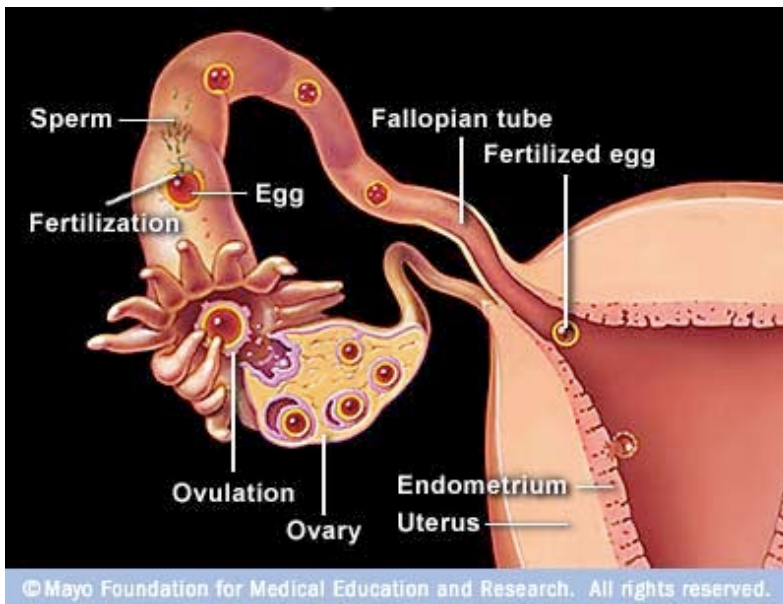


## Notes: Embryonic Development

source:  
[http://www.naturalbeginnings.com.au/images/stories/sperm\\_fertilizing\\_egg.jpg](http://www.naturalbeginnings.com.au/images/stories/sperm_fertilizing_egg.jpg)

Fertilization, the fusion of the sperm and egg, usually occurs in the upper third of the fallopian tube.

Thirty minutes after ejaculation, sperm are present in the fallopian tube, having traveled from the vagina through the uterus and into the fallopian tube.



source:  
[http://www.riversideonline.com/source/images/image\\_popup/r7\\_fertilization.jpg](http://www.riversideonline.com/source/images/image_popup/r7_fertilization.jpg)

Sperm traverse this distance by the beating of their flagellum.

Of the several hundred million sperm released in the ejaculation, only a few thousand reach the egg.

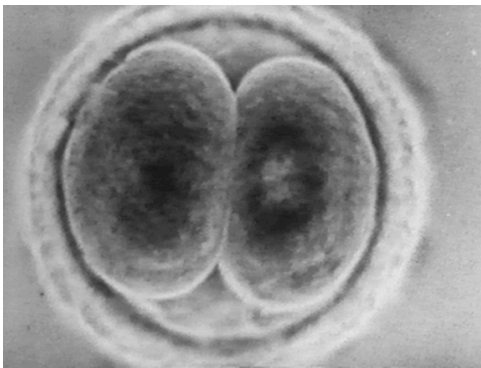
Only one sperm will fertilize the egg.

One sperm fuses with receptors on the surface of the secondary oocyte, triggering a series of

chemical changes in the outer oocyte membrane that prevent any other sperm from entering the oocyte. The entry of the sperm initiates Meiosis II in the oocyte.

Fusion of the egg and sperm nuclei forms the diploid zygote.

**1 egg + 1 sperm = 1 zygote (fertilized egg)**



Zygote:

Source: <http://www.fredcamper.com/PF/Friedrich/01.jpg>

The cells of the fertilized egg, the zygote, begin while it is still in the fallopian tube, producing a solid ball of cells called the morula.

The morula enters the uterus, continuing to divide and becomes a blastocyst.

What happens next? The lining of the uterus becomes enlarged and prepares for implantation of the embryo.

These events trigger the release of Human chorionic gonadotropin (hCG) which is a hormone that promotes development of placenta which secretes estrogen and progesterone.

How do home pregnancy tests work? The urine test detects the presence of Human chorionic gonadotropin (hCG), the hormone released after conception. Maternal and embryonic structures interlock to form the placenta, the nourishing boundary between the mother's and embryo's systems. The umbilical cord extends from the placenta to the embryo, and transports food to and wastes from the embryo.

## **Stages of Development**

The period of time from fertilization to birth (usually 9 months) is divided into trimesters, each about three months long. During pregnancy the zygote undergoes 40 to 44 rounds of mitosis, producing an infant containing trillions of specialized cells organized into tissues and organs.

### **The First Trimester**



Embryo 6 Weeks Old -

Source:  
<http://ethics.davidson.edu/wp-content/uploads/2010/02/6-week-human-embryo-Getty.jpg>

The three embryonic tissue layers form. Cellular differentiation begins to form organs during the third week. After one month the embryo is 5 mm long.

During the second month most of the major organ systems form, limb buds develop. The embryo becomes a fetus by the seventh week.

Beginning the eighth week, the sexually neutral fetus activates gene pathways for sex determination, forming testes in XY fetuses and ovaries in XX fetuses. External genitalia develop.

### **The Second Trimester**

The fetus increases in size during this trimester, and bony parts of the skeleton begin to form. Fetal movements can be felt by the mother.

## **The Last Trimester**

During this trimester the fetus increases in size. Circulatory and respiratory systems mature in preparation for air breathing. Fetal growth during this time uses large parts of its mother's protein and calcium intake. Maternal antibodies pass to the fetus during the last month, conferring temporary immunity.

## **Birth**

Birth is a positive feedback hormonal mechanism. During birth the cervix dilates to allow passage of the fetus. Uterine contractions propel the fetus through the birth canal, usually head first. Hormonal control of the birth process involves the release of oxytocin and prostaglandins, which are stimulated by uterine contractions, which stimulate more hormones that cause more contractions....etc.

First Stage of birth lasts from beginning of contractions to the full dilation (10 cm.) of the cervix.

Second Stage of birth involves strong uterine contractions that propel the fetus down the birth canal.

Third Stage of birth occurs after the delivery of the baby. The placenta (or afterbirth) is expelled through the vagina.