

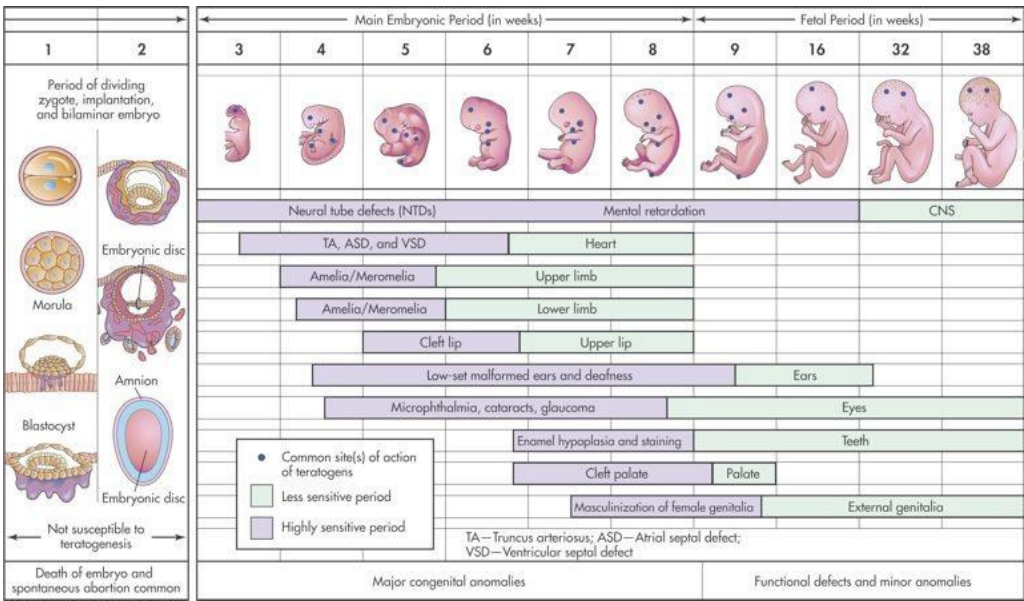
Chapter 3

Fetal Development

Niomi Quinteros  
BSN, RN



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# Fertilization

- Occurs when a sperm penetrates an ovum and they unite
- Takes place in the outer third of the fallopian tube, near the ovary
- As soon as it occurs, a chemical change in the membrane around the fertilized ovum prevents further sperm from penetrating the ovum

## NURSING TIP

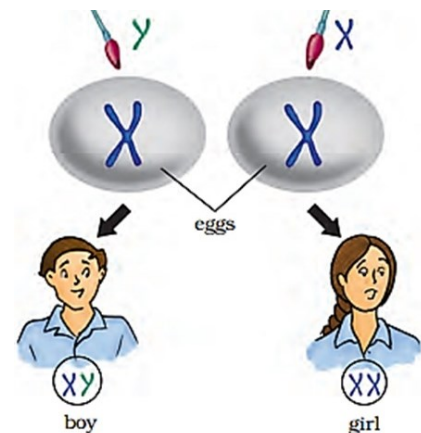
During sexual counseling, the nurse should emphasize that the *survival time of sperm ejaculated into the area of the cervix may be up to 5 days and that pregnancy can occur with intercourse as long as 5 days before ovulation.*

## Fertilization

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## Sex Determination

- Sperm can carry either an X or Y chromosome
- Male determines the gender of the fetus
- pH of female reproductive tract influences survival rate of the X- and Y- bearing sperm, including speed of motility
- XX results in female
- XY results in male



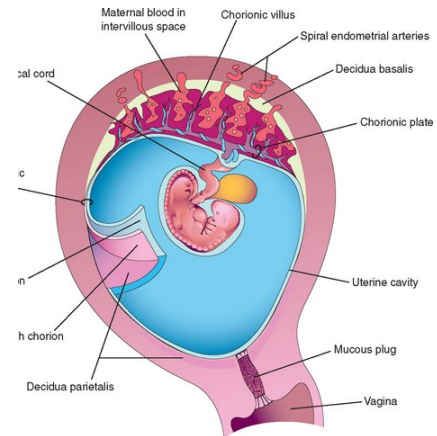
How Genetics Determine Your Baby's Gender

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# Cell Differentiation

## Cell Differentiation

- Chorion
  - Embryonic side of placenta
- Amnion
  - Amniotic fluid
- Yolk Sac
  - A cavity develops on the 9th day after fertilization
  - Functions only during embryonic life
  - Initiates production of red blood cells
  - Continues until fetal liver takes over, about 6 weeks
  - Umbilical cord encompasses yolk sac which then degenerates
- Germ Layers
  - Ectoderm
  - Mesoderm
  - Endoderm



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## Accessory Structures of Pregnancy

- Placenta
- Umbilical cord
- Fetal circulation
  - Supports fetus

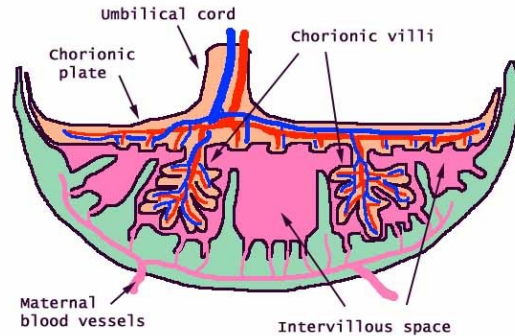


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# The Placenta

- Organ for fetal respiration, nutrition, and excretion
- Produces four hormones
  - Progesterone
  - Estrogen
  - Human chorionic gonadotropin (hCG)
  - Human placental lactogen (hPL)



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## Placental Hormones

### PROGESTERONE

- Functions during pregnancy
  - Maintains uterine lining for implantation of the zygote
  - Reduces uterine contractions to prevent spontaneous abortion
  - Prepares the glands of the breasts for lactation
  - Stimulates testes to produce testosterone, which aids the male fetus in developing the reproductive tract

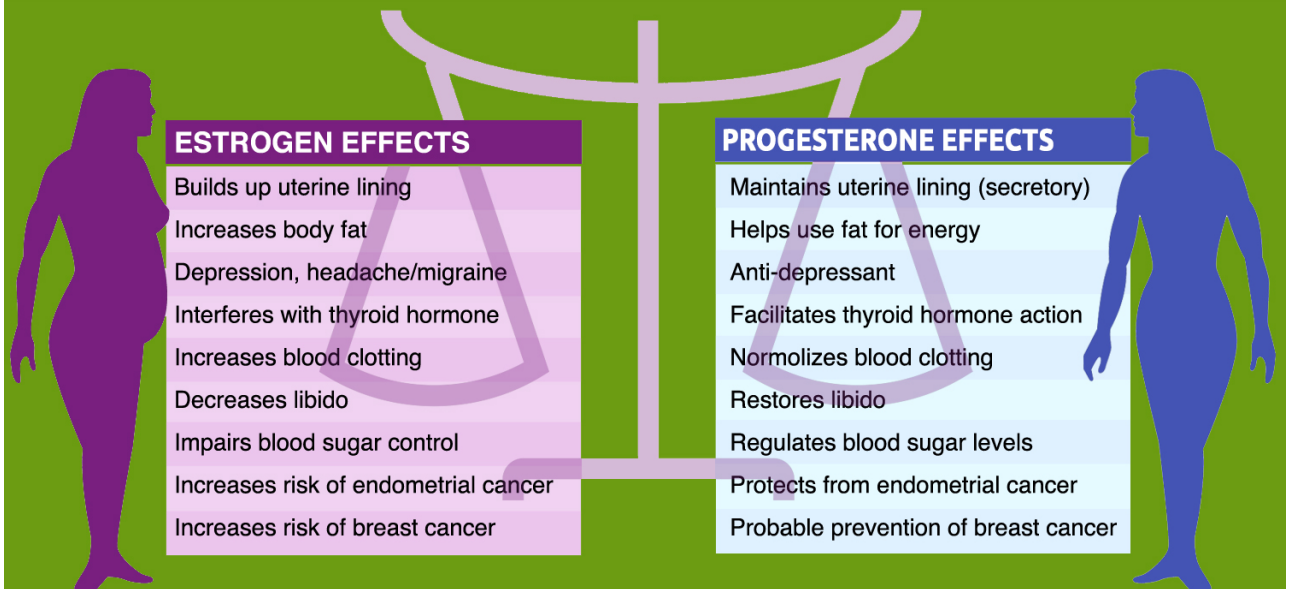
### ESTROGEN

- Stimulates uterine growth
  - Increases the blood flow to uterine vessels
  - Stimulates development of the breast ducts to prepare for lactation
- Effects of estrogen, not related to pregnancy
  - Increased skin pigmentation
  - Vascular changes in the skin and mucous membranes of nose and mouth
  - Increased salivation

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# The Role of Estrogen and Progesterone



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## Human Chorionic Gonadotropin (hCG)

- Causes the corpus luteum to persist and continue production of estrogen and progesterone to sustain pregnancy
- hCG is detectable in maternal blood as soon as implantation occurs (usually 7 to 9 days after fertilization)



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## Human Placental Lactogen (hPL)

- Also known as human chorionic somatomammotropin (hCS)
- hPL causes decreased insulin sensitivity and utilization of glucose by mother
  - Helps to make more glucose available to fetus to meet growth needs



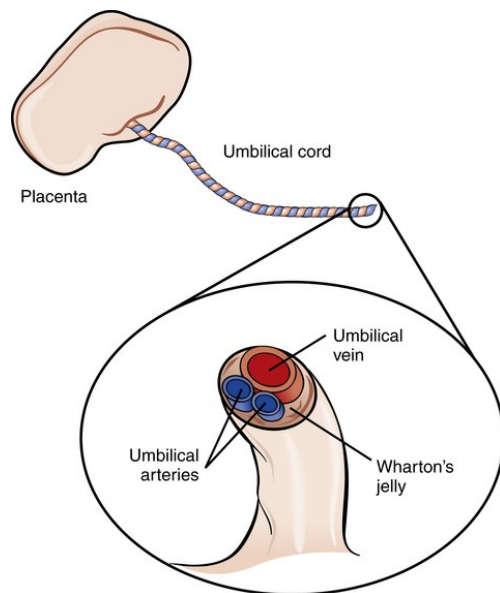
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## Umbilical Cord

- Lifeline between mother and fetus
- Two arteries carry blood away from fetus
- One vein returns blood to the fetus
- Wharton's jelly covers and cushions cord vessels
- The umbilical cord is usually inserted near the center of the placenta

**A V A**



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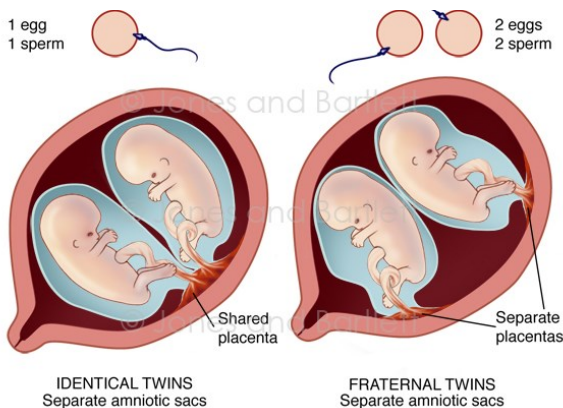
- Foramen ovale: diverts most blood from the right atrium directly to the left atrium, rather than circulating it into the lungs
- Ductus Arteriosus: Diverts most blood from the pulmonary artery into the aorta
- Ductus venosus: diverts some blood away from the liver as it returns from the placenta

[Fetal Circulation](#)

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## Formation of Twins

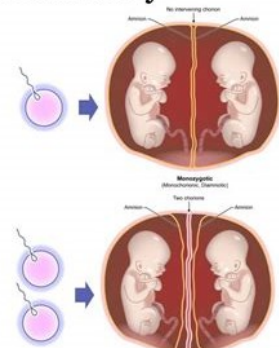
### [Twins](#)



## Genetics & Heredity

### • Twins

- Monozygotic Twins
  - Identical twins
  - 1 egg and 1 sperm
  - Share 100% genes
- Dizygotic Twins
  - Fraternal twins
  - 2 eggs and 2 sperm
  - Share 50% genes

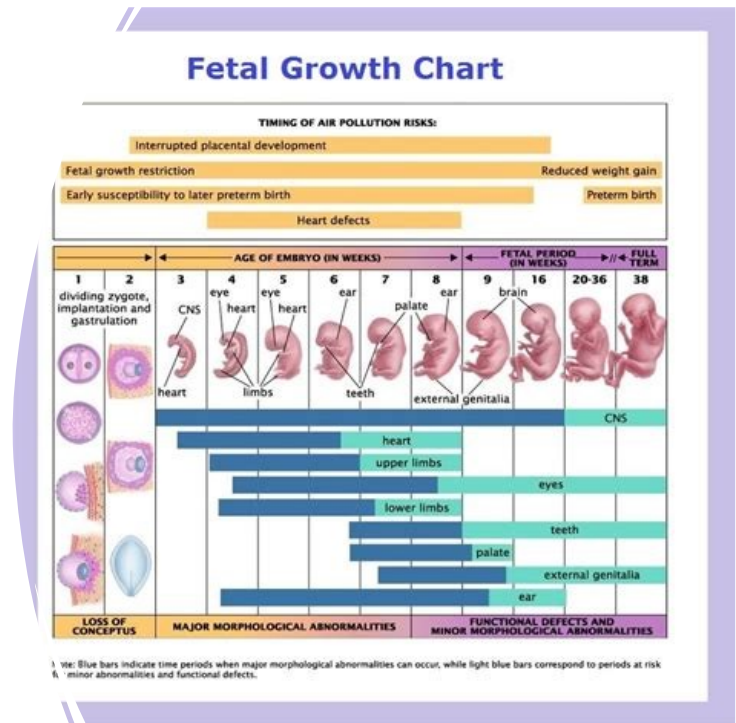


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# Health Promotion

- Undernutrition
  - Can result in permanent changes in fetal structure, physiology, and metabolism
  - Can influence development of conditions such as heart disease and stroke in adulthood
- Exposure to toxins in utero
  - Can also influence health in later life



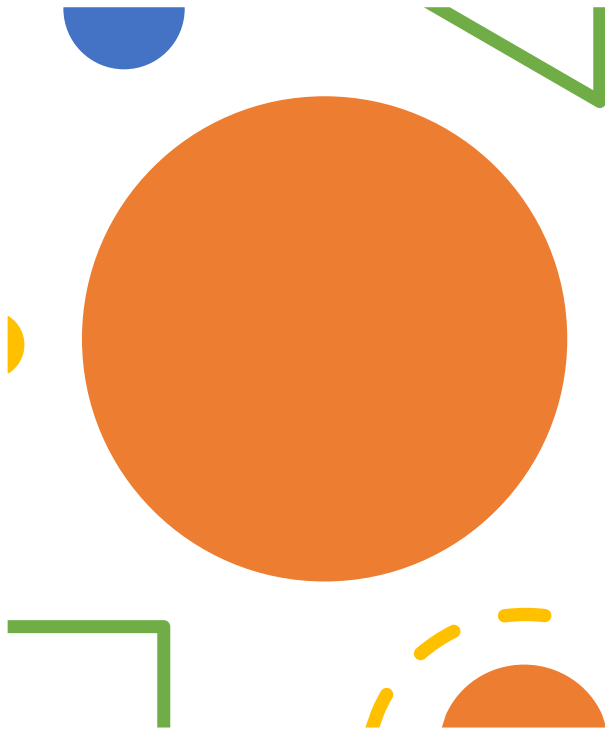
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Which is correct about monozygotic, or identical twins?

- A. They are always contained in a single amniotic sac
- B. They may be the same or different sex
- C. They result from the fertilization of one ovum by one sperm
- D. They have increased incidence with the use of fertility drugs

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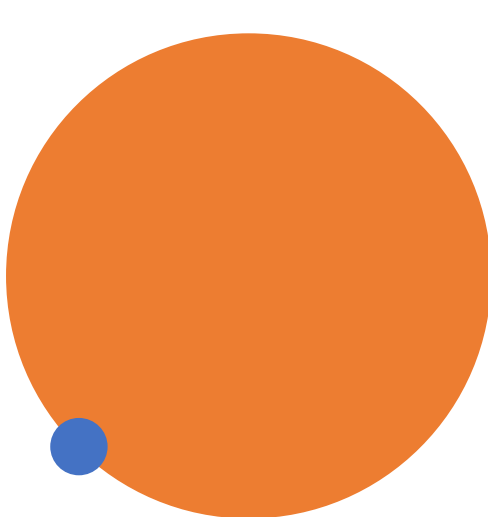




The human ovum and sperm contain how many chromosomes?

- A. 23
- B. 46
- C. 69
- D. 92

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Which of the following does the umbilical cord contain?

- A. One artery and one vein
- B. Two arteries and one vein
- C. Two veins and one artery
- D. Two veins and two arteries

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## Fill in The Blank

An ovum survives about \_\_\_\_\_ hours after ovulation.

Sperm survives up to \_\_\_\_\_ days after ejaculation.

If the ovum is fertilized by a sperm bearing a Y chromosome, the baby will be a \_\_\_\_\_.

If the ovum is fertilized by a sperm bearing an X chromosome, the baby will be a \_\_\_\_\_.

Fertilization usually occurs in the \_\_\_\_\_.

The fertilized ovum usually implants in the \_\_\_\_\_ section of the \_\_\_\_\_ uterus.

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Most fetal blood bypasses circulation to the lungs by way of the?

- A. Ductus venosus
- B. Foramen ovale
- C. Umbilical vein
- D. Umbilical artery



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