Cleaveg ,blastocyst formation and implantation

Cleavage

Once the zygote has reached the two-cell stage, it undergoes a series of mitotic divisions,increasing the numbers of cells.

These cells , which become smaller with each cleavage division, are known as **blastomeres**. Until the eight-cell stage, they form a loosely arranged clump.

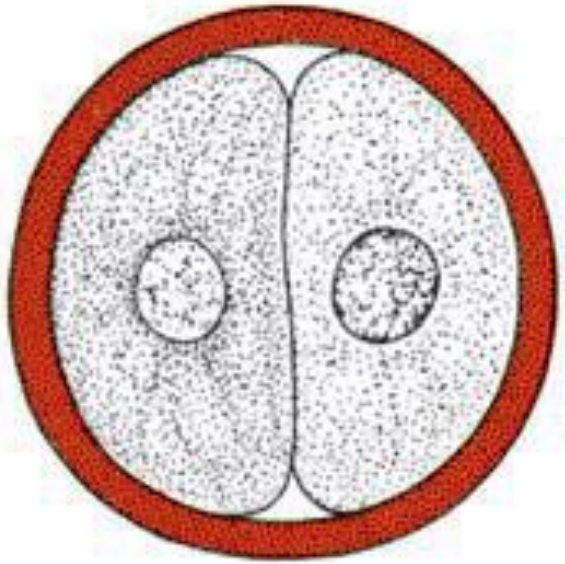
After the third cleavage, however, blastomeres maximize their contact with each other, forming a compact ball of cells held together by tight junctions

Approximately 3 days after fertilization, cells of the compacted embryo

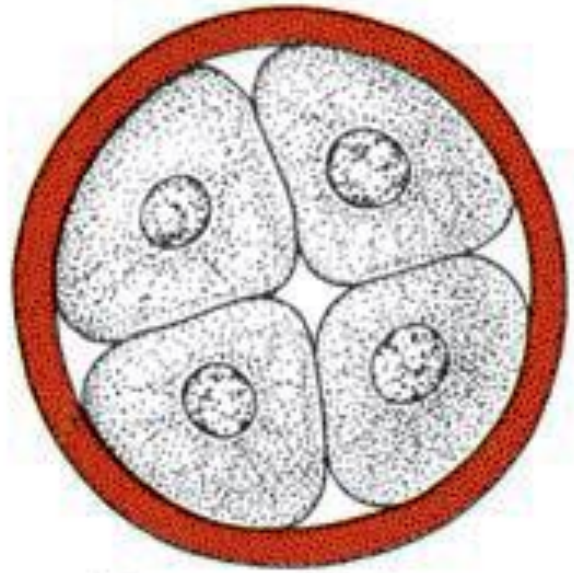
divide again to form a 16-cell **morula** (mulberry). Inner cells of the morula constitute the **inner cell mass**, and surrounding cells composed the **outer cell mass.**

The inner cell mass gives rise to tissues of the **embryo proper**.

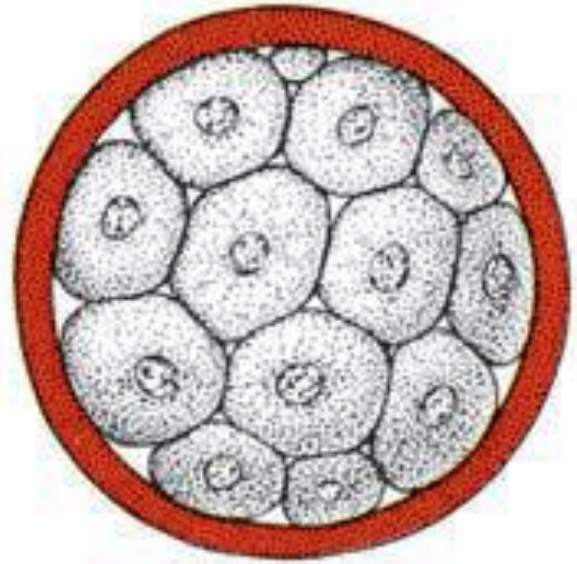
The outer cell mass forms the **trophoblast**, which later contributes to the **placenta**.



Two-cell stage



Four-cell stage



Morula

BLASTOCYST FORMATION

About the time the morula enters the uterine cavity, fluid begins to penetrate

through the zona pellucida into the intercellular spaces of the inner cell mass and finally, a single cavity **(blastocele)** forms.

At this time, the embryo is a **blastocyst**.

Cells of the inner cell mass, now called the **embryoblast**, are at one pole.

Cells of the outer cell mass, or **trophoblast**, flatten and form the epithelial wall of the blastocyst.

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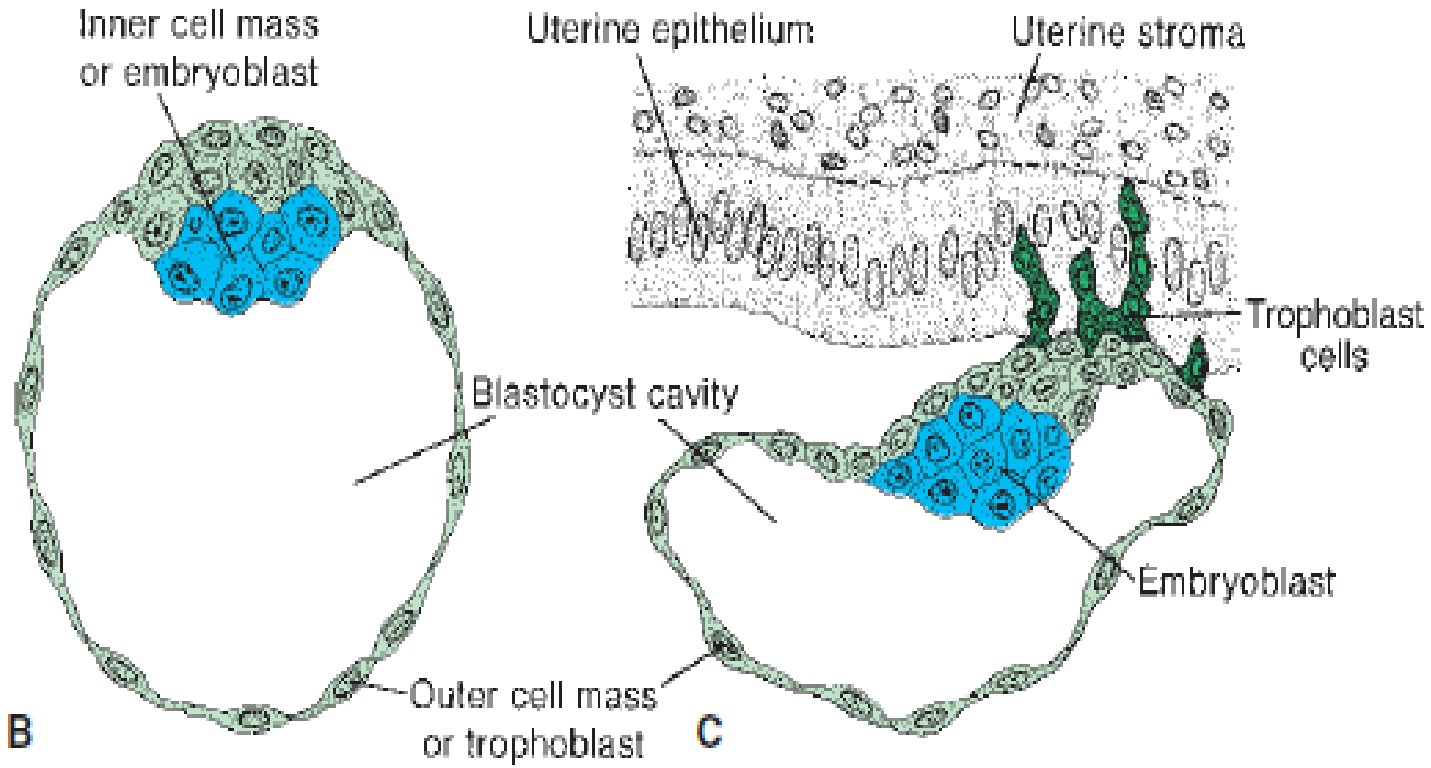

Inner cell mass
or embryoblast
Uterine epithelium
Uterine stroma
Trophoblast
cells
Blastocyst cavity
Embryoblast
Outer cell mass
or trophoblast
B
C

- The zona pellucida has disappeared, allowing implantation to begin.
- In the human, trophoblastic cells over the embryoblast pole begin to penetrate between the epithelial cells of the uterine mucosa on about the sixth day.
- New studies suggest that **L selectin** on trophoblast cells and its **carbohydrate receptors** on the uterine epithelium mediate initial attachment of the blastocyst to the uterus, so that implantation is the result of mutual trophoblastic and endometrial action.

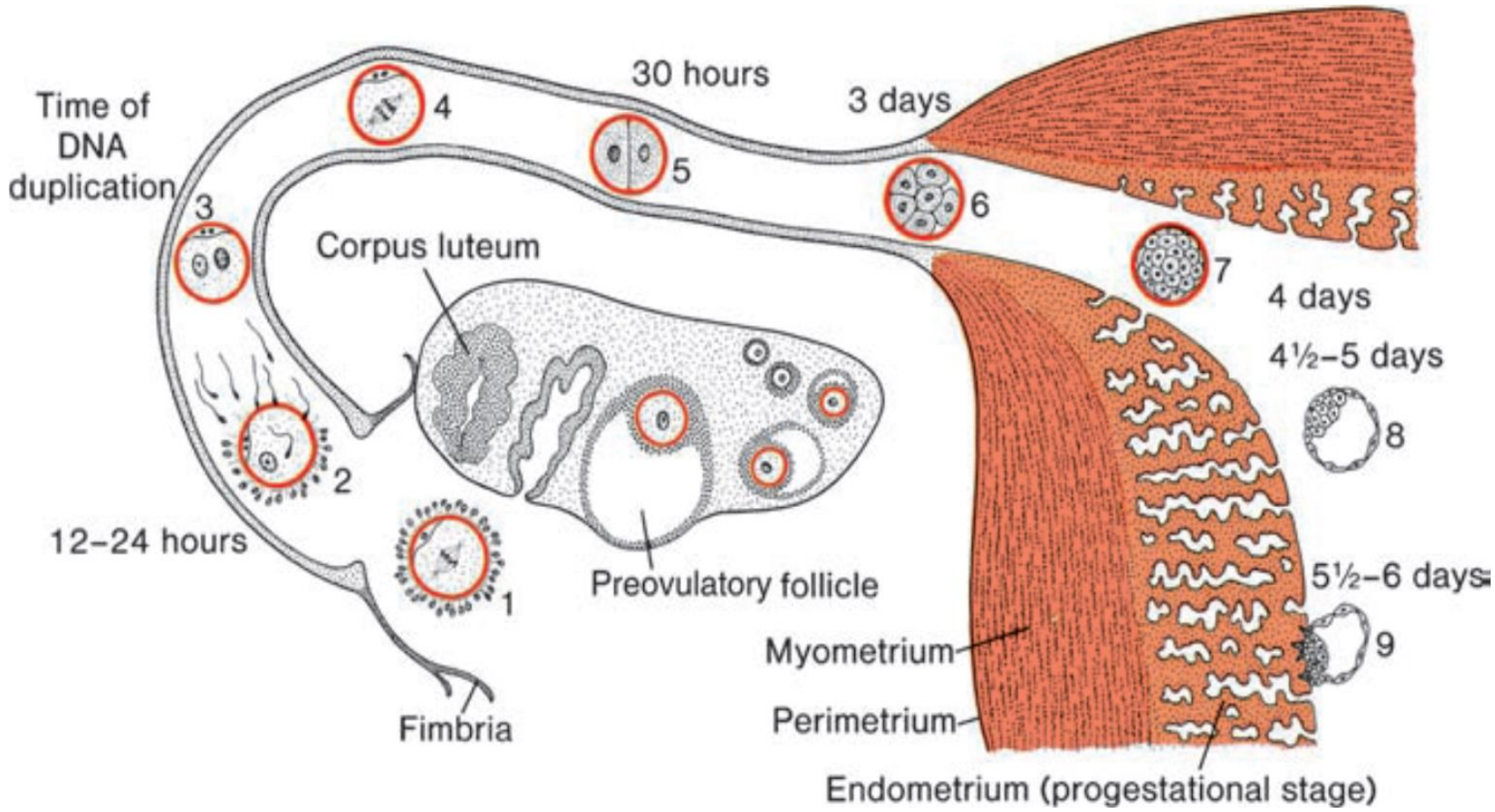
By the end of the first week of development , the human zygote through the morula and blastocyst stages and has begun implantation in the uterine mucosa.

The wall of the uterus consists of three layers:

1-Endometrium.

2-Myometrium.

3-Perimetium.

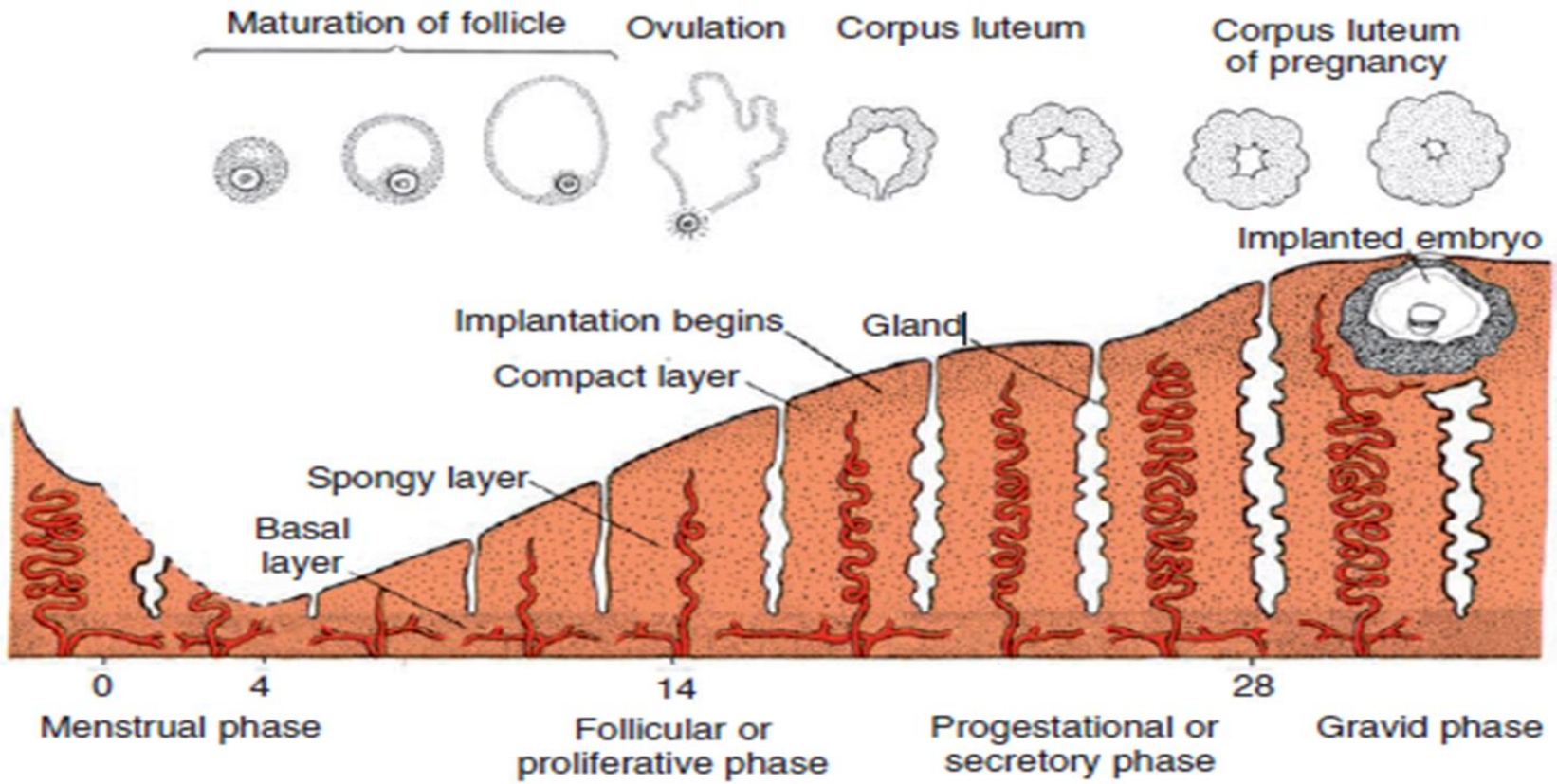

Time of DNA duplication
30 hours
3 days
4
5
6
3
7
Corpus luteum
4 days
4½–5 days
8
2
12–24 hours
1
Preovulatory follicle
5½–6 days
9
Myometrium
Perimetrium
Fimbria
Endometrium (progestational stage)

During the menstrual cycle ,the uterine endometrium passes through three stages :

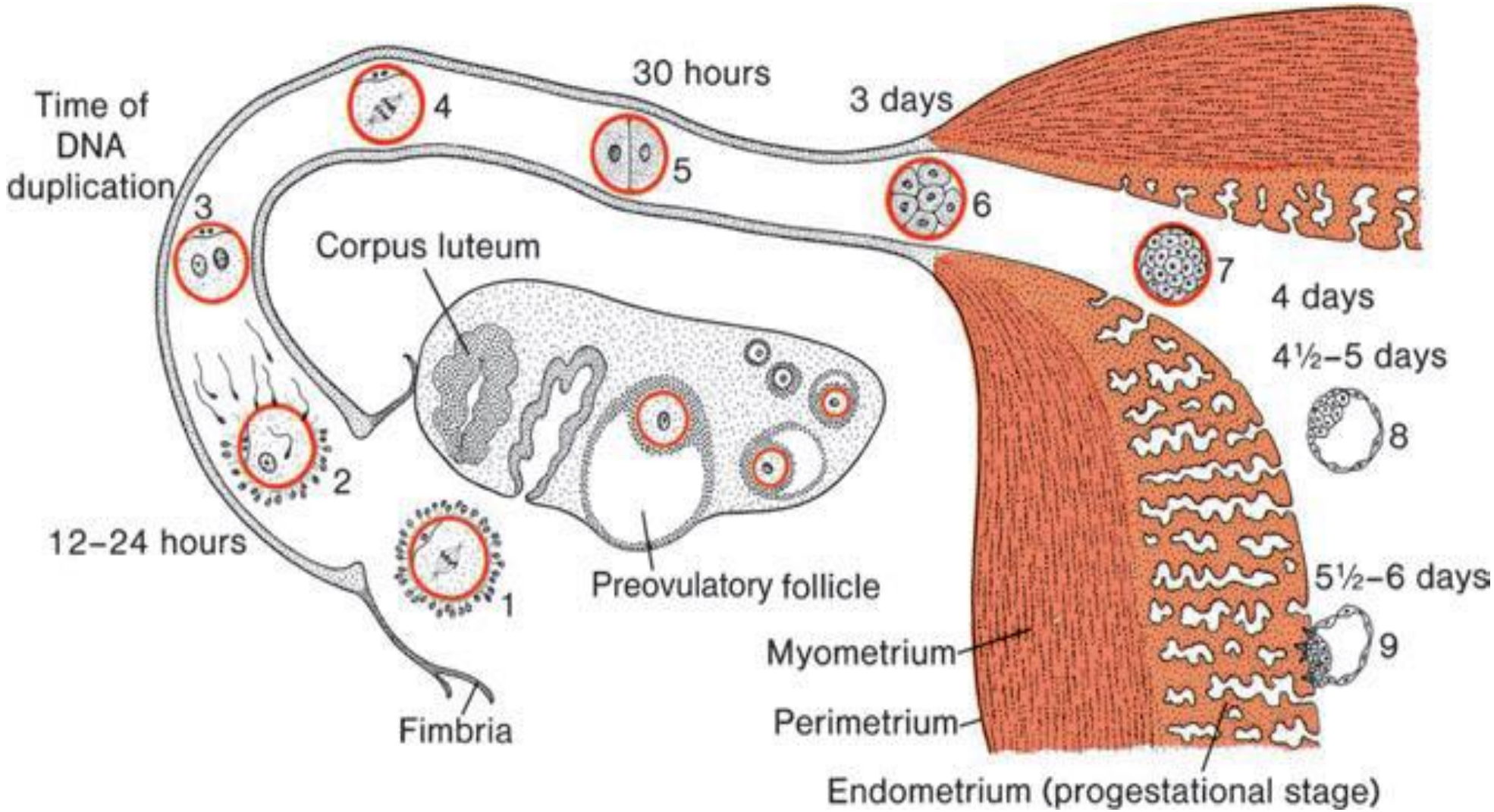
1- Follicular or proliferative phase

2-Secreatory or progestational phase

3-Menstrual phase.


Maturation of follicle
Ovulation
Corpus luteum
Corpus luteum of pregnancy
Implanted embryo
Implantation begins
Gland
Compact layer
Spongy layer
Basal layer
0
4
14
28
Menstrual phase
Follicular or proliferative phase
Progestational or secretory phase
Gravid phase

- The uterus at the time of implantation is in the **secretory phase**, and the blastocyst implants in the endometrium along the anterior or posterior wall.
- If fertilization does not occur, then the menstrual phase begins, and the spongy and compact endometrial layers are shed.
- The basal layer remains to regenerate the other layers during the next cycle.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Perimetrium
Fimbria
Endometrium (progestational stage)