Failure To Thrive in Children: A Modern Field Guide

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Objectives

Participants should be able to:

- Understand the paradigm shift away from the binary “organic” –vs- “non-organic” classification for FTT
- Add 2 new questions to their FTT history taking
- Calculate estimated calorie needs for a child
- Identify 1 new growth chart feature to consider when assessing a child’s growth
- Identify which team members to assemble for a FTT child
- Understand the ‘modern’ indications for admission for FTT
FTT Historically classified as a syndrome

- Non-organic FTT was often a euphemism for a healthy child with a psychosocial etiology for poor growth
- Long inpatient workups with a battery of consults
- Great care to document failures of parenting
A newer paradigm for FTT

- FTT is an observation:
  - Inadequate physical growth diagnosed by observation of growth over time using a standard growth chart

- This necessitates that the practitioner:
  - Correctly and serially plot data on a growth curve
  - Knows how to interpret the growth curve data

- Assessment over time is key:
  - Impractical to do this inpatient anymore
  - Confirming real growth requires a minimum of several weeks
Dogma doesn’t fully capture FTT

**Growth Chart Dogma**
- Weight below 3rd (or 5th) %ile
- Weight %ile drops down two major centiles
- Weight below 80% of the ideal weight for age
- WFL below the 3rd or 5th %ile

**Other considerations?**
- Is growth issue symmetric?
- Is there short stature?
- Parental heights
- Genetic concerns
- Is length disturbance > than weight disturbance?
- 3 year old FT girl
- Dx with celiac disease at 12 months
- Normal HC
- Totally gluten free for 2 years
- Eats 3 meals + 2 snacks per day

What would you do next?

a. Biopsy duodenum for active celiac dz
b. Nutritional rehab
c. Send IGF-1, IGF-BP3
d. Send a karyotype
e. Skeletal survey
- 9 year old FT girl
- Dx with celiac disease at age 6
- Totally gluten free for 3 years
- Eats 3 meals per day

What would you do next?

a. Workup for active celiac disease
b. Nutritional rehab
c. Send IGF-1, IGF-BP3
d. Send a karyotype
e. Skeletal survey
• 14 year old Vietnamese boy
• Parents worry he is so small and grows slowly
• Tanner II
• Eats 3 meals and 1 snack per day
• No other medical complaints and otherwise healthy

What additional lab tests would help reassure you?

a. Bone age and IGF-1, IGF-BP3
b. Skeletal survey
c. TSH and free T4
d. Celiac serologies
e. Karyotype

Target height: Use it!

\[
\text{Target height (cm) = } \frac{\text{Mother's height (cm)} + \text{Father's height (cm)} - 13 \text{ cm}}{2}
\]

\[
\text{Target height (cm) = } \frac{\text{Mother's height (cm)} + \text{Father's height (cm)} + 13 \text{ cm}}{2}
\]
Case

- 26 week old FT baby girl admitted for FTT and respiratory distress
- At 6 mo WCC, she was tachypneic with a concerning growth chart
- She has been fed “generic” infant formula since birth
- She currently takes 15 ounces of formula per day
- Stools once per day, soft, no blood.
- No vomiting, rash, fever
Case

- Has intermittent wheezing at rest, with RR=36
- Found to have micrognathia
- PO ad lib feeds are observed by the inpatient team
- Patient is able to take 2-3 ounces by mouth before fatiguing
- Spits up ½ ounce after every feed but appears content
Just memorize it.

<table>
<thead>
<tr>
<th>Age in months</th>
<th>Wt gain (g/day)</th>
<th>RDA (kcal/kg/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3 mo</td>
<td>25-35</td>
<td>108</td>
</tr>
<tr>
<td>3-6 mo</td>
<td>15-21</td>
<td>108</td>
</tr>
<tr>
<td>6-12 mo</td>
<td>10-13</td>
<td>98</td>
</tr>
<tr>
<td>1-3 yr</td>
<td>4-10</td>
<td>102</td>
</tr>
<tr>
<td>4-6 yr</td>
<td>5-8</td>
<td>90</td>
</tr>
<tr>
<td>7-10 yr</td>
<td>5-12</td>
<td>70</td>
</tr>
</tbody>
</table>

Column 2: Acceptable weight gain per day by age
Column 3: Recommended caloric intake by age

There are male and female specific guidelines but they aren’t terribly different.
Which sounds better?

The baby is taking 15 ounces of formula per day

The baby is taking 60% of her calorie needs per day
Can we infer an etiology?

Can we begin to infer an etiology?

Genetic?
Endocrine?
Inadequate calories?
Familial?
Loose classification to organize differential diagnosis

| Inadequate intake/retention | • Not enough food offered  
|                           |   • Child not taking enough food  
|                           |     • Oromotor dysfunction  
|                           |     • Behavioral/sensory feeding problem  
|                           |     • Emesis/GERD  |
| Inadequate absorption     | Allergic enteropathy, celiac disease, IBD, CF, cholestasis, short gut  |
| Increased energy requirements | Chronic UTI, CHD, chronic renal failure, pulmonary disease, CF, malignancy, immunodeficiency, thyrotoxicosis, trisomies, insulin resistance, inborn errors of metabolism |
Help isn’t far.
But where to start?
Take a COMPLETE history

- Adequate resources?
- Breast feeding going OK?
- How do you mix formula?
- How much juice?
- Grazing all day?
- Who is with child during the day and night?
- Who grocery shops? How do you know what the child should eat?
- Dietary restrictions?
- How do you convince the child to take more?
- Do you know the child’s “no” cues?
- Is meal time stressful?

.....And Physical Examination
Explain to families our obsession over growth

- **FTT is often a sign of under nutrition**

- **Why we care?**
  - The undernourished child may not reach typical developmental milestones such as sitting up, walking, and talking at the usual ages.
  - Undernourished children are often irritable, have poor sleep, and are less interactive.

- **Why are children at risk more than adults?**
  - Fewer energy reserves
  - High resting energy expenditure
  - Growth and development phase
Navigate the therapeutic alliance

- Parental anxiety (‘my baby is failing to thrive!’)
- Parental disconnect (‘my child acts just fine’)
- Psychosocial issues (food security, health literacy)
- Belief systems around nutrition (no formula; vegan)
- Will that CBC help or hinder the alliance?
There are tests

- No evidence to support a systematic battery of tests to rule out organic etiologies

- History, physical exam (including growth curves) are most sensitive and specific

- When appropriate, a CBC, CMP, and bag UA can help build that therapeutic alliance
Some really helpful tests

- CBC and Fe panel: anemia/iron deficiency
- UA: urine pH for RTA; negative screen for UTI
- Urine Cx: **Cath if needed**
- CMP: hepatic, renal issues
- Alk phos
  - Low could be Zn deficiency
  - High could be rickets
And some great tests with a caveat

- Thyroid and GH studies (IGF1, IGFB3) only if:
  - Linear growth is decelerating AND
  - Length is below 50th percentile

- Celiac serologies in children exposed to gluten
  - If over 2, send TTG-IgA and total IgA
  - If under 2, add a de-amidated gliadin panel

- Inborn error labs
  - Lots of blood and urine
  - Secondary labs if suspicion is elevated and child not improving
And...some less useful tests

- **Albumin**
  - Half life = 20 days
  - Low in malnutrition, also in infection, burns, fluid overload, hepatic failure, cancer, nephrotic syndrome.

- **Transferrin**
  - Half-life = 10 days
  - Low in protein energy malnutrition, but also affected by iron status

- **Prealbumin**
  - Half-life = 2-3 days
  - Low in malnutrition, also in infections, liver failure and increased in renal failure

- **CRP**
  - Positive acute phase reactant. Helps determine whether above proteins are reduced because of inflammatory process or due to inadequate substrate, as in malnutrition.

Having a team avoids admissions

- RD: calorie counts, recipes, expertise
- Therapy team: access early
  - SLP/OT for feeding
  - MBS
  - PT/OT for tone and head support
- Early Intervention/Birth-to-three
  - Access early and often
  - Is there dedicated feeding services (not just generic OT)
- Specialists with quick turnaround
- SW or mental health support for family
Indications for admission

- Severe malnutrition
  - 60% of median weight for age
  - 75% of median WFL for age
- Significant dehydration
- Serious medical problem
- Child at risk for harm
- Failure to respond to several months of outpt mgmt.
- The need to document precise intake
- Extreme parental impairment, parental anxiety, or parent-child dysfunction
- Practical concerns (eg: transportation)
The bag of tricks

- Cut out grazing
- Eliminate distractions at meal time
- Limit high glycemic foods (eg: juice)
- Assess whether parents know baby’s “no” cue
  - Commonly mistaken as back arching/reflux
- Admission with home “way of life” in place
  - Can’t use this in pts. with urgent nutritional needs
- Consider riding out an infection-malnutrition cycle
- Calculate mid-parental height
IUGR babies are not all the same

- **Dysmaturity**: Expect robust catch-up
  - Placental defect
  - Abruptio placenta

- **Hypoplasia**: Child may not follow a standard curve
  - Congenital anomalies
  - Chromosomes
Prematurity

- Despite faster linear growth rates, even late preterm children (34-36 weeks' gestational age) are at increased risk of stunting compared with term peers

- Preterm and small-for-gestational-age infants are more likely to show persistent deficits in growth and in cognitive and academic achievement at 8 years of age

- Avoid early discontinuation of energy dense formula

- Consider oromotor skills before advancing solids