

## HUMAN REPRODUCTION

### IMPLANTATION

- It starts 7<sup>th</sup> day onwards.
- **Haploid ovum** (ootid) & **haploid sperm fuse together and form** Diploid zygote.
- **Proximal centrioles** initiates 1<sup>st</sup> zygotic division.
- Mitotic division starts as the zygote moves through the isthmus of the oviduct called **Cleavage**. Towards the uterus and forms 2, 4, 8, 16 daughter cells of Blastomeres.
  - A -cell formed from cleavage is called – **Blastomene**.
- Un equal Blastomenes will develop
- Finally multiple cell stage will develop (**8 -16 blastomenes**) Morula.
- **Morula gradually increase the size & re arrange the cells.**
  - Like – Outer cells are smaller blastomeres **Micromeres**.
    - Inner cells are larger blastomeres **Macromeres**.
- Solid ball like structure formed after completion of cleavage is – **Morula**
- Uterine lining ready to receive Morula once it reach it start enlarge & continues to divide & transform in to – **Blastocyst**.
- Outer side of blastocyst cover with a outer layer – **Trophoblast**.
- Inner group of cells attached to trophoblast is called – **Inner cell mass**

**Blastocyst:**

- Becomes embedded in the endometrium of the uterus. This process is called Implantation.
- Blastocyst also called as Mammalian Blastula.
- Pregnancy begins with implantation of **Blastocyst**.

## FORMATION OF CHORIONIC VILLI

### Chorionic villi: (Formation)

- Blastocyst  $\xrightarrow{\text{Trypsin}}$  zonapellucida - Later zona pellucida cells gradually disappear.
- Blastocyst comes out zonapellucida with the help trypsin enzyme.
- Trophoblast stick to the uterine endometrium - Form - Foetal part  $\rightarrow$  Placenta Later.
- Trophoblast by enzyme (proteolytic) & develops Trophoblastic villi.

### Trophoblast:

- Inner cellular layer Cytotrophoblast cellular trophoblast cellular trophoblast also called Layer of Langhans. (Cuboidal Epithelial cells)
- Outer cellular layer **Syncytio - Trophoblast** a layer of Fused cells.

### Conceptus:

- **Embryo along with its membrane.**
- Implantation of blastocyst is completed by the end of 2<sup>nd</sup> week
- Inner cell mass forms - **Embryonic disc(or) Germinal disc**  
**Embryonic disc:**
  - Outer layer Epiblast - **Primitive Ecto derm.**
  - Inner layer Hypoblast - **Primitive Endoderm.**
 Hypoblast  $\rightarrow$  Facing Blastocyst cavity  $\rightarrow$  **Future extra Embryonic Endoderm**  $\rightarrow$  Pushed down (delamination)  $\rightarrow$  Separation into layers

Delamination → Forms the lining of the “**Yolk sac**” (exocoelomic cavity)

- Now the Embryonic disc called **Bilaminar Embryonic Disc**.

## FORMATION OF PLACENTA

### Placenta:

#### Endometrium of the Uterus,

- **Maternal Part:**

Uterine epithelium, connective tissue, capillary Endothelium.

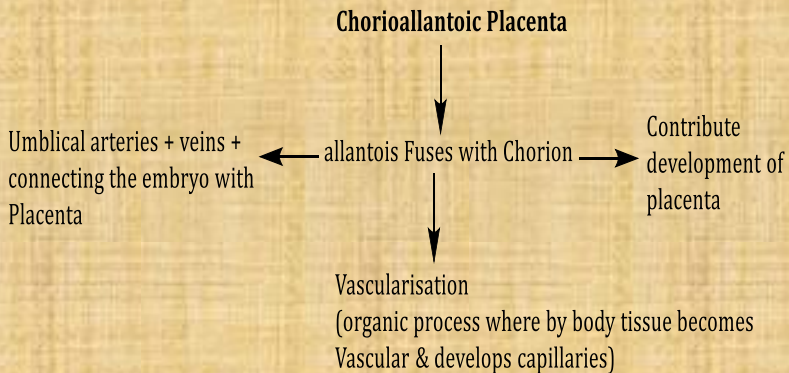
#### Foetal membrane,

- **Foetal Part :**

Foetal capillary endothelium, connective tissue, chorionic Epithelium.

### Umbilical Cord:

- Inner region of the chorionic villi develops a network of capillaries of the umbilical artery & Vein.
- These vessels run in the tough **Umbilical cord**.
- **Placenta** also called **Chorioallantoic placenta**.



### Haemochorial:

Maternal blood comes in to direct contact with the membrane of the Foetal Chorionic Villi.

### Extra Embryonic membranes:

- It help protect the embryo from desiccation, Mechanical shock, absorption of nutrients, exchange of gases etc.

Trophoblast forming Amniotic cavity.

- The lining of Amniotic cavity made up of – **“Amnioblasts”**. **Filled with amniotic Fluid.**
- **Chorion**
  - **Outer** – Trophoblast
  - **Inner** – Somatic Mesoderm / Extra embryonic mesoderm.

Chorion undergoes rapid proliferation of cells & forms – **Chorionic villi.**

### Allantois:

**Develops – Embryonic hindgut** (Splanchnopleuro – Outer mesodermal & inner endoderm)

**Allantois + Chorion** (Forms highly Vascularised) → Allanto - Chorion → Contribute → Foetal part of placenta.

### Placenta:

– Gases, Nutrients, Hormones, Antibodies by 12<sup>th</sup> week of pregnancy.

## PREGNANCY EMBRYONIC DEVELOPMENT

- After Implantation finger like projection appear to the Trophoblast called **Chorionic villi, which** are surrounded by Uterine tissue & Maternal blood.
- Chronic villi & Uterine tissue become Interdigitated (Interlock) with each other & jointly form a structural

& Functional unit between developing (**Foetus**) Embryo & maternal body called placenta.

## PLACENTA

- It is Facilitate the supply of O<sub>2</sub> & Nutrients to the Embryo
- It removes (emits) CO<sub>2</sub> & Excretory / Waste materials.
- Placenta connected embryo through foetus umbilical cord which helps to transport of substance & from the Embryo.
  - Human placenta is formed by **Chronic villi & Uterine tissue.**
  - Structural & Functional unit between developing Embryo (Foetus) & maternal body is called **Placenta.**
  - Villi of human placenta develop from **chorion.**
  - Extra structure that provides nutrition to Embryo is **Placenta.**
  - Attachment of foetus to placenta occurs through **Umbilical cord.**
  - Which hormones produced during pregnancy?
- The placenta also act as Endocrine tissue & produce several hormone.
  - HCG** – Human chorionic Gonadotropin – help the grow foetus (**progesterone**)
  - HPL** – Human placental Lactogen – similar to growth hormone & but provide energy to foetus.-Anti insulin Properties.
- Estrogen, Progestogus, Cortisol, Prolactin, Thyroxine.
- **Relaxin** :
  - It release after pregnancy, which secretes by the ovary.
- These Hormones are essential support to the **“Foetus.”**

### HCG – Function:

Interacts with **LHCG** (Luteinizing hormone / Choriogonadomajor receptor) of the ovary & promotes

maintenance of corpus luteum & initiated secreted the hormone **Progesterone**.

- It is detected in – Pregnancy test.

**Prolactin** – Luteotropic hormone, secreted from pituitary gland, produce milk.

**Thyroxin** – Normal development of baby brain.

