esophagitis
- Laryngopharyngeal reflux causing laryngitis and chronic cough
ACID SUPPRESSION: H2 BLOCKERS

H2 Blockers

- Ranitidine (Zantac)
- Famotidine (Pepcid)

Cautions

- Many drug interactions, including calcium channel blockers.

Indications

- Peptic ulcer disease
- GERD

Sites of Drug Action
SURGICAL OPTIONS: REFLUX

Patients with Normal Motility

- Nissen Laproscopic Fundoplication
- Toupet Partial Fundoplication
### Behavioral

- High-fiber foods can make gastroparesis worse
  - Oranges, broccoli, apple with the skin on, wheat, beans, nuts, kale, and red cabbage.
- Fatty foods can make gastroparesis worse
  - Butter, cheese, processed meats, canned goods, and any fried meat.
- Minimize exacerbating medications:
  - Narcotic
  - Tricyclic antidepressants
  - Calcium channel blockers
  - Clonidine
  - Dopamine agonists
  - Lithium
  - Nicotine
  - Progesterone

### US Medication Options

- Metoclopramide (Reglan®)
- Erythromycin (low dosages, not antibiotic dosing levels)
- Domperidone (Motilium®, now only under special FDA protocols)
- Tegaserod (Zelnorm®, Zelmac®, now only available under special FDA protocols)

**Mechanism:**
- Speeds up stomach emptying and movement of the upper intestines.
- Caution: Cardiac toxicity

**Treatment of nausea**
SURGICAL OPTIONS: GASTROPARESIS

Gastric Pacemaker

- Battery-operated device is implanted into the abdomen
- Sends electrical pulses to the muscles of the abdomen to increase gastric emptying

Feeding Tube

- Usually inserted directly into the small intestine through the abdomen
SMALL INTESTINAL BACTERIAL OVERGROWTH

**Characteristics**
- Abdominal Pain
- Distention
- Diarrhea

**Behavioral**
- Minimize medications
- Hormone replacement
- PPI

**Therapeutics**
- Pro-motility drugs
- Initiate or cycle antibiotics
- Probiotic
- Nutrition
## Constipation

### Behavioral
- Physical activity
- Adequate fluid intake
- Stop constipating medications

### Therapeutics
- Osmotic Laxatives
- Stimulants:
  - Lubiprostone
  - Linaclotide
- Pro-motility:
  - Pyridostigmine
- Biofeedback
- Sacral Nerve Stimulation
TECHNIQUE

How it works

**Problem**

**Sitting**

- Anorectal Angle
- Puborectalis Muscle

**Solution**

**Squatty Potty**

- Anorectal Angle
- Puborectalis Muscle
- Sphincter

- Correct anorectal angle
- Knees above hips
- Raised heel for comfort
- Wide stance platform
- Elevates your feet

THE PUBORECTALIS MUSCLE “CHOKES” THE RECTUM MAINTAINING CONTINENCE

Squatting RELAXES THE PUBORECTALIS MUSCLE ALLOWING EASIER ELIMINATION
# DIARRHEA & SOILAGE

## Important Considerations
- Medication review:
  - Magnesium
  - Cholesterol-lowering
  - Gout medication
  - Anti-inflammatories
  - Metformin
  - Thyroid medication
- Recent antibiotics:
  - C. Difficile toxin
- Travel:
  - Giardia antigen
  - Ova/ parasites

## Behavioral
- Pelvic floor exercises
- Biofeedback

## Dietary Considerations
- Lactose intolerance
- Sugar substitutes
- Food allergies
  - Gluten

## Therapeutics
- Octreotide
- Bile acid sequestrants
- Anti-depressants
NUTRITIONAL CONSIDERATIONS

- The physical ability to digest food including chewing, swallowing, absorption, and elimination.
- Appetite fluctuations
- Taste changes
- Food/drug interactions
- Skills and ability to comply with dietary lifestyle changes.

FODMAP Diet:
- Short-chain carbohydrates
- Poorly absorbed
- Osmotically active
- Rapidly fermented
- Result in symptoms of abdominal bloating and pain.

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<tr>
<th>F</th>
<th>Oligosaccharides</th>
<th>Fructans</th>
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<tr>
<td>O</td>
<td>Disaccharides</td>
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<td>D</td>
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<td>Sorbitol</td>
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Low FODMAP education consists of initially eliminating FODMAPs from the diet for 6-8 weeks.

Following symptom resolution, gradual reintroduction of foods to determine individual tolerance.

FODMAP dietary education should be provided by a trained dietician.
The role of food allergy in SSc is unclear.

Immunologic methods used in evaluating food allergies may include:
- Skin prick testing
- Atopy patch testing
- Blood RAST testing

Goal is to identify trigger and restore gut balance.
GOOD GUT BACTERIA

- Changes in the distribution or composition of the GIT microbiota may alter intestinal physiology and immunity.

- Environmental, nutritional, and gut-derived triggers that cause microbiome perturbations can drive an abnormal overload of dysbiosis, influencing gut barrier.

- The change in composition of the GIT biofilm communities in response to immunosuppressive therapies has not been well-characterized.
SSc-GIT HOMEOSTASIS

**Probiotics**
- Live microorganisms that, when administered in adequate amounts, have shown potential benefits in SSc patients.

**Prebiotics**
- Non-absorbed carbohydrate polymers that promote metabolic activity and expansion of presumed beneficial gut bacteria.

**Rifaximin**
- Non-absorbable antibacterial activity, including prevention of gut mucosal adherence and bacterial translocation.

**Fecal Microbiota**
- Recipients following transplantation becomes more diverse and more similar to the donor profile.
• GIT symptoms in SSc are common.

• A personalized approach to each patient and a focus on nutrition is critical.

• Improved use of questionnaires, bedside testing, and biopsy specimens will improve management.

• The role of dysbiosis and immune dysfunction in SSc-GIT needs to be defined in management.
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QUESTIONS?