

# Evaluating Growth Failure

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When it comes to growth failure, many factors are involved. How short is the child? Is the child's height velocity impaired? Is the child's height/growth within the range for the family? In this podcast, Francesco De Luca, MD, Division Director of Pediatric Endocrinology at Children's Mercy Kansas City, discusses key considerations for evaluating growth failure in the pediatric population. **[For more information, visit the Common Endocrinology Conditions page on the Children's Mercy website. \(https://www.childrensmercy.org/health-care-providers/pediatrician-guides/endocrinology/\)](https://www.childrensmercy.org/health-care-providers/pediatrician-guides/endocrinology/)**



Featured Speaker:

**Francesco De Luca, MD**

Francesco De Luca, MD is the Division Director of Pediatric Endocrinology at Children's Mercy Kansas City.

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Transcription:

Andrew Wilner, MD (Host): Pediatricians carefully monitor childhood growth and development. But how do they know when a short child is too short or a small child too small? Today, we will discuss the causes of growth failure and how parents and physicians can address these early on to maximize a child's growth potential. This is Pediatrics in Practice with Children's Mercy, Kansas City.

I'm your host, Dr. Andrew Wilner, Division Director of Neurology at Regional One Health in Memphis, Tennessee. I invite you to listen in as Dr. Francesco De Luca, Division Director of Pediatric Endocrinology at Children's Mercy, Kansas City, shares his experience with childhood growth failure. Welcome Dr. De Luca.

Francesco De Luca, MD (Guest): Thank you. Thank you for the having me.

Host: Dr. DeLuca, to start, could you define childhood growth failure?

Dr. De Luca: So growth failure is a term we use to describe a growth rate that is below the appropriate growth velocity or growth speed for a child's age. So this term is often used interchangeably with abnormal growth. Now another term that you often see in pediatric practice is failure to thrive. And failure to thrive describes slow growth typically in toddlers, in young children. And that typically affects both height and weight, and actually more often affects weight. Encounters growth failure is more often used as a term to describe slow growth, primarily in height.

Host: Well, I remember going to the pediatrician and you know, they have these growth charts. Right? Do they still use those? Are those important?

Dr. De Luca: Yes. Very much. So that's the way we can really distinguish if the child is short rather than not short, or if the child is growing with an appropriate growth rate over time.

Host: So it's not only absolute weight, but it's the change in weight over time, as well as the height and the change in height over time, that needs to fit in a certain, I guess, normal range is that right?

Dr. De Luca: Correct. They are obviously different criteria by which we define a growth pattern, being normal, or rather being abnormal. One, as you said, is whether the height and the weight for the mother of a given child is within the normal range at any given age, or rather below the normal range. So in that case, obviously we will be managing or facing a short child versus a normal stature child.

On the other hand it's equally important and probably in many respects, even more important to know the speed, again, the velocity with which a child is growing. And to do that, we also use the same growth chart and we plot serial measurements of the child's height and weight on that chart and see if those measurements end up being plotted on the same curve or the same percentile. If this happens, then we'll say the child's growth pattern appears to be normal.

Host: How much, you know, we live in an age now in North America where there's a lot of different backgrounds of people from different parts of the world. So, do we have to adjust the growth charts for different races? For example, Asians tend to be smaller. Do they need their own chart or is one chart good for all children?

Dr. De Luca: It clearly every country in the world where every country, many countries in the world, they use specific growth charts that are much more appropriate for their own population and ethnic background. And there are clearly differences as you suggested among different ethnicities in terms of overall average or normal height. However in the states we use the CDC charts, which are based on a, I would say multiracial population of children. That said, it's also fair to say that the large majority of the children that we represents normal growth data in the United States again, they are primarily Caucasians.

Host: It sounds to me like a lot of energy is put into this for each child at every pediatrician's office. How often is it a problem? In other words, what percent of children actually have a growth failure?

Dr. De Luca: Actually the data on the prevalence of growth failure differ among different studies. And this primarily depends on the type of children included in the studies. Just to give you an example, it has been shown that less than 5% of children with short stature who are otherwise healthy, though, have growth failure.

So, a very small percentage of these children have growth problems. In contrast, if you check the prevalence of growth failure in other population, the appearance of growth failure may increase and may be as high as 40%, when we evaluate the growth pattern in short children affected though by chronic conditions. So adding or not adding any underlying health problems clearly determines the prevalence of growth failure. You have chronic conditions, you have prevalence of the likelihood of having growth failure is much higher.

Host: So a pediatrician who sees a child who has juvenile onset diabetes or sickle cell anemia or cystic fibrosis has got to be much more clued in to measuring very carefully the height and weight watching for growth failure. Is that right?

Dr. De Luca: It's perfectly right. In fact, I would say that growth failure may actually be triggered by a very wide variety of health problems, or we can call it risk factors. Some of these risk factors are genetic conditions like Turner syndrome. Other possible cause of growth failure are nutritional deficiencies and nutritional deficiencies are for sure the primary cause of growth failure in less developed countries. And we mentioned already, having a chronic disease, like severe asthma, anemia, chronic kidney disease, chronic inflammatory bowel disease; these are all rather common causes of growth failure. And ultimately, obviously not to forget that the likelihood of developing growth failure in case of some endocrine problems. And I like to remember growth hormone deficiency, primarily as a cause of growth failure and hypothyroidism.

Host: Yeah. So we're going to talk more about the thyroid gland in another podcast. So I'm looking forward to that as well. You mentioned short stature. Now, how is that different from growth failure?

Dr. De Luca: Now by definition, I would say by statistical definition, about 3% of the whole pediatric population is short. However, the large majority of these children, short children do not have growth failure. So short stature is defined as the length or height of a child that is plotted below the third percentile of the growth chart, with the third percentile, being the lowest percentile of a normal range at any given age.

Now it's important to say to emphasize that children with growth failure are often short, but not all the time. Just to give you an example, when exception, in fact, maybe a child whose height at any given day may be at the 50th or the 25th percentile, thus this child is a normal height, is in the normal range, but themm same child may have had his height plotted at the 90%, one or two years earlier. So clearly he shifted his curve or percentile from the 90th to the 50th and 25th yet he doesn't have short stature. He may well have growth failure. On the other hand is also important to say that many children with short stature, have a normal varaint of growth, we call them normal variants of growth. Meaning that again, they are short, but they don't have growth failure and there are two very common examples of normal variance of growth in children. One is familial short stature, and the other one is what we call constitutional growth delay.

Host: Well, I've heard that children also can grow in spurts. Right? There are a growth spurts. So how do you factor that into their sort of growth curve?

Dr. De Luca: Yeah, this spurt actually that is commonly, I would say knowledge and plenty of evidence supporting the existence of a spurt is actually the growth spurt that comes with puberty. We know that and advise a little bit of timing in girls versus boys, but a meet to more advanced stage of puberty, the stage of puberty is associated with what we call a growth spurt, which also is defined as a peak growth velocity. Otherwise, if we think about a younger child that is not supposed to be in puberty, actually the growth rate of that child, let's say a child whose age is anywhere between four years and up to, again, up to puberty again, in all these years, the growth rate is rather steady, rather constant. In fact, a child who is growing with a normal growth rate during those years is supposed to grow five to six centimeters a year, which equals to two inches a year.

Host: So let's say a pediatrician has done all these measurements and the child is six or seven years old. And she notices that the child is kind of dropping off the curve, not progressing the way he's

supposed to. So, what should the pediatrician do?

Dr. De Luca: Now once the pediatrician and in general, the primary care physician has decided, because he may have reasons to refer a child to a pediatric endocrinologist because that pediatrician suspects growth failure, he, or she may want to consider obtaining an initial diagnostic workup. I would say it is not necessary, but it may help expedite the whole diagnostic process.

So there are a number of screening laboratory tests that he or she can obtain. And these tests may actually be useful to rule out a number, I would say many of the most common causes of growth failure. Again, to name some of the most commonly used screening tests I mentioned the complete blood count or an ESR, and this test helps to rule out anemia or a chronic inflammatory state, or obtaining electrolytes, creatinine, calcium, phosphate to evaluate the child's kidney function and the minimum metabolism of that child.

Another useful set of labs that can be obtained at first is the labs for celiac disease and celiac disease, is an important gastrointestinal disorder that is often associated with growth failure. And last but not least, there are a number of endocrine tests that still the pediatrician can obtain if he wants, even before referring the child.

I think the most important ones are the thyroid test. And again, we'll talk more in another podcast and there are two specific tests I would like to recommend. One is called free T4 and the other one is called TSH. Those tests help in ruling out any thyroid dysfunction. And lastly, two tests called one is called IGF1. And the other one is IGF DP3. These are very useful screening tests to assess the likelihood of the child having growth hormone deficiency.

Host: Let's step back a second from the testing and go back to the history and exam. Is there anything that the parents could tell the pediatrician or that the pediatrician could actually find on physical exam that would be helpful?

Dr. De Luca: Yes. I think when a child is found with short stature, obviously there are a number of different findings that can be useful in determining which child may need to be referred for the possibility of growth failure. And these findings are part of the medical history, as well as the physical exam of that child.

Regarding the history for instance, but there are so-called systemic symptoms that may be somewhat suggestive of growth failure. I'm thinking about chronic fatigue, frequent headaches, loss of appetite. There are some gastrointestinal symptoms may be alarming like abdominal pain, diarrhea, constipation, respiratory symptoms, like asthma or frequent respiratory infections. And also, I like to point out that the prolonged continued use of certain medications can actually raise the question about the possibility of growth failure. And I think primarily is the use, long-term use of steroids for a number of very different reasons, medical reasons, long use of steroids can cause growth failure. And if we think about possible alarming findings in the physical exam, but I'm thinking about the possibility of dealing with weight loss or poor weight gain over time. Again, this could be alarming signs for growth failure, or we are seeing in clinic an adolescent, and that adolescent doesn't have any signs of puberty or some what we call facial dysmorphism, some facial features that may not necessarily be normal. Like low set ears, frontal bossing, a triangular face, a web neck, again, all this possible so-called dysmorphism may raise

again, the question as to whether a short child has growth failure.

Host: Well, we're just about out of time, Dr. De Luca, is there anything you'd like to add?

Dr. De Luca: Well, I like to say at this point, at the end of our conversation, that in my opinion, there are a few take home points that I hope that the pediatrician, the primary care physician can take out of this conversation. But the first one I would say is that many short children actually have a normal growth pattern. And therefore they may not need to be referred to a specialist. And then I would say there are three main criteria when a referring physician, a pediatrician should probably become suspicious of growth failure. One is if the child has severe short stature, the second criteria is if the child as we discussed, has low growth velocity for his age and the thirdly, if the current height percentile of that child is actually well below what we called the mid parental height. So in other words, if the child is growing at a percentile on a curve that is below what we expect based on the parent's height. Now it's important to think about the fact that these findings, the three criteria may be present all together in the same child. So obviously the suspicion is very high. I would say that even if one scenario I just described is present in that particular child, I think should be enough again, to raise a red flag and prompt the pediatrician to consider a referral to a pediatric endocrinologist.

Host: Thanks Dr. De Luca, this has been a very informative discussion. Thanks for being on Pediatrics in Practice.

Dr. De Luca: Thank you very much.

Host: This has been Pediatrics in Practice with Children's Mercy, Kansas City. To refer your patient, or for more information, please visit [childrensmercy.org](http://childrensmercy.org) to connect with one of our providers. Please remember to subscribe, rate, and review this podcast and all the other Children's Mercy podcasts. I'm your host, Dr. Andrew Wilner. Thanks for listening.

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