

## HEALTH & SCIENCE

### Fetal Growth & Development



#### First Trimester

During the first 8 weeks, an unborn child is called an embryo. The embryo grows 10,000 times in size from conception through the first 4 weeks. The vital organ called the placenta has vessels from the mother to the unborn child that intertwine without joining. This organ is the source of nourishment. The heart begins to pulsate and pump blood during the 3rd week. By the end of 4 weeks all major systems and organs begin to form. The neural tube (which becomes the brain and spinal cord), the digestive system, and the heart circulatory system begin to form. The embryo has an independent oxygen diffusion system. The beginnings of the eyes and ears are developing. Tiny limb buds which will develop into arms and legs appear. By eight weeks, all major body systems including the circulatory, nervous, digestive and urinary systems continue to develop and function. The central nervous system is now functioning, and 40 muscle sets begin their first exercises. The embryo is taking on a human shape, although the head is larger in proportion to the rest of the body. The mouth is developing tooth buds, which will become baby teeth. The eyes, nose, mouth and ears are becoming more distinct. Arms and legs are clearly visible. Fingers and toes are still webbed but can be clearly distinguished. The fetal heart-beat can be heard using a Doppler. Bones, nose and jaws are rapidly developing. The embryo is in constant motion, but cannot be felt by the mother. The unborn child reacts to touch.

After 8 weeks, the unborn child is referred to as a fetus (Latin for 'little one'). At 8 weeks, the fetus is 1 to 1 1/2 inches long and all major organs and systems have been formed. During weeks 9 - 12, the external genital organs are developed, fingernails and toenails appear, eyelids are formed, fetal movement increases, the arms and legs are fully formed, and the larynx begins to form in the trachea. The unborn child can now squint, swallow, move the tongue and sleeps and awakens. There is now a distinct set of fingerprints. Sensitive to touch, the unborn child will now grasp an object placed in the palm. The fetus breathes amniotic fluid to help develop and strengthen the respiratory system, but oxygen is supplied through the umbilical cord. The most vulnerable time for the unborn child is during the first 12 weeks. All the major organs and body systems are developing and can be damaged by exposure to drugs, German measles, radiation, tobacco and chemical and toxic substances. Although all the organs and body systems are fully formed by the end of 12 weeks, the fetus cannot survive independently.

#### Second Trimester

Now that all the major organs and systems have formed, the following 6 months are spent growing. By 4 months, the unborn child is 6-7 inches long. The mother may feel

movement. The unborn child's brain is maturing, a process that will continue long past birth. The eyelids are sealed shut and will re-open at 7 months. Taste buds are working. 300 quarts of fluid a day pass through the umbilical cord. Fine hair is growing on the head, eyebrows and eyelashes. Facial expressions can be seen. Rapid eye movements (REMs), a sign of dreaming can be recorded. At the end of 5 months, the unborn child is 10-12 inches long and weighs about 1 lb. Babies born at this age have survived. The 20th week marks the halfway point of the pregnancy. Pain receptors (nociceptors) are present throughout the unborn child's entire body by 20 weeks. After 20 weeks, the unborn child reacts to stimuli that would be recognized as painful if applied to an adult. In the unborn child, application of such painful stimuli is associated with significant increases in stress hormones (the stress response). Subjection to painful stimuli is associated with long-term harmful neurodevelopmental effects, such as altered pain sensitivity and, possibly, emotional, behavioral, and learning disabilities later in life. Fetal anesthesia is routinely administered during surgery on unborn children and is associated with a decrease in stress hormones compared to their level when painful stimuli are applied without anesthesia. There is documented reaction of unborn children to painful stimuli. Fetal surgeons have found it necessary to sedate the unborn child in order to prevent thrashing about in reaction to invasive surgery. There is substantial medical evidence that an unborn child is capable of experiencing pain by 20 weeks. By the 24th week, the unborn child can be 11-14 inches long and weighs about 1 3/4 lbs. Oil and sweat glands function and help regulate body temperature. Vernix caseosa, a creamy white substance protects the delicate skin from amniotic fluid and from scratches as the unborn child twists and turns. The unborn child responds to sound. The lungs are fairly well developed and the unborn child stands a good chance of survival if born at this time.

#### Third Trimester

In the 7th month, the unborn child uses 4 senses. The eyelids open and close and the eyes look around, and the unborn child can taste, touch, cough and hiccup. The grip is even stronger now than it will be after birth. Antibodies are received from the mother that provide immunity to a wide variety of diseases. The unborn child is now 14-17 inches and weighs 2 1/2 - 3 lbs. The bones of the skull remain soft to allow the unborn child to pass through the birth canal. Fat deposits under the skin eliminate wrinkling and will provide warmth after birth. At the end of 8 months the unborn child is about 16 - 18 inches long and weighs 4 1/2 - 5 1/2 lbs. In the 9th month, the unborn child usually shifts to a head-down position in preparation for birth. At 9 months, the unborn child averages about 19 inches and 7 lbs., but this varies widely. The human growth process will continue for many years after birth.

Sources: [www.doctorsonfetalpain.com](http://www.doctorsonfetalpain.com); [www.fetalfacts.net](http://www.fetalfacts.net); [www.littleonepublishing.com](http://www.littleonepublishing.com) (Watch Me Grow)

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