

Human Development

Fertilization...and on

Mechanisms of Fertilization

- Membrane receptors on an oocyte pulls in the head of the first sperm cell to make contact
- The membrane of the oocyte does not permit a second sperm head to enter
- The oocyte then undergoes its second meiotic division
- Fertilization occurs when the genetic material of a sperm combines with that of an oocyte to form a zygote

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The Zygote

- First cell of a new individual
- The result of the fusion of DNA from sperm and egg
- The zygote begins rapid mitotic cell divisions
- The zygote stage is in the uterine tube, moving toward the uterus

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The Embryo

- Developmental stage from the start of cleavage until the ninth week
- The embryo first undergoes division without growth
- The embryo enters the uterus at the 16-cell state
- The embryo floats free in the uterus temporarily
- Uterine secretions are used for nourishment

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The Blastocyst

- Ball-like circle of cells
- Begins at about the 100 cell stage
- Secretes human chorionic gonadotropin (hCG) to produce the corpus luteum to continue producing hormones
- Functional areas of the blastocyst
 - Trophoblast – large fluid-filled sphere
 - Inner cell mass

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The Blastocyst

- Primary germ layers are eventually formed
 - Ectoderm – outside layer
 - Mesoderm – middle layer
 - Endoderm – inside layer
- The late blastocyst implants in the wall of the uterus (by day 14)

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Derivatives of Germ Layers

- Ectoderm
 - Nervous system
 - Epidermis of the skin
- Endoderm
 - Mucosae
 - Glands
- Mesoderm
 - Everything else

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Development from Ovulation to Implantation

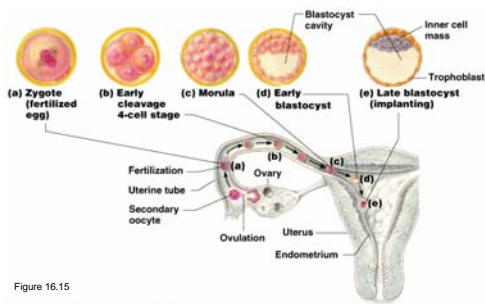


Figure 16.15

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Development After Implantation

- Chorionic villi (projections of the blastocyst) develop
 - Cooperate with cells of the uterus to form the placenta
- The embryo is surrounded by the amnion (a fluid filled sac)
- An umbilical cord forms to attach the embryo to the placenta

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Development After Implantation

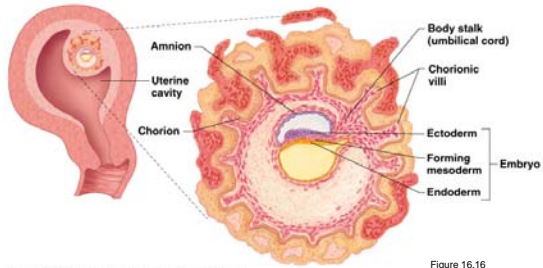


Figure 16.16

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Functions of the Placenta

- Forms a barrier between mother and embryo (blood is not exchanged)
- Delivers nutrients and oxygen
- Removes waste from embryonic blood
- Becomes an endocrine organ (produces hormones) and takes over for the corpus luteum
 - Estrogen
 - Progesterone
 - Other hormones that maintain pregnancy

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The Fetus (Beginning of the Ninth Week)

- All organ systems are formed by the end of the eighth week
- Activities of the fetus are growth and organ specialization
- A stage of tremendous growth and change in appearance

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Developmental Aspects of the Reproductive System

- Gender is determined at fertilization
 - Males have XY sex chromosomes
 - Females have XX sex chromosomes
- Gonads do not begin to form until the eighth week

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Developmental Aspects of the Reproductive System

- Testes form in the abdominal cavity and descend to the scrotum one month before birth
- The determining factor for gonad differentiation is testosterone

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Developmental Aspects of the Reproductive System

- Reproductive system organs do not function until puberty
- Puberty usually begins between ages 10 and 15
- The first menses usually occurs about two years after the start of puberty
- Most women reach peak reproductive ability in their late 20s

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Developmental Aspects of the Reproductive System

- Menopause occurs when ovulation and menses cease entirely
 - Ovaries stop functioning as endocrine organs
- There is a no equivalent of menopause in males, but there is a steady decline in testosterone

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