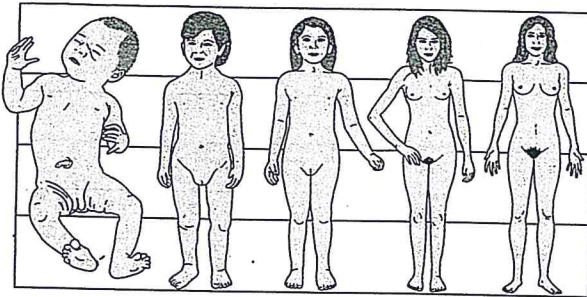


Growth and Development

Development describes the process of growing to maturity, from zygote to adult. After birth, development continues rapidly and is marked by specific stages recognized by the set of physical and cognitive skills present. Obvious physical changes include the elongation of the bones, increasing ossification of cartilage,

and changes to the proportions of the body. These proportional changes are the result of **allometric growth** (differential growth rates) and occur concurrently with motor, intellectual, and emotional and social development. These changes lead the child to increasing independence and maturity.



Newborn 2 years 5 years 15 years Adult

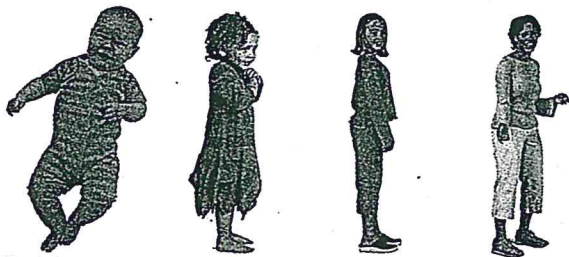
At birth the cranium is very large in comparison to the face and the skull makes up around one quarter of the infant's height. During early life, the face continues to grow outward, reducing the relative proportions of the cranium, while at adulthood the size of the skull in proportion to the body is much less.



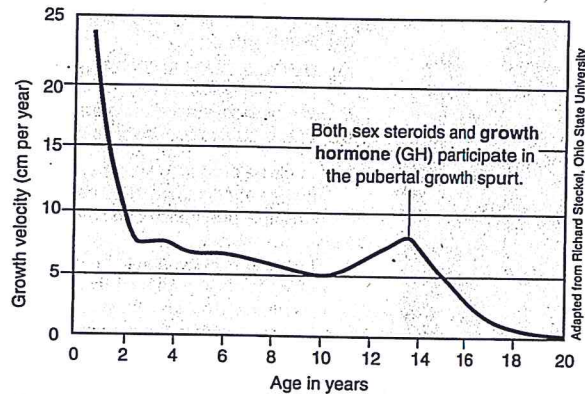
X-ray of child's skull



X-ray of adult's skull



By 6 weeks old, a human baby is usually able to hold its head up if placed on its stomach. At 3 months the infant will exercise limbs aimlessly but by 5 months is able to grasp objects and sit up. The infant may be able to crawl by 8 months and walk by 12 months. It is more or less independent by two years and undergoes changes to adulthood at around 11 years of age (puberty).



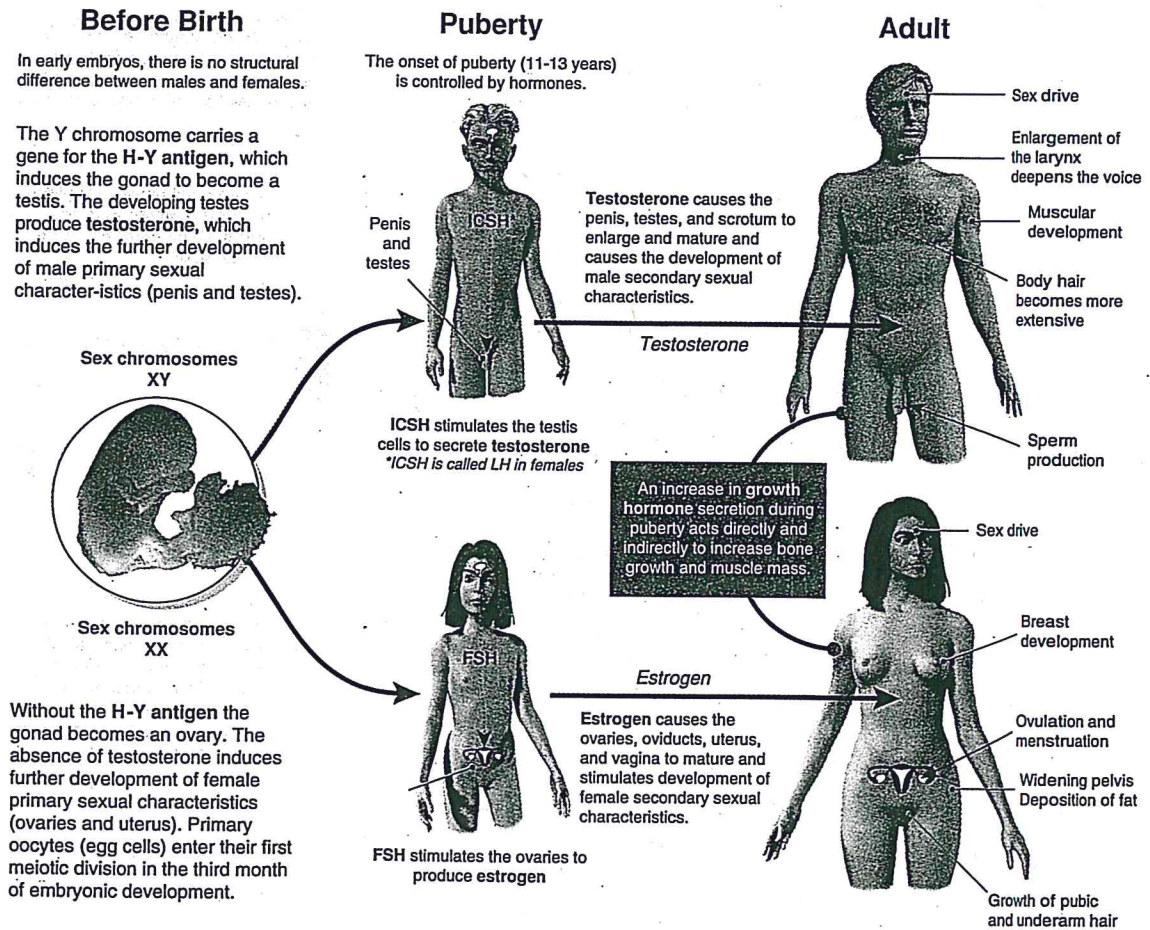
Babies are effectively born premature so that they complete much of their early development in the first two to three years of life. The rate of growth declines slowly through childhood, but increases again to a peak in puberty (the growth spurt). By 20 years of age the cartilage in the long bones has been replaced by bone and growth stops.

1. Describe the most noticeable change in body proportion from birth to adulthood: _____
2. Describe the changes that occur in the first period of rapid growth in humans: _____
3. Describe the changes that occur in the second period of rapid growth in humans: _____
4. Answer the following questions with respect to the graph depicting growth rates 0-20 years (above, right):
 - (a) Describe what happens to growth velocity in the first two years of an infant's life: _____
 - (b) Describe what the graph infers about the rate of growth in the period before birth: _____
 - (c) Identify the age range (in years) marking the pubertal growth spurt: _____
5. Relate the changes in physical development to the changes occurring in the mental development of an infant: _____

Sexual Development

Humans differentiate into the male or female sex by the action of a combination of different hormones. The hormones testosterone (in males), and estrogen and progesterone (in females), are responsible for puberty (the onset of sexual maturity), the

maintenance of gender differences, and the production of gametes. In females, estrogen and progesterone also regulate the menstrual cycle, and ensure the maintenance of pregnancy and nourishment of young.



- Distinguish between primary and secondary sexual characteristics: _____

- Name the hormone responsible for determining sex (gender) in the fetus: _____
- Describe the effects on a normal female if she were to take male hormones to enhance muscle development for sport:

- (a) Explain the role of the extra fat deposits laid down by the female at puberty: _____

 (b) Describe a potential reproductive side effect of starvation or severe dieting for women of child-bearing age:

- A second hormone, progesterone, is important in regulating female reproduction after puberty:
 - Name the site(s) of production of this hormone: _____
 - Describe its major roles: _____
