Failure to Thrive in a 4-Month-Old Nursing Infant*

CASE

Christine, a 4-month-old infant, is brought to the office for a health-supervision visit by her mother, a 30-year-old emergency department nurse. The mother, who is well known to the pediatrician to be a competent and attentive caregiver, appears uncharacteristically tired. They are accompanied by the 18-month-old and 4-year-old siblings because child care was unavailable, and her husband has been out of town on business for the last 5 weeks. When the pediatrician comments, “You look exhausted. It must be really tough to care for 3 young children,” the mother appears relieved that attention was given to her needs. She reports that she has not been getting much sleep because Christine wakes up for 2 or more evening feedings and the toddler is now awakening at night. During the day, she juggles nursing the baby, caring for her other 2 young children, and managing the household. Although visibly fatigued and mildly depressed, the mother appears comfortable holding Christine; the baby likewise appeared closely attached. The mother has no concerns regarding Christine’s health or development.

During the physical examination, Christine is a slightly thin but active and alert infant. She has no remarkable or focal physical findings; her muscle strength, tone, and reflexes are normal. She achieves all motor, social, and language milestones for a 4-month-old infant. Plotting her height and weight on the growth chart, the pediatrician and mother were surprised to see that her weight did not change in 2 months, and her linear growth decelerated slightly. The growth measurements were repeated and corroborated. In the office, Christine was a vigorous feeder, latching onto the full areola quickly. During the nursing session, she studies her mother’s face, cooed, and reached out for the breast with her free hand. The mother reports that breastfeeding occurs every 4 to 5 hours for at least 10 minutes on each breast. Her urine output and bowel movements are normal, and she did not have a history of vomiting or excessive regurgitation. The mother’s diet and fluid intake seem adequate.

A review of past medical history does not reveal an explanation for Christine’s failure to gain weight. She was born full-term after an uncomplicated pregnancy and a normal spontaneous vaginal delivery. Her birth weight was 8 pounds. She was nursing vigorously by the time of discharge from the hospital. At her 2-week and 2-month health-supervision visits, her weight and linear growth and developmental milestones were normal. In addition, at those visits she was observed to respond quickly to visual and auditory cues. There was no family history of serious diseases.

In that a comprehensive history and physical examination did not indicate an organic cause, the pediatrician reasoned that the most likely cause of her failure to thrive was an unintentional caloric deprivation secondary to maternal stress and exhaustion. Christine’s mother and the pediatrician discussed how maternal stress, fatigue, and depression could hinder the let-down reflex and reduce the availability of an adequate milk supply, as well as make it difficult to maintain regular feeding sessions. The pediatrician recommended obtaining help with child care and household responsibilities. The mother was also encouraged to consume adequate fluids, eat high-protein foods, nurse more frequently, and offer a formula supplement after nursing 3 times a day.

At the same time that these therapeutic interventions were initiated, screening laboratory studies were obtained. All results were normal, including a complete blood cell count with differential; serum electrolytes, creatinine, hepatic transaminase (ALT), total protein, and albumin; urinalysis; and stool fat stain and occult blood. A serum thyroxine was normal (6.3 mg/dL). A plan was made for Christine to return to the office in 1 week.

INDEX TERMS. failure to thrive, breastfeeding, maternal hypothyroidism.

Dr Martin T. Stein

The biopsychosocial model is an effective guide for pediatricians who care for infants, children, and adolescents. It is particularly useful during early infancy when faced with a feeding problem. The interaction between physiological functions and psychological factors shapes our clinical thinking when confronted, in particular, with a nutritional disorder.

During the early infant period, growth is dependent on a healthy relationship between a baby and its mother (or caretaker). The quality of attachment between an infant and mother is delineated during an observation of a feeding episode. Pediatricians use these moments in the office to assess mother-child attachment and the characteristics of the feeding process. Christine appeared to be nursing adequately; she demonstrated behaviors that reflect a positive attachment to her mother and appropriate mechanics of nursing. Without historical clues to explain failure to thrive between 2 and 4 months of age, the normal physical examination and the normal breastfeeding observation left the pediatrician uncertain about the cause for growth deficiency. By systematically incorporating biological and psychosocial factors, the out-

PEDIATRICS (ISSN 0031 4005). Copyright © 2004 by the American Academy of Pediatrics and Lippincott Williams & Wilkins.
come in these cases is usually successful with an early intervention.

Two pediatricians were invited to comment on this challenging case. Dr Daniel Kessler is a developmental-behavioral pediatrician who is a Clinical Associate Professor of Pediatrics and Director of Developmental and Behavioral Pediatrics at the Arizona Child Study Center, Children’s Health Center of St Joseph’s Hospital and Medical Center in Phoenix, Arizona. Dr Kessler is coeditor of a recent book of significant value to pediatricians, Failure to Thrive and Pediatric Undernutrition: A Transdisciplinary Approach. Dr Eustratia (“Tia”) Hubbard is a fellow in Developmental and Behavioral Pediatrics at the University of California, San Diego.

Dr Daniel B. Kessler

The case of Christine, a 4-month-old infant with failure to thrive (or what my colleague Peter Dawson and I prefer to call “pediatric undernutrition”) presents the primary care provider with a diagnostic challenge. This child presents with a significant deceleration in her expected pattern of growth. At the 2-month office visit, the history indicates that her weight increased from 8 pounds at birth to the 75th percentile of the National Center for Health Statistics (NCHS) growth curves (assuming she had maintained this growth percentile). Four-month-old girls are expected to gain an average of 26 g per day. Christine did not gain any weight during this time period, and her linear growth showed a deceleration as well. Christine is described as otherwise doing well and making expected gains in the developmental domains assessed. History and physical examination as well as basic screening laboratory evaluations are normal. To determine the cause or causes of this growth problem, the primary care provider needs to carefully review the presenting data to determine possible risk factors for poor or no growth.

Failure to gain weight or pediatric undernutrition in the exclusively breastfed infant is somewhat of a mystery. In a mature, experienced mother, lactation difficulties would be unexpected. Passive, undemanding infants may fuss less and consume less than the required amount of calories needed for growth in this rapid growth phase of infancy. Feeding at 4- to 5-hour intervals may be a little long for Christine to go between nursing. Undernutrition in this time frame in a breastfed infant has also been associated with a significant amount of underlying illness in the infant or in the mother. So far there is no evidence for either.

Had Christine’s weight gain been slow rather than absent, it may have been helpful to review her weight using a growth chart for exclusively breastfed infants. Several studies have found that breastfed infants follow a different growth trajectory than what the 1977 NCHS growth charts indicate. Exclusively breastfed infants can show significant decreases in weight for age and smaller decreases in length for age and weight for length than bottle-fed infants when using the NCHS charts. This is because the data sets used to construct these curves had few breastfed infants. This slower increase in weight can be particularly prominent between 3 and 12 months and is of no concern in the otherwise healthy infant.

The revised growth charts have a higher proportion of breastfed infants than the 1977 charts, and this should no longer be a cause for concern.

In contrast with the absence of contributing historical or physical examination data that might provide a diagnostic clue for an organic cause for Christine’s lack of expected growth, the psychosocial data are rich in risk factors. She is the third of 3 children born in a 4-year time span, just 14 months younger than her next-oldest sibling. Christine is still waking for a feeding at least twice a night (a good sign), and now the 18 month old is waking in the night as well. Her mother has been single-parenting for the past 5 weeks as her husband is away on a business trip. She must juggle the needs of her young family and her own needs, which often appear last in the equation. We are not told of extended family or other environmental supports. The mother sounds and looks depressed. Parental depression, particularly in the primary caregiver, is a risk factor for inadequate growth in an infant.

In this type of situation, the primary care pediatrician has an advantage over his or her specialist colleagues. This is the advantage of relationships developed over time and a longitudinal perspective. The pediatrician was obviously quite comfortable in this relationship and shared with Christine’s mother the possibility that Christine’s poor weight gain might be a reflection of stress and exhaustion. This information was provided supportively and without judgment, and an appropriate intervention plan was provided. In addition, the pediatrician has the luxury to allow the case to evolve over time without exhausting the diagnostic laboratory and the family with 1 esoteric test after another without appropriate indication. Basic screening laboratory tests and others that might be indicated by a careful history and physical examination are all that are necessary.

This approach does not come naturally to the inexperienced clinician who must face his or her own anxiety when faced with a complex dilemma. The need for diagnostic certainty in the face of little supportive evidence is seductive. Nevertheless, the ability to “embrace complexity” to avoid premature diagnostic closure, to allow information to develop, and to consider new information carefully as it becomes available is a valuable trait and one worthy of practice.

Daniel B. Kessler, MD
Clinical Associate Professor of Pediatrics
Director, Developmental and Behavioral Pediatrics
Arizona Child Study Center
Children’s Health Center of St Joseph’s Hospital and Medical Center
Phoenix, Arizona
In turn, infrequent breastfeeding decreases milk production secondary to dysregulation of prolactin-induced lactation.

It is important for the pediatrician to inquire about a mother’s well-being during these early visits to assess for fatigue, social stressors, and psychological disturbances. As many as 30% to 75% of mothers may experience “postpartum blues,” a transient condition with onset in the first few weeks after delivery and characterized by sadness, tearfulness, and dysphoria. Adequate rest, optimal nutrition, and extra support at home are helpful; specific therapy is not usually necessary. In contrast, postpartum depression is manifested by irritability, fatigue, anorexia (or less often overeating), early morning awakening, and decreased libido and may develop in 10% to 15% of women. A severe depression may progress to include suicidal ideation and, in approximately 1 to 2 per 1000 mothers, psychosis. Antidepressant pharmacotherapy is often indicated along with supportive care and, in some cases, psychotherapy.

Pediatricians are in the position of identifying early signs of postpartum depression because they are often the only health care providers to have contact with a mother in the first 6 weeks. If a mother appears to be suffering from this condition, immediate referral to her physician or a mental health specialist is warranted. If untreated, postpartum depression will interfere with mother-infant attachment, infant care, the child’s development, and family functioning. Maternal depression also places a child at increased risk of emotional and physical neglect, physical abuse, language delays, and poor socialization. In this case, Christine’s mother experienced a low-grade depression of organic origin that responded to thyroxine hormone replacement. Several studies indicate that postpartum thyroid dysfunction, especially in the presence of thyroid antibodies, may place a mother at increased risk for depression. In addition, postpartum depression may be more likely to occur in women with antithyroid antibodies even in the absence of hypothyroidism.

Is it also possible that postpartum hypothyroidism may impair adequate lactation? The literature on this topic is sparse unless you are a cow! Studies of dairy cows have shown that induced maternal hypothyroidism leads to decreased milk production and poor weight gain in their euthyroid calves; this trend is reversed by thyroxine hormone replacement. A lower fat content of milk has also been found in hypothyroid dairy cows. In a human study among hypothyroid mothers, significantly less breast milk was produced during the first 6 days postpartum compared with control mothers, even when euthyroidism was attained with thyroxine therapy. When a mother has difficulty with adequate breast milk production, the diagnosis of maternal hypothyroidism should be considered after other recommendations are not successful, such as increasing frequency of breastfeeding, ensuring adequate fluid and caloric intake, and nursing in a quiet, comfortable place to help facilitate milk let-down.

Once Christine’s mother began thyroid-hormone replacement, her breast milk production increased.

REFERENCES

Interim History
At the first follow-up visit, Christine’s weight had increased 1.2 ounces per day in response to more frequent nursing and formula supplementation. She returned to the pediatric office the following week for another weight check and again showed gains. What was more interesting was the information her mother shared at this visit. The mother’s sister, a nurse, had noticed Christine’s growth and development and had a concern. The mother was noted to be “puffy” and suggested the possibility of a “hormone imbalance.” Christine’s mother made an appointment with her doctor, who made a prompt biochemical diagnosis of Hashimoto’s thyroiditis (hypothyroid phase). Soon after thyroid replacement was initiated, Christine’s hypothyroidism was attained with thyroxine therapy. When compared with control mothers, even when euthyroid, there was a decreased growth rate and decreased milk production.

In this case, Christine’s mother experienced a low-grade depression of organic origin that responded to thyroxine hormone replacement. Several studies indicate that postpartum thyroid dysfunction, especially in the presence of thyroid antibodies, may place a mother at increased risk for depression. In addition, postpartum depression may be more likely to occur in women with antithyroid antibodies even in the absence of hypothyroidism.

Is it also possible that postpartum hypothyroidism may impair adequate lactation? The literature on this topic is sparse unless you are a cow! Studies of dairy cows have shown that induced maternal hypothyroidism leads to decreased milk production and poor weight gain in their euthyroid calves; this trend is reversed by thyroxine hormone replacement. A lower fat content of milk has also been found in hypothyroid dairy cows. In a human study among hypothyroid mothers, significantly less breast milk was produced during the first 6 days postpartum compared with control mothers, even when euthyroidism was attained with thyroxine therapy. When a mother has difficulty with adequate breast milk production, the diagnosis of maternal hypothyroidism should be considered after other recommendations are not successful, such as increasing frequency of breastfeeding, ensuring adequate fluid and caloric intake, and nursing in a quiet, comfortable place to help facilitate milk let-down.

Once Christine’s mother began thyroid-hormone replacement, her breast milk production increased.

Dr Eustratia Hubbard
Failure to thrive as a result of psychosocial factors is far more common in the United States than that of organic origin. However, in Christine’s case, both psychosocial and maternal medical factors played a role in her poor weight gain. Her mother developed clinical evidence of hypothyroidism due to autoimmune thyroiditis during the postpartum period with symptoms of fatigue, depressed mood, and myxedema. Maternal exhaustion may be expected during the first few weeks after delivery, especially if there are other young children to attend to and a lack of additional caregivers. Inadequate rest may interfere with a mother’s ability to consistently meet the needs of her young infant, including routine breastfeeding.
and the infant’s growth and development were normal; however, it remains uncertain whether Christine escaped unharmed from this episode. Her mother may have had thyroid dysfunction during pregnancy as well. Increasing evidence indicates that hypothyroidism in pregnant women is associated with subtle intellectual impairment in their children. More specifically, hypothyroxinemia in the first trimester places a fetus at an increased risk for abnormal neuropsychological development. This may even occur with normal triiodothyronine and thyroid-stimulating hormone levels because maternal T4 is the sole fetal source of thyroid hormone during the first trimester. The presence of maternal thyroid peroxidase antibodies during pregnancy has also been associated with a 10-point lower IQ in offspring, adding to the evidence that low thyroid reserve as a result of autoimmune thyroiditis may have adverse effects during fetal life. 

Although undiagnosed hypothyroidism in a woman of childbearing age may have a significant impact on her future children, a reasonable screening program to detect low free thyroxine during early pregnancy may be difficult to achieve. Most women do not routinely see a physician before conceiving, so prevention of first trimester hypothyroxinemia by early detection and treatment may not be feasible. If screening is performed at the first prenatal visit, typically around 8 to 10 weeks gestation, by the time an abnormal screening test is confirmed, thyroid replacement may be initiated beyond the period in fetal life at which it is required for critical brain development.

EUSTRATIA HUBBARD, MD
Fellow in Developmental and Behavioral Pediatrics
University of California
San Diego, California

REFERENCES
8. Morreale DE, Obregon MJ, Escobar DR. Is neuropsychological development related to maternal hypothyroidism or to maternal hypothyroxinemia? J Clin Endocrinol Metab. 2000;85:3975–3987

Web Site Discussion
The case summary for the Challenging Case was posted on the Developmental and Behavioral Pediatrics Web site (www.dppeds.org) and the journal’s Web site (www.lww.com/DBP). Comments were solicited.

Dipesh Navsaria, MPH, Physician Assistant/Medical Student, University of Illinois, Champaign
I had a similar case to this last year in which a 4-month-old nursing infant stopped gaining weight and even began to slowly lose weight. After a negative laboratory evaluation and repeated weight checks, I asked a question that I probably should have asked more clearly the first time regarding maternal medications. A few weeks before the onset of poor growth, the mother’s obstetrician prescribed an oral contraceptive. The mother then noticed a reduction in her milk supply and discontinued the oral contraceptive after a few days. Subjectively, the mother reported that she felt her milk supply return. I suspect that the amount of breast milk remained low. In that this was her first child, she may not have accurately assessed her milk output. Formula supplementation was initiated and lactation was stimulated by giving the mother metoclopramide. Her breast milk output eventually returned. The baby perked right up, gained weight, and subsequently did well.

When the oral contraceptive was prescribed, the mother pointed out to the doctor that she was nursing and specifically asked if the oral contraceptive would interfere with nursing. She was reassured that it would not affect nursing. When I consulted with an obstetric colleague, I learned that the brand of oral contraceptive prescribed was known to interfere with lactation. I learned to always ask about oral contraceptive use—patients may not think of them as “medicine.”

Editor’s note: Oral contraceptives with estradiol are more likely to be associated with breast milk reduction. Those that include only a progesterone are less likely to affect lactation.

Dr Martin T. Stein
This case might be titled “A mother who had the wisdom to invite an attentive and informative sister to her home.” The pediatrician (admittedly the author and not too early in his pediatric career) observed the mother’s fatigue, sleep deprivation, and multiple environmental stressors, but he did not no-
tice the myxedema facial appearance. In fact, at the
time, maternal hypothyroidism was not considered
among potential organic causes for failure to thrive
in a nursing infant. Similar to other examples in the
ongoing education of a physician, since this initial
case, other infants with early growth failure second-
ary to maternal hypothyroidism have been seen.

My sustained interest in the field of developmental
and behavioral pediatrics comes from a recognition
of 1 central element. Developmental-behavioral pe-
diatrics focuses on the dynamic interactions between
biological and psychological phenomena. We recog-
nize the potential role of psychological and social
factors in the child with an organic illness (eg, the
importance of environmental factors in the treatment
and outcome of children with asthma1 and attention-
deficit hyperactivity disorder2). At the same time, we
also are attentive to possible biological contributors
in the child with a behavioral or psychosomatic dis-
order (eg, the importance of considering occult con-
stipation, lactose intolerance, giardia, or a urinary
tract infection in a school-aged child with recurrent
abdominal pain—a condition most often without a
clear organic cause and often associated with chal-
 lenging events in the child’s life or family conflict3).
A pediatrician’s training in biological medicine, child
development, and behavioral pediatrics prepares
him or her to analyze clinical situations similar to
the current case with a comprehensive model.

Dr Kessler was not aware of the interim history
that revealed the mother’s hypothyroid condition.
His commentary is a fine example of a biopsychoso-
cial approach to understanding the cause of Chris-
tine’s failure to thrive. On the biological side, he
noted the importance of a knowledge about expected
daily growth in a breastfeeding infant at this age.
That “slower increase in weight can be particularly
prominent between 3 and 12 months [in breastfed
infants] and is of no concern in the otherwise healthy
infant” is relatively new information from studies in
the past decade. In addition, he emphasized the im-
portance of interpreting growth charts correctly.
With the recognition that exclusively breastfed in-
fants can show significant decrease in weight-for-age
growth on the 1977 NCHS growth charts, Dr Kessler
observed that the revised Centers for Disease Control
and Prevention growth charts, generated with a
higher proportion of breastfed infants, are a more
accurate assessment of growth in these babies.

Both Drs Kessler and Hubbard emphasized the
multiple psychosocial risk factors that may have con-
tributed to Christine’s poor weight gain. The physi-
ology of lactation is bound intimately to the environ-
ment of baby and mother. Christine’s pediatrician
was also sensitive to these factors. She wisely made
use of the initial office visit when she included a
direct observation of nursing as a part of the assess-
ment. In addition, Dr Kessler pointed out the impor-
tance of infant temperament in the assessment. Al-
though we were not given information about
Christine’s temperament, he observed that “passive,
undemanding infants may fuss less and consume
less than the required amount of calories needed for
growth in this rapid growth phase of infancy.”

Most clinical situations similar to this case will not
result in a diagnosis of maternal hypothyroidism. A
more likely diagnosis in a similar situation might be
maternal postpartum depression; the evidence in this
case for that diagnosis was incomplete. It is a re-
member, however, of the role of pediatricians to be
sensitive to a mother’s mood and physical appear-
ance at the time of office visits (especially in the early
months after the birth of a baby). Emotional lability,
withdrawn behavior, and signs of sleep deprivation
provide clues to depression. An empathic statement,
similar to the one by Christine’s pediatrician, that
“You look exhausted. It must be really tough to care
for 3 young children” provides an opportunity for
further gathering of data. During some health-super-
vision visits, the effective therapeutic intervention
(for mother and baby) is a timely referral of the
mother for an evaluation and treatment of depres-
sion.

REFERENCES
1. Stein MT, Meltzer EO, Stein REK. Challenging case: recurrent episodes of
2. Stein MT, Levine M, Reiff M. Challenging case: school underachievement
### Failure to Thrive in a 4-Month-Old Nursing Infant

*Pediatrics* 2004;114;1468  
DOI: 10.1542/peds.2004-1721N

<table>
<thead>
<tr>
<th>Updated Information &amp; Services</th>
<th>including high resolution figures, can be found at:</th>
</tr>
</thead>
<tbody>
<tr>
<td>References</td>
<td>This article cites 20 articles, 1 of which can be accessed free at:</td>
</tr>
<tr>
<td>Subspecialty Collections</td>
<td>This article, along with others on similar topics, appears in the following collection(s):</td>
</tr>
<tr>
<td></td>
<td>Developmental/Behavioral Pediatrics</td>
</tr>
<tr>
<td></td>
<td>/cgi/collection/development:behavioral_issues_sub</td>
</tr>
<tr>
<td>Permissions &amp; Licensing</td>
<td>Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:</td>
</tr>
<tr>
<td>Reprints</td>
<td>Information about ordering reprints can be found online:</td>
</tr>
</tbody>
</table>

PEDIATRICS is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. PEDIATRICS is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2004 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 0031-4005. Online ISSN: 1098-4275.
Failure to Thrive in a 4-Month-Old Nursing Infant

*Pediatrics* 2004;114;1468

DOI: 10.1542/peds.2004-1721N

The online version of this article, along with updated information and services, is located on the World Wide Web at:

/content/114/Supplement_6/1468.full.html