

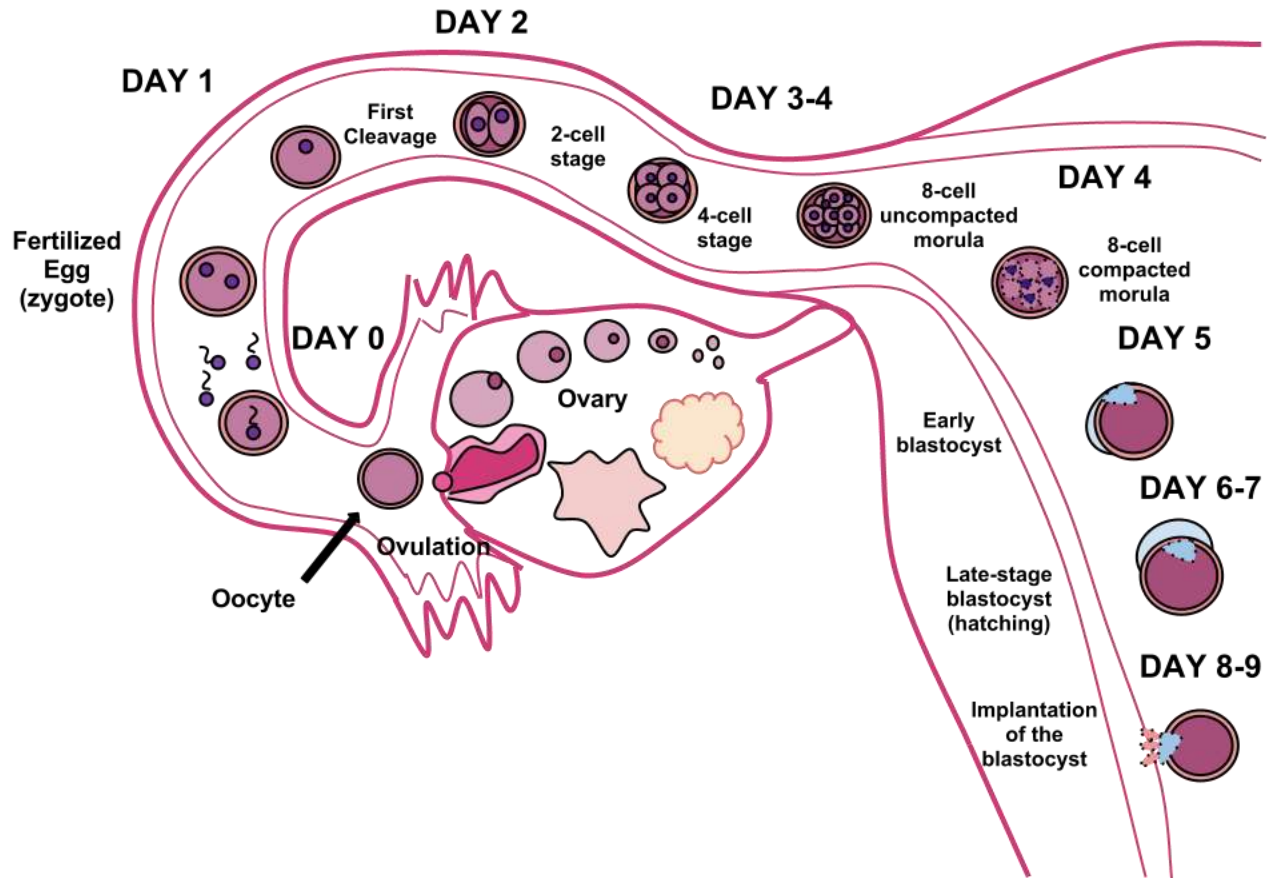
IMPLANTATION & GASTRULATION

IMPLANTATION

- **Implantation** is the very early stage of pregnancy at which the embryo adheres & embedded in the wall of the uterus
- It occurs on 6th or 7th day of fertilization
- Normal site of implantation – usually posterior uterine wall near fundus

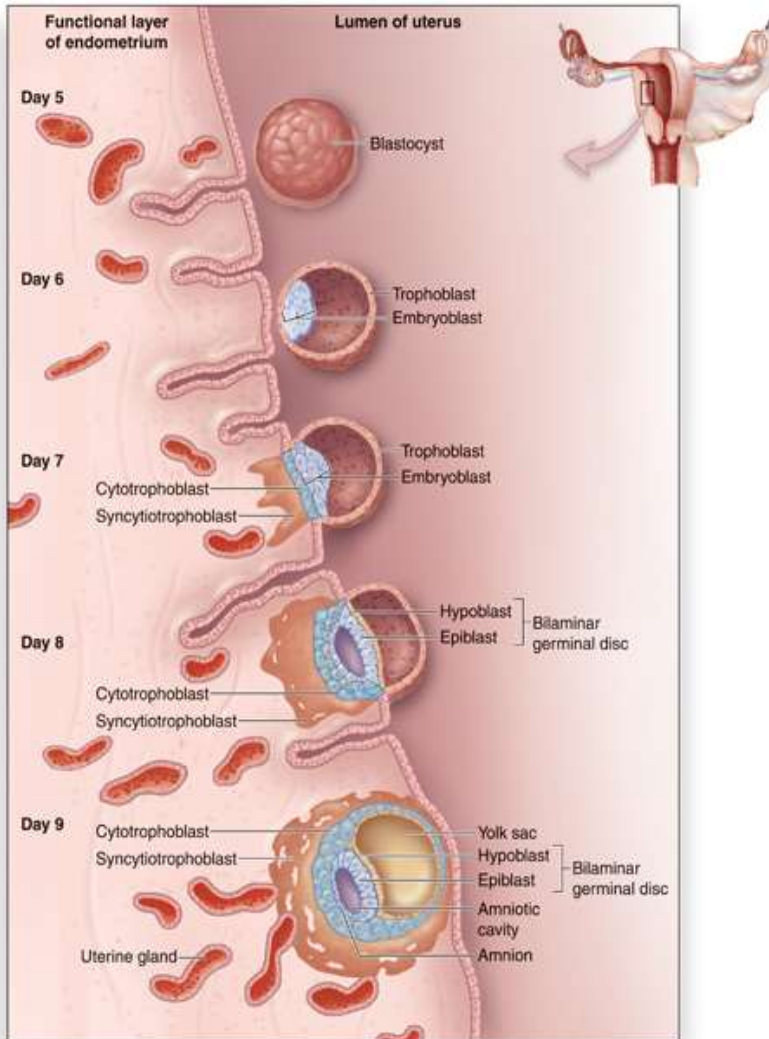
• **CHANGES OCCURRING FOR IMPLANTATION –**

- Zona pellucida is dissolved- 'Hatching'
- Blastocyst adheres to the mucosa of uterus
- Trophoblasts dissolve the endometrium
- Blastocyst is embedded completely into the endometrium
- Implantation is completed by 12th postovulatory day



Implantation

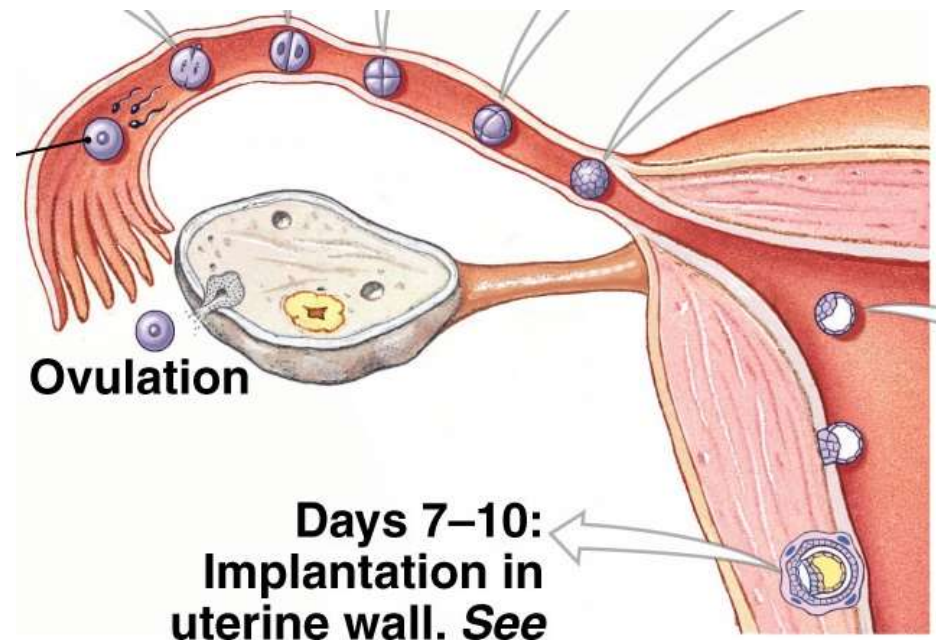
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- **APPLIED ANATOMY –**
Tubal pregnancy
- **Contraception methods that hinder implantation**
- Chemical methods
- Mechanical methods

Normal and Ectopic Implantation

- Normal: the endometrium of the uterus
- Ectopic:
 - Uterine (Fallopian) tube
 - Cervix
 - Abdominal cavity
 - Ovary



POST IMPLANTATION CHANGES

- Post implantation changes can be divided into following categories –
- Changes in the Uterus – Decidual reaction is intensified
- Changes in the Trophoblasts
- Changes in the Inner cell mass

Decidual reaction

- **Definitions:** The cellular and vascular changes occurring in the endometrium at the time of implantation.
- Normally in secretory phase of menstrual cycle the endometrial cells accumulate glycogen & lipid & get vacuolated. If pregnancy occurs these changes are intensified after implantation.
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- **TYPE OF DECIDUA –**
- **DECIDUA BASALIS** – Lies deep to developing embryo take part in of placenta formation
- **DECIDUA CAPSULARIS**
Covers the developing embryo
- **DECIDUA PARITALIS**
Line the rest of uterine cavity

Placental villi imbedded in the

Decidua basalis

Allantois

Cavity of uterus

Yolk sac

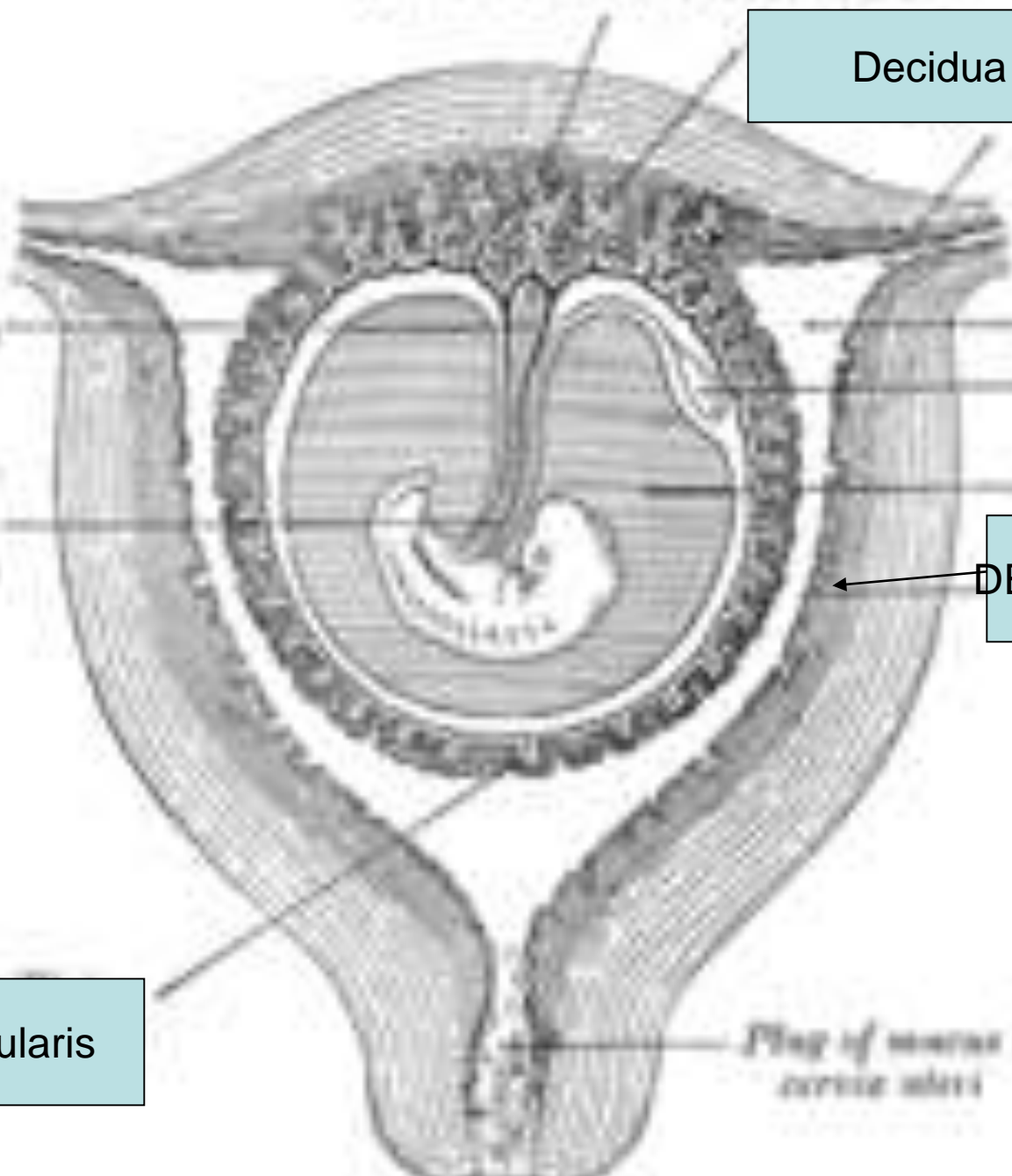
Doubled cord with the umbilical vessels

Cavity of amnion

DECIDUA PARITALIS

Decidua Capsularis

Plug of mucus in the cervical os



Changes in the Trophoblasts

- The trophoblasts are differentiated into two-
- The **Syncytialtrophoblasts** It is the outer layer of the trophoblast
- It lacks cell boundaries
- So it is a mass of multinucleated cytoplasm.
- It actively invades the uterine wall & ruptures maternal capillaries and thus establishes contact between maternal blood and embryonic extracellular fluid.

- The **cytotrophoblast** (or **layer of Langhans**) – It is the inner layer of the trophoblast. It is interior to the syncytiotrophoblast and external to the wall of the blastocyst in a developing embryo.

FORMATION OF GERM LAYERS

- AS blastocyst develops further ,it give rise not only to tissues & organs of the embryo but also to no. of structures that support the embryo & help to acquire nutrition.
- we had seen that blastocyst is spherical cyst lined by flattened trophoblastic cells & inside it there is a mass of cells, the **inner cell mass**.

Further changes

- some cells of inner cell mass differentiate i.e flattened cells now called **as hypoblast.**
- the remaining cells of inner cell mass become columnar –**epiblast.**
- thus now disc is two layered.
- a space appears b/w epiblast & trophoblast called amniotic cavity, filled by amniotic fluid or liquor amnii., roof of this cavity is formed by **amniogenic cells.**

- Flattened cells arising from hypoblastic spread & line the inside of blastocystic cavity. the lining of flattened cells is called **heuser's** membrane.
- in this way cavity is formed lined on all sides by cells of endodermal origin – **primary yolk sac.**

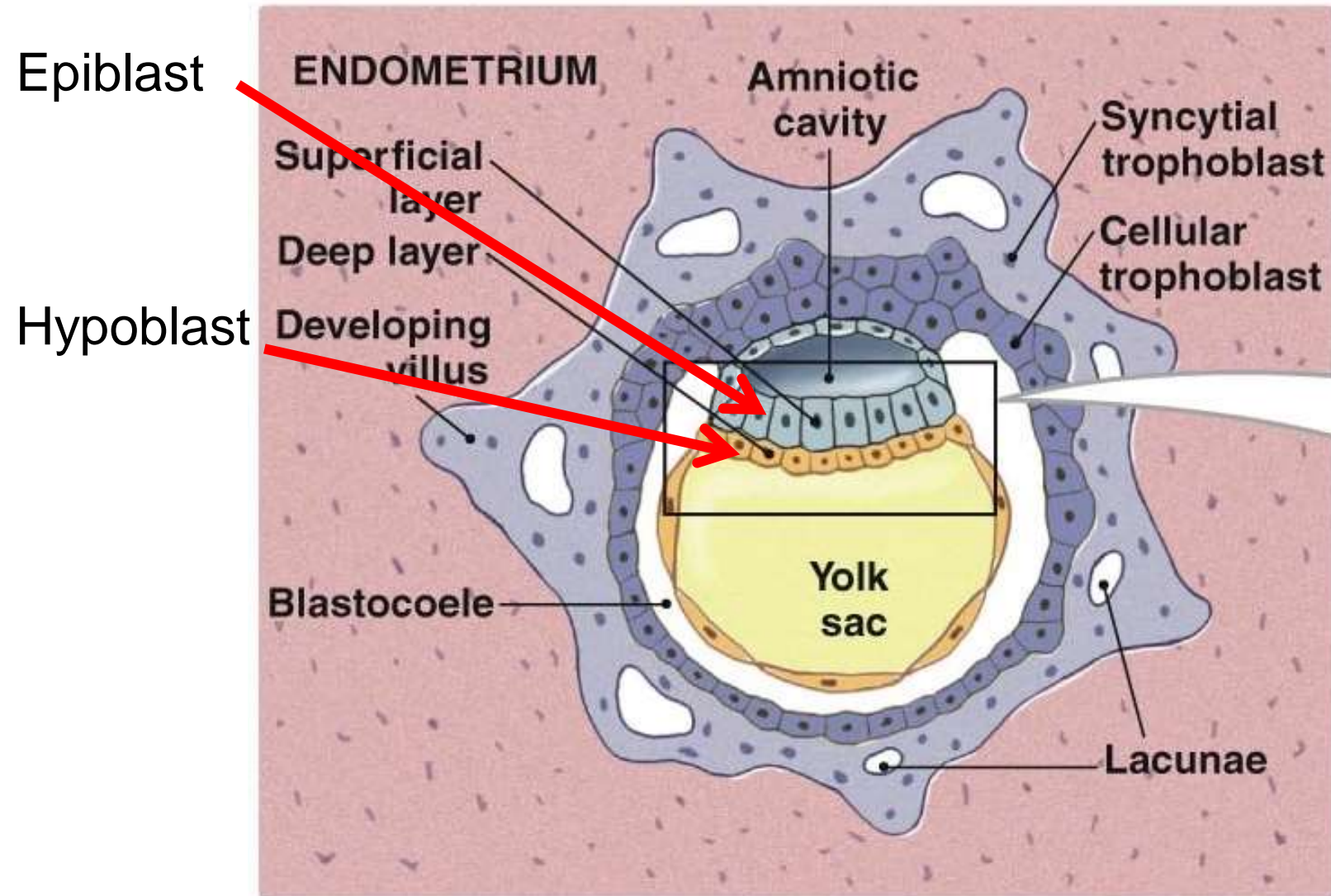
Changes in the Inner cell mass

- **thus to summarise**
- **The Inner cell mass (embryoblast)**
- Differentiate into a bilaminar (two layered) embryo. (Bilaminar disc)
- Each layer is a single cell thick
- These layers are
- the *epiblast (primitive ectoderm)* and the *hypoblast (primitive endoderm)*

- **The epiblast** - is adjacent to the trophoblast and made of columnar cells.
- It gives rise to all three germ layers of the embryo
- All the tissue of the body develop from **The epiblast**

- **The hypoblast** is close to the blastocyst cavity, and made of cuboidal cells.
- It gives rise to extraembryonic structures only, such as the lining of the primary (primitive) yolk sac (exocoelomic cavity).

Bilaminar Germ Disc



embryonic disk (or embryonic disc)

- It is the stage of development that occurs after implantation
- The floor of the amniotic cavity is formed by the **embryonic disk (or embryonic disc)**
- It is composed of two layers of cells –
 1. epiblast layer,
 2. the hypoblast layer
- epiblast layer lies between the hypoblast and the amnion
- Through the process of gastrulation, the bilaminar embryonic disc becomes trilaminar.

Extra embryonic tissue

- cells of trophoblast give origin to a mass of cells called **extraembryonic mesoderm**.
- these cells come to lie b/w the trophoblast & flattened endodermal cells. Lining the yolk sac.
- this mesoderm is called extra embryonic , as it lies outside embryonic disc.,it does not give rise to any tissues of embryo itself.

- small cavities appear in extra embryonic mesoderm , gradually join to form one large cavity called extraembryonic coelom .(chorionic cavity)
- with this the extra embryonic mesoderm is splits into two layers, the part lining inside of trophoblast --parietal somatopleuric EEM.
- the mesoderm lining outside the amniotic cavity---visceral somatopleuric EEM.

- The four **extraembryonic membranes** are the yolk sac, amnion, chorion, and allantois.

In human being **yolk sac** has a role in early erythropoiesis

The **amnion** encloses the embryo in a fluid-filled amniotic sac which protects the embryo from drying out.

The **chorion** (*chorionic cavity* or *extraembryonic coelom*) cushions the embryo against mechanical shocks.

The **allantois** functions as a disposal sac for embryo.

PGD

- Each cell of the preimplantation embryo is totipotent. That is, each cell has the potential to form all of the different cell types in the developing embryo.
- This totipotency means that some cells can be removed from the preimplantation embryo and the remaining cells will compensate for their absence.
- This has allowed the development of a technique known as **preimplantation genetic diagnosis** (PGD), whereby a small number of cells from the preimplantation embryo created by IVF, can be removed by biopsy and subjected to genetic diagnosis. This allows embryos that are not affected by defined genetic diseases to be selected and then transferred to the mother's uterus.`