

# Evaluating Abnormal Thyroid

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Between 25-50% of the referrals to a pediatric endocrinology clinic are related to abnormal thyroid function tests (TFTs). However, the majority of these abnormal TFTs are not associated with a true thyroid problem, especially when these tests are ordered in the absence of any signs or symptoms suggestive of a thyroid disease. In this podcast, Francesco De Luca, MD, Division Director of Pediatric Endocrinology at Children's Mercy Kansas City, covers tips for evaluating abnormal thyroid in the primary care setting. **[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): Thyroid disease is common in adults, but can also occur in children. Our guest today will discuss the signs and symptoms of childhood thyroid disease and approach to treatment. 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 thyroid disease. Welcome Dr. De Luca.

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

Host: Dr. DeLuca, to start, could you describe some of the common thyroid diseases seen in children and their signs and symptoms?

Dr. De Luca: Sure. The two most common types of thyroid problems or thyroid dysfunctions in children and as well as actually in adults, are one is hypothyroidism, which is also known as an underactive thyroid. And the second one is hyperthyroidism, also known as an overactive thyroid. Now the typical signs and symptoms of hypothyroidism are the presence of a goiter and the goiter is an enlarged thyroid gland. And this typically is discovered when the pediatrician examines the child's neck. Then there are other informative signs and symptoms. One is fatigue. Fatigue could be a new onset fatigue or a worsening fatigue. A very important, obviously a special in children is a growth rate, a stature or growth rate that is slowing down is declining. That would be an alarming sign that is typically seen actually in hypothyroidism. Then there are symptoms that are rather consistent at any age in patients with hypothyroidism. One is constipation. Another one is dry skin and then cold intolerance.

Those children feel cold environment in their room. Well, nobody else in the same family in the same household is feeling cold. That's typical and it's somewhat suggestive of hypothyroidism. Other signs,

furthermore are losing hair, doing badly or worse in school. The grades of the child are declining, are worsening over time.

And then if the child is actually a teenage girl with hypothyroidism, that girl may start experiencing abnormal periods, abnormal menstruation. Now with respect to that opposite dysfunction, if you will, the hyperthyroidism, interestingly enough, still the child may present with a goiter. So the occurrence of an enlarged or large gland, thyroid gland is common to both of these conditions, hypo and hyperthyroidism, but more typical signs of hyperthyroidism are unexplained weight loss.

The child is growing in height, and yet he doesn't gain any weight or maybe he's losing weight. The child becomes more emotional, more hyper-active. Sometimes actually the child may develop depression, like mood and symptoms. Then again, the child with hyperthyroidism may experience palpitations, he feels his heart beating too fast, or we described cold intolerance being a sign of hypothyroidism, conversely heat intolerance is a sign of hyperthyroidism. And then interestingly enough, these two opposite thyroid dysfunctions, again, it can actually show similar or identical symptoms. We talked about hair loss or poor school grades, in children with hypothyroidism. Interestingly enough, the same symptoms may be experienced in a child with hyperthyroidism.

Host: All right. So I'm gonna ask you to take a step back because there just seems to be a myriad of symptoms that can occur when the thyroid doesn't function properly. So I'm going to ask what sounds like a simple question, but I suspect that the answer is not simple and that is what is the thyroid gland supposed to do?

Dr. De Luca: So the thyroid gland is without a doubt, one of the most important endocrine glands in our body. Why? Because it produces, it secretes, releases two main hormones. One is called T4. And the other one is called T3. Now the effects, the action of these hormones is critical for our wellbeing for not only for the child's wellbeing, but actually these hormones are important at any age, but especially in children, they have two main functions. One is to assure, to support a normal brain development. And therefore if a child develops hypothyroidism. So again, underactive thyroid, that child, if he's not treated adequately, timely, properly, that child may develop some symptoms that are neurological symptoms. And if the child is untreated, the child with hypothyroidism is untreated, and that particular child is very young, that actually the child may actually eventually develop developmental delays, which in some cases it may be permanent. Now the other main function, the thyroid hormones actually relates to growth. And when I talk about growth, I'm particularly referring to statural growth. Interestingly enough, having a normal thyroid function, secreting releasing normal amounts of thyroid hormones is important. Not necessarily for a normal weight gain. Because the primary function of thyroid hormones is to support normal growth in height. And therefore if the child has hypothyroidism again, underactive thyroid, one very important, very common presenting scenario is again, poor growth rate in height.

Host: I know in adults you know, some days at the hospital, it seems like every other patient is taking a thyroid supplementation. But I think the numbers that I saw, is something like one in 10 or one in 15 of the elderly require thyroid supplementation. How often is thyroid disease a problem in children?

Dr. De Luca: 'It's a relatively common disorder. The challenge, if you will, is to define what is an appropriate diagnosis of a thyroid problem in a child. And when I say that it is because sometimes many may argue a little too often, the thyroid function tests. So thyroid laboratory tests are requested, are

obtained when there's really no reason to obtain the thyroid test. And in fact, sometimes we may face some thyroid tests, they may be just off the normal range, slightly off the normal range, and yet they don't reflect the thyroid disease. And therefore, if just look at the levels of thyroid hormones in the blood being just slightly abnormal, it doesn't necessarily mean that a child has a thyroid dysfunction. So what I'm trying to say is that in some cases, a significant number of children are found with maybe one abnormal thyroid test. And yet the true prevalence of a true thyroid dysfunction is much lower than that.

Host: Right. Well, I think that's kind of a law of clinical practice is that when you order a test that you didn't really need, it's likely to come back abnormal and then you don't know what to do with it. So what type of thyroid tests should be ordered and when should it be ordered?

Dr. De Luca: So, in my mind, there's no question that TSH is the most, the single most sensitive test to diagnose one of the most common types of thyroid dysfunction, which is primary hypothyroidism, ordering a TSH and dealing and facing primary hypothyroidism results in the TSH being found high. So primary hypothyroidism, it will mean having a high TSH. In contrast, if the child has hyperthyroidism, it will be a low TSH.

So, again, it's very informative, very useful, but even in these situations the free T4 is going to be useful as well. Because for instance, in hypothyroidism along with a high TSH, we will find a low free T4. And again, with a low TSH in a child with hyperthyroidism, we will obtain a high free T4. Now, when we obtain both tests again, TSH and free T4 making the diagnosis of a clinical or overt thyroid condition is very likely straight forward.

On the other hand, if we obtain only one test, for instance, if we obtain only the TSH in some situations may be falsely normal. And I name one situation, which is central hypothyroidism. In that situation, that TSH, if you measure, if it's obtained as a single test, maybe normal again, and unless we also measure a TSH and free T4, which with central hypothyroidism will be low.

Again, we will miss that diagnosis. So the take home message, if you will, is in case the pediatrician is suspicious of the child or the child having a thyroid disease, we definitely recommend obtaining both TSH and free T4 because either one obtained as an isolated test may eventually lead us to miss some diagnoses of thyroid dysfunction.

Host: When should the child be referred to an endocrinologist?

Dr. De Luca: Now I'll try to review and discuss some possible scenarios. Again, let's say that we obtained the TSH one of the two thyroid tests I'm recommending and the TSH is below the normal range. Then the free T4, which is the second test that we will obtain, maybe abnormal as well, either is high or low. Or a different scenario, the TSH is abnormal, the thyroid antibodies, which are markers of an autoimmune thyroid disease in this child, may be positive. Again, in all these scenarios, abnormal TSH and abnormal free T4 and elevated thyroid antibodies; these are all scenarios, situations in which the child should be referred to a pediatric endocrinologist.

Another scenario is the child, maybe on a routine physical exam at the pediatrician's office is found with a goiter. Either the pediatrician is examining the neck, finds an enlarged thyroid. Again, this should be

enough, sufficient finding to prompt a referral to a specialist. Now, one scenario that I think is really raises a red flag, so prompts an urgent referral is when the TSH is frankly suppressed. It's not just low. It is truly virtually undetectable in the blood. And at the same time, the second test, again, the free T4 is high. This combination of abnormal findings clearly suggests hyperthyroidism. And that is maybe a true urgent referral.

Let's say there is an opposite scenario the TSH is high. The TSH is high, it really depends how high is the TSH to determine the need to refer this patient, this child to a pediatric endocrinologist. Evidence indicates if the TSH is greater than 10 and normally is up to four. When I say four or 10, I'm referring to 10, mainly unit per liter, these are the units to measure the concentration of TSH in the blood.

Again, if the TSH is greater than 10, the child without any doubt should be referred to an endocrinologist because that level of TSH clearly suggests the likelihood of hypothyroidism. Now it is a little bit more complex if the TSH is higher than the normal range, but is below 10. So let's say it's between five and 10, or is slightly high. But in that case, again, we need to check the free T4. And if the free T4 is normal, and by the way, it's often the case with a slightly high TSH, actually we recommend the pediatrician to repeat the same test, maybe a month later. Why? Because it's been shown and there is plenty of medical literature published in recent years that has shown that when the TSH is only slightly high and the free T4 is normal on repeat lab evaluation, the TSH about 70% of the times comes back normal. So again, repeating before referring the child, repeating the labs just few weeks after the initial evaluation, when the TSH is just slightly high, may prevent an unnecessary referral.

Host: Well, there definitely seems to be an art to diagnosing a thyroid disease. Given that the long list of symptoms that children might have due to hypo or hyper thyroidism; what important takeaways would you like pediatricians to know about diagnosing thyroid disease?

Dr. De Luca: I think that there is a few important points that probably is I think very useful to bear in mind. One is, as I just discussed, the TSH as a thyroid test should always be measured with a concomitant measurement of the free T4 and never as an isolated test. Because again, as I said, this may actually lead to missing some diagnoses of true thyroid dysfunction or other diagnoses. A child who is otherwise actually healthy happened to have only an isolated, slightly high TSH, which again, very often doesn't reflect the thyroid disease. The second point I like to make is that the thyroid function tests again, this TSH and the free T4 should be measured only when the primary care physician, when the pediatrician is truly suspicious of the occurrence of thyroid disease.

In other words, when the child, has some signs, some symptoms of those signs of things that we discussed earlier, they are typical of hypothyroidism or hyperthyroidism.

Maybe, because again, the pediatrician found a goiter on physical examination. So in those situations, when there is a suspicion of a possible likely thyroid problem, it clearly makes sense and is advisable to obtain, to measure free T4 and TSH.

Otherwise again, it may actually be an airport and lastly, a slightly elevated TSH with a normal free T4, in an otherwise asymptomatic child, the child is otherwise healthy. Well, there are no other concerns. Again, a slightly high TSH and normal free T4 are most often associated with a normal thyroid function.

Host: Thanks Dr. De Luca for a very informative discussion.

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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