

# *Life* IN THE *womb*

HUMAN DEVELOPMENT FROM CONCEPTION TO BIRTH





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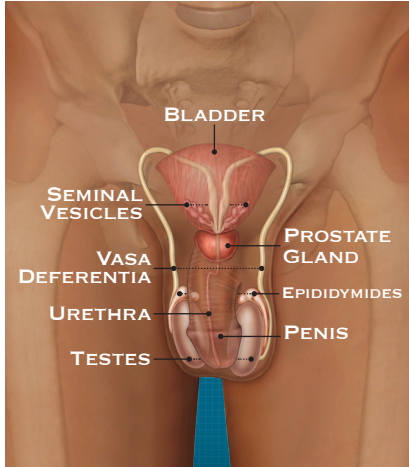
"I highly recommend this tool to anyone who wants to communicate the development of human life in a simple but profound way!"

T.J. Addington  
*Senior Vice President, EFCA  
ReachGlobal*

"This is not only a wonderful resource for teaching others about life in the womb, it is the most practical resource I have seen for doing so in one-on-one counseling sessions or small group teaching settings. The photography, illustrations, and text are unsurpassed."

Omar C. Garcia  
*Missions Pastor, Kingsland Baptist Church  
Katy, Texas*

## THE MALE REPRODUCTIVE SYSTEM



After sperm cells are formed in the testes, they are stored in the epididymides. During sexual arousal, the penis enlarges and becomes erect, which allows it to penetrate the female vagina during sexual intercourse.

In the first stage of ejaculation sperm cells travel through the vasa deferentia, where they combine with additional fluids from the seminal vesicles and prostate gland to create semen. The semen collects in the ejaculatory ducts, which are located where the ends of the vasa deferentia join the seminal vesicles within the prostate gland.

During the second stage of ejaculation, a spinal reflex causes rhythmic contractions of the smooth muscles within the urethra, penis, and prostate gland, and propels the semen through the urethra out the tip of the penis in spurts.

### FOR FURTHER DISCUSSION

The bladder is the organ that collects urine from the kidneys before disposal during urination. Urine exits the bladder via the urethra, **but this process is entirely separate from ejaculation**, and is not associated with reproduction.

During ejaculation, the internal sphincter of the urinary bladder is tightly sealed to ensure that the seminal fluid travels forward, and to prevent any urine from mixing with the semen.

### NOTES

**BLADDER**

**SEMINAL  
VESICLES**

**PROSTATE  
GLAND**

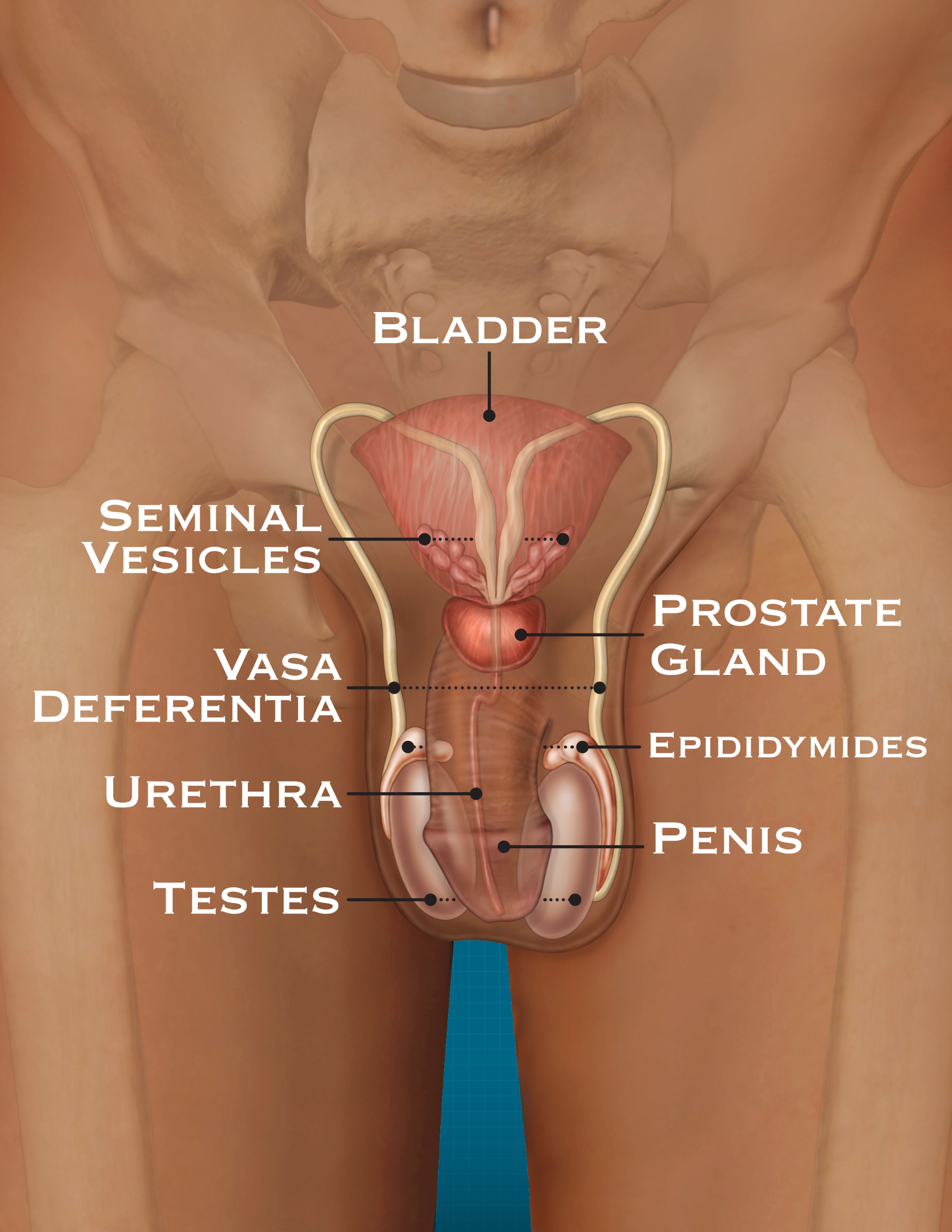
**VASA  
DEFERENTIA**

**EPIDIDYMIDES**

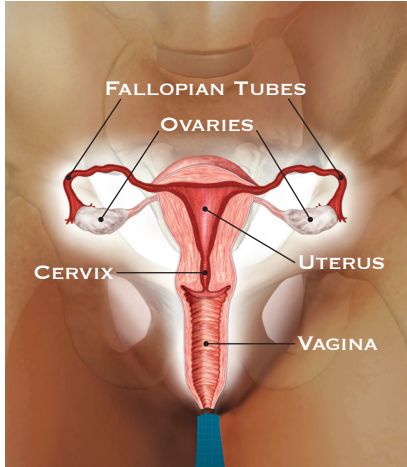
**URETHRA**

**PENIS**

**TESTES**



## THE FEMALE REPRODUCTIVE SYSTEM



The ovaries are the female reproductive organs that produce eggs. During ovulation, an egg is released from one of the ovaries into the nearby fallopian tube. Upon ejaculation during sexual intercourse, the man's erect penis releases semen into the woman's vagina, where it then flows through the cervix into the uterus. The sperm contained in the semen travel through the uterus into the fallopian tube and surround the egg, which is traveling in the opposite direction—from the ovary toward the uterus. If the egg is fertilized, a new human life has begun. For the next eight weeks this human being is called an embryo. From week nine of pregnancy until birth, this human being will be called a fetus.

### FOR FURTHER DISCUSSION

Pregnancy is generally dated by “gestational age,” in which day 1 of pregnancy is the first day of the woman's last menstrual period (LMP). Ovulation and fertilization generally occur around day 14, or two weeks, of a 40-week pregnancy term. By the time the woman's period is late, and she suspects

she may be pregnant, the newly formed child is considered to be about “five weeks” old, even though fertilization actually took place only three weeks ago. The term of a pregnancy is measured in three trimesters: first, weeks 1–13; second, weeks 14–26; and third, weeks 27–40.

### NOTES

*The circles on the bottom of each page designate the 40-week timeline of pregnancy. Each circle represents one week of pregnancy, from week 1 at far left to week 40 at far right. The marker on the timeline designates the week of pregnancy seen in each image. In addition, the colored highlights on each page (green here) indicate the corresponding trimester: green for first trimester ●, orange for second trimester ●, and red for third trimester ●.*

*The marker below is placed at the two-week mark because, according to gestational age, day 1 of a woman's pregnancy is the first day of her last menstrual period, which was about two weeks ago.*

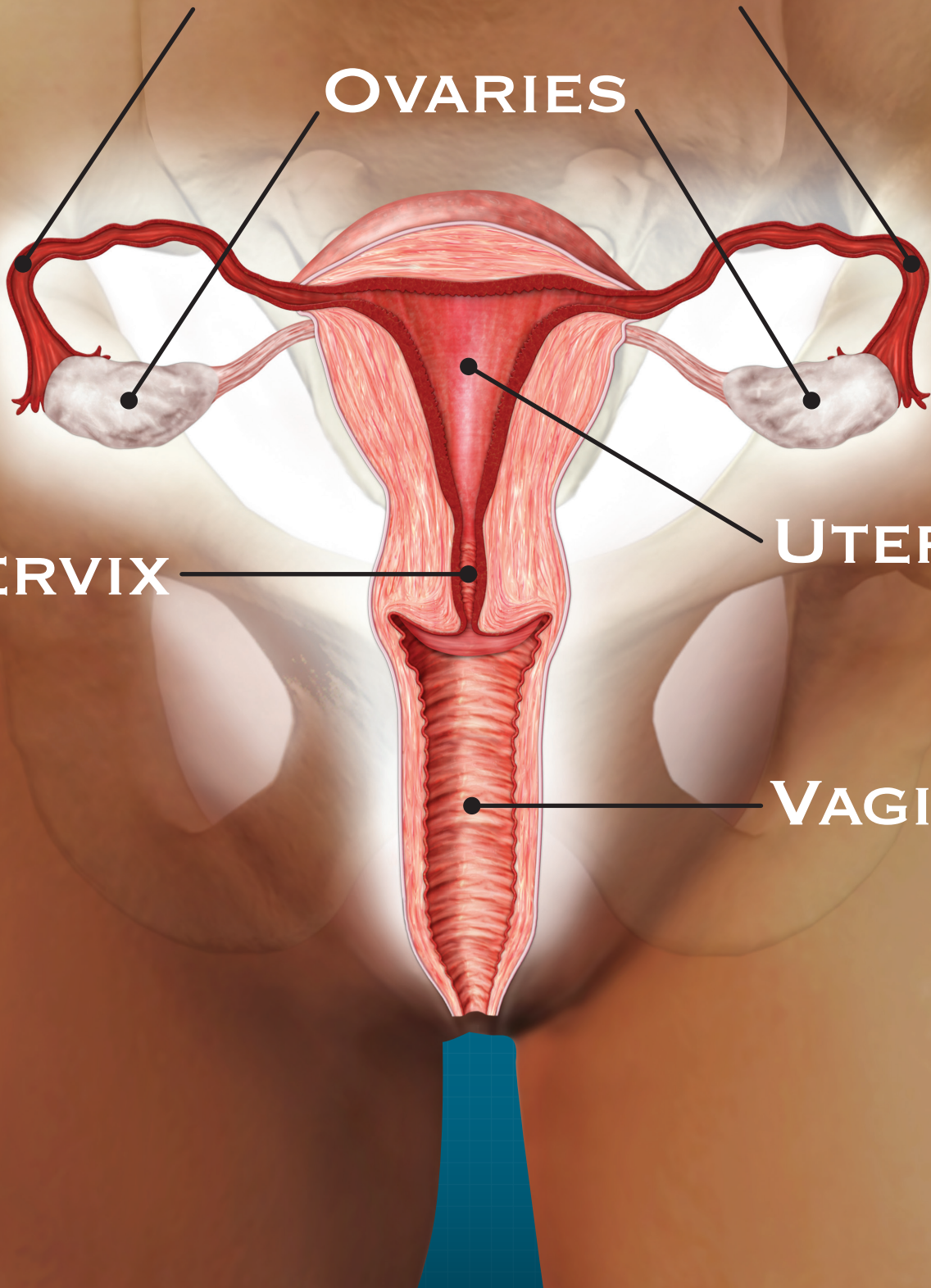
**FALLOPIAN TUBES**

**OVARIES**

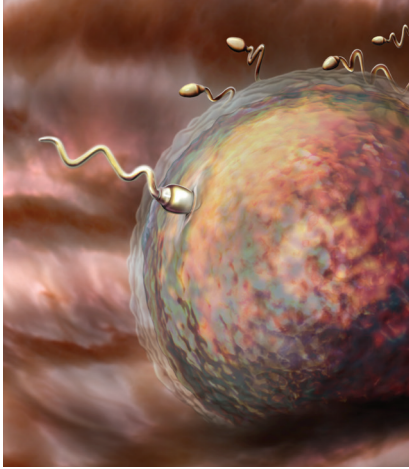
**CERVIX**

**UTERUS**

**VAGINA**



## FERTILIZATION



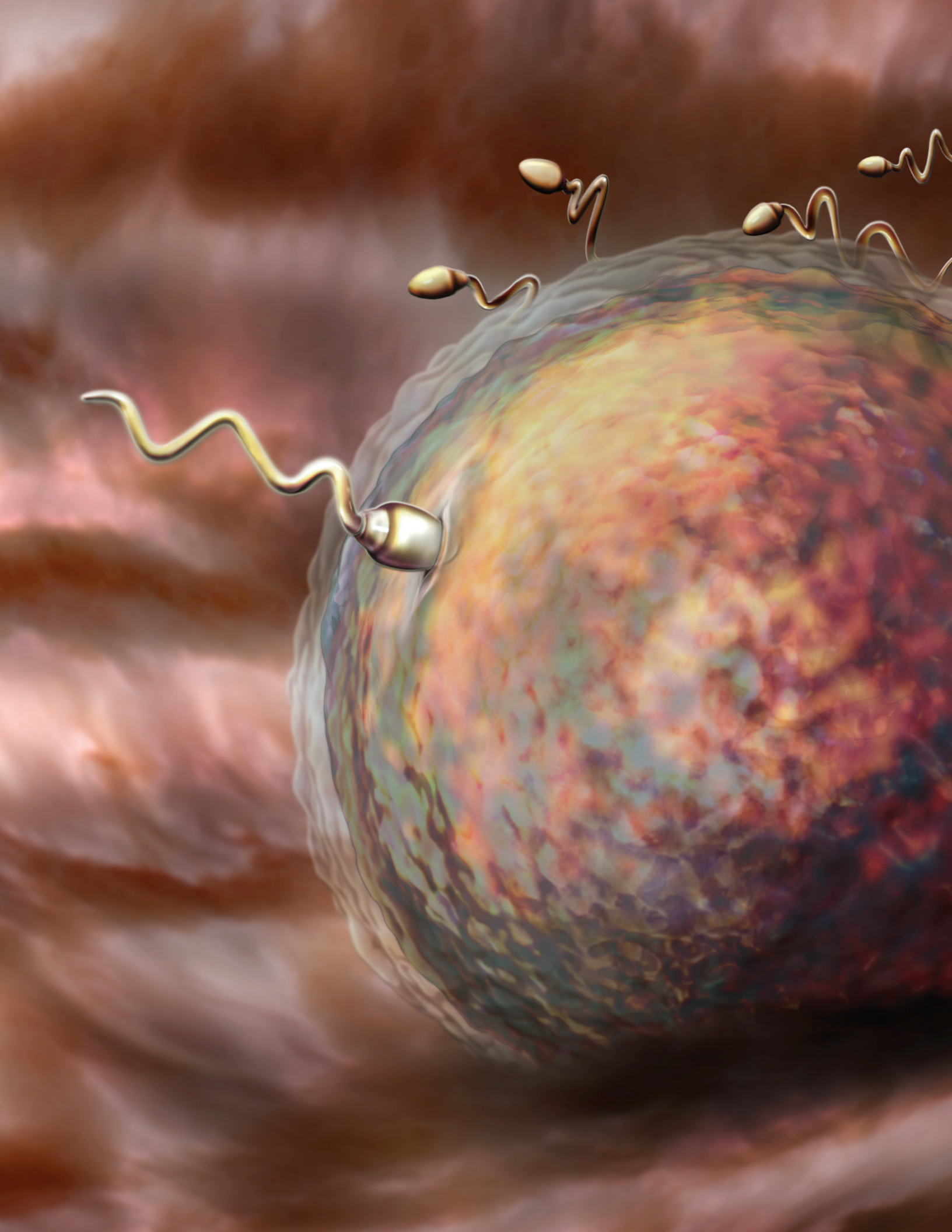
While semen contains millions of sperm, fewer than 1,000 sperm will make it to the egg. The head of each sperm contains the man's genetic material, called DNA, and the tail is used for movement. Each sperm is propelled forward toward its destination—the egg—by the whipping motion of its tail. Many sperm will attempt to penetrate the egg, but only one sperm will be able to fertilize the egg.

### ESSENTIAL FACTS

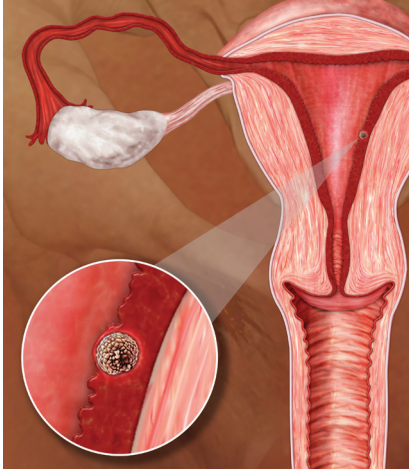
- Under the right conditions and lighting, the human egg may be visible to the naked eye. The egg is about 25 times larger than a single sperm.
- Sperm, which are produced in the testicles, take about 70 days to reach maturity.
- The average number of sperm released during sexual intercourse ranges from 50 to 500 million.
- The tip of the sperm contains enzymes to break through the outer layer of the egg. Once the egg has received a single sperm, it immediately creates a barrier to prevent penetration by additional sperm.
- In addition to sperm, semen contains fructose, enzymes, citric acid, free amino acids, prostaglandin, potassium, and zinc.

### NOTES





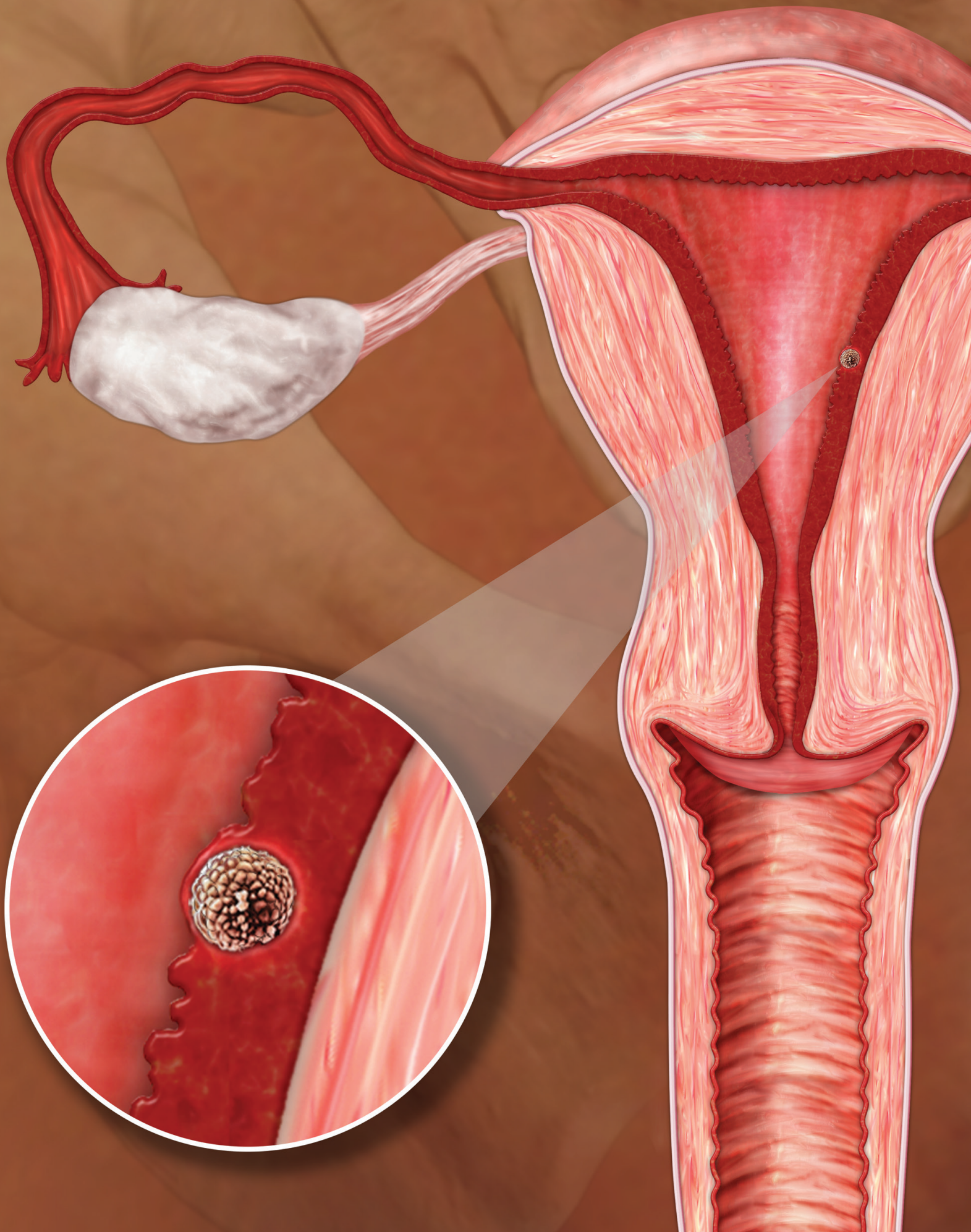
## IMPLANTATION



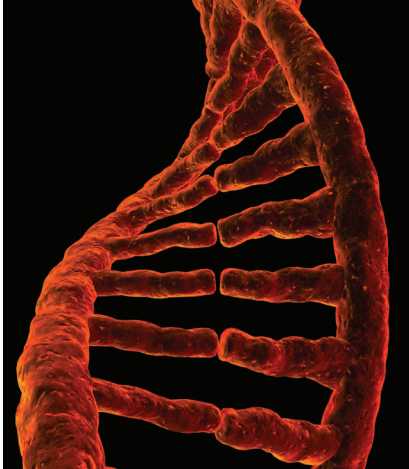
When a sperm penetrates an egg, the DNA from each parent combines to create a unique human being, known now as a zygote. This single cell begins to multiply immediately—from one to two to four to eight to sixteen cells, and so on.

As the cells multiply within the zygote, the earliest stage of the human embryo, it continues to grow. During this time, it is moving slowly through the fallopian tube toward the uterus, where it may implant into the uterine lining. If implantation occurs, the pregnancy will continue unless interrupted. The embryo will take approximately five days to reach the uterus, and it will be known as a blastocyst at this phase. The blastocyst is comprised of 70–100 cells. If implantation does not occur, the blastocyst will pass from the woman's body during menstruation, resulting in an early pregnancy loss.

## NOTES



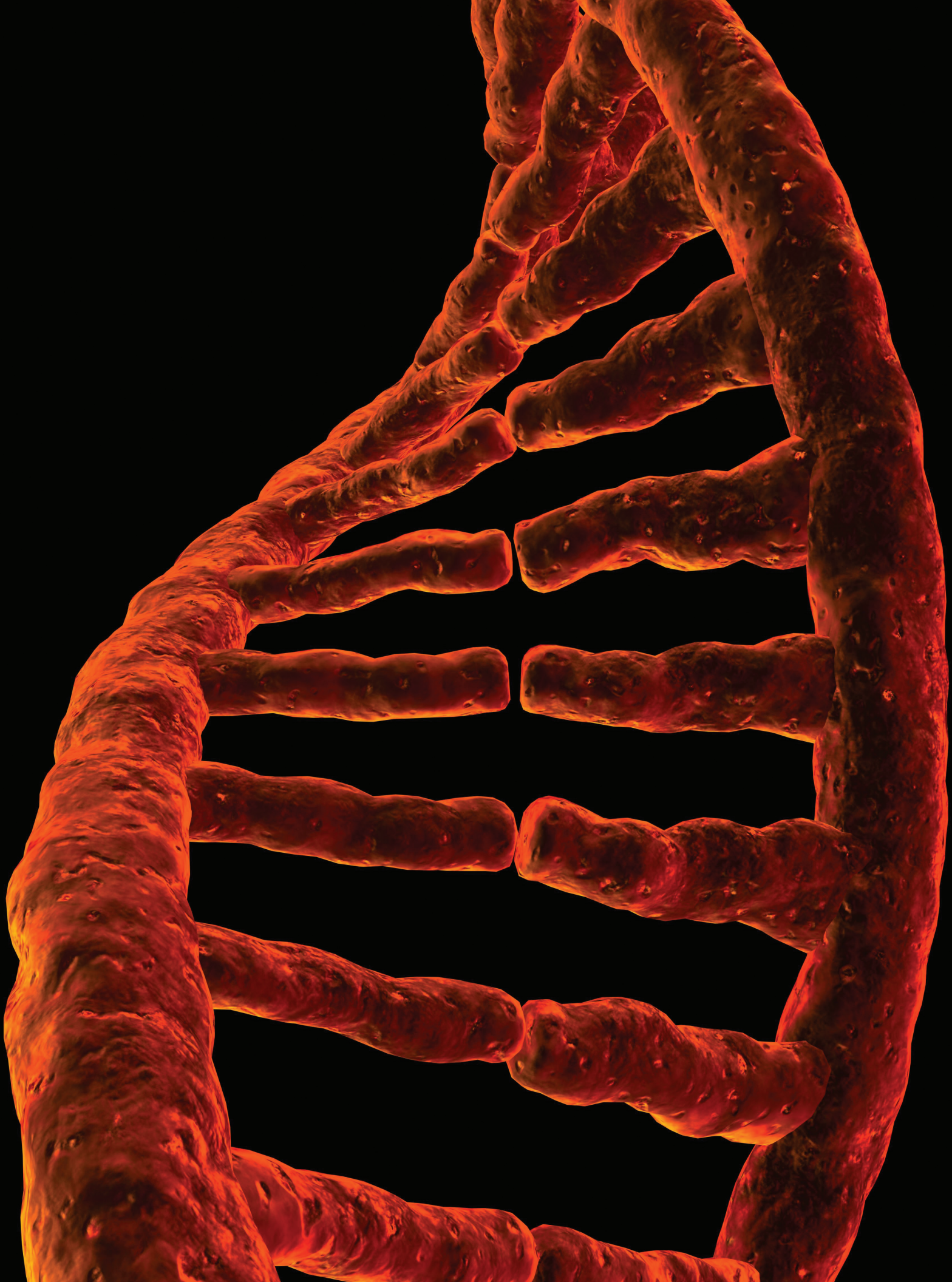
## DNA (DEOXYRIBONUCLEIC ACID)



Every human being possesses 46 chromosomes in his or her DNA (except for people born with chromosomal abnormalities). Though microscopic, DNA has a structure known as a double helix, as seen in this computer-generated image. The egg and sperm each contain 23 chromosomes—exactly one half of each parent’s DNA. At the moment of fertilization, the 23 chromosomes from the sperm combine with the 23 chromosomes from the egg to create a unique human being with 46 chromosomes. Every detail of the child’s development—sex, eye color, hair color, fingerprints, and more—is determined at this point.

### ESSENTIAL FACTS

- The sex of the new human being formed at fertilization is determined solely by the sperm. Every egg carries a female sex chromosome, designated by the letter X. Each sperm carries *either* a female sex chromosome or a male sex chromosome, designated by the letter Y. If a “Y” sperm fertilizes an egg, the new person will be male—XY. If an “X” sperm fertilizes an egg, the new person will be female—XX.
- Every time that a sperm fertilizes an egg, the genetic material from the two cells combines in a completely new arrangement, which is why siblings with the same biological parents are unique (except for identical twins). However, because each sibling still possesses one half of each parent’s genetic code, there are often shared traits among brothers and sisters.
- Because every baby possesses exactly one half of the mother’s and father’s chromosomes, each baby possesses *one quarter* of each grandparent’s chromosomes.
- Identical twins are formed when *one* egg is fertilized by *one* sperm to create *one* zygote, which then divides into *two* separate embryos. These two embryos will develop into genetically identical people because they share the same genetic code.
- In the case of fraternal twins, two eggs must be released during ovulation. Both of these eggs must be fertilized and implant into the uterine wall. Although these twins will gestate and be born at the same time, they *will not* share the same genetic code. In fact, other than having the same birthday, these siblings will be no different from siblings who happen to be born several years apart.
- DNA is tightly coiled within each cell of the human body. If you were to uncoil all of the DNA in the cells of an adult human being and arrange it in a straight line, it would exceed 63 *billion* miles in length—long enough to travel back and forth to the sun 340 times!





Most organs and body structures have begun to form, including the brain and spinal cord, the heart, the stomach and intestines, bone tissues, eyes, and ears. Though she is already a mother, the woman does not yet suspect that she is pregnant.

## NOTES

*The measurements at top right designate the average weight and length of the embryo at a given stage of development. Measurements until week 20 are crown (top of head) to rump, because the baby's legs are curled up against her torso in the early months of pregnancy, making accurate measurement difficult to attain. Measurements from week 20 until birth are head to toe.*



**4 WEEKS**

## THE FETAL HEARTBEAT



At five weeks' gestational age, or 21 days from conception, the embryo's heart will begin beating at a rate near the mother's, about 75–80 beats per minute (bpm). Within a month, the heart rate will have increased to a gestational peak of 185 bpm.

By the time this person has reached old age (80 years old), her heart will have beaten over 3.2 *billion* times!

## NOTES

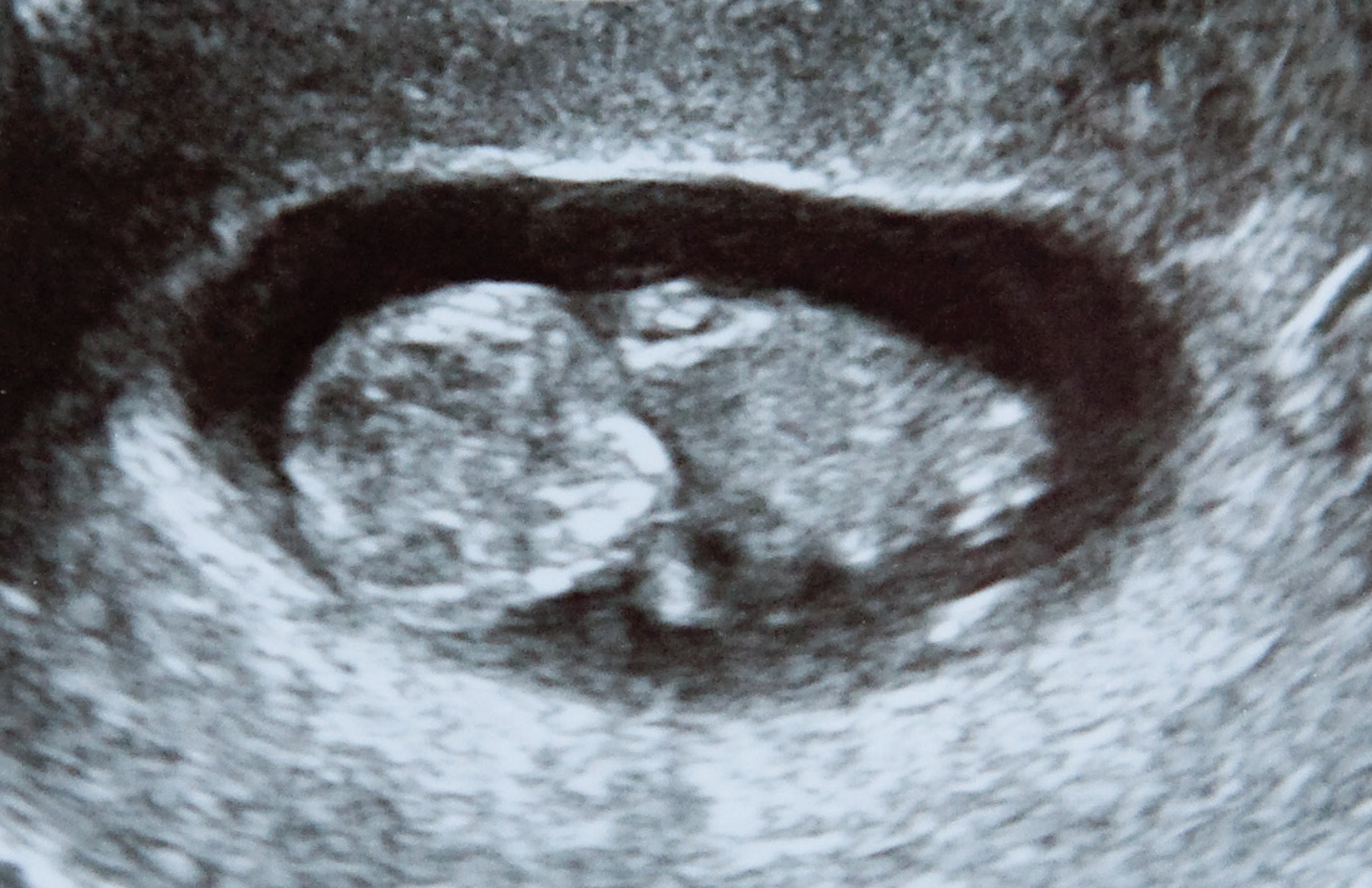
5 WEEKS

FIRST TRIMESTER

SECOND TRIMESTER

THIRD TRIMESTER





*Note: Image above is of an 8-week embryo.  
Used here for illustration purposes only.*



*Note: Image above is of an 8-week embryo.  
Used here for illustration purposes only.*



By now, the embryo's heartbeat can be clearly heard on sonogram, and blood cells are circulating throughout the body. All of the major organ systems are now forming. Basic facial features appear and arms and legs continue to grow. Though unfelt by the mother, the embryo's body and limbs begin to move.

## ESSENTIAL FACTS

- The embryo now possesses over 90 percent of the structures found in adults.
- The umbilical cord is now visible.
- There is reflexive response to touch and primitive brain activity can be measured.
- Ovaries and testicles begin to form.
- Lungs are present.
- Taste buds, tooth buds, and eyelids appear.
- The forehead is large and the external genital organs differentiate into female or male.
- The outer ears have begun to take shape.

## FOR FURTHER DISCUSSION

This is a critical stage because the embryo's developing organs are susceptible to toxins ingested by the mother. Once she knows she's pregnant, it's important for the mother to take good care of herself and her child by avoiding cigarettes and alcohol, eating nutritious foods, and taking prenatal vitamins when possible.

## NOTES



**8 WEEKS**



The embryo is now known as a fetus, which in Latin means “young one.” This young one will soon start sucking her thumb. All essential internal organs are formed and functioning.

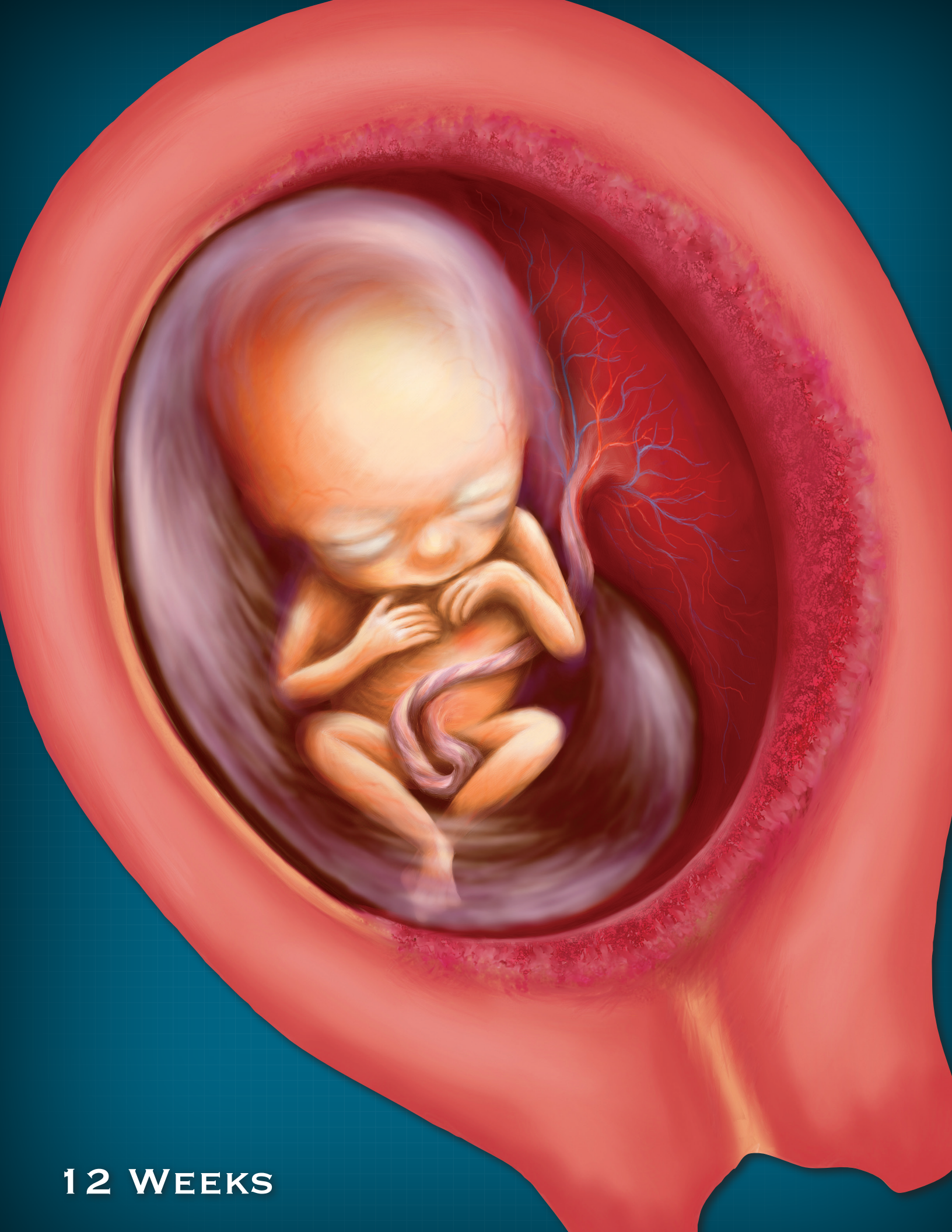
## ESSENTIAL FACTS

- The kidneys are producing urine.
- The head rounds out and comprises half the size of the fetus.
- Bone formation is now underway in most bones.
- Eyelids close to protect the eyes.
- The genitals are differentiated.
- The brain now controls muscle movement, as seen by yawning and sucking.

## FOR FURTHER DISCUSSION

One of the functions of the placenta, which is now completely developed, is to provide nutrient-rich, oxygenated blood to the child’s body. This nourishing blood circulates through the vein and arteries in the umbilical cord connecting the child to the placenta.

## NOTES



**12 WEEKS**



The baby's legs and arms are exceptionally thin at this point because body fat has not yet begun to deposit there, but the limbs are moving independently, being controlled by the child's brain. The umbilical cord, seen here behind the feet, is usually about 50 cm (20 inches) long.

## NOTES



**14 WEEKS**



The child can now make a fist with fingers that are fully differentiated. Fingernails can be seen and the child's skin is almost transparent. His arms have lengthened to be in proportion to the rest of his body. In this photograph, oxygenated blood can be seen in the blood vessels running to the child's fingertips.

## NOTES





**14 WEEKS**



The child's movements can now be felt by the mother, as the child's physical activity grows increasingly vigorous. By late in the pregnancy, not only can the child's movements be *felt* externally, they can be *seen* as the growing child twists and turns in an increasingly confined space.

## ESSENTIAL FACTS

- The child's mouth makes sucking motions and she has begun to swallow amniotic fluid.
- Tooth development is now underway.
- The skin is still mostly transparent.
- Swallowing and chest movements are present.
- The liver and pancreas have begun to function.
- The child's head and body take their proper proportions.
- The heart is now beating 110–180 beats per minute and pumping 23.7 liters (25 quarts) of blood every day.

## FOR FURTHER DISCUSSION

Millions of eggs are now growing in the fetal ovaries, and a uterus is present. When this little girl is born, her body will contain all of the eggs that it will ever produce, and they are being produced now—five months before she is even born!

## NOTES



**16 WEEKS**



Instead of being curled inward, the child's head is now more erect than it has been. Her eyes have moved closer to the front of her face, and her ears are close to their final position.

NOTES



**18 WEEKS**



Even though this fetus has been a unique human being since the moment of her conception, a significant outward form of that distinction can now be seen in her unique fingerprints and toe prints. Downy hair known as lanugo can be seen, and vernix, a waxy cream, coats and moisturizes the baby's skin. The child will likely have established waking and sleeping cycles by this point, and she may have even found a favorite position in which to sleep.

## ESSENTIAL FACTS

- Some studies have concluded that the fetus is capable of feeling pain at this stage.
- The skin becomes less transparent as fat begins to deposit.
- The child begins to punch and kick more vigorously, and the mother feels it!
- Eyebrows and eyelashes have appeared.
- Blinking and frowning reflexes have developed.
- The child can now suck her thumb.
- While the lungs have not developed enough to permit survival outside of the womb, breathing-like movements become regular.
- Buffered in amniotic fluid, the child can fully turn from side to side and front to back.

## FOR FURTHER DISCUSSION

Now that the baby's genitals are mostly formed, an ultrasound can reveal the baby's sex. And since all body structures and systems are now in place, most of the baby's energy will go toward gaining weight.

## NOTES



**20 WEEKS**



The child's eyes, eyelids, and eyebrows are now fully formed, but her eyes still lack the pigment that will give them their color. Her skin is deeply wrinkled, and will be until it is filled out with a layer of fat.

## NOTES





**22 WEEKS**



The child's ears can now perceive sounds from outside of the womb, and loud noises may even startle her. And though the mother can't hear her, the child's vocal cords are now active. If you were to peek into the womb through ultrasound, you'd be able to see her squinting, smiling, and frowning.

## ESSENTIAL FACTS

- Eyes are fully functional.
- Eyebrows and eyelashes are almost fully formed.
- Rapid brain growth continues.
- Lungs are developing rapidly.
- Rapid eye movement, which is associated with dreaming, can be measured.

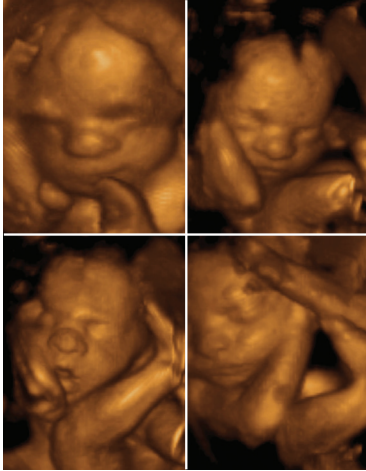
## FOR FURTHER DISCUSSION

The child has now reached a point where she could survive outside of the womb if given intensive care. The youngest children known to survive preterm birth were not even 22 weeks old; they were born barely halfway through pregnancy!

## NOTES



**24 WEEKS**



These are the first pictures taken of a female named Beatrix. These three-dimensional (3D) images were taken with an advanced ultrasound system, which allows mothers and fathers to see their children months before they are born. As she has grown, Beatrix has started to grow cramped in the womb, seen by the toes at her mouth, knees at the chin, and arms crossed over her face.

## NOTES



**25 WEEKS**



If you put your ear to a pregnant woman's abdomen, you may be able to hear the baby's heart beating. And even though the child's lungs are not yet fully developed, she would have a good chance of survival if she were born at this stage.

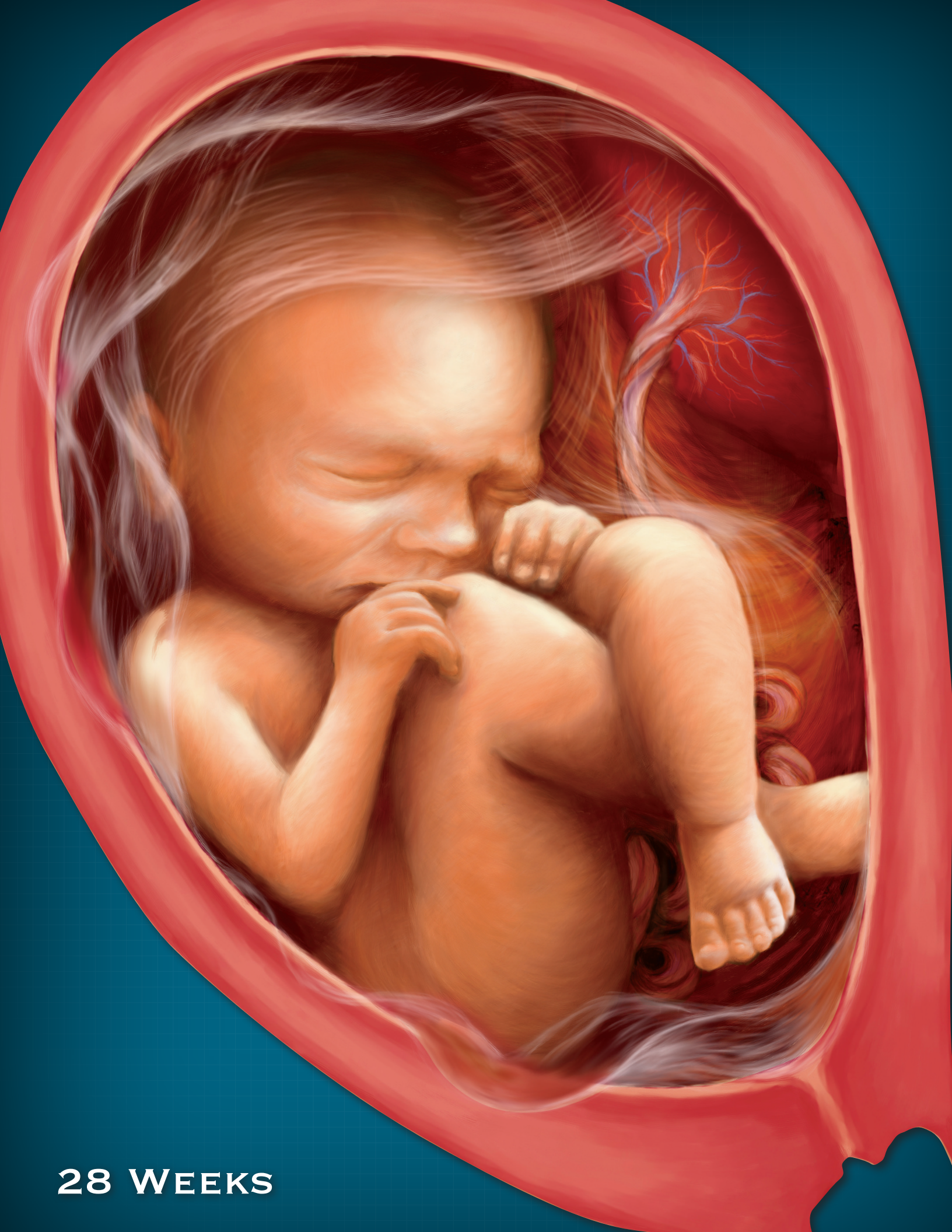
## ESSENTIAL FACTS

- Brain-wave patterns are similar to those of a full-term baby.
- Though she won't cry until she's born, her eyes can now produce tears.
- The child's brain now controls her "breathing" movements and body temperature.
- Eyelids are opening and closing and the child's eyes can perceive light.
- The child is getting her exercise through acrobatic kicks and stretches.
- More fat is deposited and the child's skin is smoothing out, losing its wrinkles.

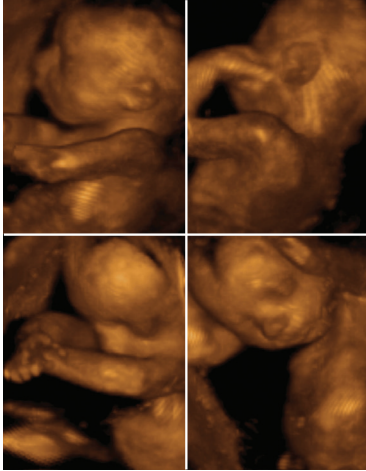
## FOR FURTHER DISCUSSION

Many babies are in breech position at this stage of pregnancy, which means that they are positioned feet- or bottom-first, instead of the typical head-down birth position. There is still plenty of time for the baby to change position, however, and most babies will rotate within the next few weeks.

## NOTES



**28 WEEKS**



Using the same 3D ultrasound technology that allowed us to see Beatrix at 25 weeks, here we see a 28-week-old male named Luke. His brain is developing billions of neurons as he begins the third trimester—the last stage of pregnancy before he will be born.

## NOTES





**28 WEEKS**



The baby's movements will soon grow less acrobatic as she settles into a head-down birth position. Most of the skin wrinkles will have disappeared from her face. By the time she is born eight weeks from now, her present weight will have more than doubled!

## ESSENTIAL FACTS

- Though the lungs are not yet mature, rhythmic “breathing” is occurring.
- Even though the bones are fully developed, they are still pliable and soft.
- The baby's skin has thickened.
- Nails have grown to the tips of the fingers and toes.
- The baby's head may now be covered with hair.

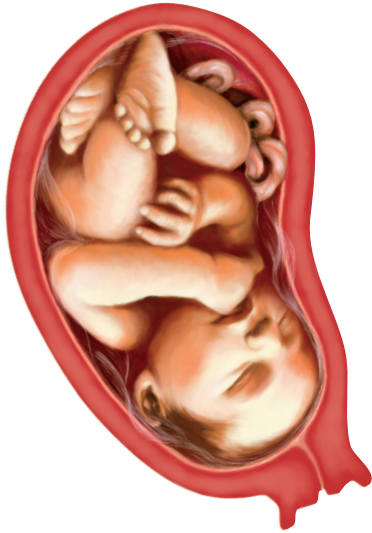
## FOR FURTHER DISCUSSION

Some women may notice Braxton Hicks or “practice” contractions at this stage, which are intermittent contractions every 10 to 20 minutes. These contractions may be accompanied by mild discomfort or pain.

## NOTES



**32 WEEKS**



The child has probably rotated into birth position by now, with her head pointed downward in the mother's pelvis, where she'll stay until she's born. This shift will likely allow the mother to breathe more easily, but because the baby has settled lower onto the woman's bladder, she may need to urinate more often.

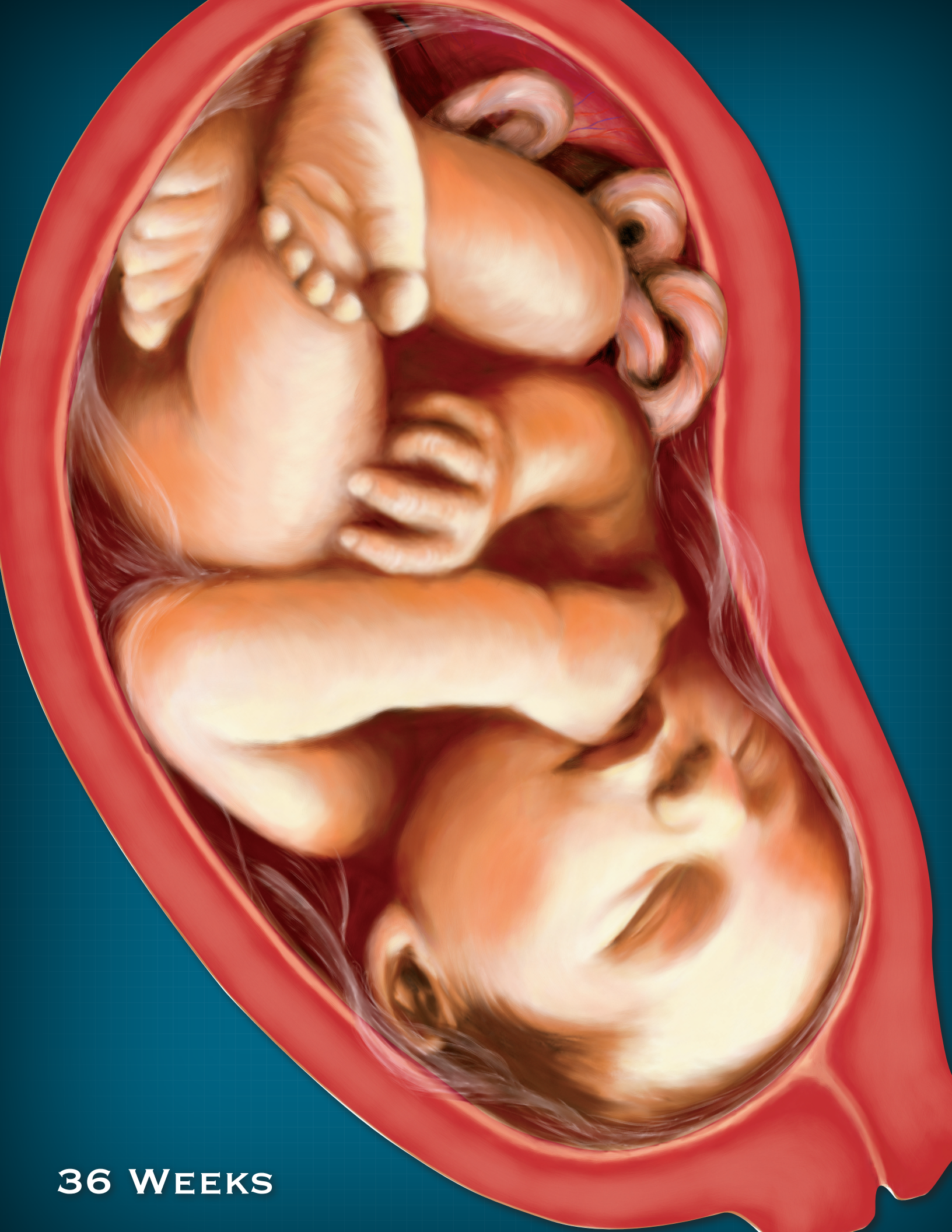
## ESSENTIAL FACTS

- The eyes are open during alert times, and closed during sleep.
- The child will notice light and turn toward a light source.
- The child's outer ears are now fully formed.
- Breast buds are present on baby girls and boys.
- The child can now grasp firmly.

## FOR FURTHER DISCUSSION

The extra fat that the baby is putting on—about half a pound a week—will help her to regulate her body temperature after she is born. Her body weight at birth will be about 15 percent fat.

## NOTES



**36 WEEKS**



The journey from conception to birth has been about nine months long, and the baby will be born sometime between weeks 38 and 42. Weight gain will continue rapidly throughout these weeks, and hair and fingernails will continue to grow.

Since the moment of her conception, the child has been a being of staggering complexity. For nine months, a unique genetic code, defined when the sperm met the egg, has guided the development of this person. Now she is ready to draw her first breath. Welcome to the world, young one!

## ESSENTIAL FACTS

- Breast milk will supply important antibodies to replace those supplied by the placenta before birth.
- The newborn baby's skull bones have not yet fused, which allows them to compress in the birth canal.
- Boys tend to weigh more than girls at birth.
- The newborn's eyes are fully formed, but the nerves inside her eyes will continue to develop in the weeks after her birth.

## FOR FURTHER DISCUSSION

A newborn baby has about 300 bones, far more than the 206 bones of an adult. Some of these bones are made of cartilage that will turn to bone and fuse together over the next few years. Bone growth is complete by age 25, after which point the bones are as big as they will ever be.

## NOTES



## ACKNOWLEDGMENTS

Doublet, P. M., Benson, C. B., Nadel, A. S., & Ringer, S. A. (1997). Improved birth weight table for neonates developed from gestations dated by early ultrasonography [Electronic version]. *Journal of Ultrasound Medicine*, 16(241), 241–249.

The Endowment for Human Development. (n.d.). Prenatal Timeline: All. Retrieved March 1, 2010, from [http://www.ehd.org/science\\_main.php?level=all](http://www.ehd.org/science_main.php?level=all)

Hadlock, F. P., Shah, Y. P., Kanon, D. J., & Lindsey, J. V. (1992, February). Fetal crown rump length: Reevaluation of relation to menstrual age (5–18 weeks) with high resolution real-time US. *Radiology* 182(2): 501–505.

Mayo Clinic staff. (2009, July 25a). Fetal development: The first trimester. In *Pregnancy week by week*. Retrieved from <http://www.mayoclinic.com/health/prenatal-care/PR00112>

———. (2009, July 25b). Fetal development: The second trimester. In *Pregnancy week by week*. Retrieved from <http://www.mayoclinic.com/health/fetal-development/PR00113>

———. (2009, July 25c). Fetal development: The third trimester. In *Pregnancy week by week*. Retrieved from <http://www.mayoclinic.com/health/fetal-development/PR00114>

Moore, K. L., & Persaud, T. V. N. (2008). *The developing human: clinically oriented embryology* (8th ed.). Philadelphia: Saunders/Elsevier.

Sadler, T. W. (2009). *Langman's medical embryology* (11th ed.). Baltimore: Lippincott Williams & Wilkins.

Usher, R., & McLean, F. (1969, June). Intrauterine growth of live-born Caucasian infants at sea level: Standards obtained from measurements in 7 dimensions of infants born between 25 and 44 weeks of gestation [Electronic version]. *Journal of Pediatrics* 74(6): 901–910.

### **Image Credits:**

123RF.com: DNA

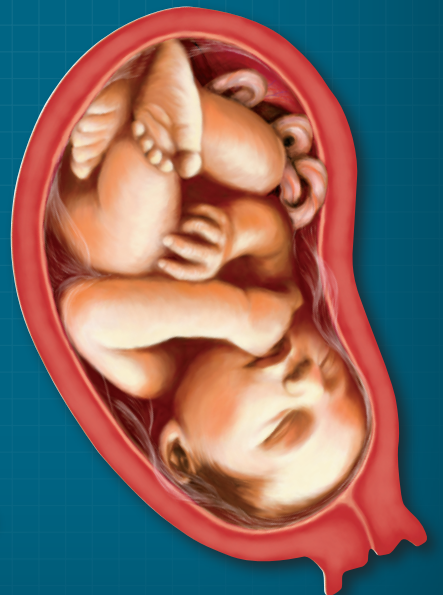
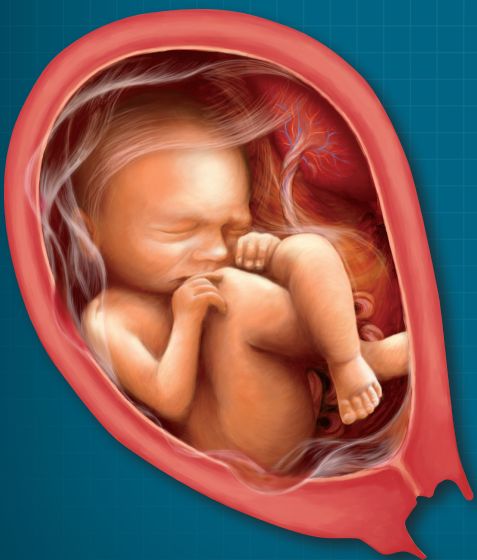
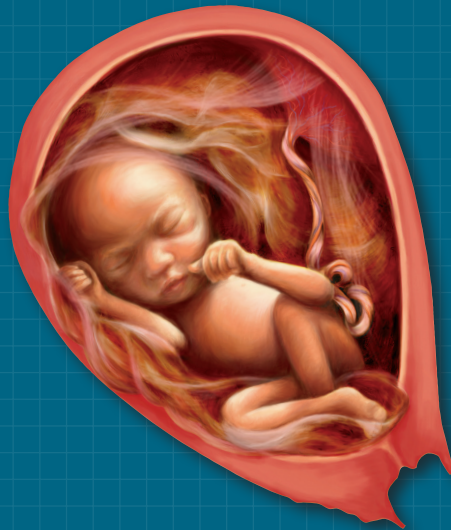
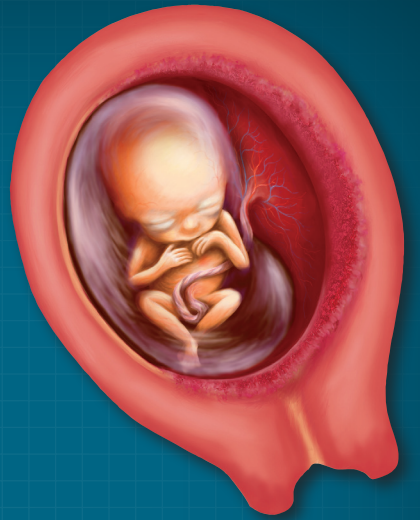
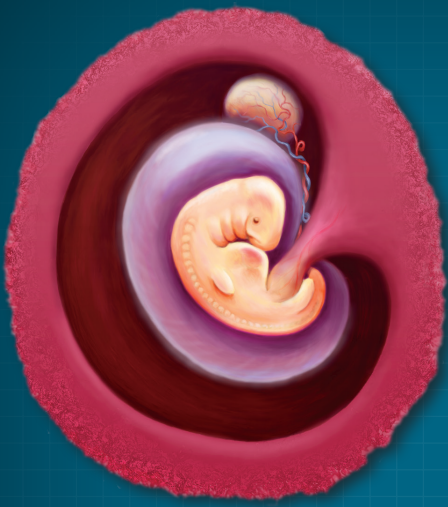
iStockphoto.com: 40 Weeks: Newborn

Life Issues Institute: 14 Weeks, 18 Weeks, and 22 Weeks

QualisMedia: The Male Reproductive System, The Female Reproductive System, Fertilization, and Implantation

StandUpGirl.com: 4 Weeks, 8 Weeks, 12 Weeks, 16 Weeks, 20 Weeks, 24 Weeks, 28 Weeks, 32 Weeks, 36 Weeks, and The Nine Months of Pregnancy





*Life in the Womb: Human Development from Conception to Birth* invites you to travel on a journey through the nine months of pregnancy. Peer into a window of the womb as you learn about the stages and milestones that every developing child encounters before birth.

Written in easy to understand language, this guide is perfect for learners of every educational level. You choose the level of detail to share as you follow a basic narrative about life before birth. For young and old, women and men, this tool will inspire true wonder in the development of human life in the womb.



## FEATURING:

Lifelike, full-color images

Metric and standard measurements included

Essential facts of each gestational stage

Convenient, at-a-glance pregnancy timeline

20 WEEKS 16 CM / 300 G • 6.5 IN. / 10.5 OZ.

32 WEEKS

ESSENTIAL FACTS

Even though this fetus has been a unique human being since the moment of her conception, a significant outward form of that distinction can now be seen in her unique fingerprints and toe prints. Downy hair known as lanugo can be seen, and vernix, a waxy cream, coats and moisturizes the baby's skin. The humanity of the preborn child can be easily seen in her waking and sleeping cycles, and she may have even found a favorite position in which to slumber!

FOR FURTHER DISCUSSION

Now that the baby's genitals are mostly formed, an ultrasound can reveal the baby's sex. And since all body structures and systems are now in place, most of the baby's energy will go toward gaining weight.

NOTES

FIRST TRIMESTER SECOND TRIMESTER THIRD TRIMESTER

36 WEEKS

“Millions of eggs are now growing in the fetal ovaries, and a uterus is present. When this little girl is born, her body will contain all of the eggs that it will ever produce, and they are being produced now—five months before she is even born!”

*From Life in the Womb*

### What pro-life leaders are saying about *Life in the Womb*

I highly recommend this resource from LIFE International. It is a clear, beautiful, and accurate portrayal of the developing preborn child. I see this as an effective tool to communicate that every child is a complete human being, worthy of our protection.

#### **Randy Alcorn**

*Author, ProLife Answers to ProChoice Arguments & Why Pro-Life?*

*Life in the Womb* is a beautifully made and useful tool for every pregnancy help center and medical clinic.

#### **Peggy Hartshorn**

*President, Heartbeat International*

## ABOUT LIFE INTERNATIONAL

LIFE International's mission is to multiply healthy, Christ-centered, life-giving ministries wherever abortion exists around the world. Our primary focus is to equip, empower, and release leaders for life-giving ministry, in order to see people come to new life in Christ and preborn lives saved from abortion. We come alongside these leaders to provide foundational training in the sanctity of human life and in starting life-giving ministries. We also offer online resources and mobile ministry tools and are mobilizing 24/7 prayer to uphold life-giving work worldwide.

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