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# Failure to Thrive: A Consequence of Undernutrition

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disclose any financial  
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to this article.

**Objectives** After completing this article, readers should be able to:

1. Recognize three common presentations in the physician's office of failure to thrive.
2. Identify three principal mechanisms that lead to a mismatch between caloric intake and caloric expenditure.
3. Understand the complex interaction between psychosocial and biomedical risks that may lead to failure to thrive.
4. Review the diagnostic approach based on three different growth presentations.
5. Discuss the role of the physician in identifying psychosocial factors in failure to thrive and in referring families to mental health professionals.

## Introduction

Failure to thrive (FTT) is not a disease, but a sign that is better thought of as a final common pathway of many medical, psychosocial, and environmental processes that lead to poor growth in a young child. Although FTT once was conceptualized as either organic or nonorganic, it now is understood to be the result of interaction between the environment and the child's health, development, and behavior. The evaluation of a young infant who is growing slowly, or not at all, is truly the ultimate test of the pediatrician's ability to evaluate simultaneously biomedical and psychosocial information obtained from the medical history and the physical examination. The stakes are high during the diagnostic phase because the child could have a life-threatening disease or be in a life-threatening psychosocial environment. Fortunately, these dire scenarios are exceedingly rare. Most cases of FTT are due to inadequate nutrition that results from biologic and environmental factors that intersect in such a way as to preclude adequate nourishment of the child. It is essential to take a developmental approach to poor growth because the causes of this condition change with development.

## Case Histories

Two case histories are presented to illustrate examples of medical and psychosocial conditions leading to inadequate growth. Management must be tailored to the child, taking into account medical, psychological, family interaction, and economic problems.

### Case 1

AB, a 15-month-old girl, was referred by her primary care pediatrician for evaluation of poor growth. She had grown adequately for the first 6 postnatal months, but her growth began to plateau after 6 months of age. She had experienced nine ear infections over 9 months, several bouts of "pneumonia," and loose bowel movements and "diarrhea" almost constantly.

Her nutritional history included breastfeeding for 2 months, followed by weaning to formula. She was started on rice cereal at 4 months of age and gradually was introduced to a variety of pureed foods. She had been eating some table food for many months. The family history was noncontributory. The parents were very concerned. The maternal grandmother, who had lived with the family, had cancer and was in hospice care. The mother reported depression because of her own mother's illness. The parents had

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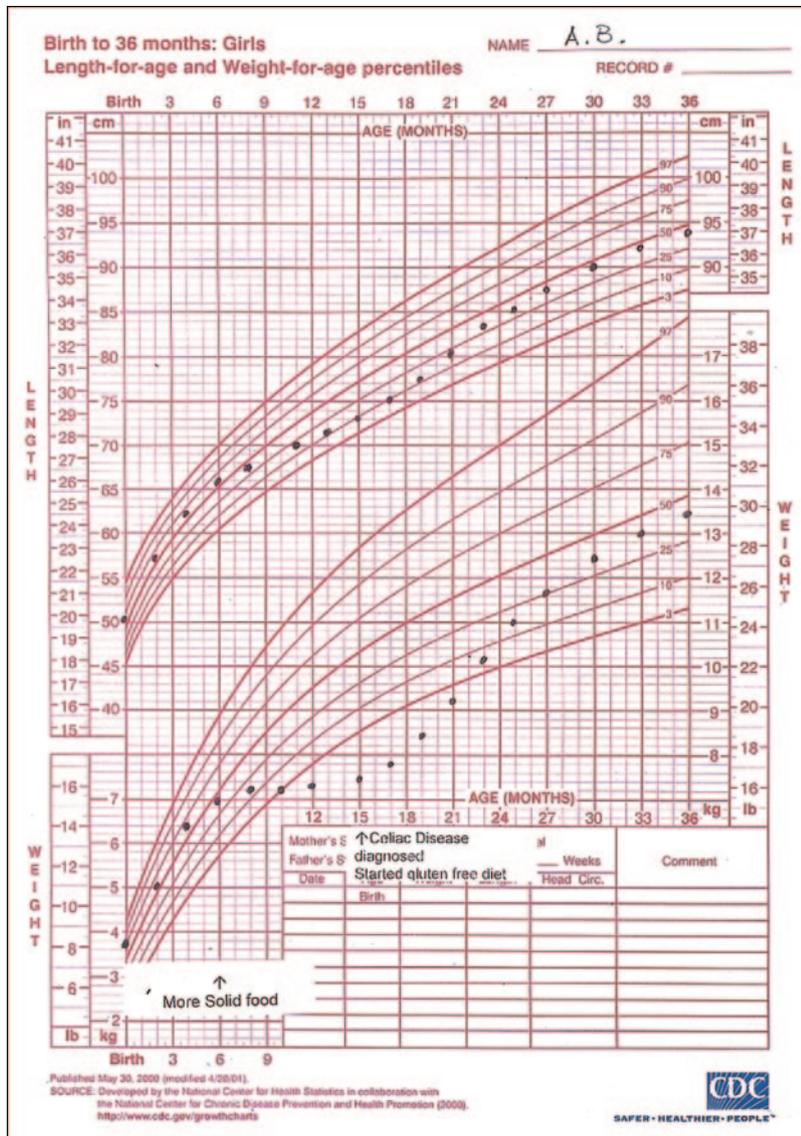


Figure 1. Growth chart for AB.

separated for several months during the last year because of marital discord, but were back together and doing well.

Notable findings on the child’s physical examination included thin, wispy hair; bilateral serous otitis media; transmitted upper airway rhonchi; and a protuberant abdomen. She was normocephalic, her length was at the 10th percentile, and her weight was below the 3rd percentile (Fig. 1). She had very thin extremities, with a triceps skinfold thickness of 6 mm (<5th percentile) (Table 1).

The differential diagnosis included multifactorial FTT due to recurrent ear infections and psychosocial stress. In

addition, the history of chronic diarrhea, her protuberant abdomen, and the severity of her wasting in the face of a normal dietary history raised concerns. A limited laboratory evaluation was undertaken, looking specifically for malabsorptive diseases, including cystic fibrosis and celiac disease. The chronic infections suggested the possibility of immunologic disease, which would be considered if she did not have malabsorptive disease.

Laboratory studies were ordered and a sweat test scheduled. The family was asked to feed her three meals and three nutritious snacks on a set daily schedule. The importance of social support for the family dealing with a sick child, a fragile marriage, and a dying grandmother was discussed, and the family was helped to contact community mental health services. Telephone contact was maintained.

Laboratory studies showed anemia, a low serum albumin, and positive tests for immunoglobulin A antiendomysial antibody and anti gliadin antibody. These positive tests were confirmed by an intestinal biopsy diagnostic for celiac disease. Her sweat test was negative. She responded to a gluten-free diet with excellent weight gain.

In this case, the important psychosocial problems were not the cause of the child’s FTT. These issues may have delayed her diagnosis by distracting the family from her symptoms or biasing her pediatricians against a medical cause for her poor growth. On the other hand, she was diagnosed at a young age, and she made

### Table 1. Triceps Skinfold Thickness Norms Within 2 Standard Deviations Based on Preliminary NHANES Data (1971–1972)

Age	Boys	Girls
1 year	9.8 to 11.6	9.8 to 11.4
2 year	9.6 to 10.8	9.9 to 11.1
3 year	9.7 to 11.1	11.1 to 12.5
4 year	9.1 to 10.5	10.1 to 11.3

an excellent recovery after the proper diet was instituted. The important clues for an underlying medical condition included the history of recurrent infections, physical findings consistent with severe malnutrition, and a height percentile decreasing nearly simultaneously with the decreasing weight percentile.

**Case 2**

CD was referred for evaluation of FTT at 8 months of age by his primary care pediatrician. He was born to a 31-year-old, primiparous mother from Taiwan, whose husband was working in the United States as an engineer. She was university-educated, but did not speak English. The baby was born at term, weighing 3.4 kg and delivered by cesarean section for failure to progress. The mother was readmitted to the hospital on the 11th postoperative day for fever and endometritis. She was discharged on oral antibiotics after 4 days.

Over the first 2 postnatal months, the infant was breastfed and grew well, doubling his birthweight by the 2-month visit (6.8 kg, >95th percentile). Between 2 and 8 months of age, he gained only 500 g (average of 2 g/d). He refused to eat and often vomited during feedings when upset; his mother wondered aloud whether he might be “evil.” He nursed at night approximately every 2 hours for 5 minutes each time. During the day, he received 24-kcal/oz formula fortified with cereal. They had tried many different types of pureed foods. Both parents had been thin as children. The mother was isolated in their apartment and did not drive. She did not know any neighbors, and their only friends lived more than 30 miles away. They sometimes visited with friends on the weekend, but not every weekend. The maternal grandmother had come from Taiwan to help for the first 2 months of the infant’s life. The mother had no history of depression and did not believe that she was depressed.

The physical findings were normal except for cachexia and fussiness. The child’s head circumference was at the 50th percentile, length at the 25th percentile, and weight at less than the 5th percentile (Fig. 2).

Results of a complete blood count and electrolyte

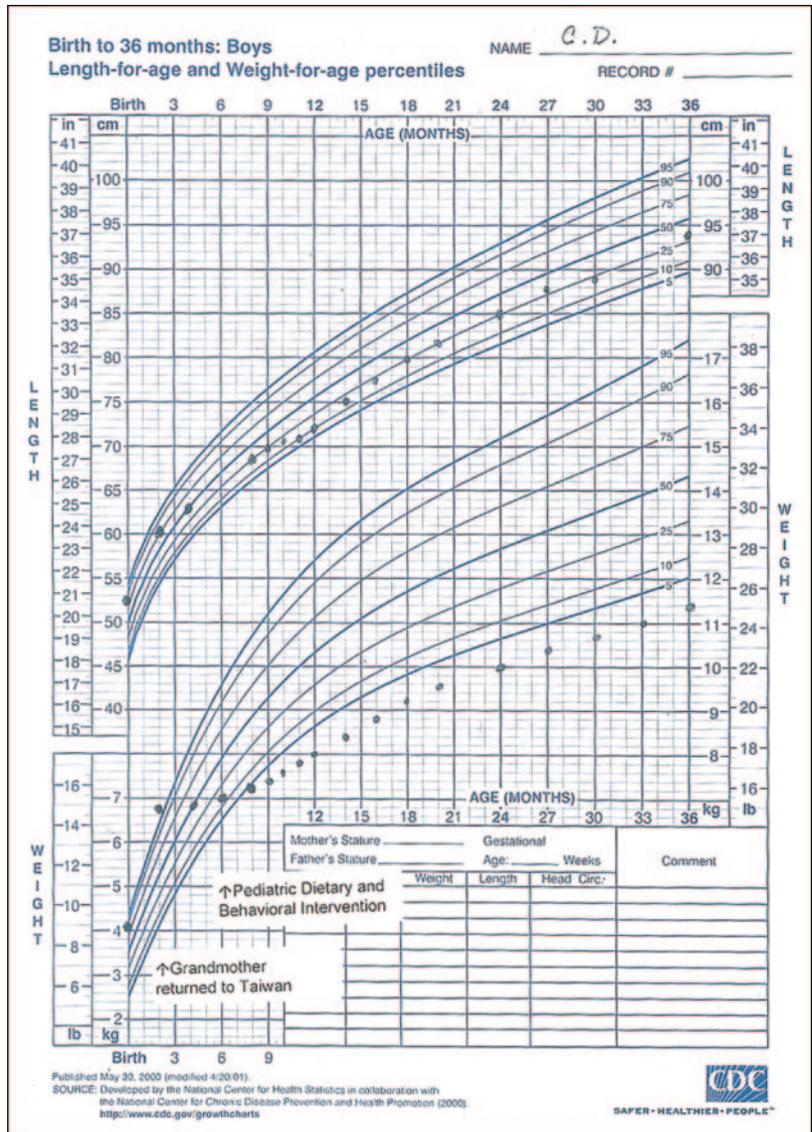


Figure 2. Growth chart for CD.

measurements were within normal limits. Later, the child was evaluated for gastroesophageal reflux by pH probe because of his ongoing vomiting. The study result was normal.

An ideal intervention should have included mental health services and a significant change in living situation to allow social interaction for the mother. A visiting nurse to help with feeding and early child development services were warranted. However, the family did not accept recommended interventions, and they were unable to organize more social interaction and support for the mother. A behavioral plan for negative reinforcement of the child’s vomiting was developed collaboratively

with the family. This plan involved giving only necessary and casual attention to vomiting, while providing more spirited interaction for good eating behavior. Concrete feeding goals were set, and the parents were educated to avoid force-feeding. The pediatrician, who was their primary source of support, praised and supported even small improvements in the child's behavior, feeding, and weight gain. The child's feeding and weight gradually improved, until he was growing below and parallel to the 5th percentile for weight, where he remained until age 5 years.

At 5 years of age, his height had reached the 50th percentile. Between ages 5 and 6 years, CD gained considerable weight to the 95th percentile. His height reached the 90th percentile, and body mass index increased to the 85th percentile. At 8 years of age, he is at risk for being overweight, but otherwise in good physical health. His primary pediatrician notes that his mother continues to show considerable anxiety about his health and does not allow him to use public rest rooms. Her fear is so extreme that she requires him to wear a pull-up diaper if they are going to be away from home for more than a few hours.

This is a complicated case of a mother who is extremely isolated and probably has an anxiety disorder. It is possible that she also was depressed during his infancy. The child began life fully able to consume adequate amounts of milk, but he developed an infant feeding disorder, characterized by aversion, refusal, and vomiting. Current evidence suggests vulnerable child syndrome. Although his inadequate weight gain has resolved, he is now at risk for obesity and perhaps mental health problems of his own. Although the pediatricians recognized the importance of mental health care, including infant mental health services, the family did not accept those recommendations. The pediatricians instead provided frequent pediatric visits, counseling, and monitoring. If the child had not responded, it might have become necessary to involve child protective services, place a gastrostomy tube, or both. It is impossible to say how mandated social service involvement or gastrostomy tube feeding might have changed the outcome for better or for worse.

### Definitions and Diagnostic Classifications

FTT is defined, for the purposes of this article, as failing to grow at a rate consistent with expected standards for infants and toddlers younger than 3 years of age. FTT is a clinical syndrome that has multiple possible causes, often occurring in combination. The terms "undernutrition" and "inadequate growth" have been proposed as

alternative labels to FTT. Although most inadequate growth is related to undernutrition, growth failure can result from unusual medical conditions that involve other factors. The term FTT may have pejorative connotations to some families and social service agencies. Wasting is decreased weight for height and signals acute malnutrition. It also is defined by decreased subcutaneous fat, as measured by triceps skinfold thickness (Table 1). Stunting is decreased height for age and can be a sign of chronic undernutrition. It is important to take into account family stature (genetic potential).

Organic FTT (OFTT) describes an infant or toddler who has grown poorly and has a medical disorder known to interfere with growth, including malabsorptive diseases, genetic syndromes, endocrine disorders, and neurologic dysfunction. Almost any chronic medical condition in a young child may manifest as poor growth. Nonorganic FTT (NOFTT) often has been used as a diagnosis of exclusion to describe the child who has grown poorly and has no identified medical condition. This framework suggests that NOFTT is caused by environmental conditions, rather than intrinsic biologic disease. Multifactorial FTT (or "mixed FTT") describes the common situation in which both organic and nonorganic factors are identified as contributing to a child's poor growth. Just as "layering of risk" or multiple risks can result in developmental delay, multiple predisposing conditions can interact to cause growth failure in an infant who might have grown normally having only a single disease or a single psychosocial risk factor. Conditions contributing to FTT often are of high prevalence, such as chronic otitis media and reactive airway disease in the child and depression in the mother.

Current standards of care encourage more descriptive diagnoses for children who have environmental contributors to their poor growth. Children who previously would have been described as having NOFTT now are identified more commonly as having specific developmental or psychological problems, including oromotor dyspraxia, sensory-motor disorder, feeding disorder of infancy, a family relationship problem, a "quality of nurture problem," child neglect, or mental disorder of a parent. The *Diagnostic and Statistical Manual for Primary Care (DSM-PC) Child and Adolescent Version* contains descriptive diagnoses for these conditions. (1) Another helpful manual is the *Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood (Diagnostic Classification: 0 to 3)*. (2)

## Epidemiology

Inadequate growth is a common concern in the pediatric office. The prevalence of underweight is highest in young infants. Interpreting prevalence data is difficult because many studies do not exclude low-birthweight infants. Low-birthweight infants account for 20% to 40% of the children who have low height for age in studies of low-income children. (3) The prevalence of low weight for age has dropped over the past 30 years from 5.5% to 4.1% in children 2 to 6 years old. (4) The prevalence of low weight for height has remained at approximately 2.5% during the same period. Although few affected children have serious organic disease, all require skilled pediatric care to uncover the cause of their growth failure and to implement a successful plan for nutritional rehabilitation. Poor growth is more common in lower-income communities because of the prevalence of risk conditions, including lack of knowledge about good child nutrition, financial hardship, and social problems that include substance abuse and child maltreatment. However, FTT exists in all socioeconomic groups.

Conditions that put children at risk for poor growth include poverty and food insecurity. Currently, 20% of United States children younger than 4 years of age are living below the federal poverty line (\$18,850 for a family of four in 2004). (5) Food insecurity has been documented in 21% of households having children younger than 3 years of age in five United States urban medical centers. (6) Food insecurity occurs when the availability of adequate food is limited or uncertain and often is associated with intermittent hunger. Other documented risk factors include larger family size and a history of child abuse.

## Pathogenesis

The pathogenesis of poor growth in young infants is related to inadequate caloric intake to meet caloric expenditure. Three principal mechanisms lead to this mismatch: 1) loss of calories through malabsorption; 2) in-

creased caloric expenditure (such as occurs in hyperthyroidism, congenital heart disease, and chronic pulmonary disease); and, most frequently, 3) inadequate intake of calories.

In some cases, low intake is associated with poor strength or neurologic ability to suck, chew, or swallow adequate amounts of food. In addition, some children have minor neurologic or psychological differences that lead to oral aversion or an inability to enjoy eating some or all foods. These children often are characterized as having “sensory food aversions.”(7) Some specific dietary factors have been associated with FTT, including breastfeeding difficulties, poor transition to food between 6 and 12 months of age, improper formula mixing, avoidance of high-calorie foods, and excessive fruit juice consumption (Table 2). Family conditions that put a child at risk for decreased nutritional intake include inadequate knowledge about infant nutritional needs, mental health disorders (including depression and anxiety), family chaos, and rarely, outright child neglect. It is not uncommon to find more than one medical and social factor contributing to the condition.

If clinicians do not reference the weight-for-height curve, infants and toddlers from families who are of short stature more likely will be labeled as having “FTT” than those whose families are tall. Short stature syndromes, including genetic, teratologic, and endocrine conditions, initially may come to medical attention because of poor growth. Psychosocial dwarfism is an interesting short stature syndrome, sometimes associated with measurable growth hormone deficiency, that occurs in environments characterized by emotional deprivation.

## Clinical Aspects

### Presentation (Symptoms and Signs)

Infants and toddlers who have FTT present to the physician because: 1) the family is concerned that their child is not growing as well as other children of the same age, 2) the family reports that the child is feeding poorly, or 3) the physician notices on physical examination or by scrutiny of the growth charts that the child is growing poorly. An a priori diagnosis of FTT by a physician who has had no concern expressed by the family is common. If the family does not understand the physician’s concern about the child’s growth or if they feel criticized by the identification of poor growth in their child, it is more difficult to build the necessary collaborative therapeutic partnership.

The evaluation of a child who has FTT requires a complete history, including a review of systems. The clinician must remember that almost any medical condi-

### Table 2. Dietary Associations With Poor Growth in Young Children

- Breastfeeding difficulties
- Improper formula mixing
- Poor transition to food (6 to 12 months of age)
- Excessive juice consumption
- Avoidance of high-calorie foods

**Table 3. Developmental Approach to Possible Causes of Failure to Thrive**

0 to 6 Months	6 to 12 Months
Maternal psychological (depression or attachment disorder)	Maternal psychological (anxiety disorder or separation/individuation disorder)
Poor breast milk supply	Inadequate knowledge about nutrition needs
Economic problem	Infant needs poorly ascertained
Poor feeding (sucking, swallowing)	Genetic problem: short stature syndrome
Feeding refusal (aversion)	Infant difficulty with transition to solid food
Medical problem (eg, malabsorption)	New-onset illness (eg, celiac disease, human immunodeficiency virus infection)

tion can present with poor growth in a young child, including very rare diseases. However, more than 80% of children who are of inadequate growth do not have any underlying medical disorder. A nutritional history, a feeding behavior history, and documentation of parent-child patterns of interaction are essential components of the evaluation, along with the presenting complaint, medical history, family history, social history, and history of height and weight trajectories of parents and siblings. The nutritional history should include exact mixing techniques for infant formula. Documentation of who cares for and feeds the child throughout the day is part of the feeding behavior history.

When growth failure is based on a feeding disorder, the timing of the onset of the feeding and growth problem reveals important information about the psychodynamic status of the infants and families (Table 3). Infants who do not grow in the first 6 months after birth may be poorly attached to their caregivers. Infants who develop eating problems in the second 6 months after birth are more likely to have overinvolved mothers who interfere with development toward a more independent feeding style. It is very unusual for poor growth to start later in the second year after birth.

Some early-onset feeding disorders are believed to result from uncomfortable processes such as intubation

or other medical interventions occurring soon after birth. Affected infants may associate the new experience of feeding with discomfort from another source, resulting in refusal to feed. This behavior may be the earliest manifestation of “posttraumatic feeding disorder.”(7) This association is confounded by the increased likelihood of developmental problems in sick newborns, which could result in feeding disorders related to a medical condition or neurologic disability. Enteral feeding may be needed to support these infants nutritionally. Weaning from tube feedings and learning how to eat later may be extremely problematic and require intensive occupational and speech therapy, as well as psychological support.

### Growth Chart

The growth chart is the most important tool used to evaluate a child who has FTT and is the basis for the approach to the differential diagnosis. Plotting weight, length/height, and head circumference serially is critically important. Attention to growth velocity for all three measurements provides a dynamic picture of changes in weight, length, and head circumference over time. Normal growth velocity tracks along a percentile curve at an expected rate. Average expected weight gain by age is listed in Table 4. The time of onset of growth deficiency can be determined by examining the growth curve. It often is possible to find an illness or a psychosocial event that coincides with the onset of poor growth.

### Physical Examination

A complete physical examination emphasizing neurodevelopmental status, evaluation of skin for neurocutaneous markings, dysmorphic features, and assessment of nutritional status is performed, remembering that very rare conditions may present as inadequate growth (Fig. 3) Signs of acute medical problems such as dehydration

**Table 4. Growth Velocity at the 50th Percentile National Center for Health Statistics Growth Charts**

Age (mo)	Average Weight Gain/d (g)
0 to 3	25 to 30
3 to 6	20
6 to 12	12
12 to 18	8

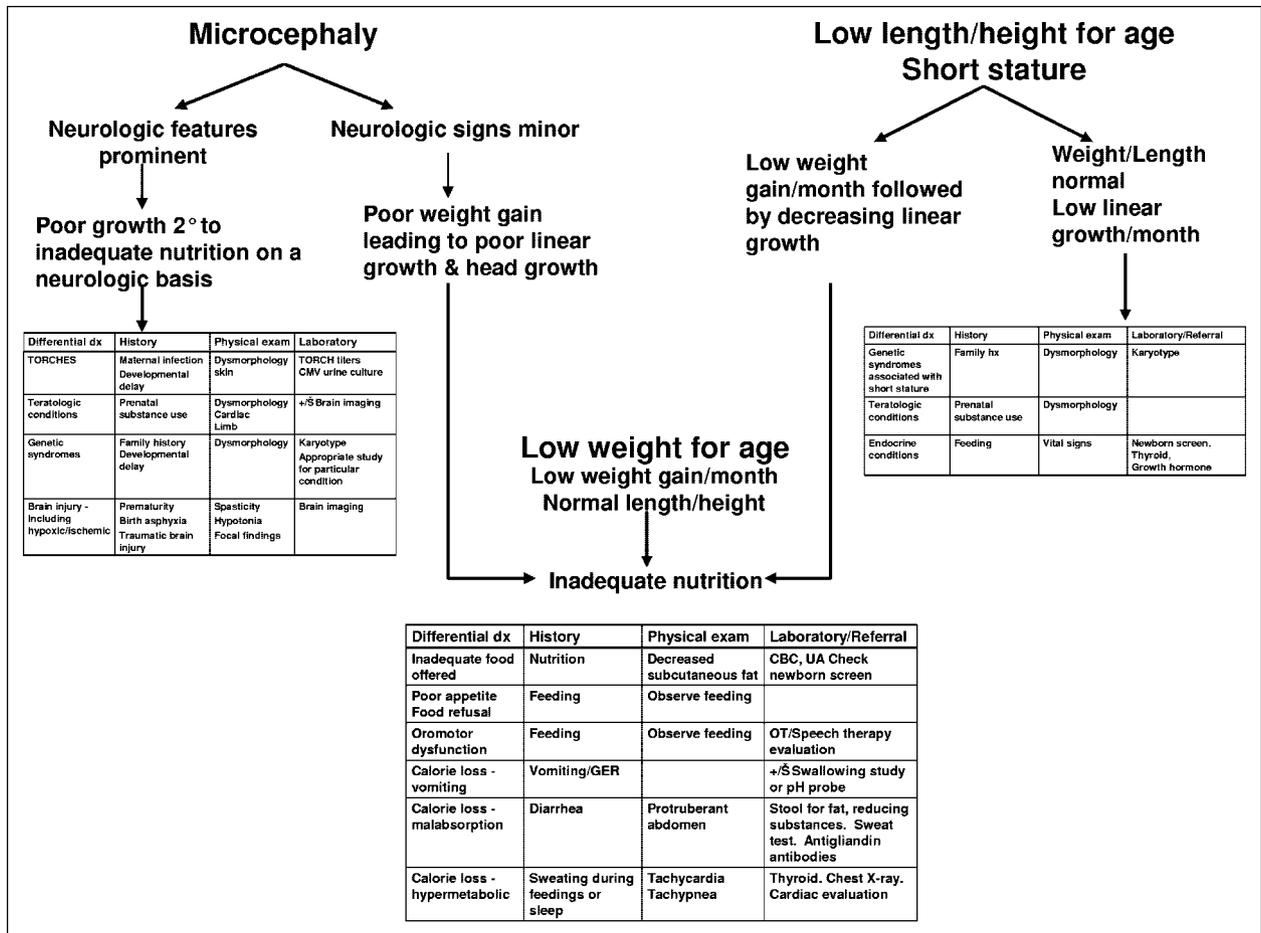


Figure 3. Approach to the differential diagnosis of failure to thrive.

may prompt hospitalization for further evaluation and treatment.

When a feeding disorder or family problem is in the differential diagnosis, a feeding observation is helpful. Feeding can be observed in the examination room, by videotape, or by home visit. Observation of breastfeeding can reveal physical difficulties with latch on, suck, let down, and mother-infant interaction. Observing bottle feeding may uncover a poor suck or a lack of coordination of suck and swallow. Improper feeding techniques such as prolonged attempts at burping or discontinuing feeding when the infant is still hungry often are apparent only by observation. Observation of spoon-feeding and self-feeding ideally includes observation of other family members to assess factors that enhance or interfere with developmentally appropriate feeding. Examples of interactions that interfere with feeding include the extremes of force feeding and neglect. More subtle parent-child interaction problems, such as parental anxiety about

feeding, may result in refusal by the child. Furthermore, parents who cannot tolerate the messiness of toddler eating inadvertently may create unpleasant associations with meal times for the child. Parenting practices that enhance intake include creating a social feeding environment in which the child receives familiar food that is developmentally appropriate in texture and portion size.

### Laboratory Tests

Few routine laboratory tests are recommended. A shotgun approach to laboratory testing for FTT is not cost-effective. Rather, tests are performed based on positive findings from history and physical examination (Fig. 3). Additional laboratory and radiologic tests are completed for children who do not respond to dietary intervention. It is wise to review the newborn metabolic screening tests for a young infant who is not growing adequately. Hypothyroidism and inborn errors of metabolism can cause feeding problems as well as poor growth. Routine labo-

ratory tests in children between 6 and 18 months of age include screening for iron deficiency, lead poisoning, tuberculosis, and chronic urinary tract infection. All other laboratory testing should be based on findings from the history, physical examination, or specific diagnostic hypothesis. Some children will be evaluated for malabsorption and others for chromosomal problems; still others will require brain imaging. However, there is no uniform “FTT evaluation.” An evaluation that is guided by findings from the history and physical examination will have good predictive value.

### Psychosocial Evaluation

When psychosocial contributors to the child’s problem are suggested, further evaluation of family economic, organizational, and mental health is warranted. During this phase of the evaluation, identifying resources as well as problems can aid in the development of an intervention plan. For example, if the mother is suffering from a grief reaction and is not attached to her infant, a strongly attached father might be able to provide enough nurturing to both infant and mother to reverse the inadequate nutritional intake. A skilled primary care physician often can understand the factors that lead to an infant feeding poorly. However, in some cases, a referral to a social worker or a public health nurse provides more in-depth information about the family, home, resources, and interpersonal interactions. Sometimes it is necessary to involve child protective services for neglect or purposeful starvation. Any possible signs of physical abuse are cause for concern because children who have physical trauma and FTT may be at increased risk for death from child abuse.

### Differential Diagnosis

The child’s growth parameters are the basis for a systematic approach to the differential diagnosis. Figure 3 is a diagnostic schema outlining this strategy, although no attempt has been made to itemize all possible diagnoses. Three categories of growth patterns are used to help the clinician think through the broad differential diagnosis: 1) FTT with microcephaly, 2) FTT with short stature, and 3) FTT characterized by adequate height for age and normal head circumference. Children who have microcephaly are subdivided further into those who have and those who do not have prominent neurologic signs. Children who have microcephaly but no neurologic signs are evaluated for the possibility that head growth has been impaired by malnutrition, which happens only in very severe cases. Those having microcephaly and prominent neurologic symptoms are evaluated for TORCH

## Table 5. Examples of Short Stature Syndromes That May Cause Failure to Thrive

### Genetic Short Stature Syndromes

- Russell–Silver syndrome
- Turner syndrome
- Down syndrome

### Endocrine Conditions

- Hypothyroidism
- Hypophosphatemic rickets
- Growth hormone deficiency

### Teratologic Conditions

- Fetal alcohol syndrome

infections, teratologic and genetic conditions, and brain injury.

Those who have no microcephaly but are of short stature are evaluated initially to see if the short stature is primary or if it has developed because of poor weight gain. Those having primary short stature are evaluated for genetic syndromes associated with short stature as well as teratologic and endocrinologic conditions (Table 5).

Most children who have FTT do not have significant microcephaly or short stature. The evaluation then begins with assessing the adequacy of calories offered. When adequate calories are not being offered, the physician must determine if this situation is inadvertent or intentional.

It is not uncommon to find a child who is unable or unwilling to accept the food that is offered. In these cases, the child may have poor appetite, oral aversion (resistance to tasting, licking, sucking, and swallowing), food aversion (more specific difficulties with particular foods or textures), or oromotor dysfunction (neurologic impairment related to sucking, chewing, or swallowing). These findings may be linked to physical illness. Poor appetite may be habitual in a child who has been sick or otherwise undernourished. These children simply are used to their low caloric intake.

Other conditions to consider in a child who manifests low weight but normal height and head circumference include those caused by caloric loss through vomiting or malabsorption or a hypermetabolic state. A rare but dramatic condition, Russell diencephalic syndrome can present with severe emaciation and normal head circumference caused by a space-occupying lesion of the hypothalamic optic chiasm. A pseudohydrocephalic appear-

**Table 6. Feeding Interventions for Infants and Toddlers**

**Breastfeeding in Young Infant**

- Assist with latch-on technique
- Ensure proper feeding timing
  - Newborn (minimum of 8 times in 24 hours)
  - Feed at least 5 minutes on each breast
- Let down
  - Treat maternal exhaustion, stress, hunger, thirst
- Milk supply
  - Use breast pump to increase supply
  - Use medications such as metoclopramide

**Breastfeeding in Toddler**

- Assure adequate supplemental food
- Decrease non-nutritive sucking
- Choose weaning or increase milk supply

**Bottle Feeding**

- Verify proper formula mixing
- Verify minimum: 5.5 oz/kg (110 kcal/kg) formula

**Toddler Feeding**

- 3 meals + 2 nutritious snacks per day
- 16 to 32 oz of milk per day
- Discontinue juice, punch, soda pop until weight gain
- Stop forcing and food battles
- Feed in a social environment

ance has been described in association with the diencephalic syndrome.

## Management

Management of FTT must begin before the evaluation is complete. As the physician is gathering information from a lengthy medical history; complete physical examination; and further laboratory, radiologic, or psychosocial evaluations, education about adequate nutrition is provided. Nutritional and feeding intervention begins at the first visit, at which time feeding and growth responses are monitored. All medical conditions are treated as part of the management of a child who has grown poorly, including minor problems such as reactive airway disease and recurrent ear infections. More serious medical problems, such as electrolyte disturbances and dehydration, often require hospitalization.

Feeding management includes attention to nutrition and to feeding behavior, both of which change with development (Table 6). The normal infant initially requires 110 kcal/kg, decreasing to 100 kcal/kg at 6 months of age. Feeding begins with sucking and swallowing milk, followed by gradually developing the ability

to chew more textured foods. Between 6 and 12 months of age, milk (human milk or formula) continues to supply most of the calories. During this period, the infant should eat pureed food several times each day in a pleasant and social setting, preferably at a family meal. By the middle of the second postnatal year, nonmilk foods should provide at least 50% of the toddler's calories. During this period, the frequency of meals increases to three meals and two nutritious snacks.

When the infant who has grown poorly is breastfeeding, the feeding problem can be a maternal factor such as deficient supply or an infant problem such as poor suck. In either instance, there is value in intervening to increase the mother's milk supply through the following approaches: 1) breast pumping to stimulate the positive feedback loop of human milk production; 2) giving metoclopramide to increase oxytocin; 3) advising rest, fluids, and nutrition for the mother; 4) developing strategies to decrease maternal and family stress; and 5) making other modifications in the home and workplace to support breastfeeding. The use of metoclopramide 10 mg tid orally has been documented to be safe and effective in stimulating the initiation and maintenance of lactation. (8) If the infant has a poor suck due to neurologic or anatomic problems, expressed human milk can be fed by bottle or tube.

The decision to supplement with formula should be made with care. Such a decision may be vested with meaning by the mother. She may consciously see this decision as an indictment of incompetence or she may subconsciously allow her "failure to feed" to influence her self-concept negatively. The pediatrician must ensure that the infant receives adequate calories, but walk a fine line in the care of the mother, who may feel incompetent and even discarded if she cannot breastfeed. Addressing the psychodynamic meaning of breastfeeding may lessen maternal guilt or feelings of failure for breastfeeding difficulties. When formula supplementation is started, the mother can begin to increase her milk supply in anticipation of providing more of the infant's nutritional needs in the future.

Intervention for the formula-fed baby also requires good communication with the parents. Understanding the factors that contribute to FTT is important for overcoming the barriers to adequate feeding. If the infant sleeps most of the time, a schedule that involves waking for feedings at least every 3 hours is beneficial. If the infant falls asleep before finishing feedings, techniques for keeping the baby awake may help. Some families discontinue feeding, even when the infant is hungry, for a variety of reasons, including misreading of the baby's

cues or adherence to a predetermined quantity. Less commonly, such underfeeding happens for financial or serious psychiatric reasons. Pediatrician permission for larger feedings may allow some families to respond more appropriately to their infant's needs. If catch-up growth is desired, 120 kcal/kg are given.

Parents who want complete control of their infant's feeding may have more trouble when the child is between 12 and 18 months of age. For children, this is a period of increasing independence and ability. They often have a strong desire to self-feed. If there are problems in this transitional period, the physician can explore issues about mess, control, and the loss associated with the baby growing up. Children who feel that they are being force-fed often go hungry rather than submit. These children have been described by Chatoor as having "infantile anorexia," a condition characterized by issues of autonomy and dependency. (8) Some self-feeding is important, even for a toddler who is not growing well. However, young children usually are not yet skilled enough to attain adequate calories without assistance. A two-spoon strategy can work well, allowing the child to use his or her own spoon while the parent feeds him or her. Finger feeding is encouraged and is enjoyed by the toddler, who can handle eating soft pieces of cheese, small pieces of soft fruits and cooked vegetables, and small chunks of bread. This is an important time for developing taste preferences. Most children refuse new tastes and textures at the first exposure. However, with repeated exposures, familiar food becomes acceptable. Families must understand that they are shaping the child's food preferences during this period. We strongly recommend that families emphasize nutritious foods, including vegetables, fruits, lean meats, potatoes, rice, noodles, and dairy products. Dairy products, oils, butter, and margarine are high in fat and, therefore, very helpful in attaining adequate calories for children who do not eat well. It is more important that children accept a small number of nutritious foods than that they eat a great variety of foods. Helping families to set realistic goals can prevent many feeding battles.

Addressing nonmedical problems, including mental health disorders, child maltreatment, and feeding disorders, may be necessary even in children who have medical conditions associated with their poor growth. When a parental mental health disorder is identified, the pediatrician should refer the parent to appropriate care. Parents who are unwilling or unable to get mental health care can receive support and monitoring from the pediatrician. A weekly phone call or weight check visit for the child can provide support for the parent. Primary care

physicians also can help the family identify other sources of support, including family members, friends, and community agencies. Just as the parents may need help with feeding the child, infants and toddlers who are difficult to feed benefit from additional caretakers who can do an occasional feeding.

Positive reinforcement and encouragement from the primary care physician can be therapeutic. The pediatrician can incorporate supportive language into every visit: "This is very challenging." "Having a baby who will not eat makes many mothers feel as if they are not doing a good enough job." "You're doing a good job with her sleeping, and she does not cry excessively. Now, let me help you with her eating." It is essential to keep in mind that the mother may feel very vulnerable during the first postpartum months, a state of mind that is compounded by a child who will not eat. In all cases, long-term monitoring of the child's growth and development is warranted because children who have experienced FTT are at increased risk for future undernutrition, overnutrition, eating disorders, and developmental and school problems. Ironically, some children who experienced poor growth as infants may be at risk for childhood obesity later in life, as described in Case 2.

Hospitalization can be beneficial in the management of some children who are not gaining weight. In cases of frank neglect, feeding in the hospital can demonstrate that the child can gain weight when given adequate calories. There are several potential problems with this approach, the most important being poor appetite in children who have been taking too little food. Another problem is the current standard of short hospital stay. Hospitalization also can be useful when feeding cannot be observed in the outpatient setting. The clinician must remember that hospitalization adds new variables that may affect the child's feeding behavior positively or negatively. Hospitalization or treatment in a long-term day treatment setting is necessary for many infants and toddlers who have severe eating disorders. This type of intensive, multimodal therapy is available at few medical centers. The duration of inpatient treatment for infant or toddler eating disorders typically is several months. The cost of this type of intervention may seem excessive until one considers the risk and the cost of life-long gastrostomy tube feeding.

## Prognosis

Almost all children who have poor growth show adequate improvement in their dietary intake with intervention. Many manifest improved growth even without intervention as they move into a more independent phase

of feeding and become more competent at attaining their own food when hungry. Some children who have had eating disorders when infants continue to be “picky eaters” for most of their childhood. A small percent of the “picky eaters” have anxiety disorders, and a few have autistic spectrum disorder. Children who suffer severe eating disorders may require intensive multimodal therapy, including behavior modification, family counseling, education, and oromotor therapy. Children who require gastrostomy feeding tubes and who have neurologic dysfunction that precludes adequate swallowing usually require enteral feeding for life.

Cognitive and school outcomes of children who have had FTT are worse than those of children who have not experienced undernutrition. The association of irreversible developmental deficits in children who experience early iron deficiency anemia is well documented. (9) It is possible that lack of other micronutrients and calories could produce similar adverse outcomes. Children who have experienced calorie malnutrition also have often experienced environmental deficits of other important nurturing factors, such as parental attention and an emotionally and cognitively stimulating home. We do not yet understand what portion of the outcome is explained by the malnutrition and what portion is explained by co-existing environmental risk factors. Nonetheless, children who have had early undernutrition should be monitored for developmental and behavioral problems. The possibility of long-lasting de-

velopmental effects provides motivation to aim for preventing FTT.

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## Failure to Thrive: A Consequence of Undernutrition

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