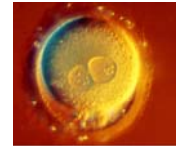


## Human Reproduction

*How does a developing fetus get food and oxygen from the mother?*

Like most animals, humans reproduce sexually.

- You started out as a single, fertilized egg called a zygote.

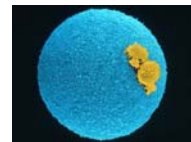


The egg came from your mother and the sperm came from your father.



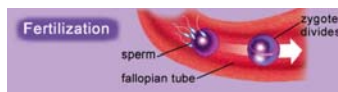
## Fertilization and Pregnancy

- The human reproductive process begins when a man ejaculates sperm into a woman's vagina during sexual intercourse.



Some sperm may exit the penis before ejaculation occurs.

- Thus, sexual activity that does not involve ejaculation could also lead to the release of sperm into the vagina, fertilization, and pregnancy.



Once inside the vagina, many sperm die because of the acidic environment.

- Surviving sperm use their flagella to swim through the uterus and up the fallopian tube. When they reach the egg, the sperm surround it.
- They release an enzyme that breaks down the proteins in the egg's outer covering.
- As soon as a single sperm gets through that covering, a reaction occurs that keeps any other sperm from entering.

The membrane of the egg then fuses with the sperm.

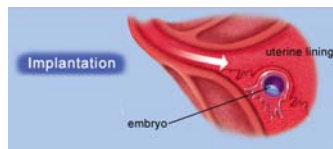
- Next, the sperm's flagellum and mitochondria break down.
- At that point, the sperm is only a nucleus.
- This explains why all mitochondrial DNA is inherited from the mother.

When the sperm and egg nuclei fuse, fertilization is complete.

- The fertilized egg then begins a 5 day journey down the fallopian tube toward the uterus.
- During the journey, the zygote undergoes many mitotic divisions.
- By the time it reaches the uterus, it is an embryo that looks like a tiny ball of cells.

The next step is called implantation.

- In implantation, the tiny embryo becomes embedded in the lining of the mother's uterus.
- Implantation is successful only about 30 percent of the time.



Once the embryo is implanted, pregnancy begins.

- One of the first signs of pregnancy is that a woman's regular menstrual cycle stops.
- A pregnant woman may give birth to a baby between 38 and 42 weeks later which is the gestation period for humans.

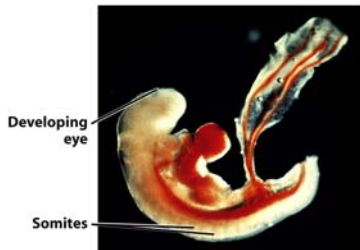
Development and Birth



Once the embryo is implanted in the uterus, the placenta begins to grow.

- The placenta supplies food and oxygen from the mother's blood to the developing embryo.
- It contains a network of blood vessels that links the embryo to the mother.

By the fourth week of pregnancy, the embryo is about 2 millimeters long.



It is surrounded by a thin, protective membrane called the amnion.

- Inside the amnion and surrounding the embryo, is amniotic fluid that protects the embryo from shocks.
- The umbilical cord has also formed.
- It contains arteries and veins that connect the embryo to the placenta.
- It enters the embryo's body at the *umbilicus*, or naval.

The developing fetus

- At the eighth week, the embryo has developed enough to be called a fetus.
- A human fetus develops from the end of the eighth week of pregnancy (when the major structures have formed), until birth.



The blood of the mother and fetus do not mix together.

- Oxygen and nutrients pass from the mother's blood to the fetus through the placenta and umbilical cord.
- Waste products like carbon dioxide pass from the fetus to the mother's blood for removal.

Fetus

- All organ systems are formed in the fetus.
- Growth & development continues.



Fetus at Five Months



After 38 to 42 weeks, the fetus is ready to live outside of the mother.



The mother goes through a series of contractions called labor.

- The fetus is pushed, headfirst, through her vagina.
- The baby is still connected to the placenta by the umbilical cord.
- When the doctor ties and cuts the umbilical cord, *birth* is complete.

The mother continues with labor until the placenta is pushed out of her body.

