**Hyperplasia**

It is increase in number of cells, organs and tissues. It occurs due to hormonal stimulation or due to loss of tissues. It may be physiological or pathological.

**Physiological hyperplasia:**

**Due to hormonal stimulation**:

* Proliferation of epithelium of female breast during pregnancy as a result of estrogen stimulation.
* Proliferation of smooth muscles of uterus due to estrogen stimulation.

**Due to loss of tissues:**

* When liver is resected or hepatectomy, the remaining cells in liver begin to divide within 12 hours and overcome the loss of tissues and increase the size of liver. This process is due to release of growth factors from the uninjured hepatocytes. After the size of liver is regained, release of growth factors is inhibited by growth factor inhibitor that stops the proliferation.

**Pathological hyperplasia:**

During normal menstrual period, there is burst of uterine epithelial proliferation due to release of estrogen or progesterone. If balance of these hormones is disturbed that results in endometrial hyperplasia that cause abnormal bleeding. e.g.

* Benign prostatic hyperplasia
* Papilloma viral infections

 **Metaplasia**

Metaplasia is the replacement of adult one type of cells into the other e.g. epithelial or mesenchyme cells are replaced into other types of cells.

**Causes of metaplasia:**

This replacement of one type of cells to other is due to:

* Chronic inflammation
* Chronic irritation
* Vitamin A deficiency

**Types of metaplasia:**

Metaplasia is of two types:-

1. Epithelial metaplasia
2. Mesenchymal metaplasia

**Epithelial metaplasia:** The replacement of pseudo-stratified columnar epithelium into the stratified squamous epithelium. In respiratory state, bronchi show this type of metaplasia in response to some irritation.

Replacement of columnar epithelium into squamous epithelium in kidney and in pelvic region and in respiratory tract in response to vitamin A deficiency.

**Mesenchymal epithelium:** Metaplasia of fibroblast into the osteoblasts to form bone in response to the traumatic injury. It is also known as ‘’myositis ossificans’’.

**Occurrence of metaplasia:**

Metaplasia is thought to arise by reprogramming of stem cells. Metaplasia does not always occur in the direction of columnar to squamous epithelium. e.g.

In gastroesophageal reflex disease, the squamous epithelium of the esophagus is replaced by intestinal columnar epithelium.

 Metaplasia is considered as double edge sword. The metaplastic cells have more resistance as compared to other cells but it has disadvantage that it move towards the cancer cells due to altered pathway in stem cells.