# 1ST WEEK OF DEVELOPMENT

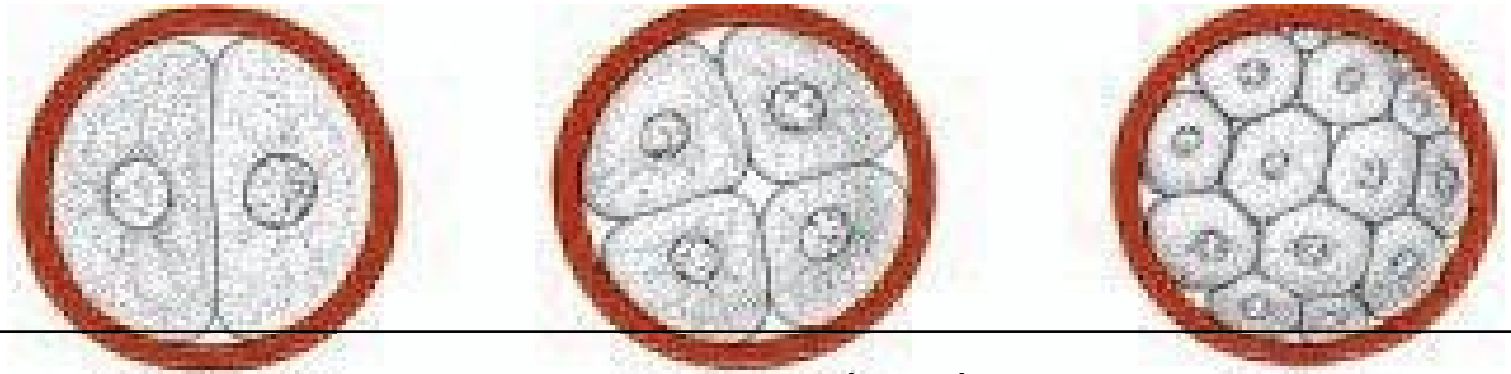
# PREVIEW

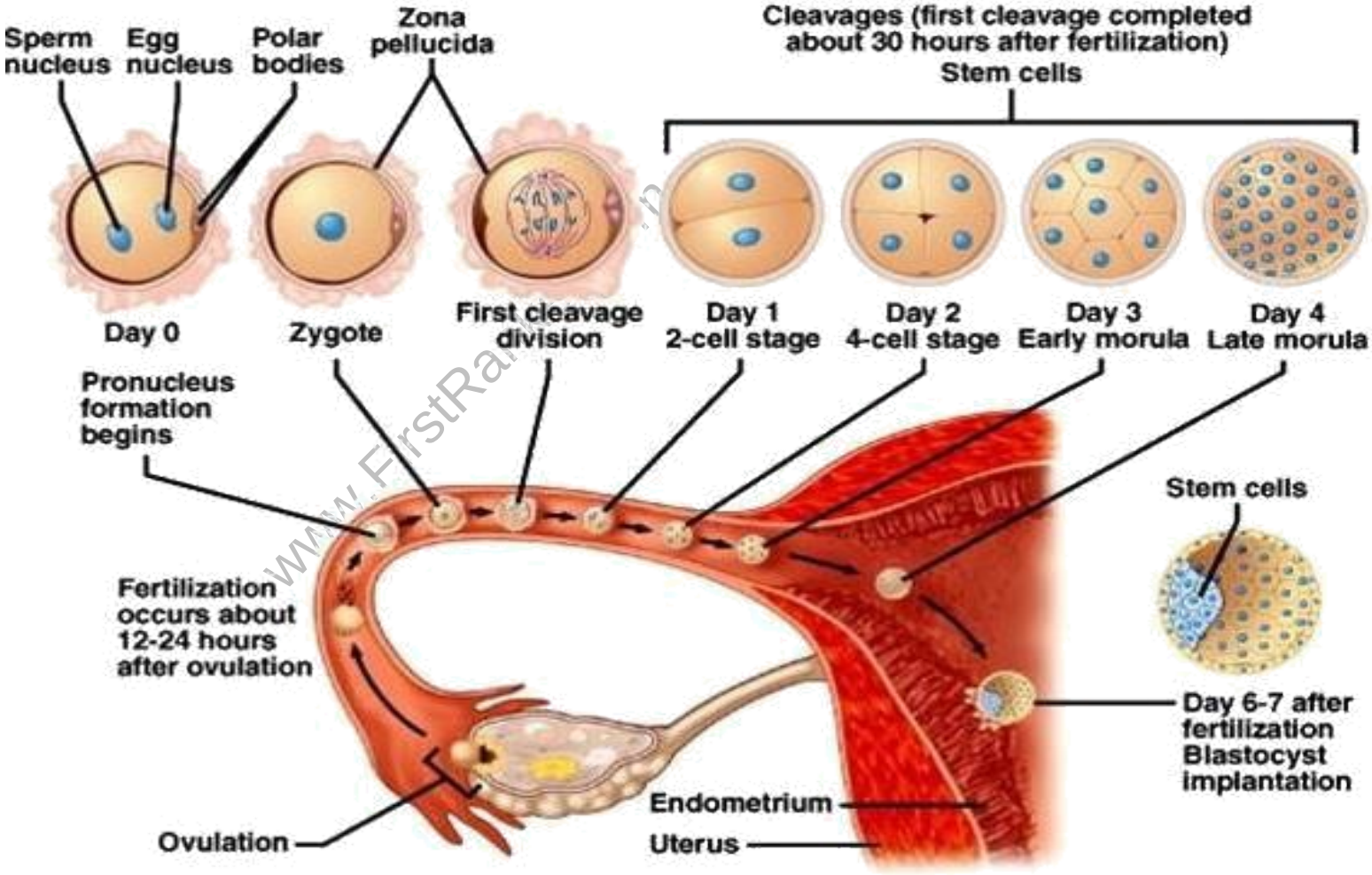
- CLEAVAGE
- BLASTOCYST FORMATION
- UTERUS AT THE TIME OF IMPLANTATION
- MENSTRUAL CYCLE

# CLEAVAGE IN HUMANS

- Cleavage is the rapid succession of mitotic cell divisions , resulting in an increase in the number of cells, blastomeres which become smaller with each division
- Cleavage is thus a fractionating process rather than a process of growth i.e. no new protoplasm has been formed

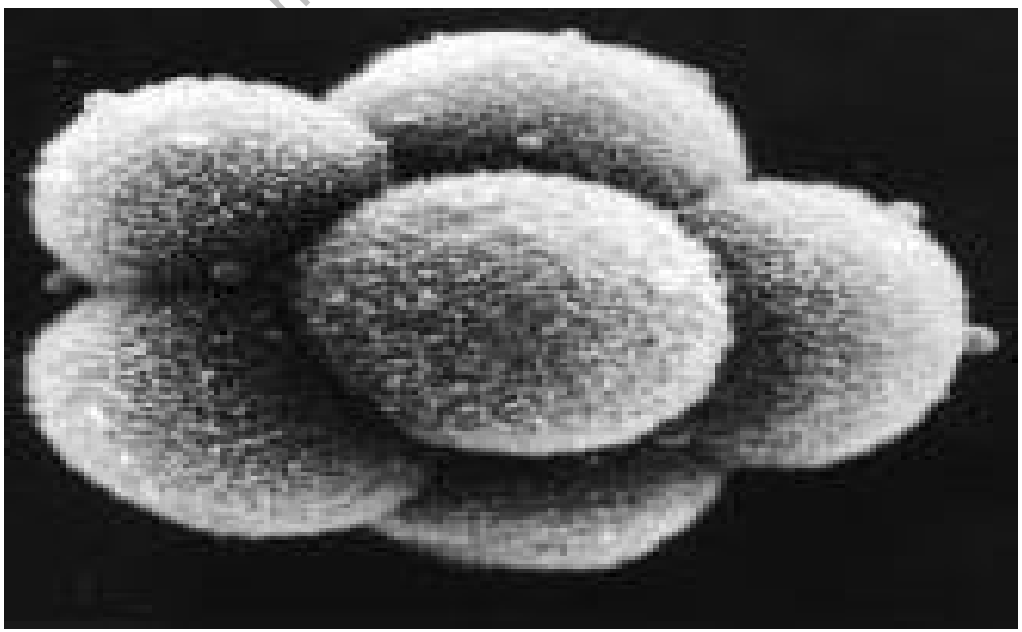







- Cleavage occurs as the zygote passes along the uterine tube toward the uterus.
- During cleavage, zygote lies within the thick zona pellucida.

## Until the 8-cell stage, blastomeres form a loosely arranged clump

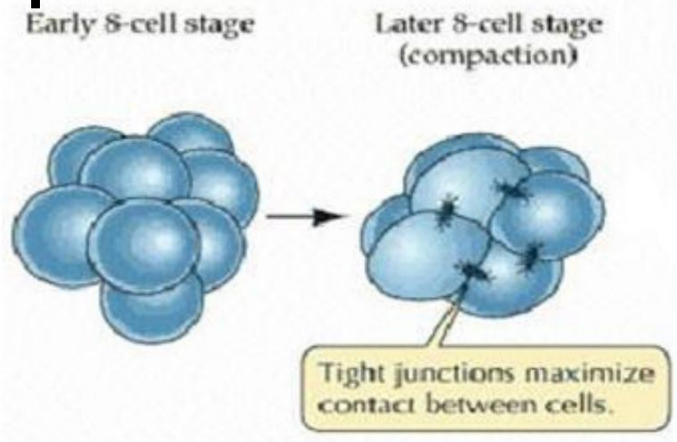


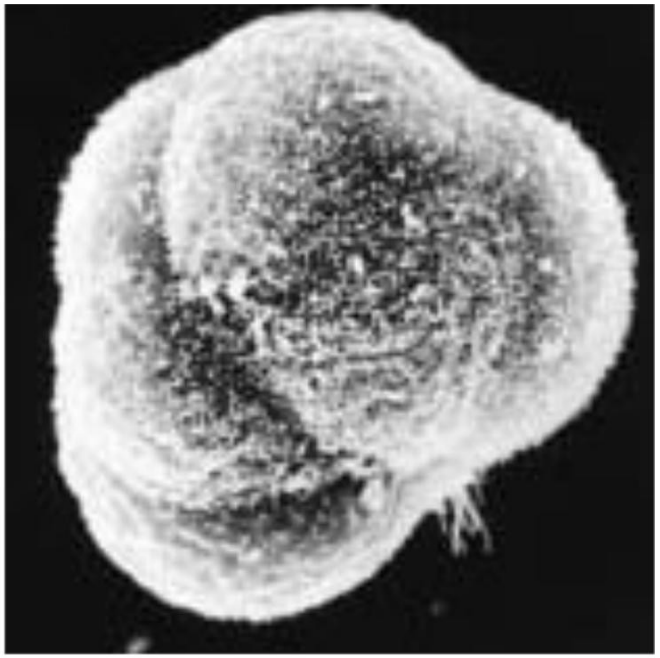
Uncompacted blastomeres

cell outlines are distinct

# COMPACTION

- After the third cleavage, blastomeres maximize their contact with each other, held together by **tight junctions** leading to deformation of their round shape**.** This change in shape of the embryo is called **compaction**.

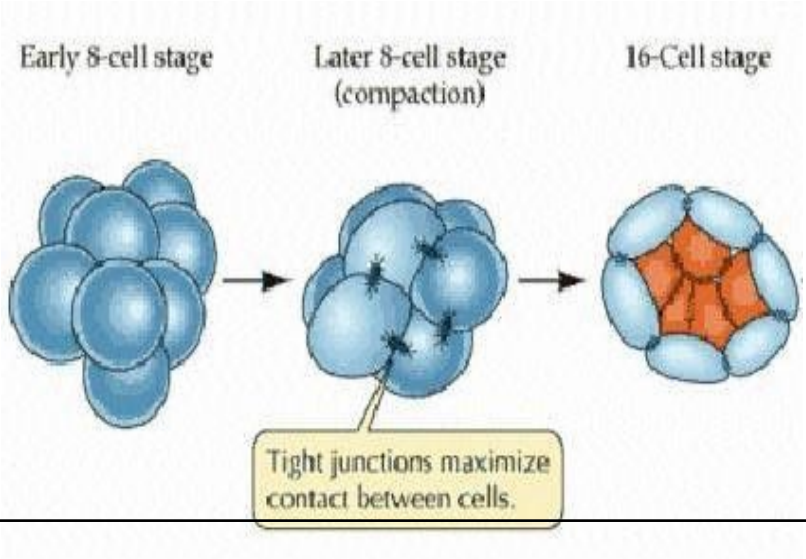


Compacted blastomeres cell outlines are indistinct

# MORULA

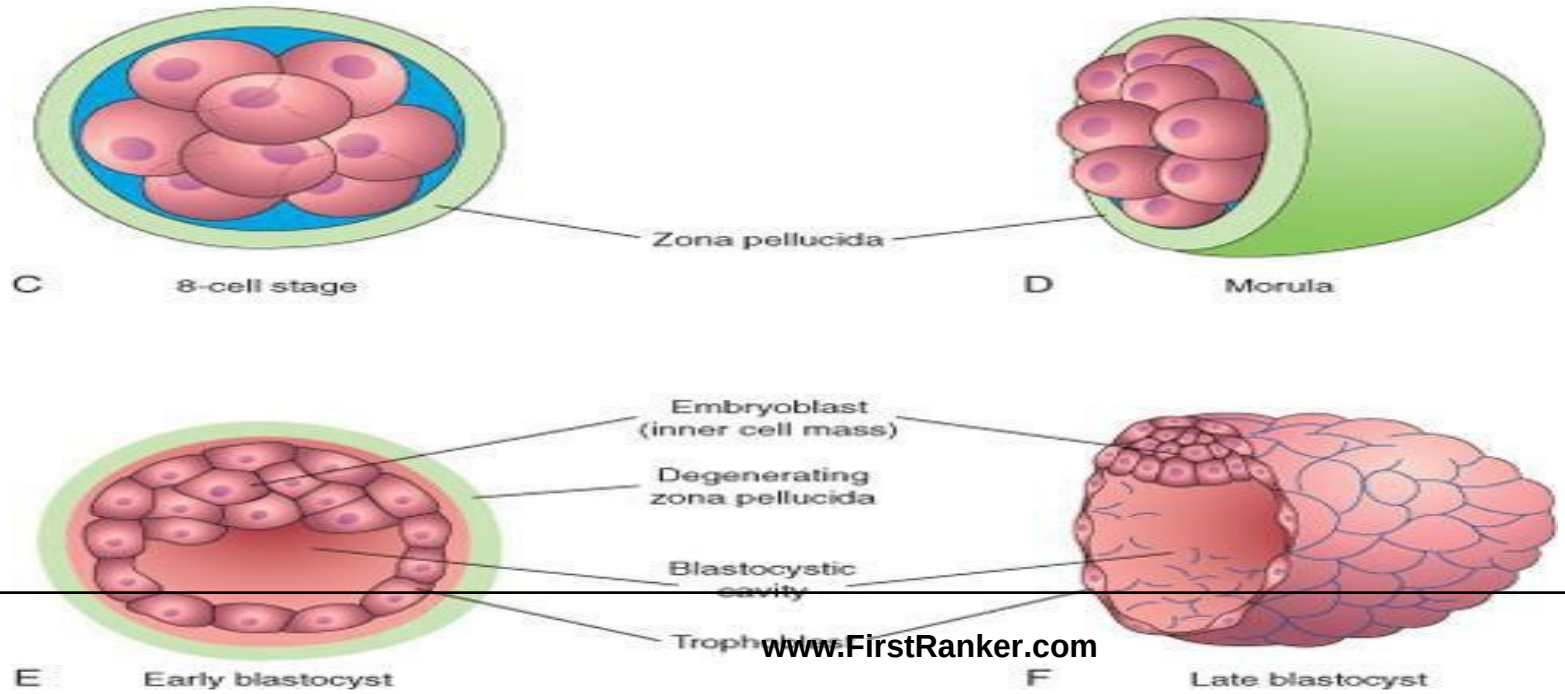
- Approximately, 3 days after fertilization, cells of the compacted embryo divide again to form a 16-cell (12-32) morula (L., morus; mulberry)
- Compaction segregates inner cells, which communicate extensively by gap junctions, from outer cells.
- Inner cells of the morula constitute the inner cell mass, & surrounding cells compose the outer cell mass.



# BLASTOCYST FORMATION

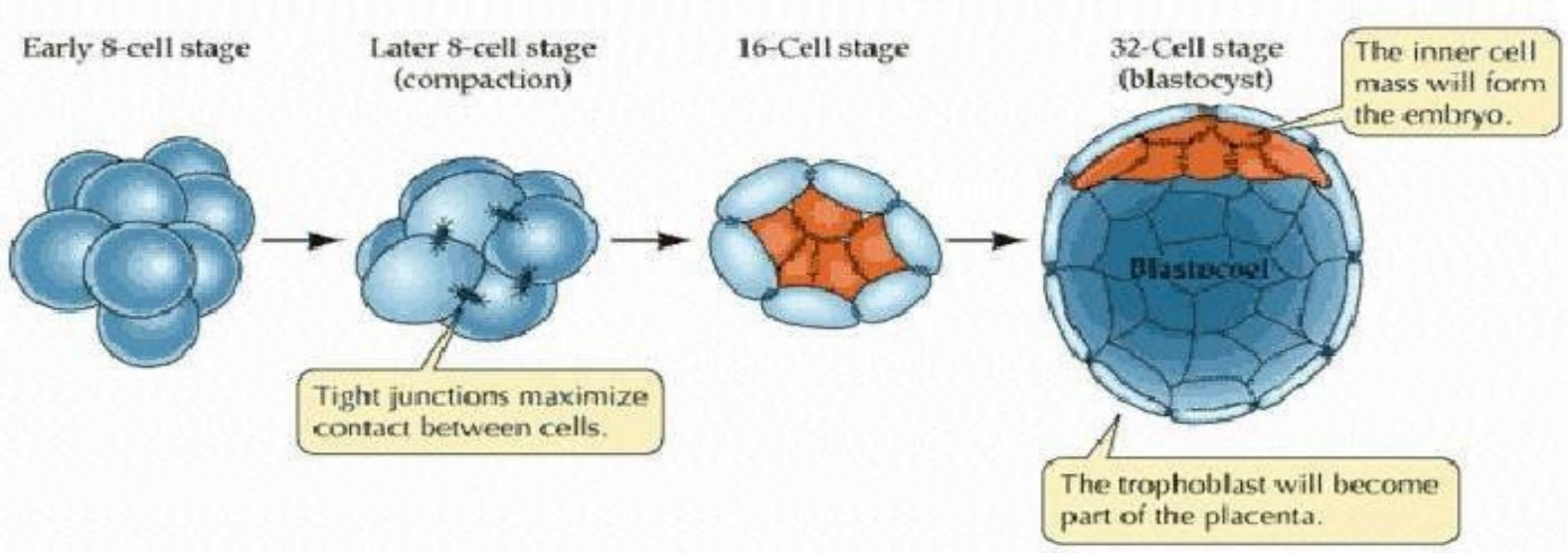
- About the time the morula enters the uterine cavity, glandular secretion from uterine cavity, begins to penetrate through the zona pellucida into the intercellular spaces of the inner cell mass.



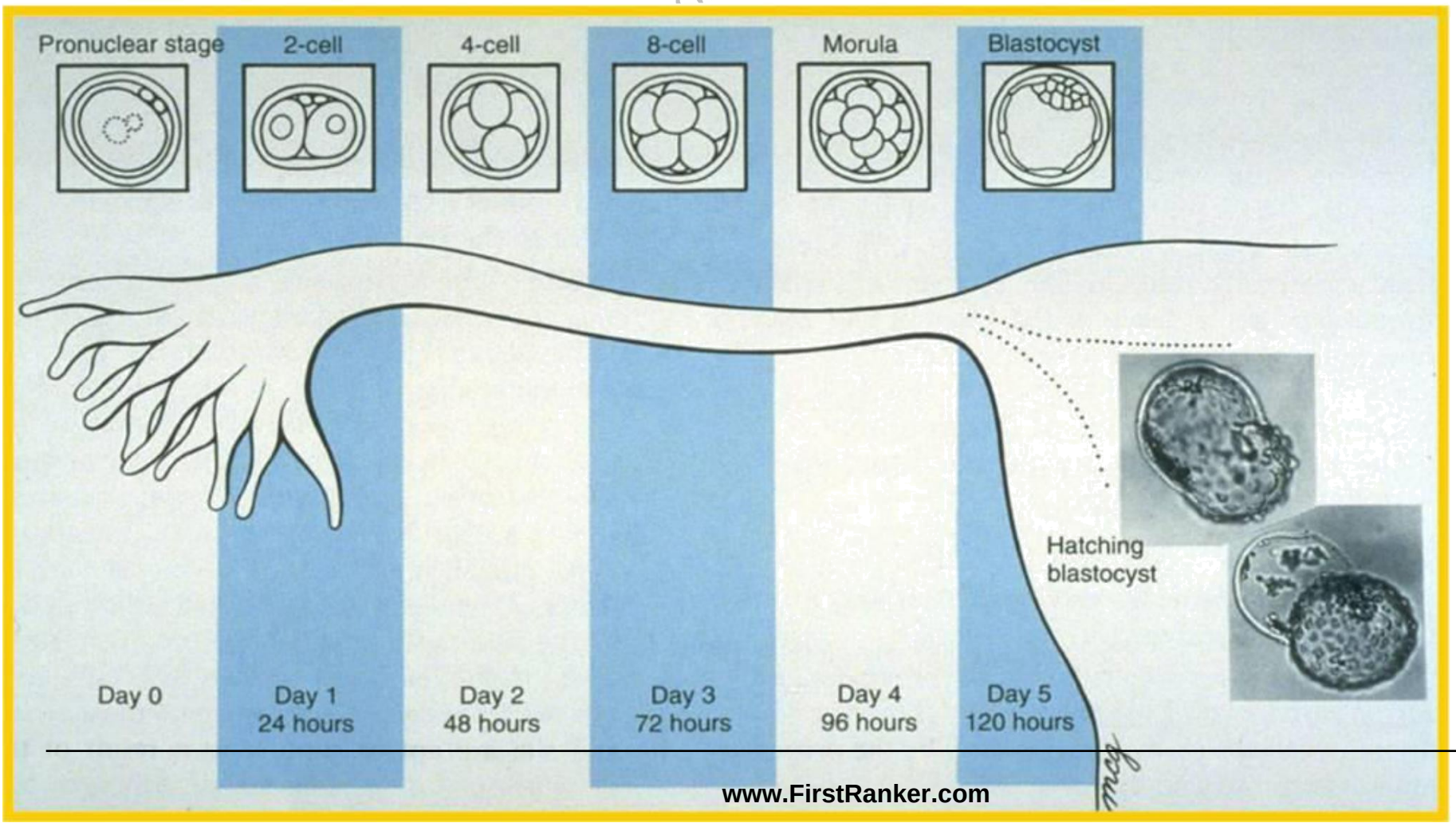


# BLASTOCYST FORMATION

- Gradually, the intercellular spaces become confluent, and finally, a single cavity, the **blastocele** forms.
- At this time ZP disappears (at the end of 4$^{th}$ day) allowing implantation to occur



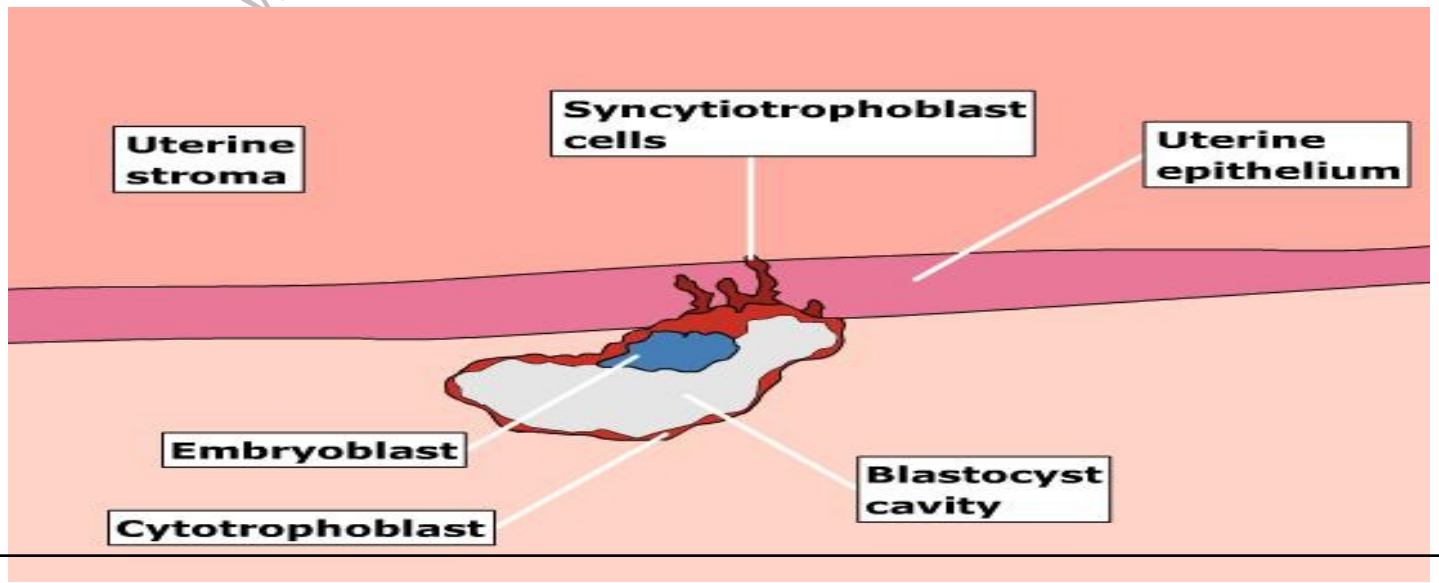
# TIME CONSUMED IN COMPLETING CLEAVAGE



# IMPLANTATION

- Begins on the 6th day after fertilization.
- L selectins on trophoblast cells and its CHO receptors on uterine epithelium mediate initial attachment of the Blastocyst to the uterus.

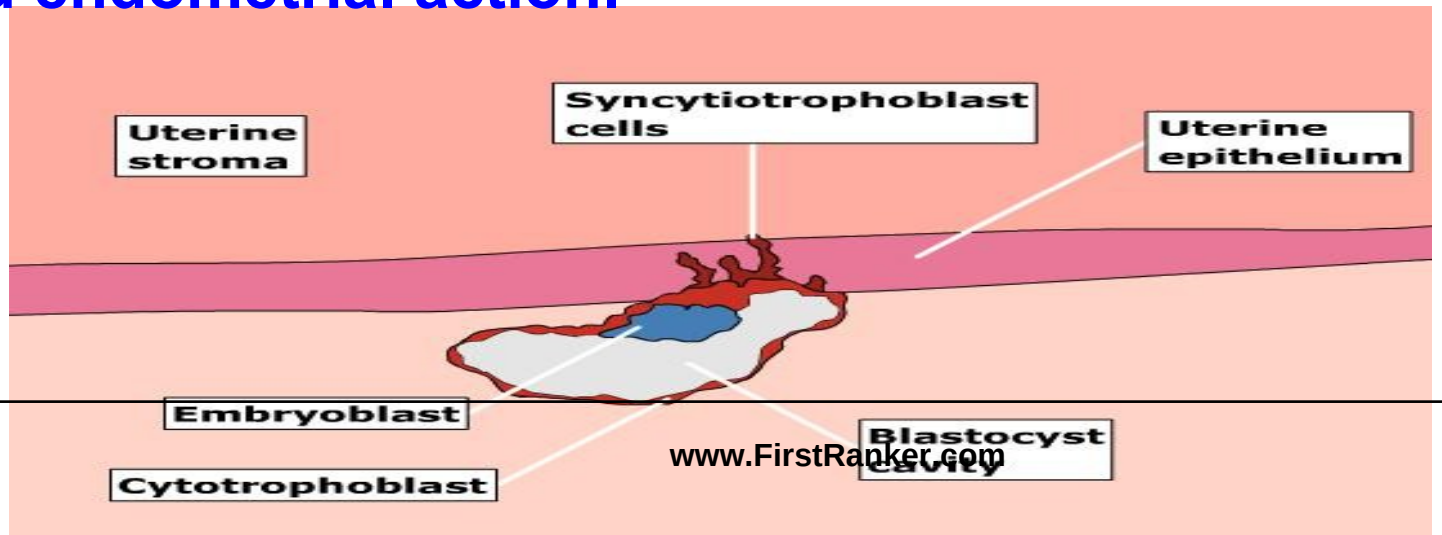




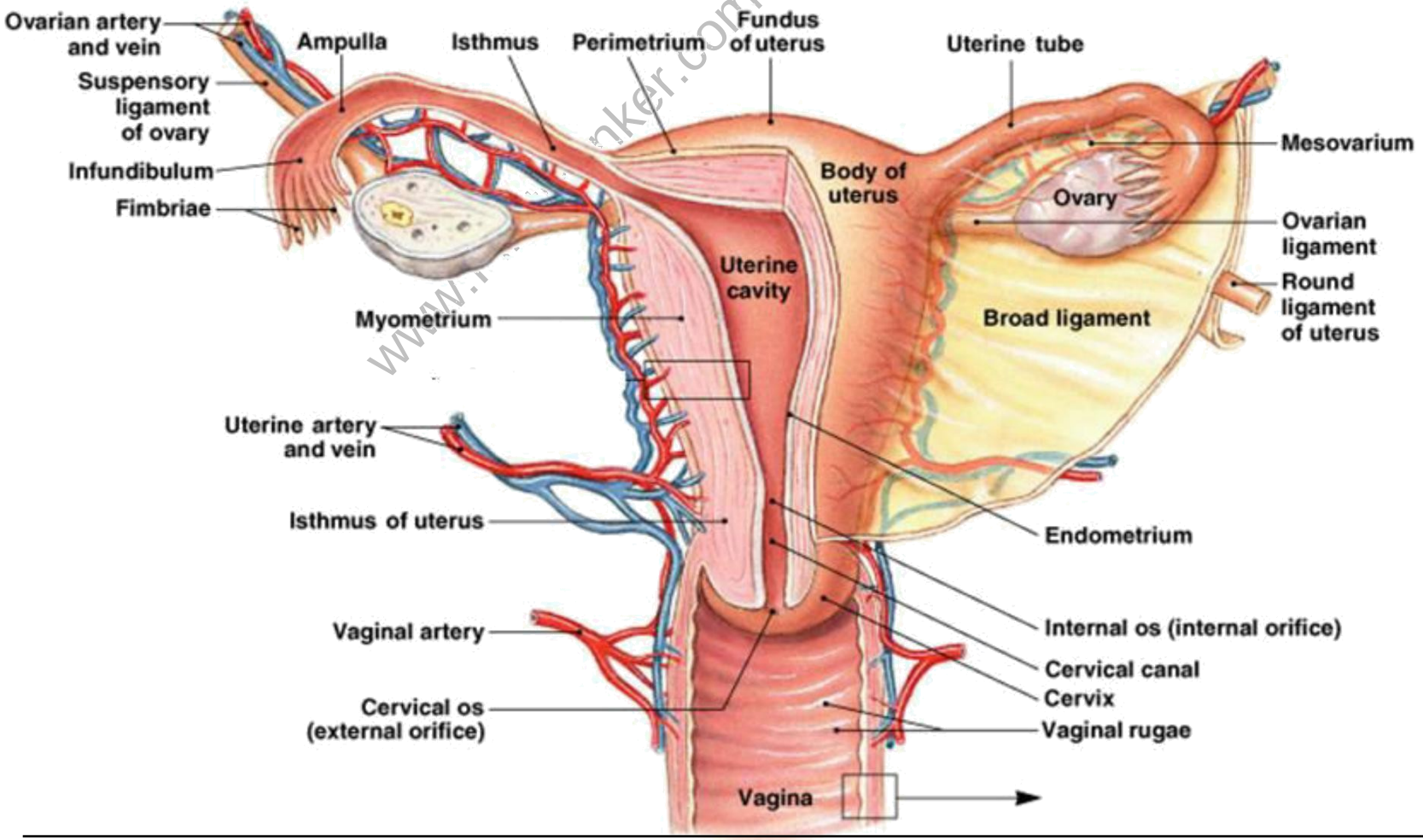
# CAPTURE OF BLASTOCYST FROM UTERINE CAVITY BY UTERINE EPITHELIUM



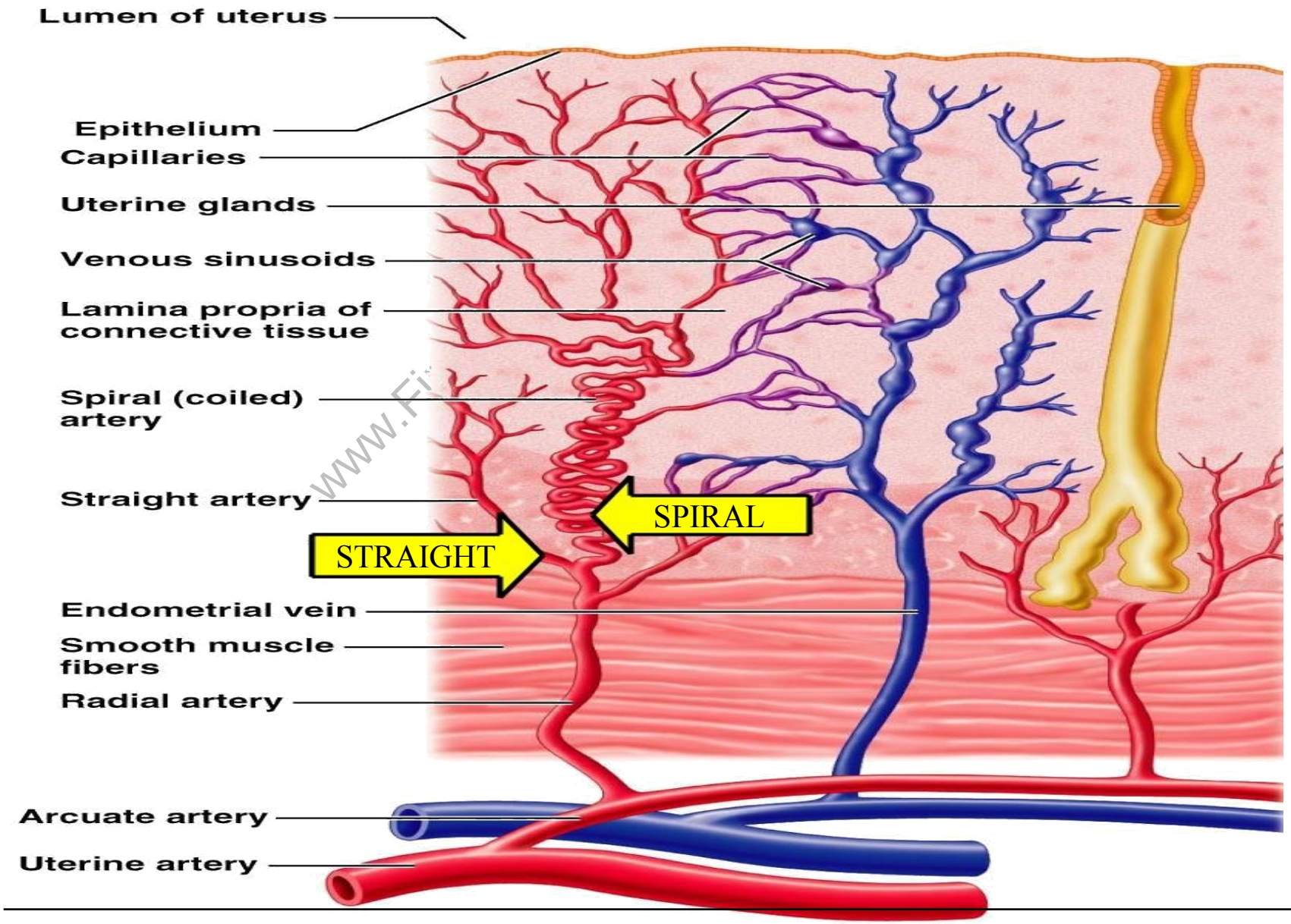
- Following capture by **selectins**, further attachment and invasion by the trophoblast involve **integrins**, expressed by trophoblast and **extracellular matrix molecules** **laminin**(attachment) and **fibronectin** (migration).
- **Implantation is the result of mutual trophoblastic and endometrial action.**



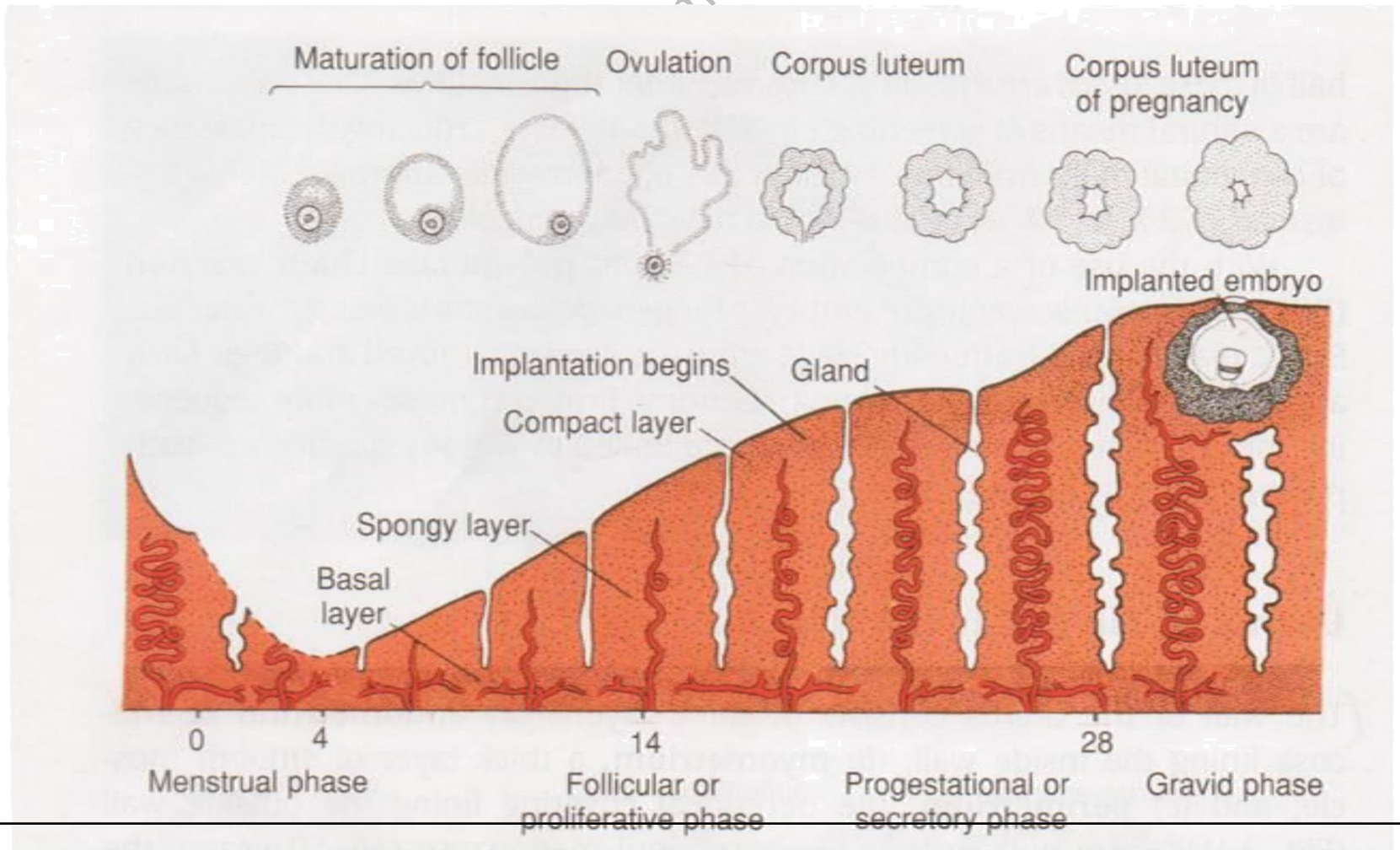
# ANATOMY OF UTERUS



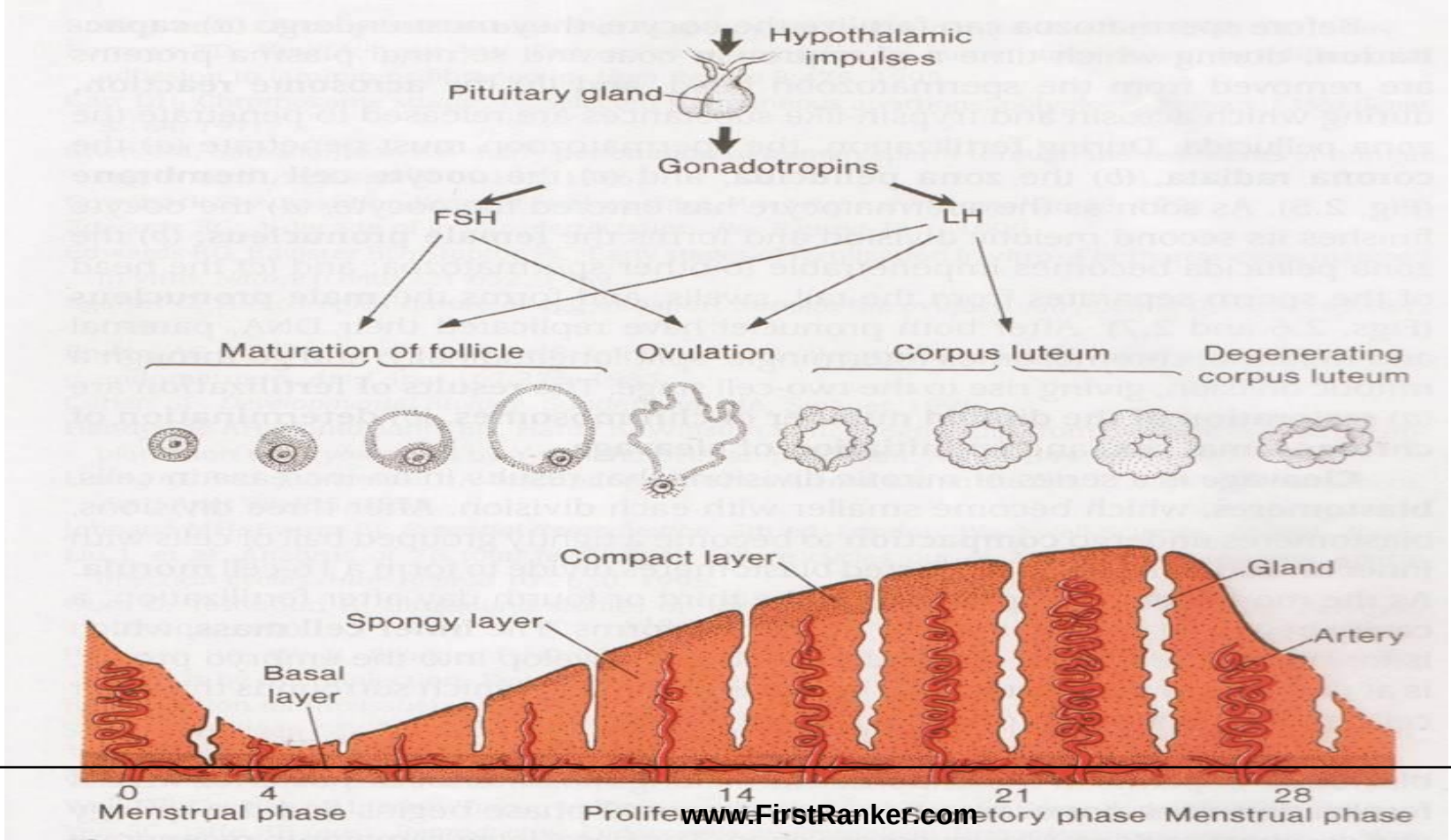

(a) Posterior view



# UTERUS AT THE TIME OF IMPLANTATION



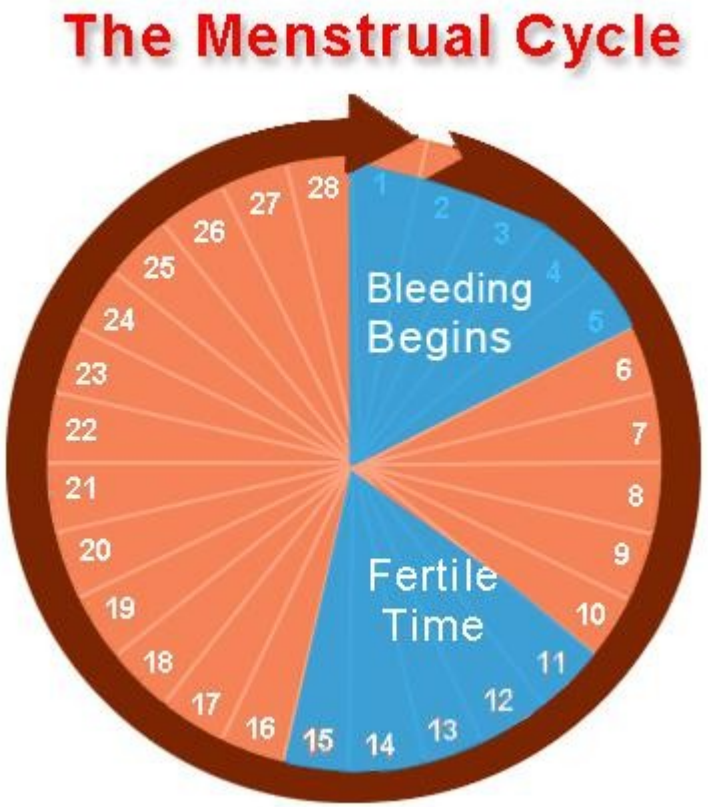
# CHANGES IN UTERINE MUCOSA CORRESPONDING TO OVARY DURING A REGULAR MONTHLY CYCLE



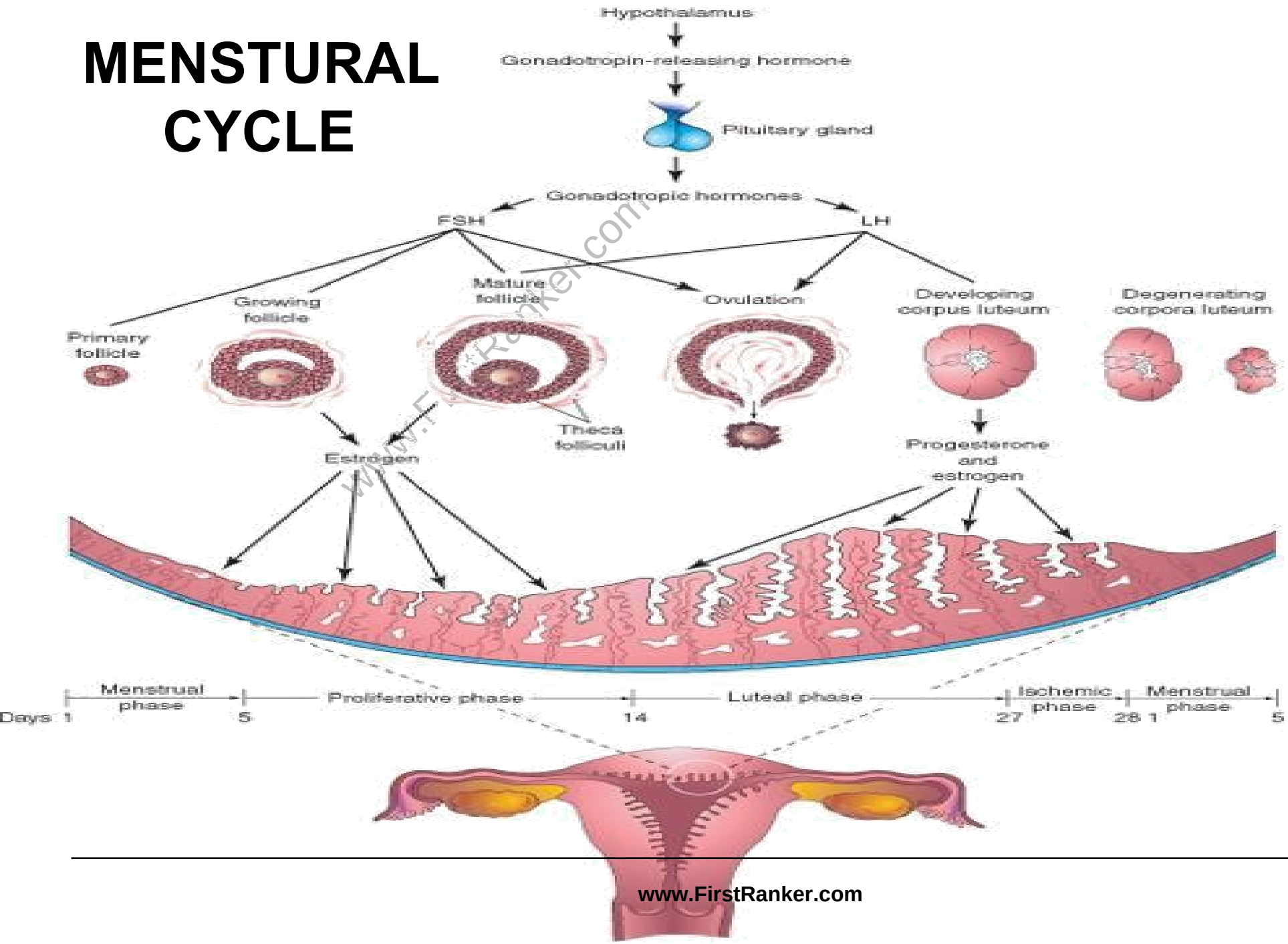
# MENSTRUAL CYCLE

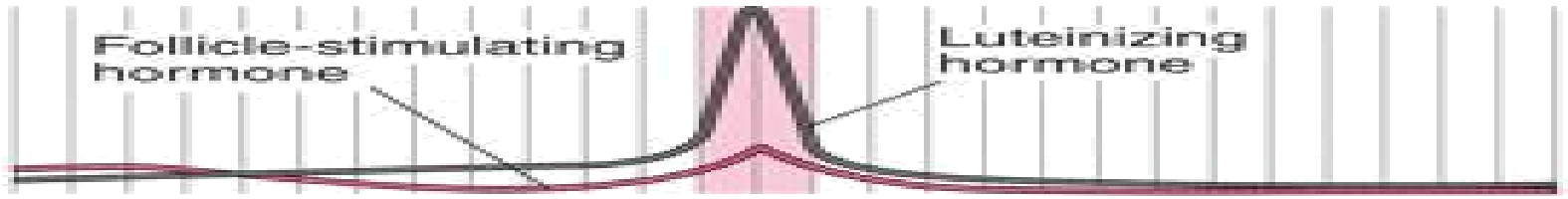
- Menstruation is the shedding of the lining of the uterus (endometrium) accompanied by bleeding.
- Menstruation starts during puberty (at menarche) and stops permanently at menopause



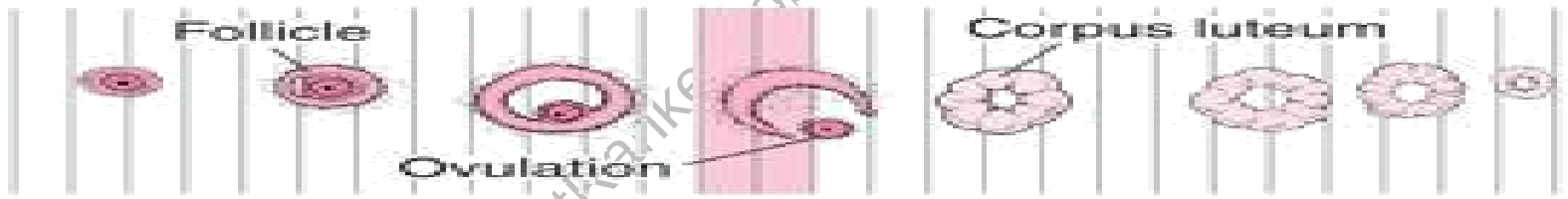


# MENSTRUAL CYCLE

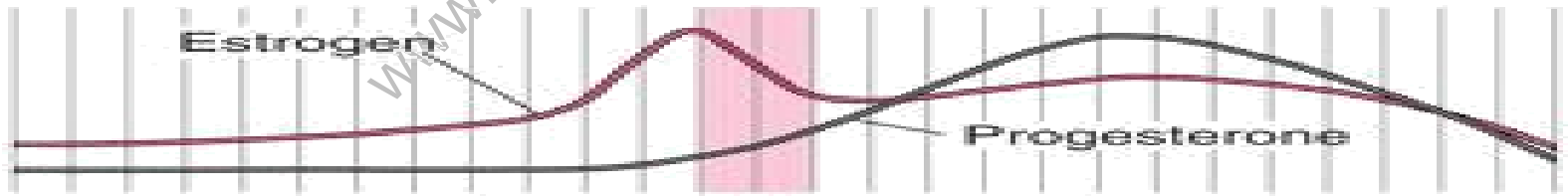




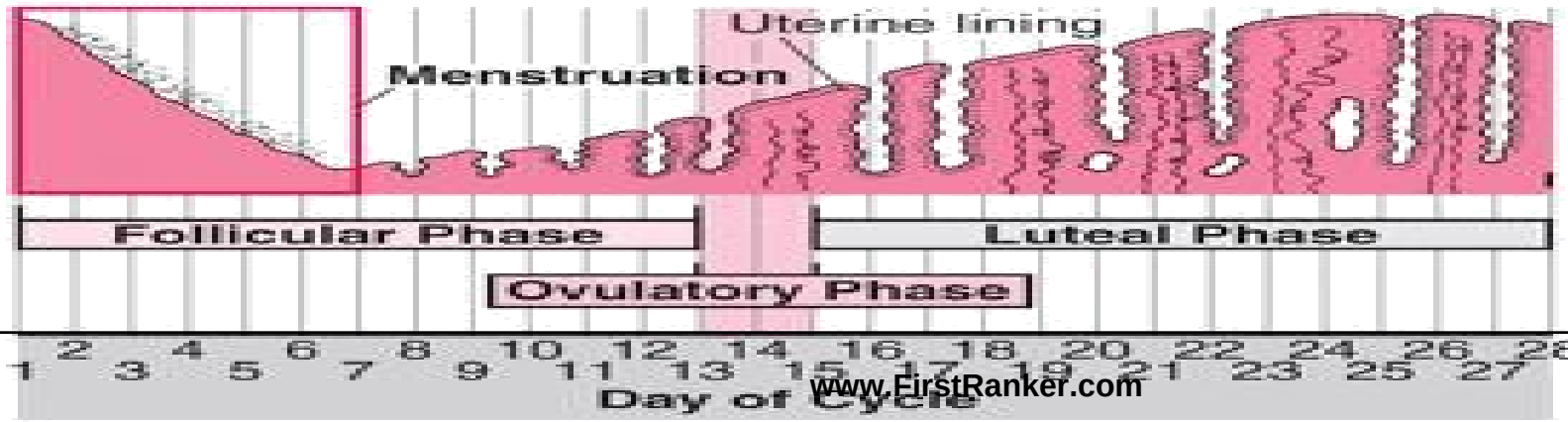

Pituitary Hormone Cycle




Ovarian Cycle




Sex Hormone Cycle




Endometrial Cycle

# THANK YOU