

## Orthodontics

### Growth and development

Different systems of body have different growth patterns in terms of rate and timing and four main types are recognized:

- 1- **Lymphoid growth**
- 2- **Genital growth**
- 3- **Neural growth:** Determined by the growth of the brain, and the calvarium follows this pattern of growth, in other words the bones grows in response to the growth of another structure. There is rapid growth of cranium in the early years of the life, but this slows until about 8 years, growth is almost complete. The orbits follow the neural growth pattern.
- 4- **Somatic growth:** Is that followed by most of body structures. It is seen in the long bones leading to increase in the body height, This growth is fairly rapid in the early years but slows in the pre-pubertal period, while the pubertal growth spurt (11years in girls, 13 years in boys) is a time of very rapid growth, which followed by further slower growth.

The maxilla and mandible follow a pattern of growth that is intermediate between neural and somatic growth, with the mandible following the somatic growth curve more closely than the maxilla, which has a more neural growth pattern. Thus different parts

of the skull follow different growth patterns, with much of the growth of the face occurring later than the growth of the cranial vault. As a result the proportions of the face to the cranium change during growth, and the face of the child represents a much smaller proportion of the skull than the face of the adult.

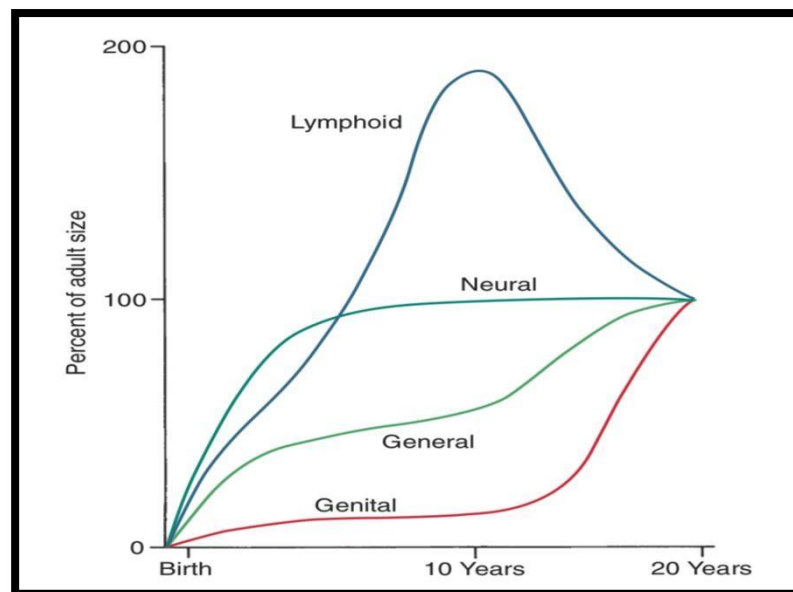


Fig. (3) **Scammon's curves** for growth of the four major tissue systems of the body. As the graph indicates, growth of the neural tissues is nearly complete by 6 or 7 years of age. General body tissues, including muscle, bone, and viscera, show an S shaped curve, with a definite slowing of the rate of growth during childhood and an acceleration at puberty. Lymphoid tissues proliferate far beyond the adult amount in late childhood, and then undergo involution at the same time that growth of the genital tissues accelerates rapidly.

## **CLINICAL SIGNIFICANCE OF THE GROWTH SPURTS**

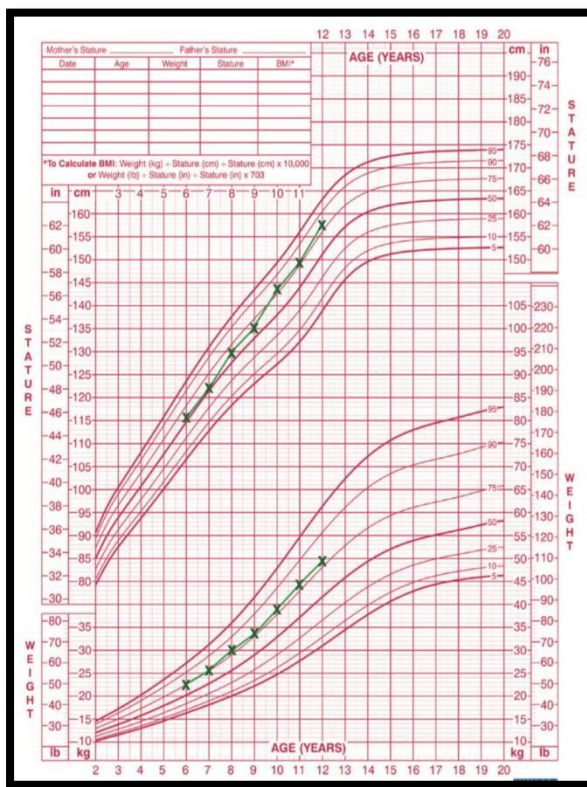
- 1- To differentiate whether growth changes are normal or abnormal.
- 2- Treatment of skeletal discrepancies (e.g. Class II) is more advantageous if carried out in the mixed dentition period, especially during the growth spurt.
- 3- Pubertal growth spurt offers the best time for majority of cases in terms of predictability, treatment direction, management and treatment time.
- 4-Orthognathic surgery should be carried out after growth ceases.
- 5-Arch expansion is carried out during the maximum growth period

## **2- Variability:**

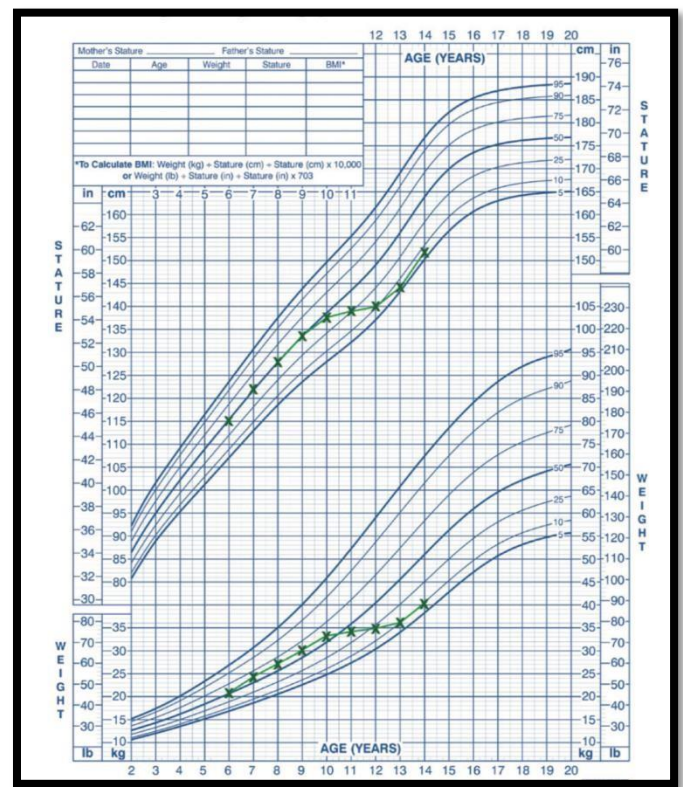
Obviously, everyone is not alike in the way that they grow, as in everything else. It can be difficult, but clinically very important, to decide whether an individual is merely at the extreme of the normal variation or falls outside the normal range. Rather than categorizing people as normal or abnormal, it is more useful to think in terms of deviations from the usual pattern and to express variability quantitatively.

One way to do this is to evaluate a given child relative to peers on a standard growth chart which can be used in two ways to determine whether growth is normal or abnormal. a-The location of an individual relative to the group can be established.

b-More importantly, growth charts can be used to follow a child were evaluate whether there is an unexpected change in growth pattern.



Normal growing girl  
boy



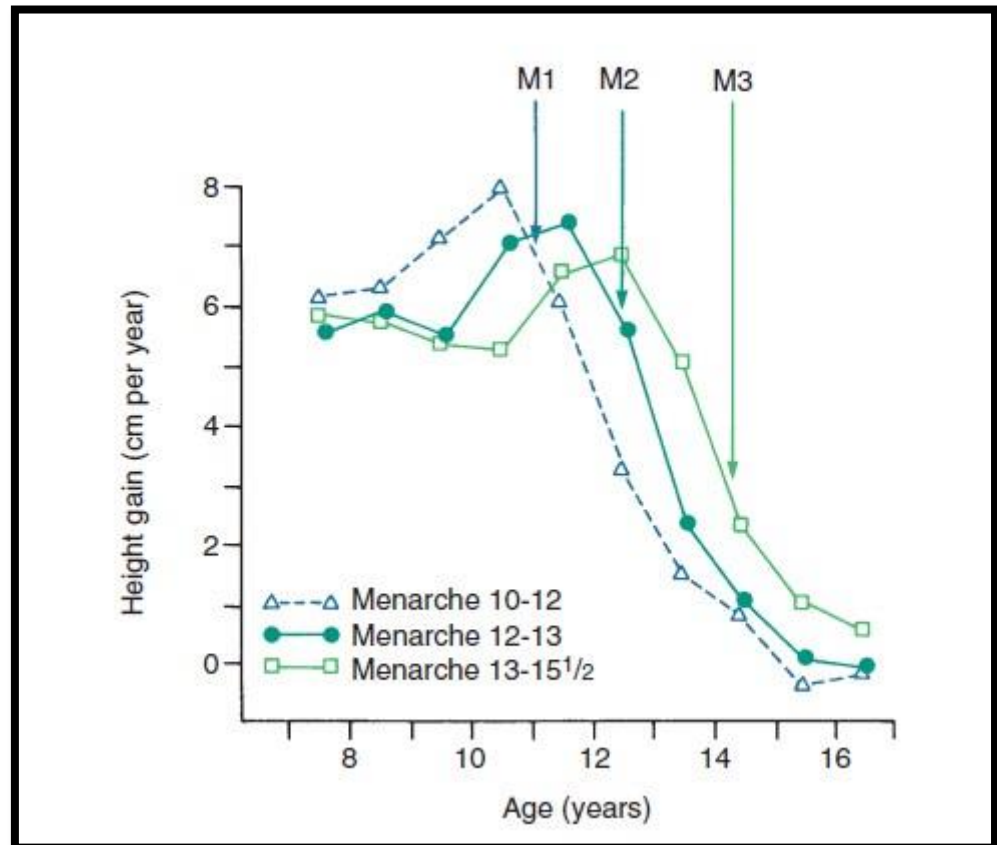
Sick growing

### 3- Timing:

Variation in timing arises because the same event happens for different individuals at different times-or, viewed differently, the biologic clocks of different individuals are set differently.

Variations in growth and development because of timing are particularly evident in human adolescence. Some children grow rapidly and mature early, completing their growth quickly and thereby appearing on the high side of developmental charts until their growth ceases and their contemporaries begin to catch up. Others grow and develop slowly and so appear to be behind, even though, given time, they will catch up with and even exceed children who once were larger. All children undergo a spurt of growth at adolescence, but the growth spurt occurs at different times in different individuals.

Growth effects because of timing variation can be seen particularly clearly in girls, in whom the onset of menstruation, often referred to as menarche, gives an excellent indicator of the arrival of sexual maturity. Sexual maturation is accompanied by a spurt in growth. When the growth velocity curves for early average-, and late-maturing girls are compared in (Figure 4), the marked differences in size between these girls during growth are apparent. At age 11, the early-maturing girl is already past the peak of her adolescent growth spurt. whereas the latematuring girl has not even begun to grow rapidly.



### Growth velocity curves for early-, average-, and late-maturing girls.

The **earlier** the adolescent growth spurt occurs, the **more** intense it appears to be.

The marked differences in size among these girls during growth are apparent. At age 11, the early-maturing girl is already past the peak of her adolescent growth spurt, whereas the late-maturing girl has not even begun to grow rapidly. Obviously, at age 11 or 12, an early-maturing girl would be considerably larger than one who matured late.