

Human Physiology/Pregnancy and birth

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Introduction

In this chapter we will discuss the topics covering pregnancy, from conception to birth. The chapter will cover fertilization, implantation of the zygote, to becoming a fetus, the three trimesters, and the progressive development of the fetus through the weeks of pregnancy. It will cover the topic of birth and different birthing methods.

Fertilization

Fertilization is the joining of a sperm and an egg. A sperm is a male gamete that is released into the vagina of a female during intercourse. In order for fertilization to occur there must be a mature ovum present. Every month one of the ovaries releases an egg which will meet one of the 4 million sperm the male ejaculates into the vagina. The sperm swim through the cervix and into the uterus which lead to the fallopian tubes. This is where fertilization is most likely to take place. The high amount of sperm in the ejaculate is needed because only around 100 survive to enter reach the fertilization site. In order to penetrate the egg the sperm must first break through two barriers surrounding the ovum. The acrosome of sperm comes in contact with the corona radiata and releases digestive enzymes that break down a gelatinous layer around the egg called, the zona pellucida. Once a sperm reaches the plasma membrane of the egg it sets off a reaction that spreads across the membrane of the egg preventing other sperm from breaking through the egg membrane. Once the sperm reaches the inside of the egg it sheds its tail and the two nuclei fuse and now the 23 chromosomes from the egg and the 23 chromosomes of the sperm join and they become a *zygote*. Chromosomes contain all the information needed to determine the genetic structure of the new baby. Normally all human beings have two chromosomes that determine sex: A combination of X and Y makes a male or a combination of X and X makes a female. All ovum have X sex chromosomes where as sperm have both X or Y sex chromosomes. Therefore, the male gametes determine the sex of the baby.



A sperm fertilizing an ovum

Pre-embryonic Period



An 8-cell embryo in the process of cleavage.

After fertilization, the zygote begins a process of dividing by *mitosis* in a process called *cleavage*. It divides until it reaches 16 cells. It is now referred to as a *morula*. As the morula floats freely within the uterus, it starts to bring nutrients into the cells. The morula fills with fluid and the cells inside start to form two separate groups. At this stage it is now a *blastocyst*. The inner layer of cells is called the *embryoblast*, and will become the fetus. The outer layer is called a *trophoblast* which will develop into part of the placenta. At this point the *zona pellucida* is disintegrating. The trophoblast contains specialized cells that become extensions, like fingers, that grow into the endometrium once in contact with the well thickened endometrium.

Implantation

The blastocyst preserves itself by secreting a hormone that indirectly stops menstruation. The trophoblast cells secrete hCG hormones that help maintain the corpus luteum that would normally regress. In turn, the corpus luteum continues to secrete progesterone, which maintains the endometrium of the uterus in the secretory phase. This helps the blastocyst to continue to grow and stay embedded within the endometrium. The fetal life support system and the placenta begin to form, and eventually the placenta will take over the job of producing progesterone.

■ Gastrulation and Formation

The embryoblast within the blastocyst forms 3 primary germs layers: ectoderm, mesoderm, and endoderm.

Ectoderm

This forms the nervous tissue and the epithelium covering the outer body surface. Epidermis of skin, including hair and nails, glands of skin, linings of oral cavity, nasal cavity, anal canal, vagina, brain, spinal cord, sensory organs, lens of eye and epithelium of conjunctiva (a membrane that covers the sclera and lines the inside of the eyelids), pituitary gland, adrenal medulla, and enamel of teeth.

Mesoderm

This forms all of the muscle tissue and the connective tissue of the body, as well as the kidneys and the epithelium of the serous membranes and blood vessels. All muscle tissue (skeletal, smooth, cardiac), all connective tissue (fibrous connective tissue, bone, blood, cartilage), dentin of teeth, adrenal cortex, kidneys and ureters, internal reproductive viscera, epithelium lining vessels, joint cavities, and the serous body cavities.

Endoderm

Forms the lining epithelium and glands of the visceral body systems. Lining epithelium and glands of digestive, respiratory, and parts of urogenital systems, thyroid and parathyroid glands, and thymus.

Formation of Placenta

As changes to the endometrium occur, cellular growth and the accumulation of glycogen cause fetal and maternal tissue to come together. This formation makes the functional unit called the placenta. The placenta does not mix blood between mother and fetus, but allows nutrients and waste products to diffuse between the two blood systems. The placenta provides protection by filtering out many harmful substances that the mother comes in contact with. The placenta cannot protect against some teratogens including but not limited to:

- Thalidomide
- Heroin
- Cocaine
- Aspirin
- Alcohol
- Chemicals in cigarette smoke
- Propecia, also known as Finasteride, which can cause birth defects simply by a woman handling a broken pill during pregnancy.

Amniotic Fluid

Attached to placenta is the membranous sac which surrounds and protects the embryo. This sac is called the amnion. It grows and begins to fill, mainly with water, around two weeks after fertilization. This liquid is called Amniotic fluid, it allows the fetus to move freely, without the walls of the uterus being too tight against its body. Buoyancy is also provided here for comfort. After a further 10 weeks the liquid contains proteins, carbohydrates, lipids and phospholipids, urea and electrolytes, all which aid in the growth of the fetus. In the late stages of gestation much of the amniotic fluid consists of fetal urine. The fetus swallows the fluid and then voids it to prepare its digestive organs for use after birth. The fetus also "breathes" the fluid to aid in lung growth and development.

Not enough amniotic fluid, or oligohydramnios, can be a concern during pregnancy. Oligohydramnios can be caused by infection, kidney dysfunction or malformation (since much of the late amniotic fluid volume is urine), procedures such as chorionic villus sampling (CVS), and preterm, premature rupture of membranes (PPROM). One possible outcome of oligohydramnios can cause is underdeveloped, or hypoplastic, lungs. This condition is potentially fatal and the baby can die shortly after birth. Babies with too little amniotic fluid can also develop contractures of the limbs, including clubbing of the feet and hands.

As with too little fluid, too much fluid or polyhydramnios, can be a cause or an indicator of problems for the mother and baby. Polyhydramnios is a predisposing risk factor for cord prolapse and is sometimes a side effect of a macrosomic pregnancy. In both cases, however, the majority of pregnancies proceed normally and the baby is born healthy.

Preterm, premature rupture of membranes (PPROM) is a condition where the amniotic sac leaks fluid before 38 weeks of gestation. This can be caused by a bacterial infection or by a defect in the structure of the amniotic sac, uterus, or cervix. In some cases the leak can spontaneously heal, but in most cases of PPROM, labor begins within 48 hours of membrane rupture. When this occurs, it is necessary that the mother receive



A small part of the placenta is shown at the bottom, while the fluid-filled amnion surrounds it

treatment immediately to postpone labor if the fetus is not viable, for as long as is safe, and for antibiotic treatments to avoid possible infection in the mother and baby. If rupture occurs too early in pregnancy little can be done to save the fetus.

A very rare and most often fatal obstetric complication is an amniotic fluid embolism, or leakage of amniotic fluid into the mothers vascular systems causing an allergic reaction. This allergic reaction results in cardiorespiratory (heart and lung) collapse, developing into a condition known as disseminated intravascular coagulation in which the mothers blood loses its ability to clot.

Amniotic band syndrome, or ABS, occurs when the inner fetal membrane (amnion) ruptures without injury to the outer membrane (chorion). Fibrous bands from the ruptured amnion float in the amniotic fluid and can entangle the fetus, reducing blood supply and causing congenital limb abnormalities dysmelia. In some cases a complete "natural" amputation of a digit(s) or limb may occur before birth or the digit(s) or limbs may be necrotic (dead) requiring surgical removal.

Endocrine Function of the Placenta

There are pituitary like hormones and steroid hormones secreted from the placenta. The pituitary like hormones are hCG and hCS. HCG is similar to LH and helps maintain the mothers corpus luteum. HCS is like prolactin and growth hormone and help aid in increasing fat breakdown that spares the use of glucose from the mothers tissues. This effect leaves more glucose available to the placenta and the fetus for necessary growth. The steroid hormones are progesterone and estrogen. Progesterone helps maintain the endometrium and supports the growth of mammary glands. Estrogen also helps maintain the endometrium and growth of mammary glands as well as inhibits prolactin secretion.

Developing Baby

The womb is expanding, the baby is growing and taking all the nourishment from the mother. What once started as a microscopic two-celled egg, will be formed into a baby in just twelve weeks. The baby develops from conception to term, in a month-to-month progress.

Overview of Developmental Milestones

WEEK	CHANGES IN MOTHER	DEVELOPMENT OF BABY
		Pre-embryonic Development
1 week	Ovulation Occurs	Fertilization occurs, cell division begins and continues, chorion appears
		Embryonic Development
2 weeks	Symptoms of early pregnancy (nausea, breast swelling and tenderness, fatigue); blood pregnancy tests may show positive	Implantation occurs; amnion and yolk sac appear; embryo has tissue; placenta begins to form
3 weeks	First period missed; urine pregnancy test may show positive; early pregnancy symptoms continue	Nervous system begins to develop; allantois and blood vessels are present and placenta is well formed
4 weeks		Limb buds form; heart is beating; nervous system further develops; embryo has tail; other systems are forming
5 weeks	Uterus is the size of a hen's egg; mother may need to urinate frequently	Embryo is curved, head is large, limb buds are showing division, nose, ears and eyes are noticeable
6 weeks	Uterus is the size of an orange	Fingers and toes are present and skeleton is cartilaginous
8 weeks	Uterus can be felt above the pubic bone	Fetus begins to look human; limbs are developing and major organs forming; facial features are becoming refined
		Fetal Development
12 weeks	Uterus is the size of a grapefruit	Head grows faster than the rest of the body; facial features are apparent, but there is no layer of fat yet and the skin is translucent; gender can be distinguished via ultrasound; fingernails appear
16 weeks	Fetal movement can be felt	Fine hair (lanugo) grows over the body; fetus resembles a tiny human being; skeleton is visible
20-22 weeks	Uterus reaches up to the level of umbilicus and pregnancy is obvious	Vernix caseosa, the protective fatty coating, begins to be deposited; heartbeat can be heard
24 weeks	Doctor can tell where baby's head, back and limbs are; breasts have enlarged and nipples and areola are darker, colostrum is produced	Fully formed but still thin; much larger and very active, all major organs are working, the lungs and digestive system need more time to develop; body is covered in fine hair called lanugo
32 weeks	Uterus reaches halfway between umbilicus and rib cage	Most babies are in a head down position in the womb; head is more in proportion to the body; eyes are open; babies born at this stage have a good chance of living
36 weeks	Weight gain is averaging about a pound a week; standing and walking are becoming very difficult because the center of gravity is thrown forward	Body hair begins to disappear, fat is being deposited
40 weeks	Uterus is up to the rib cage, causing shortness of breath and heartburn; sleeping is very difficult	Not much room to move in the womb; fully mature, baby moves less, and the surrounding fluid reduces and the womb expands its limits

Embryonic Development at Specific Stages

First trimester

4 Weeks

- There are only the beginnings of facial features. All the major organs are starting to form. Gill-like folds that develop into facial features, beginnings of the spinal cord, skin is translucent, and rudimentary (basic; minimal) heart develops.

6 Weeks

- The length from crown to rump is about the size of a finger tip, $\frac{3}{4}$ ". The beginnings of all the major organs will have formed.
- The embryo floats in a fluid filled bubble that will develop into the amniotic sac. The sac is covered by a protective layer of cells, called chorion. The yolk sac supplies the embryo with all its nutrients until the placenta is fully developed and takes over at around the twelfth week. During the first 12 weeks, the embryo will develop features and major organs of a human being. The embryo is susceptible to harmful environmental influences. This is a vital time for the embryo to develop healthily; taking supplements of folic acid, avoiding certain foods, and eliminating alcohol, cigarettes, and any unnecessary drugs or medicines.



An embryo this tiny shows very distinct anatomic features, including tail, limb buds, heart (which actually protrudes from the chest), eye cups, cornea/lens, brain, and prominent segmentation into somites. The gestational sac is surrounded by a myriad of chorionic villi resembling elongate party balloons. This embryo is about five weeks old (or seven weeks in the biologically misleading but eminently practical dating system used in obstetrics).

9 Weeks

- The length from crown to rump approximately 1 $\frac{1}{4}$ ". The facial features are becoming more distinct, and the "tail" has disappeared. The muscles are also developing. Eyes are formed but eyelids are still closed over them. Arms now bend at the elbow and rudimentary hands and fingers develop. Knees will have formed and developing feet with distinct toes.
- Heart- is now a four-chambered and fully formed organ; it beats about 180 times per minute.
- Brain and nervous system- is four times the size it was at 6 weeks. Special glial cells are being formed within the neural tube; they allow nerve cells to be joined so that messages can be transmitted from the brain to the body.
- Digestive system- the mouth, intestine, and stomach are developing very rapidly, but do not function yet.
- The fetal life-support system- the placental tissue that initially surrounds the fetus and the amniotic sac is becoming concentrated in one circular area on the womb wall to form the placenta.

12 Weeks

- At twelve weeks the fetus looks like a tiny human. It is about 2 $\frac{1}{2}$ " long and weighs $\frac{1}{2}$ oz. Arms and legs are now beginning to move. Skin is red and translucent. Fingers and toes are more defined, and nails are starting to grow.
- Heart is complete and working, pumping blood to all parts of the body. Digestive system has formed and is linked to the mouth and intestines. Sexual organs have formed inside the body, but cannot yet establish the sex of the baby.



Sonogram of a fetus at 14 weeks
(Profile)

Second Trimester

20 Weeks

- By 20 weeks the fetus will be about 6 1/3" long and weighs 12 oz. Movements are for more coordinated. The sexual organs are well developed and are usually visible on ultra sound.
- The fetus is growing very quickly. At this stage, the mother should feel the movements of the fetus. Movements are more noticeable as the fetus's leg bones achieve their final relative proportions in a process called *quickening*. Quickening is the process of muscles contracting that cause movement at the fetus's synovial joints. The joint movement enhances the nutrition of the articular cartilage and prevents the fusion of connective tissues within the joint. It also promotes bone hardening.
- From now on, the fully developed placenta will provide all the fetus' needs until birth; oxygen, nutrients and protective

antibodies.

Third Trimester

29 Weeks

- By 29 weeks the baby is about 10" long and weighs about 2 lbs. 7 oz.
- The brain grows much larger, and fatty protective sheath covers the nerve fibers; this important development allows brain impulses to travel faster, enhancing the ability to learn. The lungs have developed most of their airways and air sacs. The placenta is quite selective in what it allows to pass from the mother to the baby's blood, stopping some harmful substances, such as certain drugs, from crossing over.



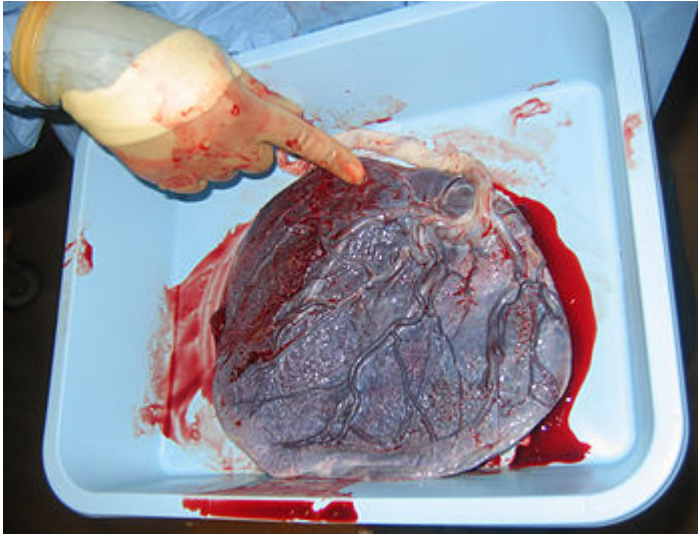
Fetus at 29 weeks gestation in 3D

40 Weeks

- The baby is now ready to be born. When the head of the baby moves down from high in the mother's abdomen and settles deeper into her pelvis in preparation for birth, it is called engagement. This can happen any time between 36 weeks and labor.
- In the last four weeks of pregnancy the baby puts on a lot of weight and develops a thick layer of fat. All organs are completely formed and functioning.

Umbilical Cord

This is the life support for a growing embryo. The umbilical cord stretches between the placenta and the fetus. This cord contains the umbilical arteries and vein. The umbilical cord forms by week 5 of conception. The average cord is close to 22 inches long and may have the appearance of a coil. The umbilical cord is very rich in stem cells and is often used for parents who choose to store their stem cells in a blood bank or donate it to a blood bank. These stem cells can be used to treat over 45 disorders and is an alternative from extracting the stem cells from a donor.



Human placenta shown a few minutes after birth. The side shown faces the baby with the umbilical cord top right. The unseen side connects to the uterine wall. The white fringe surrounding the bottom is the remnants of the amniotic sac. You can see the differences in the umbilical vein and arteries.

Umbilical Arteries

The exchange of gases, nutrients and oxygen takes place between the maternal blood and fetal blood. There are 2 main arteries.

■ *Umbilical Vein*

Vein that carries nutrients and oxygen away from the placenta to the growing fetus. It also carries oxygen and nutrient rich blood. There is only 1 main vein.

- Fetus doesn't use its lungs for gas exchange, only a small amount of blood is pumped to fetal lungs in order to support their development.

Umbilical Abnormalities

■ *Single Umbilical Artery*

One artery instead of two will result in chromosomal abnormalities. Some of these defects include poor fetal growth, preterm delivery, and still births. This can be detected by a routine ultrasound. If an ultrasound is done and no other complications or abnormalities are detected, the baby will usually be born healthy.

■ *Umbilical Prolapse*

This condition usually happens when a cord is too long. The baby may be born prematurely or will be breech.

■ *Umbilical Nuchal Loops*

This condition happens when the umbilical cord is wrapped around the baby's head at least one or more times. This can be detected when a baby is in stress or by a simple ultrasound. In most cases the mother will have a cesarean delivery. In other cases the cord may be wrapped around the hands or feet.

■ *Vasa Previa*

This occurs in one in every 3,000 births, which can become life threatening for the unborn baby. This complication happens when the umbilical cord inserts abnormally in the fetal membranes of the placenta, which appears abnormally shaped or positioned. Major risks include unprotected fetal blood vessels cross the cervix, oftentimes rupturing the membranes. Also, lack of blood pressure due from pressure, causes the loss of oxygen to the baby. Women who will be at risk for this would be those who already have experienced placenta previa or have used in vitro fertilization.

■ *Umbilical Cord Knots*

About 1% of babies are born with one or more knots in their umbilical cord. Some knots happen during labor; others happen from moving around in the womb. Most knots occur when the umbilical cord is too long. In some cases the knots can become tight, cutting off the oxygen supply to the baby. Cord knots result in miscarriages and stillbirth in 5% and 10% of most cases. Most will require a cesarean delivery.

■ Umbilical Clotting

This is more common with genetic defects, such as Factor V Leiden. This complication will prevent blood flow to and from the baby and many times will cause the placenta to also clot and die. If this is not caught early enough, the baby will die of starvation in the womb. A simple ultrasound can determine if there are problems with the blood flow.

Pregnancy from the mother's perspective

An initial sign of pregnancy is amenorrhea, or the absence of menstruation. Menses cease because the blastocyte begins the release of hCG or human chorionic gonadotropin. Most pregnancy tests are specifically designed to recognize the presence of hCG, and hCG levels can be tested through the mother's blood to learn whether or not a pregnancy is progressing normally.

Human pregnancy lasts approximately 40 weeks from the time of the last menstrual cycle to childbirth (38 weeks from fertilization). The medical term for a pregnant woman is *gestational*, just as the medical term for the potential baby is *embryo* (early weeks) and then *fetus* (until birth). A woman who is pregnant for the first time is known as a *primigravida* or *gravida 1*; a woman who has never been pregnant is known as a *gravida 0*; similarly, the terms *para 0*, *para 1* and so on are used for the number of times a woman has given birth.

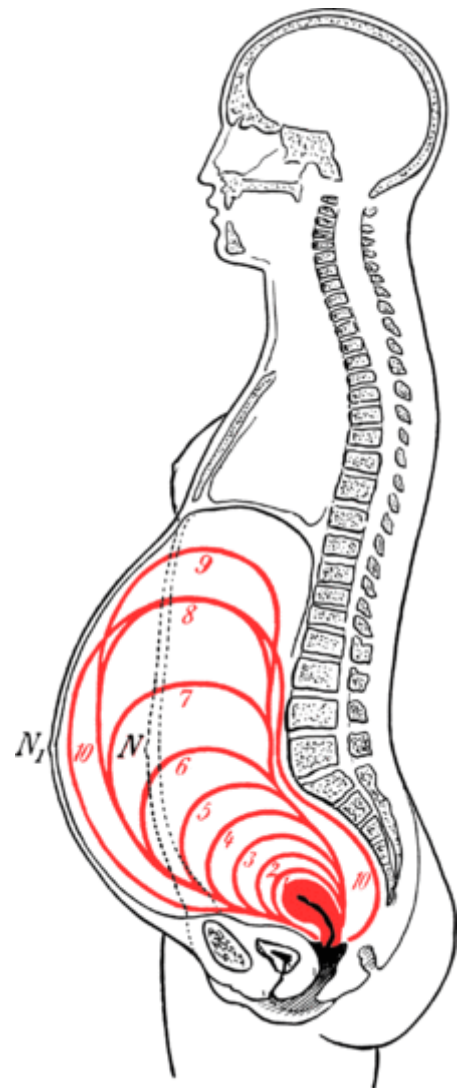
In many societies' medical and legal definitions, human pregnancy is somewhat arbitrarily divided into three trimester periods, as a means to simplify reference to the different stages of fetal development. The first trimester period carries the highest risk of miscarriage (spontaneous death of embryo or fetus). During the second trimester the development of the fetus can start to be monitored and diagnosed. The third trimester marks the beginning of viability, which means the fetus might survive if an early birth occurs.

Changing Body

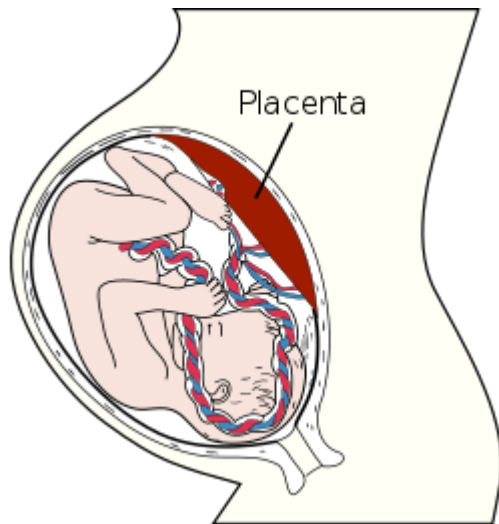
As soon as a woman becomes pregnant, her body begins to change so that it can support both herself and the unborn baby. All of the body functions start to work much harder. The heart has to pump more blood around the body, in particular to the womb, placenta, and the fetus. As well as physical demands, pregnancy also causes a range of emotional reactions.

- The first trimester, the first twelve weeks, little is visible.
- The second trimester, 13-27 Weeks, the waistline is rapidly growing, the abdomen becomes noticeably pregnant.
- The third trimester, 28-40 weeks, the body expands rapidly and the womb enlarges and presses against the diaphragm.

First Trimester



Growth of the uterus in a pregnant female.



(38 weeks) A fully developed fetus in the mother's abdomen

In the early weeks the mother is likely to be more tired. As the uterus begins to grow, the "bump" becomes noticeable. This is a good time to start looking into options on birthing and doctors.

- Physical feelings: tiredness, nausea, constipation, frequent urination, food cravings, change in size of breasts, fainting or dizziness, bloated stomach, and high emotions.

Second Trimester

The mother will probably be feeling full of energy and excitement.

- Physical feelings: More energy, constipation, heartburn, and indigestion. The breasts continue to grow, as does an increase in appetite. There is mild swelling in the feet, ankles, hands, and face. There is also more baby

movement. There may be emotional ups and downs in the feeling of pregnancy, and short-term memory may be poor.

- The hormones estrogen, progesterone, human placental lactogen, oxytocin, and prolactin prepare the body for feeding the baby, and cause the breasts to enlarge, becoming painful and tender.
- The fetus, placenta, and amniotic fluid account for just over a third of the weight gain during pregnancy. The remaining weight comes from increased blood volume, fluid retention, and extra body fat. The suggested weight gain in most pregnancies is between 25-40 lbs.

Third Trimester

Physical feelings

Shortness of breath, tiredness, difficulty in moving and sleeping, and frequent urination. The emotional mood swings ease off, but the mother begins to feel less enthusiastic about being pregnant. She may become impatient and restless and just wants for the birth to be over.

- The body is changing to cope with the ever increasing size of the womb. The baby grows and pushes out the lower back of the mother. The breathing rate of the baby is growing very quickly. At this stage, the mother should feel the movements of the fetus. Other signs may be the nipples secreting colostrum, Braxton-Hicks' contractions may begin, and blood flow to the womb has increased tenfold since conception.

Prenatal Care

Once the female confirms her pregnancy, she will need to find out her physical condition and what to expect in the coming months. Women typically begin pre-natal care at approximately 8-10 weeks gestation, and pregnancy care should continue until approximately 6 weeks postpartum. The main purpose of the prenatal visits is to perform preventative medicine. Most complications in pregnancy are best treated if they are caught early on. A series of tests will be performed throughout the pregnancy to judge the mother and fetus' well-being including:

- Mother's history

- Urine tests for glucose, protein, and infection
- The mother's weight
- Blood tests such as a complete blood count, HIV test, or the triple screen which is test used most commonly to look for neural tube defects and Down's Syndrome.
- Physical examination
- Blood pressure
- Fetal heart monitoring
- Ultrasound scans
- Non-stress tests

Continuous care is the best way to ensure a healthy mother and baby.

Labor and Birth

Labor is defined as contractions *and* cervical change, contractions alone are not labor.

- Pre-Labor Signs: as your body is preparing for labor, there are a few things that should be expected to happen within four to six weeks of labor.
 1. Pressure on the pelvic area
 2. Occasional brownish discharge
 3. Energy level is noticeably increasing or decreasing
 4. Loss of the mucus plug (does not always exist)/increasing discharge
 5. Braxton Hicks contractions (painless contraction of the uterus)
 6. Movement of the baby into the pelvis
- False Labor Signs: there are a few signs that indicate false labor.
 1. Timing of the contractions are irregular and do not become more frequent or more intense
 2. Contractions stop during rest, stopping what the mother is doing, walking, or changing position
 3. Inconsistent in strength (strong one minute then weak the next)
 4. Location of pain is in the front only
- True Labor
 1. Pain in the lower back, radiating towards the front abdomen, possibly also the legs
 2. Contractions increase in strength and are closer together; coming now on a regular basis, 30 to 70 seconds apart
 3. The mucous plug is detached, showing bloody discharge
 4. The water breaks (usually this does not break until the doctor does it), when this happens, contractions become much stronger
 5. Some women have the sudden need to go to the bathroom, diarrhea is common
 6. Contractions continue despite movement
 7. The cervix is thinning and dilating

When the contractions of labor begin, the walls of the uterus start to contract. They are stimulated by the release of the pituitary hormone *oxytocin*. The contractions cause the cervix to widen and begin to open. As labor progresses the amniotic sac can rupture causing a slow or a fast gush of fluids. Labor usually begins within a 24 hour period after the amniotic sac has ruptured. As contractions become closer and stronger the cervix will gradually start to dilate. The first stage of labor is broken into three parts:

- **Early Phase** First is the early phase of labor, when the cervix dilates from 1-4 centimeters, this can be the longest and most exhausting part for the mother.
- **Active Phase** The cervix dilates on average 1 cm per hour in the active phase of labor dilating from 4-7 centimeters. If an epidural is requested it is usually given in this phase.
- **Transition** This is often considered the most intense part of labor with contractions lasting longer and having shorter rest periods in between them. Dilation from 8-10 centimeters occurs during transition. Some women experience nausea and vomiting during this phase as well as rectal pressure and an urge to push.

At this point the labor enters the second stage, or the birth of the baby. The mother begins pushing to aid in the birth of the baby, this part of labor can last minutes, or even hours. A fetus usually delivered head first. 'Crowning' is the term used when the fetus' head can be seen between the mothers labia as it emerges. At this point if necessary the birth attendant may perform an episiotomy, which is a small surgical incision on the perineum. This procedure is usually done to deliver the baby more quickly in response to fetal distress.

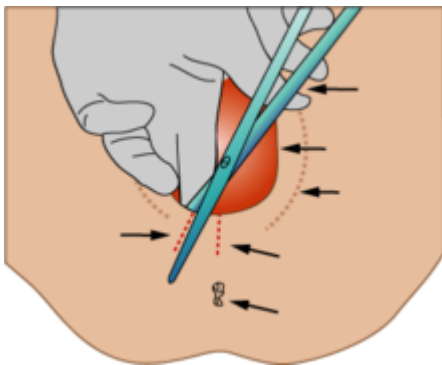


Diagram showing an episiotomie

The third stage of labor is the delivery of the afterbirth (placenta).

Oxytocin continues to be released to shrink the size of the uterus and aid in the limiting of blood loss from the site of the placenta. As the uterus shrinks the attachment site blood vessels, some of which can be as large as an adult finger, shrink also. The average blood loss in a routine vaginal delivery is 400-500 cc.

There are times when a mother may need outside aid in the delivery of the baby, some of these methods include:

- **Forceps**, an instrument used to cradle the fetus' head and manipulate the head under the pubic bone to more easily pass through the birth canal.
- **Vacuum Extraction**, a suction cup is applied to the baby's head, and a plunger is used to suck any air from between the suction cup and the head to create a good seal. The babies head is then manipulated through the birth canal. This usually leaves a baby's head bruised, but the mark fades within weeks after birth.



C-section Birth

- Cesarean section, or C-section, is the delivery of a baby through a surgical abdominal incision (Abdominal delivery - Abdominal birth - Cesarean section). A C-section delivery is performed when a vaginal birth is not possible or is not safe for the mother or child. Surgery is usually done while the woman is awake but anesthetized from the chest to the legs by epidural or spinal anesthesia. An incision is made across the abdomen just above the pubic area. The uterus is opened, and often brought through the incision after delivery for better visualization. The amniotic fluid is drained, and the baby is delivered. The baby's mouth and nose are cleared of fluids, and the umbilical cord is clamped and cut. After delivery a nursery nurse or pediatrician check the make sure that the baby is breathing and responding. Due to a variety of medical and social factors, C-sections have become fairly common; around 25% of births are performed by C-section. C-sections carry some risks to mother and baby. Compared to a vaginal birth, the risks to mother include increased risk of death, surgical injury, infection, postpartum depression, and hemorrhage, although these are rare. Babies born by c-section are more likely to be admitted to the ICU for breathing problems. Mothers are advised to carefully weigh the risks of C-section versus vaginal birth.

Delivery Options

Hospital Births

The chances of having natural, uncomplicated birth are optimized by carefully selecting your obstetrician and hospital. Doctors who work with midwives have lower cesarean section rates because midwives handle less complicated pregnancies. Delivering babies by abdominal surgery has been steadily rising in America over the past two decades, so that now 22-30% of births in American hospitals are cesarean section. The U.S., despite having the most advanced technology and highly trained medical personnel, ranks 23rd in infant mortality and 18th in perinatal mortality.

Medical interventions such as epidural anesthesia, pitocin augmentation of labor, vacuum extraction of fetus, episiotomy and separation of newborn and mother are common in American hospitals. There are circumstances where medical procedures such as these are necessary, but many parents and professionals now question the routine use of such interventions. In some cases, the routine use of these procedures have lead to further complications. For example, the epidural anesthetic, while providing pain relief, has shown to increase the operative vaginal delivery rate (i.e. forceps and vacuum extraction rates slightly) especially in first time mothers. Epidurals have not been shown to increase the cesarean section rate in recent well documented studies.



Newborn baby

Freestanding Birth Centers & Water Birth

"Freestanding" Birth Centers are not inside of or affiliated with a hospital. They are run by collaboration of midwives or physicians. This is an alternative choice for the woman who does not wish to birth in a hospital environment yet is not comfortable giving birth at home. Birth centers do not provide any additional measure of safety than most planned home births with qualified midwives; they may provide the expectant couple with the physiological comfort necessary to enable the mother to relax.

Out of hospital birth centers are designed for women having low-risk pregnancies who want drug-free birth with minimal intervention in a home-like environment. Family members may participate in the birth. C-sections rates are lower than most hospitals because the

pregnancies are low risk. Freestanding Birth Centers are an alternative choice for a woman who has had a previous cesarean and wishes to maximize her chances of a vaginal delivery. However, vaginal birth attempts after a prior cesarean section have a 1-2% risk of uterine rupture. Health insurance may cover costs. Many birth centers offer birthing tubs where one can give birth in water.

Homebirth

Birth at home provides parents with intimacy, privacy, comfort and family-centered experience. Childbirth at home may be a safe option for healthy women having normal pregnancies. It is for those who have a very strong desire for natural childbirth and who are willing to take high degree of responsibility for their health care and baby's birth. At home, the parents and midwife are in control of the birthing environment, and strict time perimeters for length of labor are not imposed, or routine medical interventions such as IVs done. However, the World Health Organization (WHO) states that "giving birth in a health facility (not necessarily a hospital) with professional staff is safer by far than doing so at home." (The World Health Report 2005). Also, the American College of Obstetricians and Gynecologists (ACOG) opposes out of hospital births. In choosing the comfort of home parents are also choosing to be further away from lifesaving measures should complications arise.

Homebirth midwives provide complete prenatal care including monthly visits, laboratory tests, screening for infections. They provide nutritional counseling and support for psycho-social issues. There is a chance that a rare, but critical emergency might occur during the birth where hospital services may not be able to be obtained quick enough. Again, the WHO states that "it is just before, during, and in the very first hours and days after birth that life is most at risk," (The World Health Report 2005) and that "many of the complications that result in maternal deaths and many that contribute to perinatal deaths are unpredictable, and their onset can be both sudden and severe." (WHO Birth and Emergency Preparedness in Antenatal Care, 2006) Home birth midwives are trained to know when an emergency requires medical interface and can provide stabilizing measures until critical care can be obtained. While homebirth midwives generally have the training, equipment, and medicine to handle many complications, there is great variation in training and skill level among midwives. In choosing a homebirth midwife one should carefully examine credentials and training.

Postpartum care

After the baby is born the umbilical cord is clamped and cut and the baby is looked over by a doctor or nurse. The baby is given an APGAR score at one and five minutes after birth. This is an analysis of how well the baby is performing its vital functions.

The five criteria of the Apgar score:

	Score of 0	Score of 1	Score of 2	Acronym
Skin color	blue all over	blue at extremities	normal	Appearance
Heart rate	absent	<100	>100	Pulse
Reflex irritability	no response to stimulation	grimace/feeble cry when stimulated	sneeze/cough/pulls away when stimulated	Grimace
Muscle tone	none	some flexion	active movement	Activity
Respiration	absent	weak or irregular	strong	Respiration



A newborn with umbilical cord still attached (3 minutes.)

If tearing, or an episiotomy occurs the wound is closed with absorbable suture. The mother is closely watched for blood loss, infection, or any other possible complications. Breastfeeding should be initiated as soon as possible after delivery as the stimulation of oxytocin in the mother aids in hemostasis.

Risks in Pregnancy

Pregnancies that warrant close attention usually come from an existing medical condition such as asthma, diabetes, epilepsy, or a condition developed because of pregnancy. Conditions that arise during pregnancy will require special treatment. The purpose of prenatal care is to detect these conditions, and to monitor and deal with them before they become serious.

- **Preeclampsia** is the medical term for high blood pressure during pregnancy. It is also characterized by edema, blurry vision, liver pain, and can progress into Eclampsia in which the mother can experience seizures, coma or even death.
- **Gestational Diabetes** is diabetes mellitus that develops during pregnancy. All women should be tested for the condition at about 28 weeks gestation. Gestational and pre-existing diabetes can cause large for gestational age babies, a sudden drop in a neonates blood sugar after birth, and has a high risk for stillbirth

Other serious risks include:

- **Teratogens** (substances that cause birth defects including alcohol and certain prescription and recreational drugs)
- **Infection** (such as rubella or cytomegalovirus) An infection in the eleventh week is less likely to damage the heart, but the baby may be born deaf.
- **Genetics** (such as Factor V Leiden) Diabetes, blood conditions, etc.
- **Radiation** (ionizing radiation such as X-rays, radiation therapy, or accidental exposure to radiation)
- **Nutritional deficiencies**
- **Fetal Alcohol Syndrome** or **FAS** exposure is the leading known cause of mental retardation in the Western world. It is a disorder of permanent birth defects that occurs in the offspring of women who drink alcohol during pregnancy, depending on the amount, frequency, and timing of alcohol consumption. Alcohol crosses the placental barrier and can stunt fetal growth or weight, create distinctive facial stigmata, damage neurons and brain structures, and cause other physical, mental, or behavioral problems. Drinking during pregnancy should be avoided. Women who drink more than 4 or 5 drinks per day may cause permanent damage to their fetus, including, behavioral problems, sight and hearing loss, deformed organs and central nervous system dysfunction.
- **Smoking** can cause low birth weight, still birth, birth defects, preterm births and immature lung development. It can also contribute to addiction in the child's later teen years.

- **Illegal Drugs** can be the most devastating. Risks include SIDS (Sudden Infants Death Syndrome), learning disorders, birth defects, uncontrollable trembling, hyperactive, and drug dependency. Most drugs can be tested by a simple urine or blood test.
- **Medications.** All medication use should be discussed with your doctor. Many over the counter and prescription drugs have warning labels. Follow these precautions to help avoid birth defects or other related problems.

Miscarriage

Miscarriage or spontaneous abortion is the natural or spontaneous end of a pregnancy at a stage where the embryo or the fetus is incapable of surviving, generally defined in humans at a gestation of prior to 20 weeks. Miscarriages are the most common complication of pregnancy. Basic Facts: 15-20% of pregnancies end in miscarriage, 70% of the time there is a chromosomal abnormality with the fetus, and one miscarriage does not increase your risk in the next pregnancy. Miscarriage is almost never the mother's fault.

If the products of conception are not completely expelled after fetal death this is known as a missed abortion and is usually treated surgically by a procedure known as a D&C or dilation and curettage.

Bleeding During Pregnancy

Vaginal bleeding at any stage should be taken seriously. Severe bleeding in the early weeks may be a sign of miscarriage. However, 25% of pregnant patient bleed in the first trimester. After 24 weeks the mother should seek medical advice immediately. Third trimester bleeding in pregnancy is often one of the first signs of placenta previa; placenta is across the opening of the cervix. An ultrasound should be performed to establish the location. Other causes of late term bleeding include:

- **Preterm Labor** or labor that occurs before 38 weeks gestation that can have multiple causes
- **Placental Abruption** is a condition in which the placenta is torn away from the uterine wall causing loss of oxygen and nutrients to the baby, and hemorrhage of mother and baby from the large blood vessels in the placenta. Most women, but not all experience heavy bleeding and abdominal pain. This is a life threatening emergency as a fetus can only survive as long as 50% of the placenta is still attached.

Blood Conditions

Individuals either have, or do not have, the Rhesus factor (or Rh D antigen) on the surface of their red blood cells. This is usually indicated by 'RhD positive' (does have the RhD antigen) or 'RhD negative' (does not have the antigen) suffix to the ABO blood type i.e. A+ B- blood typing. This is a problem only when an Rh-negative woman has a partner who is Rh-positive resulting in an Rh-positive baby. If the mother's and the baby's blood come into contact during the birth, her body produces antibodies against the baby's blood. This problem usually does not affect the current pregnancy but can be dangerous for future pregnancies as the antibodies stay in the blood causing an immune response against future Rh+ fetus. In essence the mother's body "rejects" the fetus as it would a foreign body. A drug called Rhogam is now given by injection given at 28-30 weeks gestation and given again if there is confirmation that the baby is Rh positive within 24 hours after birth to protect the future pregnancies. Rh isoimmunization is rare in our day. Rh- mothers should also be given the injection after miscarriage or abortion.

If a mother is untreated they are at risk to subsequently deliver babies who suffer from hemolytic disease of the newborn. Hemolytic disease of the newborn, also known as HDN, is an alloimmune condition that develops in a fetus, when the IgG antibodies that have been produced by the mother and have passed through the placenta include ones which attack the red blood cells in the fetal circulation. The red cells are broken down and the fetus can develop reticulocytosis and anemia. This fetal disease ranges from mild to very severe, and fetal death from heart failure (hydrops fetalis) can occur. When the disease is moderate or severe, many erythroblasts are present in the fetal blood and so these forms of the disease can be called erythroblastosis fetalis (or erythroblastosis foetalis). Hemolysis leads to elevated bilirubin levels. After delivery bilirubin is no longer cleared (via the placenta) from the neonate's blood and the symptoms of jaundice (yellowish skin and yellow discoloration of the whites of the eyes) increase within 24 hours after birth. Like any other severe neonatal jaundice, there is the possibility of acute or chronic kernicterus. Profound anemia can cause high-output heart failure, with pallor, enlarged liver and/or spleen, generalized swelling, and respiratory distress. The prenatal manifestations are known as hydrops fetalis; in severe forms this can include petechiae and purpura. The infant may be stillborn or die shortly after birth.

Other Abnormalities

Physical and Genetic Defects: Physical anomalies are present at birth. Examples are; cardiac, facial (such as cleft palate), club foot, etc. These do not always endanger the baby's life. 1-2% of babies are born with a significant congenital abnormality. 4-6% with something relatively minor.

- **Chromosomal Abnormalities:** Occur when there is a problem in the baby's genetic makeup; these include conditions such as Down syndrome. Other genetic defects, such as cystic fibrosis, can be inherited from the parents.

Staying Healthy

Pregnancy and childbirth place great demands, it is important to keep healthy. The more healthy and relaxed the mother is, the better it will be to cope with the demands of pregnancy. A healthy lifestyle combines many factors:

Balanced Diet

A poor diet can cause a low birth weight. Excessive weight gain during pregnancy can cause back problems, varicose veins, or indicate preclampsia. Advice on diet often includes to eat foods that are high in nutritional content. Sufficient protein, vitamins, carbohydrates, fats, and minerals, as well as fiber. Limit intake of saturated fats and sugar, and salt. Drink plenty of fluids.

Regular Exercise

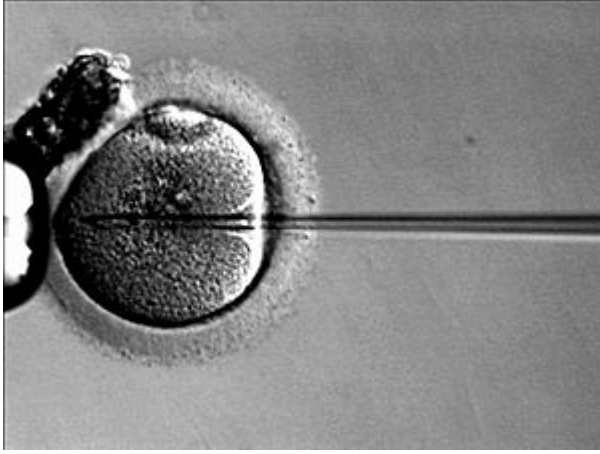
Mild exercise, such as walking or swimming, is beneficial and will help cope with the workload of pregnancy and the demands of labor. Mother's should listen to her body and stop exercising when it tells her to. Exercise should never be painful.

Baby's Health

Smoking reduces the oxygen and nutrients passing via the placenta to the baby. Avoid alcohol to avoid serious birth defects.

In vitro Fertilization and Artificial Implantation

An alternative when other methods of achieving contraception have failed.



Oocyte is injected with sperm outside of the womb.

In vitro fertilization (IVF) is a technique in which egg cells are fertilized by sperm outside the woman's womb. IVF is a major treatment in infertility when other methods of achieving conception have failed. The process involves hormonally controlling the ovulatory process, removing ova (eggs) from the woman's ovaries and letting sperm fertilize them in a fluid medium. The fertilized egg (zygote) is then transferred to the patient's uterus with the intent to establish a successful pregnancy.

The term *in vitro*, from the Latin root, is used, because early biological experiments involving cultivation of tissues outside the living organism from which they came, were carried out in glass containers such as beakers, test tubes, or petri dishes.

While the overall live birth rate via IVF in the U.S. is about 27% per cycle (33% pregnancy rate), the chances of a successful pregnancy via IVF vary widely based on the age of the woman (or, more precisely, on the age of the eggs involved). Where the woman's own eggs are used as opposed to those of a donor, for women under 35, the pregnancy rate is commonly approximately 43% per cycle (37% live birth), while for women over 40, the rate falls drastically - to only 4% for women over 42. Other factors that determine success rates include the quality of the eggs and sperm, the duration of the infertility, the health of the uterus, and the medical expertise. It is a common practice for IVF programmes to boost the pregnancy rate by placing multiple embryos during embryo transfer. A flip side of this practice is a higher risk of multiple pregnancy, itself associated with obstetric complications.

Embryo cryopreservation If multiple embryos are generated, patients may choose to freeze embryos that are not transferred. Those embryos are placed in liquid nitrogen and can be preserved for a long time. There are currently 500,000 frozen embryos in the United States. The advantage is that patients who fail to conceive may become pregnant using such embryos without having to go through a full IVF cycle. Or, if pregnancy occurred, they could return later for another pregnancy.

Embryonic stem cells

Embryonic cell lines (ES cell lines) are cultures of cells derived from the epiblast tissue of the inner cell mass (ICM) of a blastocyst. A blastocyst is an early stage embryo - approximately 4 to 5 days old in humans and consisting of 50-150 cells. ES cells are *pluripotent*, and give rise during development to all derivatives of the three primary germ layers: ectoderm, endoderm and mesoderm. In other words, they can develop into each of the more than 200 cell types of the adult body when given sufficient and necessary stimulation for a specific cell type. They do not contribute to the extra-embryonic membranes or the placenta. This means they can become any kind of human tissue (ie. heart tissue, nerve tissue, etc.).

When given no stimuli for differentiation, ES cells will continue to divide *in vitro* and each daughter cell will remain pluripotent. The pluripotency of ES cells has been rigorously demonstrated *in vitro* and *in vivo*, thus they can be indeed classified as stem cells.

Because of their unique combined abilities of unlimited expansion and pluripotency, embryonic stem cells are a potential source for regenerative medicine and tissue replacement after injury or disease. To date, no approved medical treatments have been derived from embryonic stem cell research. This is not surprising considering that many nations currently have moratoria (suspension of practices) on either ES cell research or the production of new ES cell lines.

There exists a widespread controversy over stem cell research that emanates from the techniques used in the creation and usage of stem cells. Embryonic stem cell research is particularly controversial because, with the present state of technology, starting a stem cell line requires the destruction of a human embryo and/or therapeutic cloning. Opponents of the research argue that this practice is a slippery slope to reproductive cloning and tantamount to the instrumentalization of a human being. Contrarily, some medical researchers in the field argue that it is necessary to pursue embryonic stem cell research because the resultant technologies are

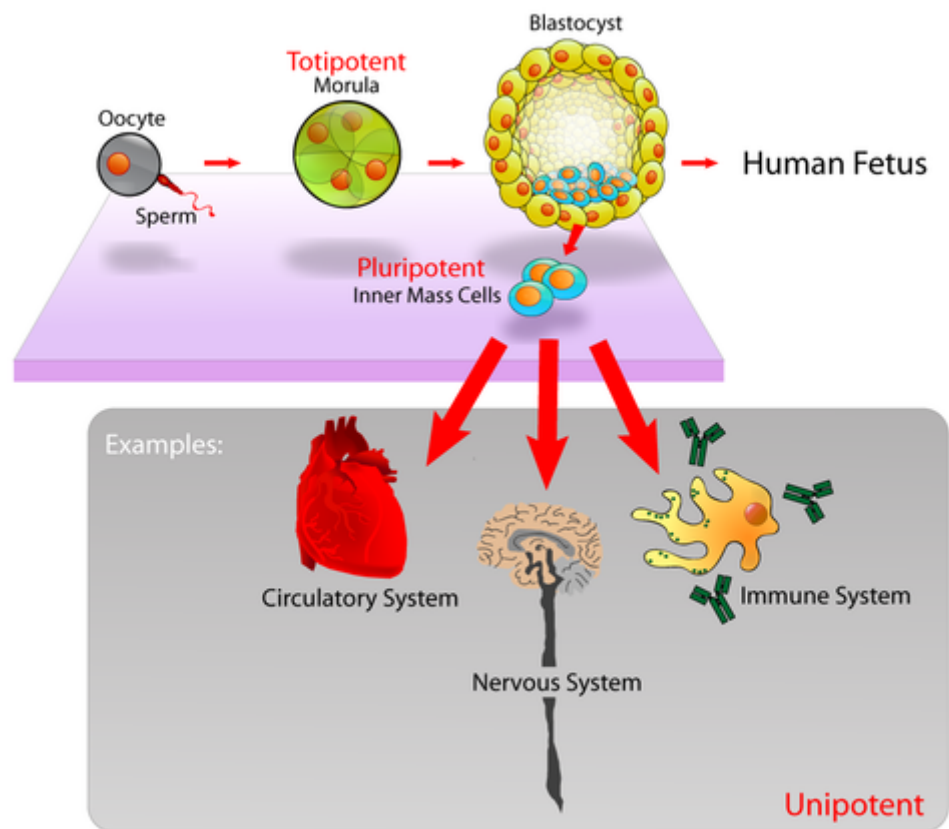
expected to have significant medical potential, and that the embryos used for research are only those meant for destruction anyway (as a product of in vitro fertilization). This in turn, conflicts with opponents in the pro-life movement, who argue that an embryo is a human being and therefore entitled to dignity even if legally slated for destruction. The ensuing debate has prompted authorities around the world to seek regulatory frameworks and highlighted the fact that stem cell research represents a social and ethical challenge.

■ Reproductive Cloning

Reproductive Cloning is a technology used to generate an animal that contains the same nuclear DNA as another currently or previously existing animal. Scientists transfer the genetic material from the nucleus of a donor adult cell to an egg whose nucleus, and thus its genetic material has been removed. The egg containing the DNA, now reconstructed, has to be treated with chemicals or electric current in order to stimulate cell division. Once the cloned embryo reaches a suitable stage, it is transferred to the uterus of a female host to continue development until birth. Currently this is illegal to practice in the United States.

■ Therapeutic Cloning

Recent research by researchers led by Anthony Atala of Wake Forest University and a team from Harvard University has found that amniotic fluid, in addition to its main functions of cushioning a growing fetus and providing buoyancy, is also a plentiful source of non-embryonic stem cells. These cells have demonstrated the ability to differentiate into a number of different cell-types, including brain, liver and bone.



Pluripotent, embryonic stem cells originate as inner mass cells within a blastocyst. The stem cells can become any tissue in the body, excluding a placenta. Only the morula's cells are totipotent, able to become all tissues and a placenta.

Therapeutic Cloning refers to a procedure that allows the cloning of specific body parts and organs to be used for medical purposes. Although this has not been realized, much research is being done on the subject.

Pregnancy and Lactation

A mother's milk is ideal because it meets the baby's specific needs. Lactation is a neuroendocrine response in *milk production*. Sucking stimulates the sensory nerve endings in the nipples and sends stimulus to the hypothalamus. The hypothalamus stimulates anterior pituitary and prolactin is released. In *milk let-down* the sucking stimulates sensory nerves in the nipples. This stimulates the hypothalamus which then stimulates the posterior pituitary and releases oxytocin. Sucking also stimulates contraction of the cells around the alveoli in the mammary cells. Milk then flows into the milk ducts causing milk let-down.

Breast milk provides all the nutrients required for the first 4-6 months. It contains carbohydrates (such as lactose), fats (such as linoleic acid), and easily digestible proteins (such as alpha-lactalbumin). Breast milk also contains an adequate supply of vitamins and minerals, digestive enzymes, hormones and immunological factors.

The first milk produced after birth is called *colostrum*. This is synthesized during the end of pregnancy and 3-5 days of postpartum. It is very high in protein and low in fat and carbohydrates, and contains immunoglobulins. This help the baby have a first bowel movement and prevent jaundice. The bowel movement that results from the colostrum is a different color and consistency than future bowel movements once the mother's milk comes in. In some cultures the colostrum is discarded because of the difference, but what they do not know is that it is the best thing for the baby.

The composition varies in breast milk during feeding, and over time with development of the baby. When breastfeeding there are three names for the composition of the milk: the fore milk, present during the beginning of breastfeeding; mid is the middle of feeding; and hind which is toward the end of the feeding and contains a composition high in fat.

When breastfeeding the female should consider the types of food that will be consumed. If the mother is on a low fat diet or if foods like garlic, broccoli, and onions are eaten, it may affect the baby's preference for breast feeding. Also, the mother should consider not breastfeeding after the consumption of alcohol, caffeine, smoking, and certain medications.

Barriers of breastfeeding are lack of professional and social support, misinformation, embarrassment, early discharge from the hospital without instruction, and returning to work or school without adequate lactation rooms and if the mother refuses to tend breastfed infant.

When breastfeeding initiate as soon after delivery as possible, position the baby correctly, feed on demand from both breasts at each feeding and at least 10 minutes on each breast. Additionally there should be a good educator in the case the infant is not latching on.

A common problem that may happen when breastfeeding is *mastitis*, which is an inflammation of one or both breasts and is usually associated with the infection of a blocked milk duct during lactation. The symptoms include flu-like symptoms, red streaks on the breast, and hot skin. Antibiotics may be necessary to clear the infection. *Thrush* may also happen and could be passed between mom and baby. A symptom of thrush includes white flecks on tongue, and the baby and mother should be treated by a doctor.

Breast milk is recommended through the first 12 months. Supplementation of cow's milk is not recommended due to the high protein that would cause liver damage to the baby.

Why breastfeed?

- It is easily digested
- Composition changes with infant needs
- Changes during a feeding, high in fat at the end of feeding
- Antibodies in milk
- Breastfeeding moms miss less work because babies are sick less
- Fewer allergies
- Less spit-up
- Less constipation and diarrhea
- Better jaw development
- Decreased risk of SIDS (Sudden Infant Death Syndrome)
- Higher IQ
- Decreased risk of diabetes, Crohn's Disease, Celiac Sprue
- Bonding
- Convenient, always at the correct temperature and ready to go
- Less expensive
- Helps the uterus return to normal size more quickly
- Less incidence of postpartum "blues"
- Lower risk of breast cancer
- Lower risk of osteoporosis

Postpartum Depression

Having a baby is usually one of the happiest times in a woman's life, but for some women, it can include times of sadness and depression. More women actually suffer from postpartum depression than we really know. Women usually ignore the emotional and physical signs, dealing with their feelings on their own.

Postpartum depression affects approximately 10 to 15 percent of new mothers. It often causes anxiety and obsession about caring for the baby or the cleanliness of the home. It may cause changes in sleep patterns and affect relationships including the ability to form a bond with the baby and other family members. Some mothers with postpartum depression have thoughts of wanting to die or of hurting the baby. If the symptoms are so severe that they keep the mother from being able to function, medical treatment is necessary.

Baby blues are common due to rapid hormonal changes but resolve after 1-2 weeks. Postpartum depression is characterized by persisting symptoms, and the mother should notify her provider immediately.

Testing Your Knowledge

Answers for these questions can be found [here \(https://en.wikibooks.org/wiki/Human_Physiology/Appendix_1:_answers_to_review_questions#Pregnancy_and_birth\)](https://en.wikibooks.org/wiki/Human_Physiology/Appendix_1:_answers_to_review_questions#Pregnancy_and_birth)

1. Is at this stage that an egg implants in the uterine lining
 - A) morula
 - B) zygote
 - C) blastocyst
 - D) embryoblast
2. Which part of the embryoblast will become the central nervous system in development

- A) ectoderm
- B) mesoderm
- C) endoderm

3. This hormone is only produced in the human body when a woman is pregnant

- A) estrogen
- B) HCG
- C) progesterone
- D) FSH
- E) LH

4. By this week of pregnancy, the beginnings of all major organs have formed

- A) 4
- B) 7
- C) 5
- D) 6
- E) 8

5. Stem cells are found in the embryoblast and use of them is very controversial, another place to find stem cells that are usable to treat leukemia and other disorders is the

- A) morula
- B) chorion
- C) amnion
- D) amniotic fluid
- E) umbilical cord

6. The cervix dilates on an average of _____ per hour in the active phase of labor

- A) 2 mm
- B) 2 cm
- C) 1mm
- D) 1 cm

7. The contractions of the uterus are stimulated by the release of

- A) oxytocin
- B) FSH
- C) LH
- D) prolactin
- E) estrogen

8. A sign of pre-labor is

- A) irregular contractions
- B) pain in the front only
- C) loss of the mucus plug
- D) contractions stop during rest

9. This is the most common complication of pregnancy

- A) preclampsia
- B) miscarriage
- C) smoking

- D) Rh factor
- E) teratogens

10. Sue decides to breastfeed because she has been told that colostrum contains

- A) high protein
- B) low fat
- C) immunoglobulins
- D) all of the above
- E) none of the above

11. What is the first milk after birth called?

- A) thrush
- B) mastitis
- C) colostrum
- D) milk let down

Glossary

Abruption: Premature separation of the placenta from the wall of the womb

Amnion: An embryonic membrane that encircles a developing fetus and contains amniotic fluid.

Amniocentesis: A procedure in which a small sample of amniotic fluid is removed from around the fetus

Amniotic fluid: The fluid surrounding the fetus

Amniotomy: (artificial rupture of membranes, ARM) Breaking the membranes using a special plastic hook

Anemia: Lack of hemoglobin in red blood cells, due to iron deficiency or disease

Antepartum Hemorrhage: (APH) Vaginal bleeding that happens after 24 weeks of pregnancy and before delivery

Breech: The baby is lying bottom down in the womb

Celiac sprue: Nutrient absorption impairment which is improved when gluten is removed from the diet. Characteristic mucosal lesion of the small intestine.

Cephalic: The baby is lying head down in the womb

Chorion: The embryonic membrane that forms the outermost covering around the developing fetus.

Chorion Villus Sampling: (CVS) A method for sampling placental tissue for genetic or chromosome studies.

Colostrum the fluid that is made late in pregnancy and the first few days postpartum in the breast that contains immunologic substances and essential nutrients.

Cleavage: The early successive divisions of embryonic cells into smaller and smaller cells.

Cilia: The fine hairs that line the fallopian tubes'

Cordocentesis: The procedure for taking blood from the fetal umbilical cord via a needle through the mother's abdomen

Copulation: (Coitus, sexual intercourse) is the procreative act of a man's erect penis is inserted into a woman's vagina. At climax, semen is ejaculated from the penis at the cervix of the uterus. Sperm then propel themselves into the uterine tubes where fertilization may occur if an egg is present.

Crohn's disease: Skip lesions in the colon and is a malabsorptive disease.

Cystitis: Infection of the bladder

Dizygous: Not identical (fraternal) twins

Doppler: A form of ultrasound used specially to investigate blood flow in the placenta or in the fetus

Down Syndrome: (Trisomy 21) A disorder caused by the presence of an extra chromosome 21 in the cells

Ectopic Pregnancy: A pregnancy that develops outside of the womb

Edema: Swelling of the fingers, legs, toes, and face.

Embryo: The medical term for the baby from conception to about six weeks

Engagement: The process in which the head of the baby moves down from high in the mother's abdomen and settles deeper into her pelvis in preparation for birth. This can happen any time between 36 weeks and labor.

Epidural Anesthesia: A method of numbing the nerves of the lower spinal cord to ensure a pain-free labor

Episiotomy: A cut of the perineum and vagina performed to make the delivery easier

External Fetal Monitor: An electronic monitor used to record the fetal heartbeat and mother's contractions

Fallopian Tubes: (uterine tubes) Two tubular structures (one on each side of the womb) leading from the ovaries to the uterus

Fertilization: The union of an egg cell and a sperm cell is present wherein 23 chromosomes from each parent come together to form a zygote. After sperm penetrates, the ovum undergoes a chemical change to prevent other sperm from entering. Multiple births can occur from complete division of the conceptus during early cleavage or from fertilization of multiple ova. Birth control techniques are designed to prevent ovulation or to prevent fertilization by barriers, that keep sperm and ova separated.

Fetus: Medical term for the baby from six weeks after conception until birth

Forceps: Metal instruments that fit on either side of the baby's head and are used to help deliver the baby

Fundus: The top of the womb

Germ layer: Layers of cells within an embryo that form the body organs during development.

Glial Cells (neuroglia; glia): Non-neuronal cells that provide support and nutrition, maintain homeostasis, form myelin, and participate in signal transmission in the nervous system. In the human brain, glia are estimated to outnumber neurons by about 10 to 1.

Glial cells provide support and protection for neurons, the other main type of cell in the central nervous system. They are thus known as the "glue" of the nervous system. The four main functions of glial cells are to surround neurons and hold them in place, to supply nutrients and oxygen to neurons, to insulate one neuron from another, and to destroy pathogens and remove dead neurons.

Hemoglobin: (Hb)The oxygen carrying constituent of red blood cells

Induction of labor: (IOL) the procedure for initiating labor artificially

In utero death: (IUD)the death of the unborn fetus after 24 weeks

In vitro fertilization: (IVF) a method of assisted conception in which fertilization occurs outside the mother's and the embryo is replaced in the womb

Lanugo: fine hair that covers the fetus in the womb

Lochia: blood loss after birth

Mastitis inflammation of the breast most frequently in lactation.

Neonatal: baby less than 28 days old

Nuchal scan: special ultrasound scan that gives an estimate of the risk of Down syndrome

Oocyte: one egg that is released from the ovary at each ovulation

Placenta: The structure by which an unborn child is attached to it's mother's uterine wall and through which it is nourished.

Postnatal: After birth

Prenatal: Before birth

Quickening: The process that occurs between the seventeenth and twentieth weeks of fetal development, the fetus's leg bones achieve their final relative proportions. In this process the muscles contract, causing movement at the fetus's sinovial joints. The joint movement enhances the nutrition of the articular cartilage and prevents the fusion of connective tissues within the joint. It also promotes bone hardening. It is this stage, where the fetus's bones become more developed and harder, that the mother begins to notice fetal movement.

Rudimentary: Basic; minimal; with less than, or only the minimum, necessary

Thrush: Creamy white flakes on a red papillae on tongue and tongue may be enlarged.

Umbilical cord: The cord like structures that connects the fetus to the placenta.

Zygote: A cell produced by the fusion of an egg and a sperm; a fertilized egg cell.

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