



Failure to Thrive

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Objectives

1. Identify the criteria for failure to thrive in children
2. Know the appropriate clinical assessment for failure to thrive
3. Identify appropriate interventions for FTT
4. Understand the role of nutritional supplements including oral and enteral formulas in treating FTT



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Defining failure to thrive:

Weight-for-length (or BMI) $<2^{\text{nd}}$ percentile (WHO growth chart) or $<3^{\text{rd}}$ percentile (CDC growth chart)

Poor or no weight gain over time

Significant downtrend in weight percentiles
(30% of full-term infants cross one percentile and 23% cross two percentiles between birth and 2 years)

Be aware of the following when evaluating growth charts:

- Parental size/growth
- Correction for prematurity (if applicable)



The WHO Growth Standards

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Growth Charts

- The WHO charts are growth standards that describe how healthy children should growth under optimal conditions (prescriptive)
- What are optimal conditions?
 - High socioeconomic status
 - Singleton mothers
 - Breastfeeding
 - No smoking

Which growth chart to use?

- 0-2 years: use WHO growth standards
- 2 years+: use CDC growth charts

WHO versus CDC

- In the first few months of life

- WHO curves show a faster rate of weight gain
- Use of the WHO charts during this time could increase the misperception of poor growth in formula-fed infants

- After 3 months

- WHO curves show a slower rate of weight gain
- Use of the WHO charts during this time might identify formula-fed infants as gaining weight too quickly



Why are growth charts important?

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Dr. Phil: “there is no reality, there is only perception”

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- If this is what you are used to seeing in your practice.....



- And a concerned mother comes in with a child that looks like this, a growth chart helps separate failure to thrive from misperception.

Etiologies for failure to thrive

- There are typically two reasons FTT occurs
 - Inadequate oral intake
 - Adequate oral intake with poor/no weight gain (suspect underlying condition)

Inadequate oral intake

- Pathophysiologic: poor oral motor skills, feeding refusal in GER/reflux, cleft lip/palate, malabsorption/inflammation, short gut, gastroparesis
- Social: no resources, neglect
- Self limiting: feeding problem (behavioral)

Adequate oral intake

- Congenital conditions
- Hypermetabolism
- Caregiver misperception

Congenital conditions

- Congenital heart disease: results in increased caloric demands
- Genetic syndromes: assess for hypotonia, dysmorphic features
- Metabolic syndromes: rare, typically identified with newborn screening

Hypermetabolism

- Identified with basal metabolic rate testing
 - Hypermetabolic state requires higher than typical caloric intake for age
 - Hypermetabolism could be secondary to other underlying cause or could be primary

Caregiver misperception

- RD evaluation of 5 day food diary
 - Evaluate daily caloric intake
 - Caregiver education on appropriate portion sizes, food volume, fat in diet
- Inpatient for feeding observation
 - Monitor for weight gain
 - Discharge plan for continued weight gain at home
 - Caregiver education

Laboratory evaluation

- Most children with FTT do not need labs
- Order labs if:
 - Significant FTT
 - FTT is not due to inadequate oral intake

Laboratory evaluation

- CBC, ESR
- Metabolic panel, electrolytes
- Anti-tTG IgA, serum IgA level
- Fecal elastase
- Urinalysis

When is upper endoscopy needed?

- When there is a suspicion of eosinophilic esophagitis based on history (other atopic condition) and laboratory findings (food allergy)
- When there is a suspicion of Celiac disease based on laboratory findings (elevated Celiac panel)

Evaluating for gastroparesis

- Gastric emptying scan of solid food meal over 4 hours (if meal can be tolerated). Refer to Gastroenterologist for management.
 - Symptoms associated with gastroparesis:
 - Abdominal pain
 - Nausea and vomiting
 - Early satiety
 - Poor appetite (worse in the evening than the morning)
 - Weight loss

Use of appetite stimulants in FTT

- Medication to increase appetite is only recommended when there is no underlying pathophysiology
 - Cyproheptadine (anti-histamine): 0.25 mg/kg/day, divide into 3 doses.
 - Can cause daytime sleepiness. Start with one time per day dosing at bedtime and increase slowly to 3 times per day as tolerated for sleepiness.
 - Megace: 1.5 mg/kg/dose, 2 times daily for 28 days only

Feeding therapy

- Suspected oral motor deficit
- Address behavioral aspects of feeding refusal
- Evaluate for sensory integration disorder
 - Suspected when there is severe self restricted diet associated with texture, not taste, of food
 - Typically in setting of other sensitivities (clothing, noise, light)

References

Jaffe, A.C.: Failure to Thrive: Current Clinical Concepts. *Pediatrics in Review* 2011; 32:100

NUTRITION INTERVENTIONS

Nutrient Loss

- Malabsorption
- Biliary atresia
- Vomiting
- Infectious diarrhea
- NEC or short bowel
- Bowel obstruction

Inadequate Intake

- Inappropriate feed technique
- Disturbed caregiver/child relationship
- Inappropriate nutrient intake
- Picky eater
- Reflux
- Mechanical problems
- Swallowing dysfunction
- Oral aversion
- Cardio disease
- Cerebral palsy
- CNS pathology
- Genetic syndromes
- Psychosocial problems
 - rumination

Social Issues

- Family Conditions

- Family chaos
- Absent parent
- Moving
- Parent mental health disorder
- Inadequate knowledge
- Neglect

- Dietary Factors

- BF difficulties
- Poor transition to food (6-12 months)
- Improper formula mixing
- Avoidance of high kcal foods
- Excessive juice or milk consumption

Developmental Effects

- Unusual watchfulness
- Minimal smiling
- Decreased vocalizations
- Lack of cuddliness
- Increased sleeping

Anthropometrics

- Accurate weight & length extremely important
- Use a length board

Dietary Assessment

•Types

- Review typical day
 - 24-hour recall
 - 3 day food record
 - 5-7 day record if variation
-
- Include all foods, fluids, & supplements consumed & time of consumption
 - Emesis should be noted

Dietary Assessment

- Look for red flags in recalls

- Excessive juice consumption
- Excessive milk consumption
- Grazing behaviors



- Also helpful in determining current dietary behaviors

- Feeding history
 - When solids were introduced
 - Feeding progression

Dietary Assessment

- Breastfeeding

- Frequency of nursing
- # of times infant nurses in 24-hour period
- Duration of feed
- Presence of maternal let-down reflex

- Digital scale

- Weigh before & after feed estimate volume consumed

Dietary Assessment

- Formula Feeding

- Type of formula

- How parent is mixing formula

- DO NOT ASSUME IT IS STANDARD

- Duration & how often

- Ounces consumed in 24 hour period

- Go through a typical day

- Red flags for parent/child struggles

- Lack of feeding routine

- Exceeds 30 minutes

- Volume intake is excessive



Interventions

- Nutrition intervention & management should begin at the 1st visit
- This includes nutrition & feeding behaviors
- Total calories vs dietary composition primary determinant of recovery

Energy Needs

- Calorie & protein needs will vary
- Total requirements for catch-up growth may be 150% or more than expected
- 55% of total energy for infant should be derived from fat
- Do not limit fat to <30% in those <2 years old

Energy Needs

- Catch-up Growth

- Find Ideal Body Weight

- 50th percentile weight for patient's LENGTH

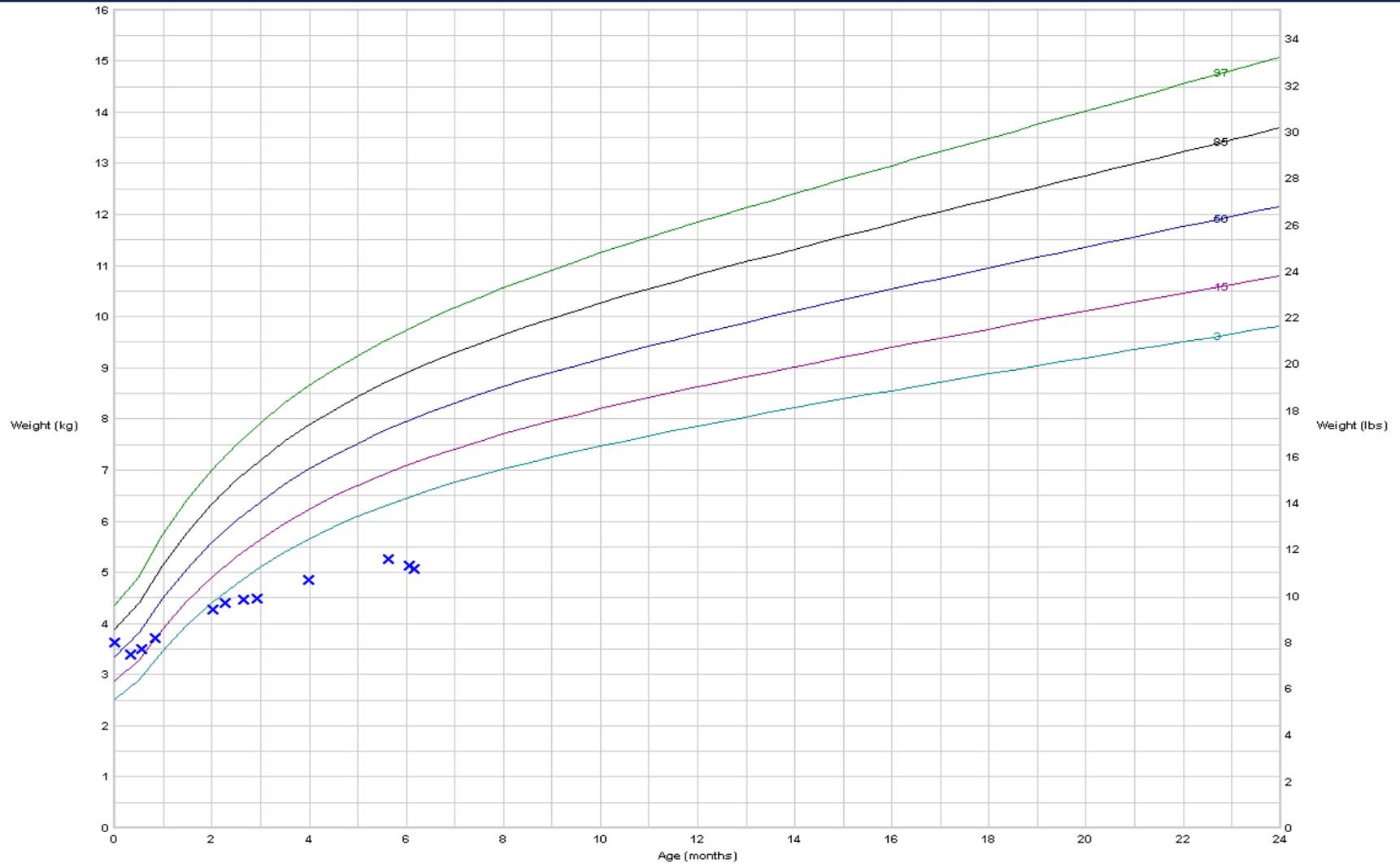
- Use weight-for-length growth chart

- Calculate calories needed at age

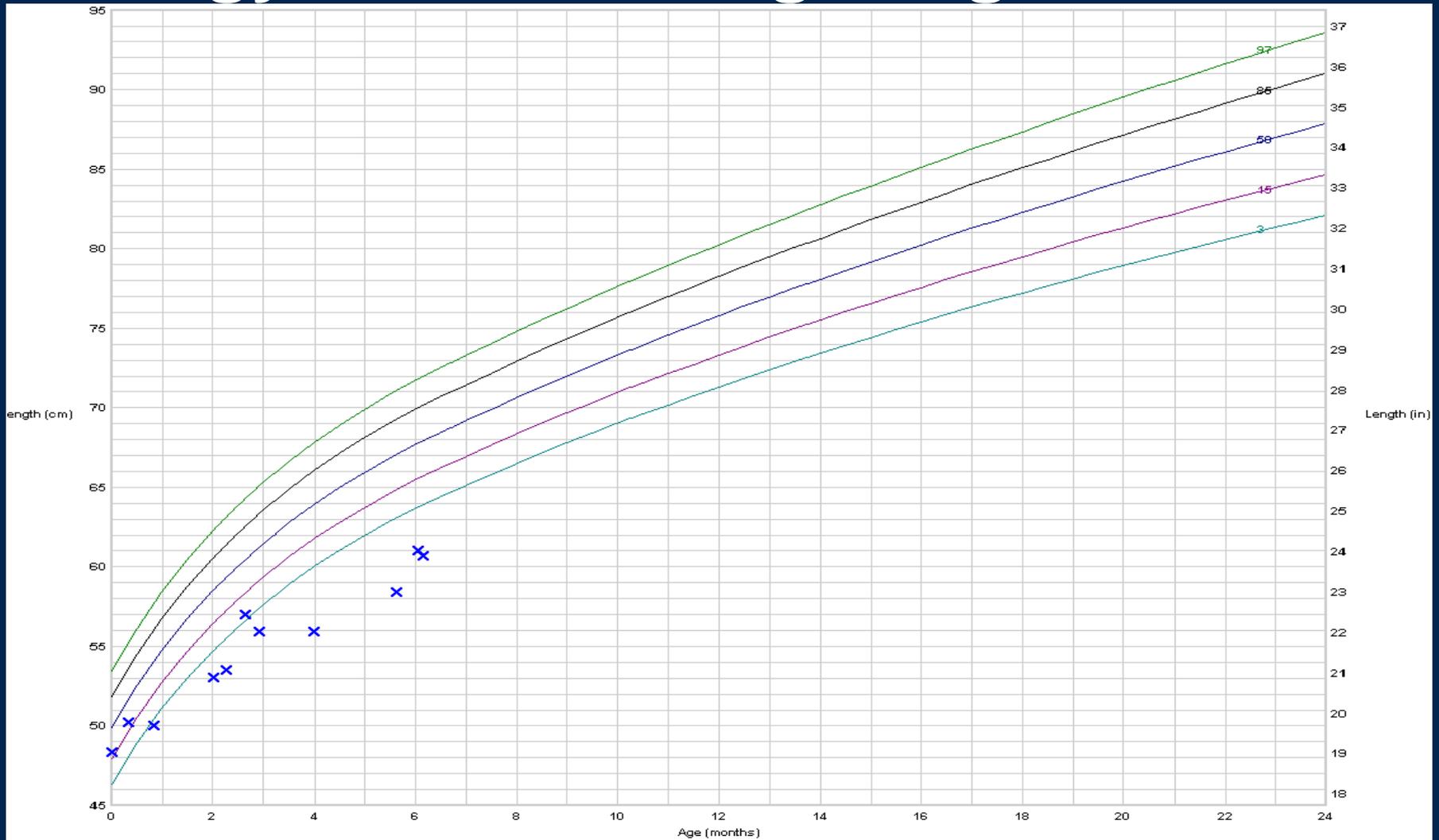
- Divide by current weight to get kcal/kg

	Age (years)	BMR (kcal/kg/day) Schofield***	DRI – Energy <i>Sedentary</i>	DRI - Protein
			kcal/kg/day	(g/kg/day)
Infants	0 – 2 mo	--	--	1.52*
	2 – 3 mo	54	102	1.52*
	4 - 6 mo	54	82	1.52*
	7 - 12 mo	51	80	1.2**
	13 - 35 mo	56	82	1.08**
Boys	3 y/o	57	85	1.08**
	4 – 5	48	70	0.95**
	6 – 7	48	64	0.95**
	8	48	59	0.95**
Girls	3 y/o	55	82	1.08**
	4 – 5	45	65	0.95**
	6 – 7	45	61	0.95**
	8	45	59	0.95**
Boys	9 – 11	36	49	0.94**
	12 – 13	36	44	0.94**
	14 – 16	28	39	0.85**
	17 – 18	28	37	0.85**
	> 18	28	36	0.8**
Girls	9 – 11	32	42	0.92**
	12 – 13	32	40	0.92**
	14 – 16	26	33	0.85**
	17 – 18	26	31	0.85**
	> 18	23	34	0.8**

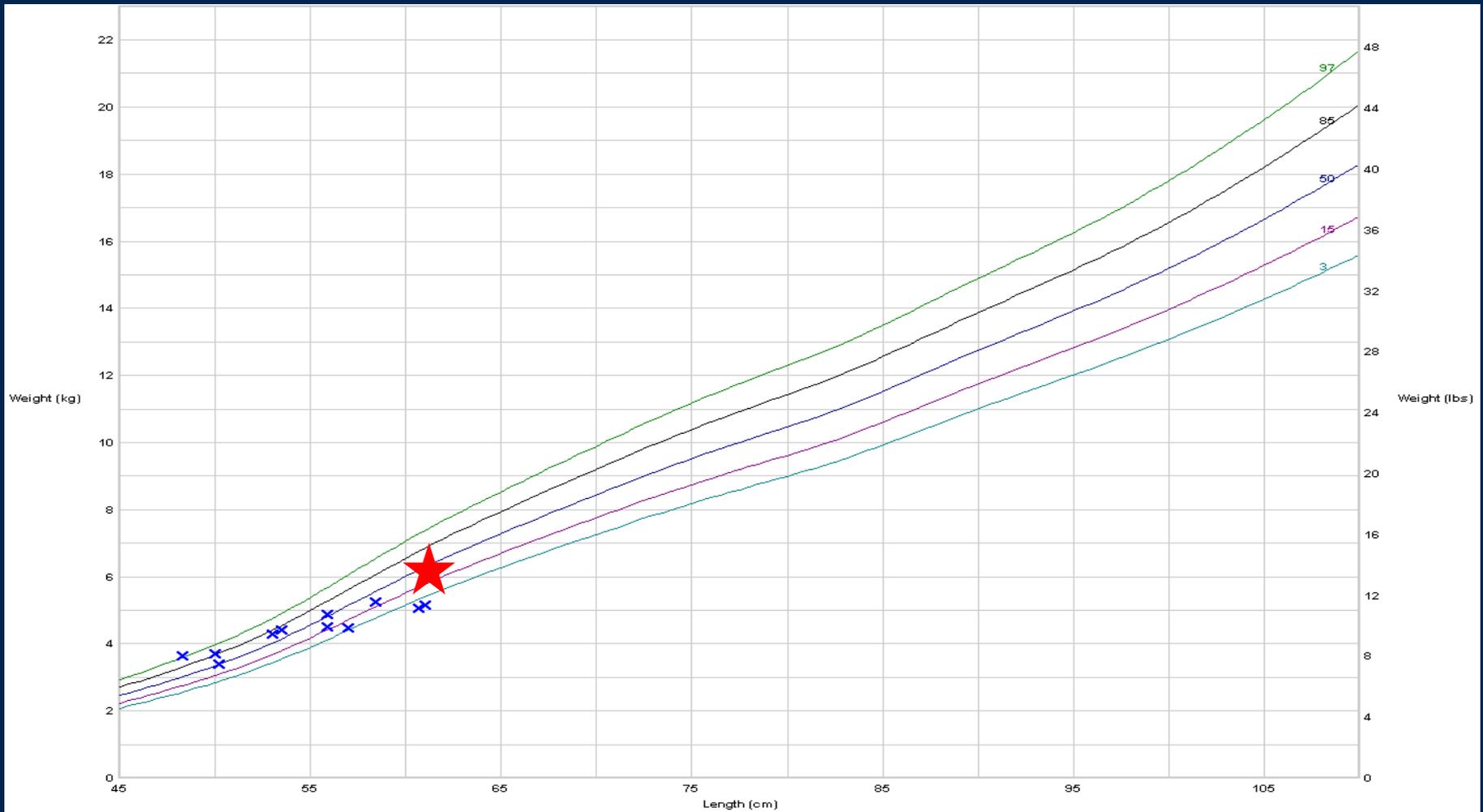
Energy Needs – Wt/Age



Energy Needs – Length/Age



Energy Needs – Wt/Length



Energy Needs

- Age: 7 months
- DRI/age: 80 kcal/kg/day
- Current wt: 5.1 kg
- IBW: (50th percentile wt/length) = 6.2 kg
- %IBW: $5.1 \text{ kg} / 6.2 \text{ kg} = 82.2\%$
- Catch-up Growth:
 - IBW x DRI = total kcal/day
 - Total kcal/day / current weight

Interventions

- In the hospitalized patient:
 - Daily food record
 - Daily weight recorded
 - Monitor K+ & Phos daily
 - Interdisciplinary team

Interventions

- Breastfeeding Infant

- Pump to stimulate milk production
- Encourage fluids, nutrition & rest for momma
 - Oatmeal & Fenugreek
- Supplemental bottle feeding
 - Formula or concentrate EBM
- Hindmilk collection for a supplement
- Feeding schedule
- Referral to lactation consultant

Interventions

- Formula feeding

- Replace low nutrient-dense fluids w/ infant formula
- Concentrate formula gradually ~2 kcal/oz/day up to 30 kcal/oz
 - Increased mOsm can cause intolerance
- Other modulars
 - Oil or carbohydrate additives

Interventions

- 3 meals + 2 snacks daily
- Discontinue all juice or sugar-sweetened beverages
- Offer milk or other high calorie/pro beverage with each meal
 - 2-3 years 16-20 oz
 - 4-12 years 24 oz

Interventions

- High calorie/High Protein diet
 - Use family's usual foods
 - Add fats only to patient's foods
 - Aim for healthy alternatives
 - Tuna in oil vs water
 - Peanut butter added to apple slices
 - Olive oil on pasta noodles + sauce
 - Do not promote junk food
 - Use high calorie/high protein beverages

Interventions

- Beverages

 - 30 kcal/oz

 - RTF: Pediasure, Nutren Jr., Boost Kid Essentials

 - 1.5 versions if needed

 - Add Carnation Instant Breakfast: 8oz whole milk

 - Double strength milk

- Wean at first possible opportunity

- Aim for balance between foods & beverages

Behavioral Interventions

- Scheduled meal & snack times
- Mealtime last 20-30 minutes
- Feed child in a chair, at table with minimal distractions
- Do not pressure child to eat
- Do not discuss eating in front of child except to ask if they would like more food
- If uncooperative, end the meal/snack in calm manner & try again at next **SCHEDULED** time

Interventions

- Communications with Parents

- “Your doing a good job with _____”

- “This is very challenging”

- “Having a baby who will not eat makes many people feel like they aren’t doing a good enough job”

Enteral Nutrition

- Supplement oral intake
- Bolus or night feeds to not disrupt daytime appetite
- Formula choice
 - Age
 - Diagnosis
 - Cost
 - Elemental in large deficits to minimize malabsorption

Study shows EN does assist FTT kids in reaching weight gain goals

(+23 gm/day) => improved outcomes

Parenteral Nutrition

- If the gut works – USE IT!!!!
- Only to be used if failure to gain adequate weight with po/enteral
- Advance slowly to reduce risk of re-feeding
- Things to consider:
 - Cost
 - Risks
 - Monitoring
 - Additive shortages



Monitoring

- Should be ongoing until condition is completely resolved

- Weight & length:

 - q week for infants

 - q month toddlers/preK children

- Nutrition adjustments made

accordingly to promote sufficient catch-up or a curve

- Monitor nutritional labs

 - Caution w/ prealb



Prognosis

- Psychosocial nutrition & growth failure can achieve normal or near-normal growth status
- Nutritional recovery accompanied by significant improvements in child's mood & sociability
- Cognitive & school outcomes are worse with those who had FTT

Summary

- Still an ongoing working definition of “Failure to Thrive”
- Multidisciplinary teams may benefit patient
- Affects not only growth, but behavior, cognitive, and academic functions – early intervention is key!
- Enteral vs Parenteral – use the gut!

QUESTIONS?