FOOD FOR THOUGHT:
Use of Enteral Nutrition in Pediatric Crohn’s Disease

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Objectives

At the end of this session, participants will be able to:

- Based on the evidence presented, identify at least two effects of exclusive enteral nutrition on children with Crohn’s disease
- Identify at least two potential barriers to widespread use of exclusive enteral nutrition in pediatric patients with Crohn’s disease
- Describe at least two necessary components for instituting a successful enteral nutrition program for your patients with Crohn’s disease

Definitions

- PEN = partial enteral nutrition
- EEN = exclusive enteral nutrition
Enteral Nutrition: How does it work?

The short answer in 2012 is....... We still don’t know!!!

Enteral Nutrition: How does it work?

Hypotheses:
- elimination of dietary antigen uptake
- decreased production of inflammatory mediators due to reduced dietary fat
- overall nutritional repletion
- provides important micronutrients to diseased intestine
- alters type/numbers of gut bacteria
Treatment Goals for Pediatric IBD

- Induce symptomatic remission
- Achieve mucosal healing
- Avoid relapse (maintain remission)
- Minimize complications (disease induced and iatrogenic)
- Improve quality of life
- Promote normal growth and development
Induce symptomatic remission
Enteral Nutrition


RCT (Ped)
10 wk EN versus Oral methylpred
4 wk full, then wean

Lost to follow-up (n = 2)
(inability to introduce the formula)

Lost to follow-up (n = 2)
(worsening of disease activity)

Primary outcome analysis (n = 18)
Secondary outcome analysis (n = 17)
Anti-inflammatory and Growth-Stimulating effects precede Nutrition Restitution

- 12 children with active CD treated for 6 weeks with EEN
- Significant improvement by day 3 in ESR, IL-6, by day 7 in PCDAI, CRP, IGF-1
- Preceded improvement in Weight-for-age Z score, mid-upper arm circumference day 14, triceps skinfold thickness day 21

Bannerjee K et al. JPGN 2004;38(3):270-5.
Treatment Goals for Pediatric IBD

- Induce symptomatic remission
- **Achieve mucosal healing**
- Avoid relapse (maintain remission)
- Minimize complications (disease induced and iatrogenic)
- Improve quality of life
- Promote normal growth and development

**Achieve mucosal healing**

- 10 wk open-label RCT of EEN vs. corticosteroids (Borrelli et al 2006)
- 19 in EEN, 18 in CS group
- Primary outcome PCDAI remission and endoscopy/histology
- PCDAI remission EEN 79%/ CS 67% (p=0.4)
- **Mucosal healing EEN 74%/ CS 33% (p<0.01)**

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Avoid relapse (maintain remission)

- Symptoms come back once enteral nutrition is stopped.
- 60-70% of patients experience a relapse within 12 months of stopping enteral nutrition and resuming a normal diet

Avoid relapse (maintain remission)

- Studies have shown that both
  - cyclical therapy (exclusive liquid diet therapy for 4 wk out of every 16) OR
  - overnight supplemental liquid diet therapy with an unrestricted daytime diet are associated with prolonged disease quiescence


Avoid relapse (maintain remission)

RCT (Adult)
51 pts randomly assigned to supplemental EN (n=26) or free diet group (n=25)
All on mesalamine, some on 50 mg AZA

Takagi S et al. APT 2006;24(9):1333-1340.
Avoid relapse (maintain remission)

MEDICAL/NUTRITIONAL REMISSION

Canani RB et al. Digest Liver Dis 2006;38:381-387

SURGICAL REMISSION

<table>
<thead>
<tr>
<th></th>
<th>EN group [n=20;n(%)]</th>
<th>Non-EN group [n=20;n(%)]</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical recurrence over 1 yr f/u</td>
<td>1 (5)</td>
<td>7 (35)</td>
<td>0.048</td>
</tr>
<tr>
<td>Endoscopic recur. 6 mo after operation</td>
<td>5 (25)</td>
<td>8 (40)</td>
<td>0.50</td>
</tr>
<tr>
<td>Endoscopic recur. 12 mo after operation</td>
<td>6 (30)</td>
<td>14 (70)</td>
<td>0.027</td>
</tr>
</tbody>
</table>

Treatment Goals for Pediatric IBD

- Induce symptomatic remission
- Achieve mucosal healing
- Avoid relapse (maintain remission)
- **Minimize complications (disease induced and iatrogenic)**
- Improve quality of life
- Promote normal growth and development

Minimize complications (disease induced and iatrogenic)

- No hepatosplenic T cell lymphomas
- No infections
- No osteoporosis
- No growth retardation

- Iatrogenic – NG tube misplacement, gastrostomy problems (anecdotal)
- Refeeding syndrome (case reports)
Steroid sparing effects

- Retrospective study of single centre experience (1985 to 2004)
  - 115 patients with EEN as initial therapy
  - 72 (63%) had ileal/jejunal involvement only, 32 (28%) ileocolonic, 11 (10%) colonic only
  - Formula type at initiation was most commonly semi-elemental 103 (90%), followed by polymeric 8 (7%) and elemental 1 (1%) 
  - 34 (30%) were started on azathioprine therapy within the first year post diagnosis.
  - 79 (69%) received no steroids during first year post diagnosis

Otley et al. Gastro 2005; 128(4) (Suppl.2): W1053

Treatment Goals for Pediatric IBD

- Induce symptomatic remission
- Achieve mucosal healing
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- Minimize complications (disease induced and iatrogenic)
- **Improve quality of life**
- Promote normal growth and development
Improve quality of life

- 26 children with active CD treated for 8 week with EEN
- PCDAI, endoscopy, QOL (IMPACT-II)
- 23/26 achieved remission *(defined as PCDAI <20)
- No correlation between change in QOL score and histology/endoscopic score


<table>
<thead>
<tr>
<th>Domain</th>
<th>Pretreatment</th>
<th>Post-treatment</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bowel</td>
<td>0.55 (.26)</td>
<td>0.71 (.21)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Systemic</td>
<td>0.33 (.25)</td>
<td>0.79 (.23)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Emotional</td>
<td>0.52 (.24)</td>
<td>0.71 (.23)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Social</td>
<td>0.68 (.17)</td>
<td>0.81 (.15)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Body image</td>
<td>0.52 (.28)</td>
<td>0.72 (.22)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Tests/Rx</td>
<td>0.48 (.28)</td>
<td>0.63 (.28)</td>
<td>0.04</td>
</tr>
<tr>
<td>TOTAL</td>
<td>0.56 (.18)</td>
<td>0.74 (.16)</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Treatment Goals for Pediatric IBD

- Induce symptomatic remission
- Achieve mucosal healing
- Avoid relapse (maintain remission)
- Minimize complications (disease induced and iatrogenic)
- Improve quality of life
- **Promote normal growth and development**

Promote normal growth and development

- Limited data
- Meta-analysis for interventions for growth failure in pediatric CD (Newby EA et al. 2005 Cochrane Database)
- 2 RCTs (Sanderson 1987; Thomas 1993), EN vs steroid, height velocity SD scores significantly increased in EN group
Treatment Goals for Pediatric IBD

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Primary Therapy with Enteral Nutrition (EEN)
Variation in use
EEN in North America

EEN as primary therapy
- 40% appropriate/very appropriate
- 43% sometimes appropriate
- 16% rarely appropriate

Use of EEN
- 31% never
- 55% sparingly
- 12% regularly

- not related to age of MD
- not related to hospital based practice
- increased by previously worked where EEN used regularly (OR 8)
- increased by currently working where EEN used regularly (OR 39)

Stewart et al. JPGN 2011;52(1):38-42.

USA compared with Canada

- Canadian GIs more likely to:
  - feel EEN is appropriate
  - use EEN regularly
  - currently / previously work where EEN used
  - use maintenance EN

Stewart et al. JPGN 2011;52(1):38-42.
Use of Enteral Nutrition for Pediatric Crohn’s Disease
Percentage of NEW diagnoses OFFERED and STARTED on EEN

Informal survey of Academic Health Centres in Canada Spring 2011

Canada compared with USA

- Canadians more likely to:
  - use NG feeds
  - involve dietitians in care
  - programs to cover costs
  - Not use concurrent drug therapy

Stewart et al. JPGN 2011;52(1):38-42.
Benefits and Barriers

Main advantages (aside from inducing remission)
1. Steroid sparing/avoidance (42%)
2. Nutritional benefits
3. Treat growth failure

Main disadvantages
1. Compliance (70%)
2. Lack of support from patient/parents
3. Lack of experience

What would increase use? Practice guidelines

Stewart et al. JPGN 2011;52(1):38-42.

Clinical Guidelines

Critch J, Day As, Otley A, King-Moore C, Teitelbaum JE, Shashidar H.

Use of Enteral nutrition for the Control of Intestinal Inflammation in Pediatric Crohn Disease.

A TYPICAL FEEDING PICTURE:

Induction Therapy
- Up to 3 months of exclusive NG feeds
- 20 hours per day
- Encourage usual ADL

Maintenance Therapy
- Transition to overnight feeds & healthy DAT
- After 3-6 ‘successful’ months, 1 night off per week
- Gradually work towards being on off feeds 2-3 nights per week

Duration of tube feeding depends on successful response and families’ lifestyle

GETTING STARTED:

Decisions, decisions...

- Energy and fluid requirements
  - Use combination of energy equations
  - Initiate on the conservative side
  - Ensure at least maintenance fluid from feeds

- Consider refeeding syndrome
  - Allow 24-36 hours for progression to ‘full’ feeds, more if refeeding risk
Getting Started: Decisions, decisions...

- **Oral versus nasogastric**
  - Polymeric, semi-elemental, elemental
  - Practice variation
  - Flavoring
- **Method of Progression**
- **Duration of Induction Therapy**
  - Substantial variation in practice
  - Commonly 6-8 weeks but anywhere from 6-12 weeks

GETTING STARTED: Decisions, decisions...

- **Who’s going to place the tube?**
  - Child
  - Parent
  - RN
  - Who will replace the tube monthly?
- **Give clear direction re plan**
  - Family & team
- **Clear fluids**
- **Monitor for hunger**
MAINTENANCE FEEDS:

- 10-12 hours overnight
- Polymeric formula
- Healthy DAT
  - No therapeutic diet
  - Include fiber
  - Emphasize nutritious choices
  - Moderate fat intake
  - Assess Calcium/Vitamin D
  - Ensure adequate fluid
- Monitor weight changes

FOR BEST RESULTS...

- Experienced health care team
- Support family through a difficult time
  - Offer a ‘support family’
- Establish appropriate community supports
  - School
  - Extracurricular activities
- Provide phone follow-up
FOR BEST RESULTS...

RESOURCES

- Equipment/supplies
  - Pump (table top versus ambulatory)
  - Tubes and feeding supplies
  - Formula
- Tube Feeding Education package
- Follow-up Care

IDENTIFYING THE CHALLENGES:

COMMUNICATION

- Where are the families receiving their education?
  - Internet
  - Family, friends & acquaintances
  - Alternative medicine practitioners
- Effective communication
  - Misinformation and mixed messages
  - Information overload (retention)
IDENTIFYING THE CHALLENGES:
FINANCIAL

- What does it cost?
- Who pays for what?

Where are the savings?
- Over 90% of new patients taught as outpatient
- Use of polymeric formulas
- Consider usual cost of eating
- Phone follow-up prevents admissions to hospital

Thank you!

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