

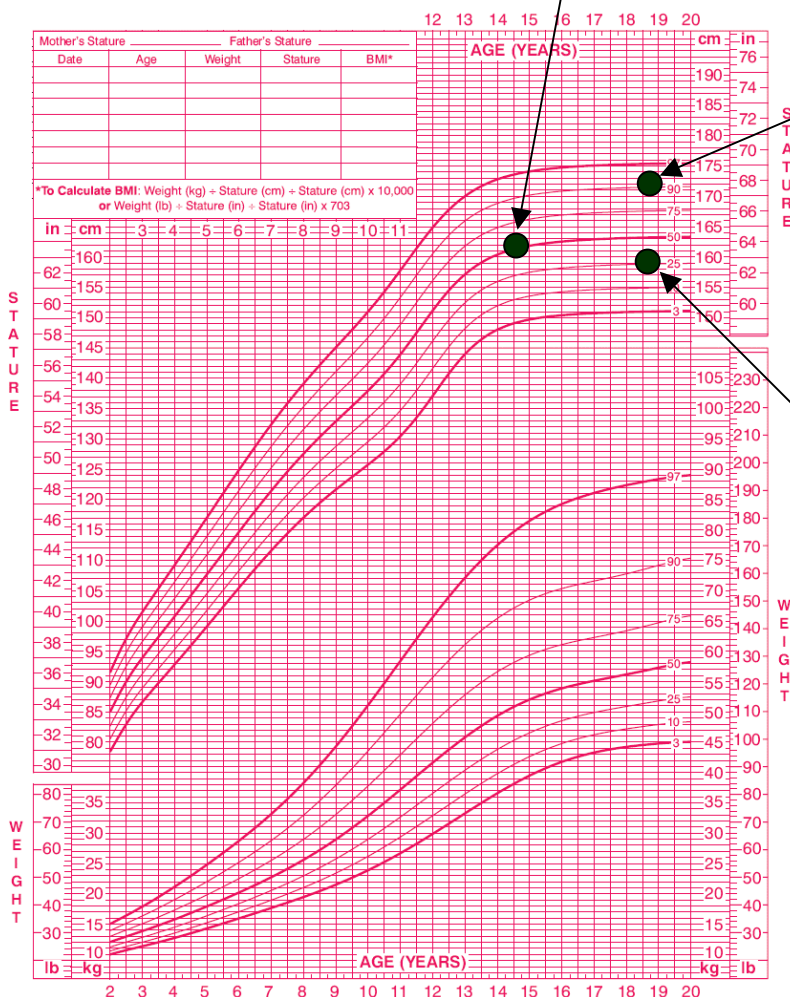
## SHORT STATURE

Many factors contribute to a child's overall growth. However, nutrition, hormones and the growth potential a child inherits from their parents are the major factors regulating the height during growth in a healthy child. Chronic illnesses such as diseases of the kidneys, liver or heart, as well as chronic use of certain medications can delay a child's growth.

## GROWTH CHARTS

Doctors use growth charts to determine if a child is growing normally with respect to their height and weight. Since there is a range of normal heights at any particular age the growth charts are composed of curves, which represent percentiles of growth.

The average height at any age is the 50<sup>th</sup> percentile or the middle line.



If your child is at the 90th percentile, this implies they are taller than 90% of children of the same age and sex and shorter than 10% of children of the same age and sex.

Likewise, a child at the 25th percentile is taller than 25% of children of the same age and sex and shorter than 75% of children the same age and sex.

**HOW TALL SHOULD MY CHILD BE?**

Which percentile a child should be growing at is primarily determined by their parent's height. The first question to answer when evaluating a child for delayed growth is are they growing on a percentile curve that is appropriate or expected for their family. In general we expect short parents have short children and tall parents have tall children.

The height potential a child receives from their parents can be estimated by calculating the midparental height (MPH). On average adult males are 5 inches taller than adult females. The formula for MPH adjusts the parent's height either up or down by 5 inches depending on whether the child is a boy or girl. The MPH is calculated using the parent's height in inches.

Girls

$$\text{MPH} = \frac{(\text{Dad's height} - 5'') + \text{Mom's height}}{2}$$

Boys

$$\text{MPH} = \frac{(\text{Mom's height} + 5'') + \text{Dad's height}}{2}$$

As an example if mom is 5' 4" (64") and dad is 5' 10" (70") their daughter's MPH would be:

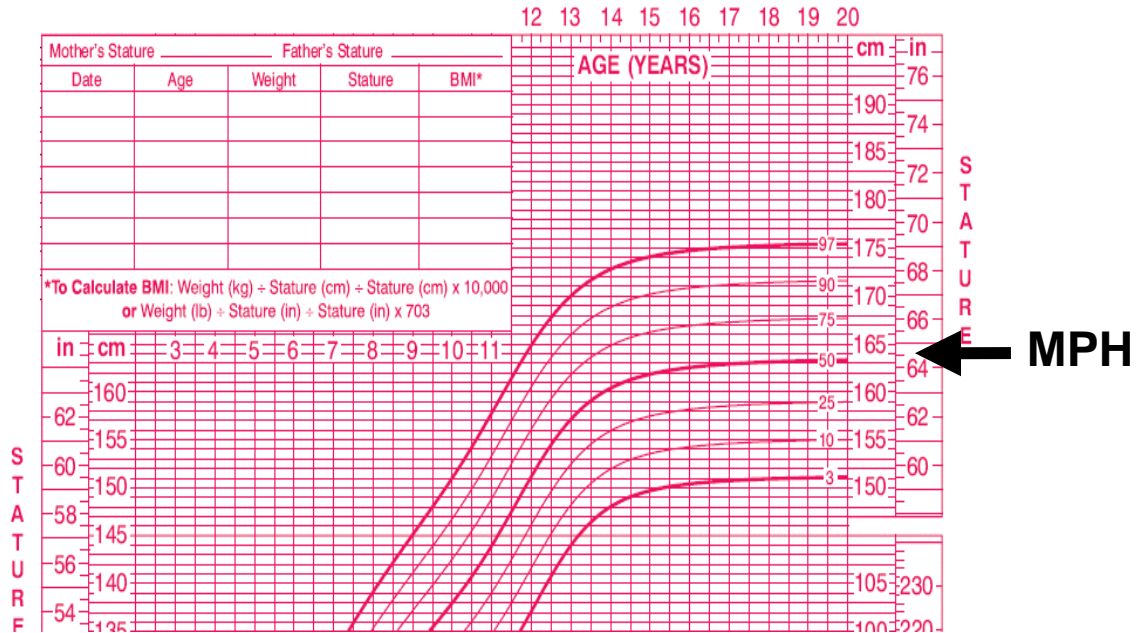
$$\text{MPH} = \frac{(70'' - 5'') + 64''}{2} = \frac{65'' + 64''}{2} = \frac{129''}{2} = 64\frac{1}{2}'' (5' 4\frac{1}{2}'')$$

And their son's MPH would be:

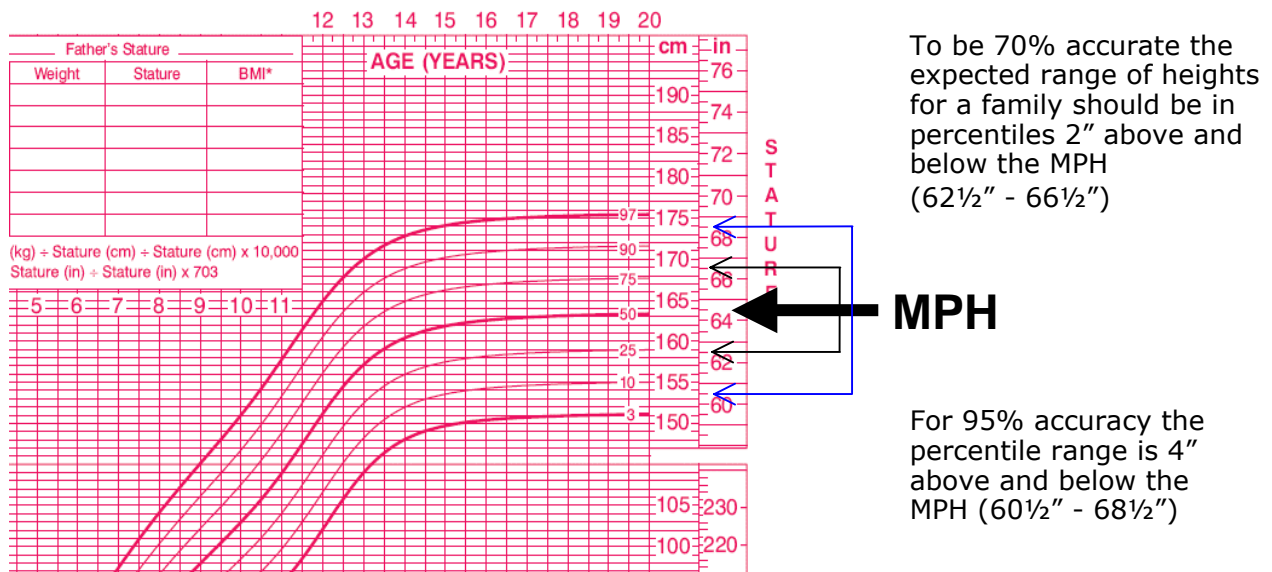
$$\text{MPH} = \frac{(64'' + 5'') + 70''}{2} = \frac{69'' + 70''}{2} = \frac{139''}{2} = 69\frac{1}{2}'' (5' 9\frac{1}{2}'')$$

The MPH is then plotted on the right hand of the growth chart.

In our example then a MPH of 5'4 1/2" for a female is at the 50% percentile,

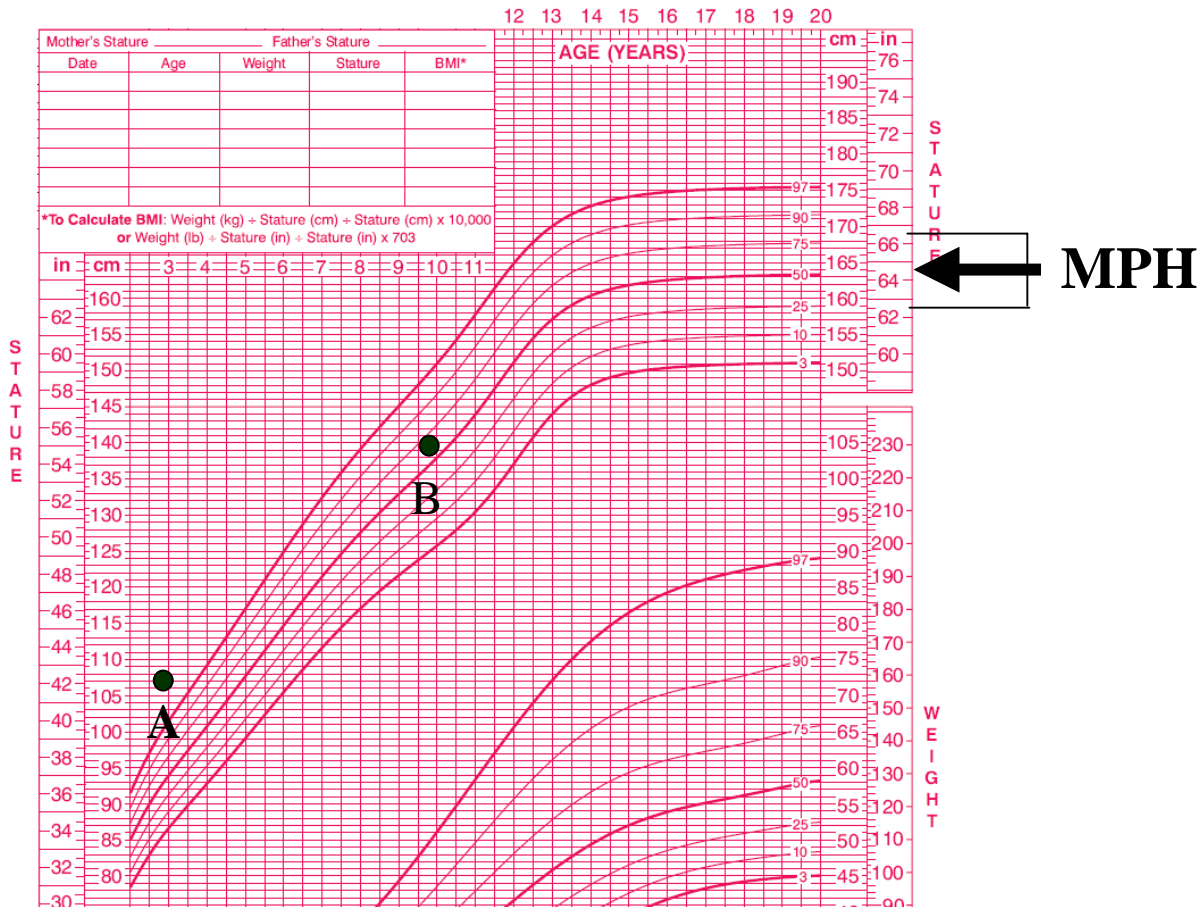


Likewise, the MPH of 5' 9 1/2" for a male is the 50%. On average for this family their sons and daughters should be growing along the 50<sup>th</sup> percentile line. Just as there is range of normal heights for children at any age there is a range of heights amongst brothers and similarly amongst sisters.



If your child's height is on a growth channel lower than the predicted ranges their growth is most likely not appropriate for your family.

In our example family they have a five year old daughter (A) who is 42" and a 12 year old daughter (B) who is 54 ¼". The five year old's height is at an appropriate percentile for the family. In contrast the 12-year-old daughter is shorter than expected for the family even though her height is in the so-called normal range of the growth chart.



## HORMONE CAUSES OF DELAYED GROWTH

There are three groups of hormones that are necessary for a child to grow. Growth hormone and thyroid hormone are important growth factors from birth until a child reaches their adult height. The production of the sex steroids testosterone and estrogen during puberty, also influence growth. A deficiency of any of these hormones will result in a delay of growth. These deficiencies can be present at birth or develop throughout childhood and adolescence. Generally with growth hormone deficiency there are very few other signs in a child except for poor growth. Children with thyroid hormone deficiency aside for having poor growth may complain of being tired, weak, feeling colder than others, having constipation, dry skin and coarse hair. The possibility of a deficiency of sex steroid production should be raised if a boy has not shown any signs of puberty by age 14 or a girl by age 13.

## **THE GROWTH EVALUATION**

The initial evaluation of child with poor growth includes reviewing their previous growth pattern, obtaining a history about their family's heights and looking for signs of hormone deficiencies, chronic illness or genetic syndromes associated with delayed growth. Growth records from birth to the present can provide an enormous amount of information as to an underlying cause of the child's poor growth. Many times a completed growth chart is more valuable than laboratory tests. Often multiple sources have to be tapped to find the complete growth history. This may include your child's doctor's office, baby books you may have kept and even the marks on the doorframe in your home where you have followed your child's growth over the years. After reviewing this information, special tests may be recommended including blood tests to measure hormone levels, assess the function of your child's kidneys, liver, intestines and assess their nutritional status. Usually we obtain an X-ray of the hand called a bone age to assess the rate at which your child's bones are maturing.

## **LINKS**

The Human Growth Foundation: [www.hgfound.org](http://www.hgfound.org)

The Magic Foundation: [www.magicfoundation.org](http://www.magicfoundation.org)