

Unit 1: Human Reproduction and Development - Lesson 2: Stages of Human Development Before Birth



تم تحميل هذا الملف من موقع المناهج الإماراتية

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المزيد من مادة
علوم:

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التواصل الاجتماعي بحسب الصف التاسع المتقدم



صفحة المناهج
الإماراتية على
فيسبوك

الرياضيات

اللغة الانجليزية

اللغة العربية

التربية الاسلامية

المواد على تلغرام

المزيد من الملفات بحسب الصف التاسع المتقدم والمادة علوم في الفصل الثالث

مراجعة شاملة لوحدة التكاثر والتطور البشري

1

مراجعة شاملة في الانقسام والوراثة والتكاثر

2

ورقة عمل متكاملة عن الجهاز الجليدي

3

درس الأدوية وتأثيرها على الجهاز العصبي

4

The Senses

5

(يَرْفَعُ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ)

Biology: It is the science concerned with the study of the life of living organisms.

So, can you reflect on the creation of Allah?

"Welcome to a new Biology lesson"

Third Term 2025–2026

Advanced Grade 9 Students

Unit 1: Human Reproduction and Development

Lesson 2: Stages of Human Development Before Birth

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و

مركز النخبة المتميزة

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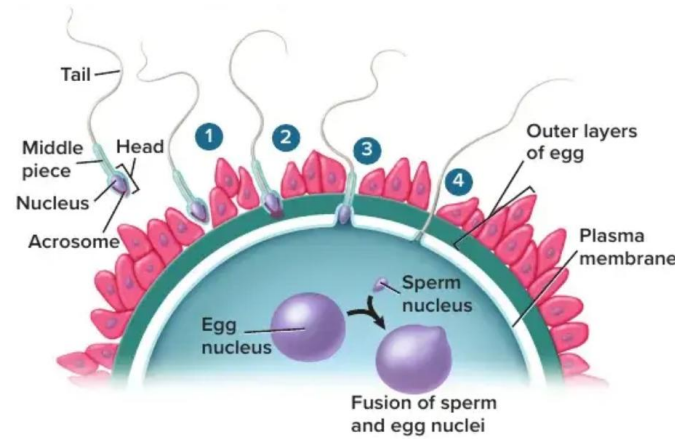
Main Idea:

- Human development begins from a single fertilized cell that develops into trillions of cells, each with specialized functions.

Learning Outcomes:

By the end of the lesson, students are expected to be able to:

- **Analyzes how the sperm meets the egg.**
- **Identifies the early stages of embryonic development up to implantation.**
- **Compares hormonal regulation before and after pregnancy.**
- **Describes the stages of human development before birth.**



- During mating, the male releases about 300 million sperm cells, but only a few hundred reach the egg. **Why?** Because many of them are attacked by white blood cells inside the female body.
- Hundreds of sperm cells work together to weaken the barrier surrounding the egg, allowing only one sperm to fertilize it. **What** if more than one sperm enters the egg?
The egg would rupture, fertilization would not occur, and a new menstrual cycle would begin.
- Only one sperm is able to penetrate and fertilize the egg. Its nucleus then fuses with the nucleus of the egg to form a fertilized egg containing 46 chromosomes. **What** is the source of these chromosomes?
23 from the male (sperm) and 23 from the female (egg).
- The acrosome of the sperm contains digestive enzymes. **What** is their importance?
They gradually weaken the plasma membrane of the egg.

Early Stages of Embryonic Development

1- The fertilized egg moves through the fallopian tube due to smooth muscle contractions and the movement of cilia lining the tube.

2- About **30 hours** after fertilization, it undergoes mitotic cell division, and cell divisions continue.

3- On the **third day**, the embryo enters the uterus and is known as the **morula** (a solid ball of cells).

4- On the **fifth day**, the morula develops into a **blastocyst** (a hollow ball of cells).

5- On the **sixth day**, it attaches to the uterine lining.

6- By the **tenth day**, implantation in the uterus is complete.

The blastocyst contains a group of cells called the **inner cell mass**, which develops into the embryo.

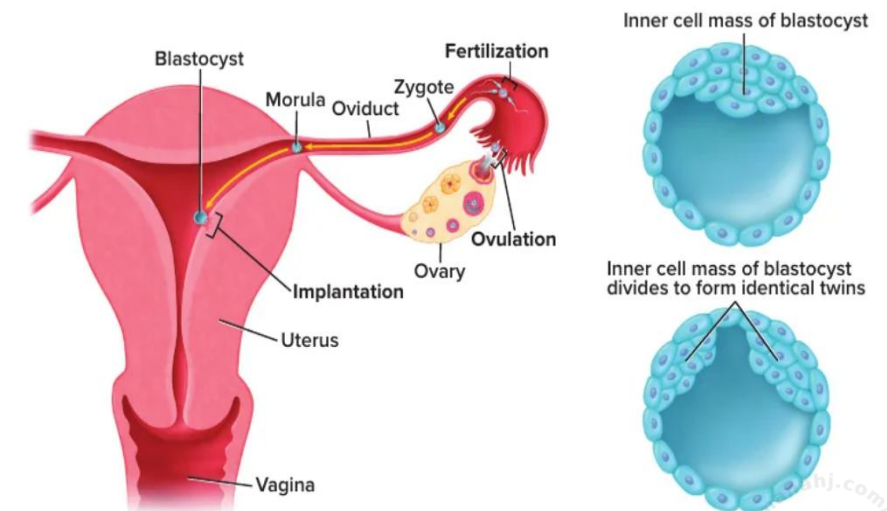
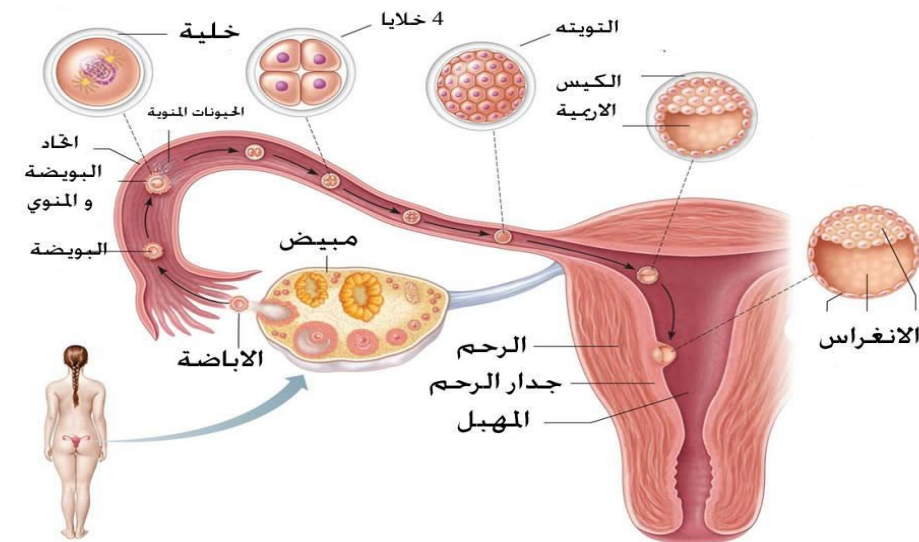


Figure 8 Left: During the first week of development, many changes occur as the zygote travels through the oviduct.

Right: The inner cell mass of the blastocyst will develop into a fetus (top). If the inner cell mass divides, identical twins might form (bottom).

1- Why is a very large number of sperm cells released even though only one fertilizes the egg?

- A. Because all of them fertilize the egg at the same time
- B. To compensate for their death inside the male body
- C. Because most of them fail due to obstacles inside the female body
- D. Because the egg needs a large number of chromosomes

2- Which of the following explains the failure of fertilization even though some sperm reach the egg?

- A. Lack of sufficient chromosomes
- B. The sperm's inability to weaken the egg's membrane
- C. Entry of more than one sperm into the egg
- D. Stopping of egg cell division

3- What is the most accurate explanation for the contribution of a large number of sperm in the fertilization process?

- A. Increasing the chance of forming more than one embryo
- B. Ensuring that chromosomes are fully delivered
- C. Working together to weaken the barrier surrounding the egg
- D. Speeding up the division of the egg

4- If there is a defect in the enzymes of the acrosome of the sperm, what is the expected effect?

- A. Increased speed of reaching the egg
- B. Inability to penetrate the egg
- C. Increase in the number of chromosomes
- D. Increase of cell division

Membranes surrounding the embryo (Extraembryonic membranes)

There are four membranes surrounding the embryo:

1. Amniotic membrane
2. Chorionic membrane
3. Yolk sac
4. Allantois

1. Amniotic membrane:

A thin membrane surrounding the embryo, forming a sac that contains amniotic fluid which protects and cushions it, isolates it, and prevents contaminants from reaching it.

2. Chorionic membrane & 3. Allantois:

They contribute to the formation of the placenta, where chorionic villi develop in them, and they also protect the embryo from shocks.

4- Yolk sac:

An embryonic structure that does not contain yolk; it is the first site of blood cell formation before it begins in the liver and spleen. It transports nutrients and contributes to the formation of early germ cells.

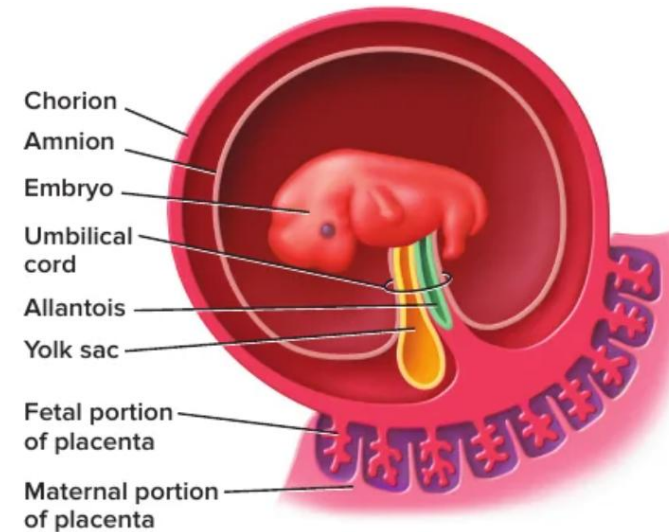


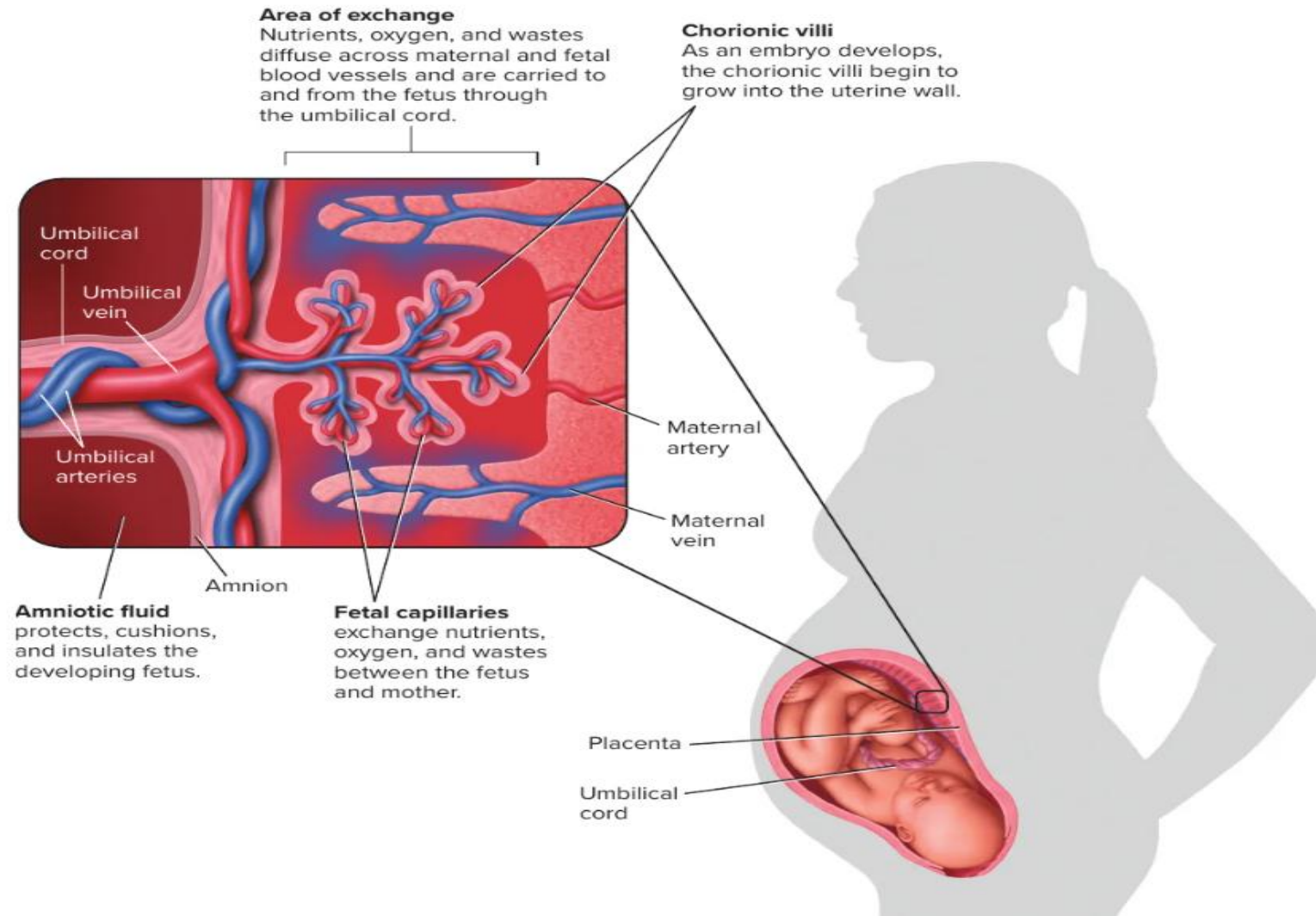
Figure 9 Four extraembryonic membranes—the amnion, chorion, yolk sac, and allantois—are important in development.

Identify the role of the yolk sac in humans.

- About two weeks after fertilization, chorionic villi begin to grow into the uterine wall, along with which the placenta is formed.
- **The placenta** supplies the embryo with nutrients and oxygen and removes its waste products.
- It consists of two layers: a fetal layer derived from the chorion that faces the embryo, and a maternal layer formed from uterine tissues.
- Its diameter is 15–20 cm, its thickness is about 2.5 cm, and its mass is about 0.45 kg.
- It regulates the transfer of substances between the fetus and the mother through the umbilical cord.



A growing fetus exchanges nutrients, oxygen, and wastes with the mother through the placenta. The placenta contains tissue from both mother and fetus.



The placenta allows the exchange of:

- Nutrients
- Oxygen
- Waste products
- Carbon dioxide

between the mother and the fetus.

It also allows the passage of:

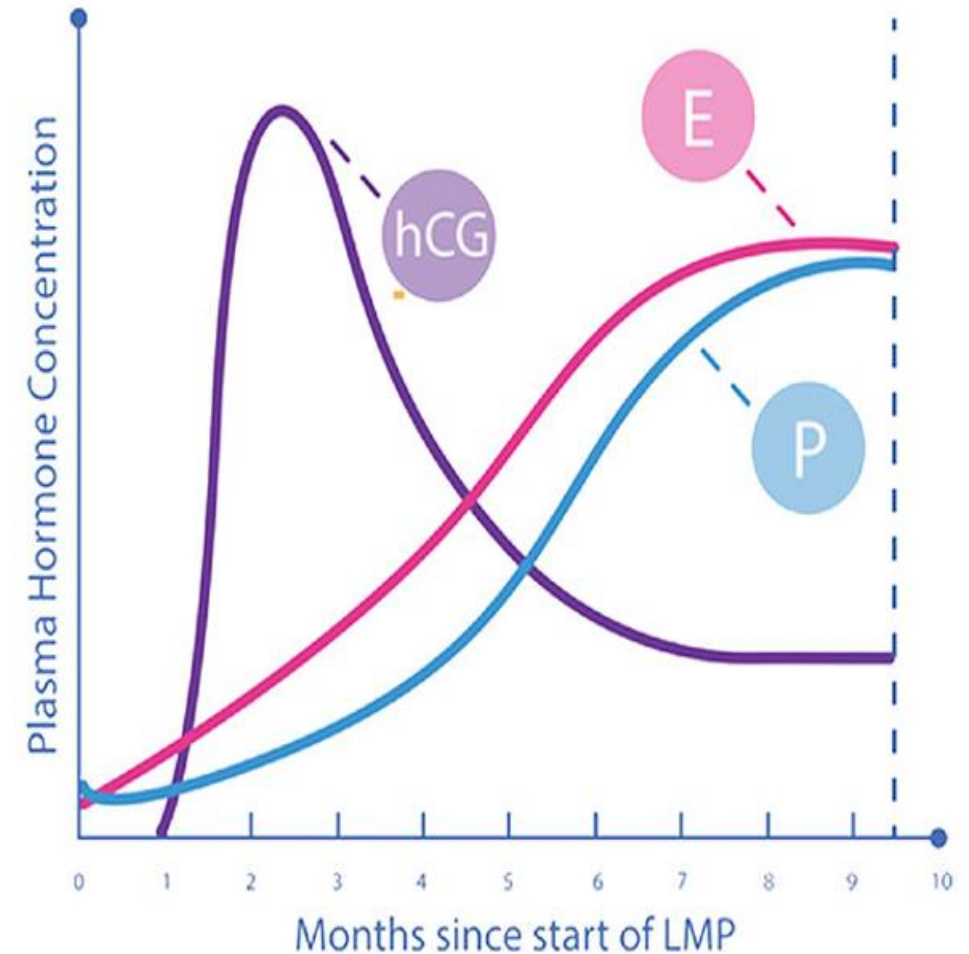
- Drugs
- Medications
- Antibodies
- HIV (if the mother is infected)

Do blood cells pass through the placenta?

✗ No, blood cells do not normally pass through the placenta.

Hormonal system during pregnancy:

- The embryo secretes human chorionic gonadotropin (hCG) to maintain the corpus luteum and prevent its degeneration.
- This keeps progesterone levels high and prevents the occurrence of a new menstrual cycle.
- After about two to three months, the placenta takes over the secretion of progesterone and estrogen to maintain pregnancy.



1- Which of the following shows the main function of the amniotic fluid?

- A. Producing blood cells for the fetus
- B. Forming the placenta
- C. Protecting the fetus and absorbing shocks
- D. Direct transport of nutrients from the mother to the fetus

2- Why are chorionic villi important in early pregnancy?

- A. Because they produce eggs
- B. Because they help uterine contractions
- C. Because they increase the surface area for nutrient exchange with the mother
- D. Because they stop embryonic cell division

3- Which organ is the first site of red blood cell formation in the fetus?

- A. Liver
- B. Spleen
- C. Early embryonic structure (yolk sac)
- D. Placenta

4- What happens when progesterone levels decrease?

- A. Pregnancy continues
- B. A new menstrual cycle begins
- C. Fetal growth increases
- D. Fertilization stops

5- What is the relationship between the embryo hormone hCG and the corpus luteum?

- A. It causes its degeneration
- B. It stops its activity
- C. It maintains it active
- D. It prevents its formation

6- Which of the following represents the correct function of the placenta?

- A. Production of sperm cells
- B. Exchange of materials between the mother and the fetus
- C. Storage of eggs
- D. Formation of eggs

1- A male ejaculates approximately sperm cells during mating.

100 million 250 million 300 million 400 million

2- Hundreds of sperm help weaken the barrier surrounding the egg so that only can fertilize it.

one sperm cell two sperm cells four sperm cells three sperm cells

3- On the day, the embryo enters the uterus and is known as a morula (a solid ball of cells).

fourth third second fifth

4- On the day, the morula develops into a blastocyst (a hollow ball of cells).

fourth third second fifth

5- On the day, implantation in the uterus is completed.

ninth tenth eighth fourth

6- After hours of fertilization, the zygote undergoes mitotic and cellular division, and cell divisions continue.

24 48 30 55

7- If the cell mass divides, ... twins may be produced.

fraternal different identical both sexes

The three trimesters of fetal development

- Fetal development takes about **266 days on average**.
- This period is divided into three stages, each lasting approximately **three months**.



First trimester (months 1, 2, and 3):

- ❖ Formation of all tissues, organs, and body systems begins.
- ❖ The embryo is most vulnerable to the effects of alcohol and drugs.
- ❖ Birth defects may occur due to deficiencies in some nutrients.
- ❖ By the end of the 8th week, it is referred to as a fetus.
- ❖ Body systems are formed by the end of the first trimester.
- ❖ It can move its arms, fingers, and toes.
- ❖ It shows some facial expressions.
- ❖ Fingerprints begin to form.

Growth stage (second trimester):

- ❖ The fetal heartbeat can be heard between weeks 18–20.
- ❖ The fetus is able to suck its thumb.
- ❖ It may experience hiccups.
- ❖ The mother feels its movements and kicks.
- ❖ Hair forms and the eyes open.
- ❖ By the end of this stage, it may be able to survive outside the uterus with medical intervention, but the chance is low because it cannot maintain a stable body temperature, its lungs are not fully developed so it cannot breathe properly, and its immune system is not yet complete.

Third trimester:

- ❖ The fetus continues to grow rapidly.
- ❖ Fat accumulates under the skin to provide an insulating layer at birth.
- ❖ Brain nerve cells form at a rate of about 250,000 cells per minute.
- ❖ It responds to sounds such as its mother's voice and music.

Table 2 Preventable Causes of Birth Defects

Cause	Defect
Alcohol consumption	• Mental retardation
Cigarette smoking	• Health problems related to premature births and underweight babies
Lack of folic acid in diet	• Anencephaly (head and brain do not completely form) • Spina bifida (nerve cells from the spinal cord are exposed, leading to paralysis)
Methamphetamine	• Premature birth • Extreme irritability

Diagnosis of fetal abnormalities:

- Many conditions can be diagnosed before the birth of the baby. **Why?**

Identifying some conditions early increases the chances of appropriate medical treatment, which helps provide the best possible quality of life for the newborn.

There are three methods of fetal testing:

1. Ultrasound (sonography)
2. Amniocentesis (amniotic fluid test)
3. Chorionic villus sampling (CVS)

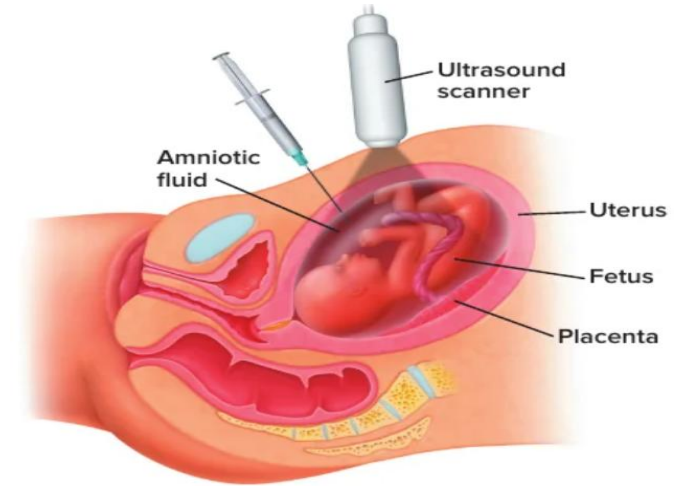
First: Ultrasound (sonography):

- Ultrasound is a method used to examine the fetus during pregnancy.
- It works by sending sound waves that reflect off the fetus to produce images on a screen.
- It helps in checking fetal growth, position in the uterus, and determining its sex.



Second: Amniocentesis :

- Amniocentesis is performed during the second trimester of pregnancy.
- It involves examining fetal cells through karyotyping or DNA analysis.
- It is used to detect abnormal chromosome numbers, determine the sex of the fetus, and measure enzyme levels associated with certain medical conditions.



Amniocentesis

Figure 12 In amniocentesis, fluid and cells lost from the fetus are removed from the amniotic fluid and analyzed.

Third: Chorionic villus sampling (CVS) :

- CVS is performed during the first trimester of pregnancy.
- It involves analyzing fetal cells using karyotyping.
- It is used to detect fetal abnormalities, but it carries a risk of miscarriage.

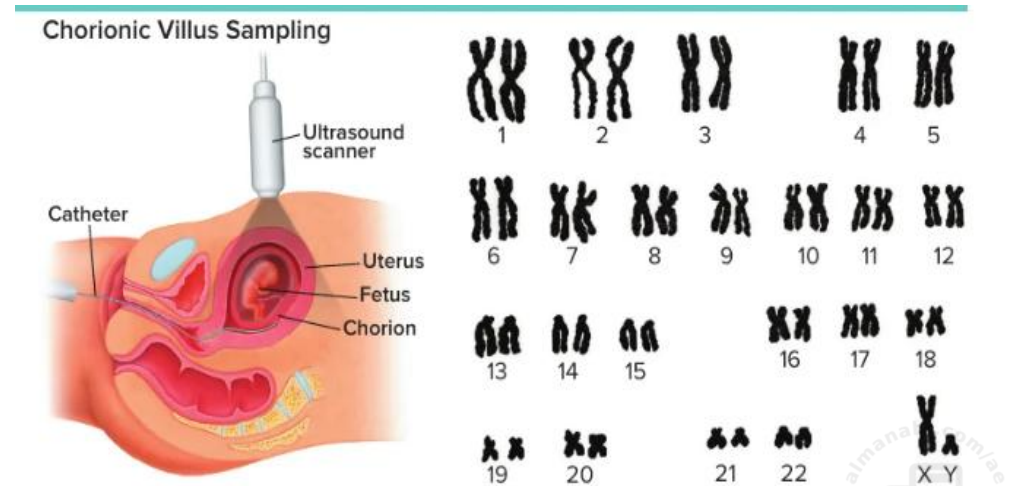


Figure 13 Left: Chorionic villus sampling involves removing cells from the chorion and analyzing them.

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The End 😊😊😊

1. By the end of which week is the developing baby referred to as a fetus?

- A) End of the 6th week
- B) End of the 8th week
- C) End of the 12th week
- D) End of the 20th week

2. During which trimester does the formation of all tissues, organs, and body systems begin?

- A) First trimester
- B) Second trimester
- C) Third trimester
- D) After birth

3. Why is the embryo most vulnerable to the effects of alcohol and drugs?

- A) Because its immune system is complete
- B) Because it is growing rapidly in the third trimester
- C) Because tissues and organs are forming during this time
- D) Because it can already breathe on its own

4. Which of the following can occur by the end of the first trimester?

- A) The fetus can survive outside the uterus
- B) The heartbeat can be heard clearly
- C) The fetus can move its arms, fingers, and toes
- D) Fat accumulates under the skin

5. Between which weeks can the fetal heartbeat typically be heard?

- A) Weeks 8–10
- B) Weeks 12–14
- C) Weeks 18–20
- D) Weeks 25–28

6. According to the text, why is the chance of survival low if the fetus is born by the end of the second trimester?

- A) Because fingerprints have not yet formed
- B) Because the mother cannot feel movements yet
- C) Because the lungs are not fully developed and body temperature is unstable
- D) Because the brain stops forming nerve cells

7. What happens during the third trimester regarding brain development?

- A) Brain nerve cells form at a rate of about 250,000 cells per minute
- B) The brain stops growing
- C) The fetus begins to suck its thumb
- D) The eyes remain closed until birth

8. What is the purpose of fat accumulating under the skin during the third trimester?

- A) To help the fetus move more easily
- B) To provide an insulating layer at birth
- C) To help the fetus hear sounds
- D) To form fingerprints

9. Which fetal testing method is performed during the first trimester?

- A) Amniocentesis
- B) Ultrasound only
- C) Chorionic villus sampling (CVS)
- D) Karyotyping after birth

10. What is one risk associated with Chorionic Villus Sampling (CVS)?

- A) It cannot detect abnormalities
- B) It is only used to determine sex
- C) It carries a risk of miscarriage
- D) It must be done in the third trimester

11. Which method uses sound waves that reflect off the fetus to produce images on a screen?

- A) Amniocentesis
- B) Chorionic villus sampling (CVS)
- C) Ultrasound (sonography)
- D) DNA sequencing

12. What can amniocentesis detect through karyotyping or DNA analysis?

- A) Only the sex of the fetus
- B) Abnormal chromosome numbers and enzyme levels
- C) The rate of brain cell formation
- D) The mother's blood type

13. During which trimester is amniocentesis typically performed?

- A) First trimester
- B) Second trimester
- C) Third trimester
- D) After birth

14. Which of the following is mentioned as a development that occurs during the second trimester?

- A) Formation of all body systems
- B) Fingerprints begin to form
- C) The fetus can suck its thumb and may experience hiccups
- D) Fat accumulates under the skin

15. Why can many fetal abnormalities be diagnosed before birth according to the text?

- A) Because all abnormalities are visible from the first month
- B) Because early diagnosis increases chances of appropriate medical treatment and quality of life
- C) Because the fetus can communicate its condition
- D) Because abnormalities only appear in the third trimester

Answer Key

1.B

2.A

3.C

4.C

5.C

6.C

7.A

8.B

9.C

10.C

11.C

12.B

13.B

14.C

15.B