SNS COLLEGE OF ALLIED HEALTH SCIENCES

SNS Kalvi Nagar, Coimbatore - 35

Affiliated to Dr MGR Medical University, Chennai

DEPARTMENT: ALLIED HEALTH SCIENCES

COURSE NAME: PATHOLOGY

Topic:CELLULAR ADAPTATION

Introduction of pathology

- Pathology (from the Greek word pathología, meaning the study of suffering) refers to the specialty of medical science concerned with the cause, development, structural/functional changes, and natural history associated with diseases.

Cellular adaptation

- In cell biology and Pathophysiology, cellular adaptation refers to changes made by a cell in response to adverse or varying environmental changes. The adaptation may be physiologic (normal) or pathologic (abnormal).
- **Types**
- Atrophy
- Hypertrophy
- Hyperplasia
- Metaplasia
- Dysplasia

Mechanism and example of cellular adaptation

- **Atrophy-**Cellular atrophy is a decrease in cell size and number.
- Mechanism-decreased in protein synthesis and increased in protein degradation in the cell.
- Physiological-Brain with ageing
- Pathological-Ischemic atrophy
- Hypertrophy-Cellular hypertrophy is an increase in cell
- Causes-increased functional demand or stimulation of hormone and growth factor
- Mechanism- increased production of cell protein
- Physiological- increased size of uterus in pregnancy
- Pathophysiology-cardiac muscle hypertrophy
- Hyperplasia-Hyperplasia is an increase in the number of cells in an organ
- Mechanism-Growth factor induced proliferation of mature cell or increased output of new cells from stem cells
- Physiological-breast –puberty, pregnancy, lactation
- Pathological-hormonal excess (endometrial/prostate) or certain viral infection(papilloma virus)

- Metaplasia-when a cell of a certain type is replaced by another cell type
- Mechanism- due to reprogramming of the precursor cells, present in the normal tissues.
- Epithelial metaplasia- bronchus
- Mesenchymal metaplasia-arterial wall

- Dysplasia-Dysplasia refers to abnormal changes in cellular shape, size, and/or organization.
- Mechanism- mechanism of protein folding and the unfolded protein response

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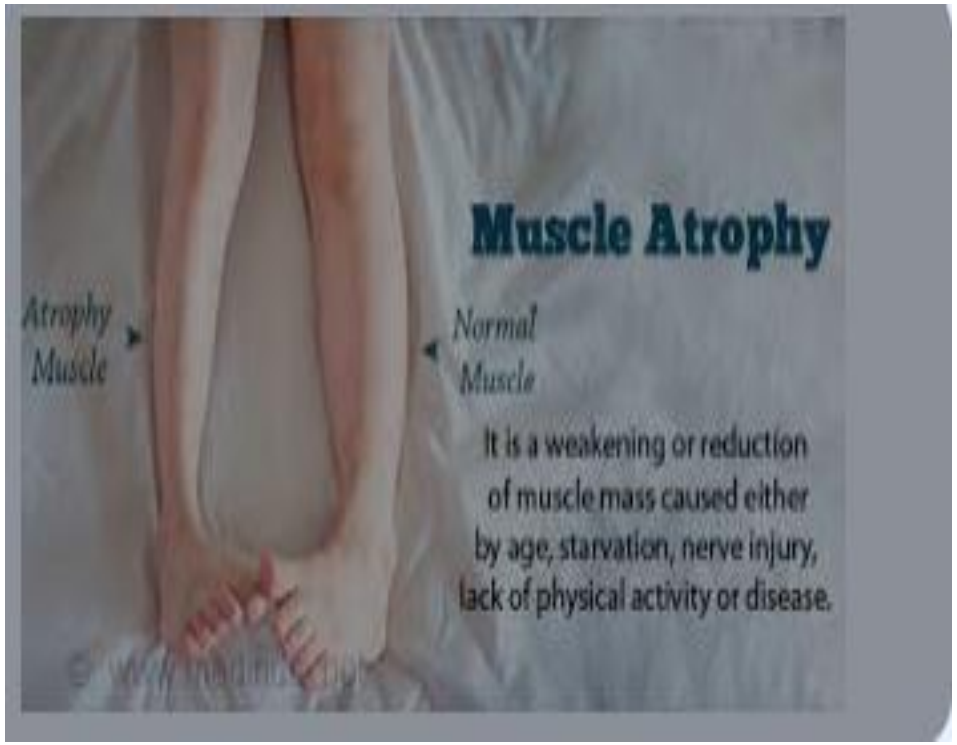

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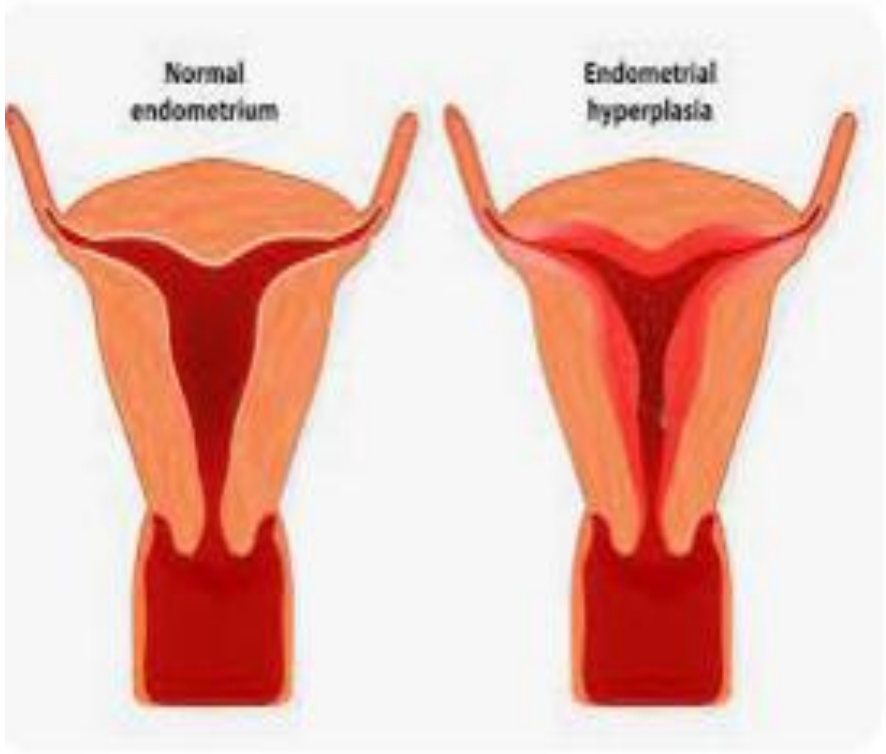

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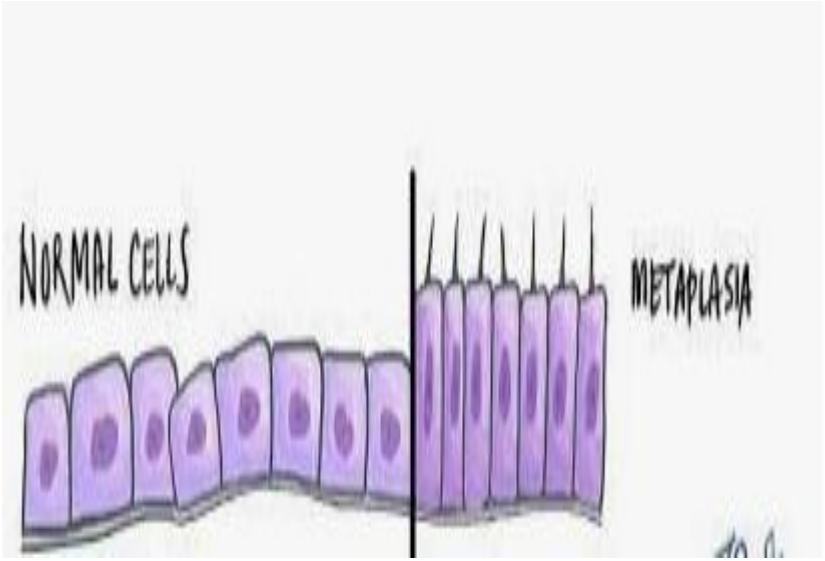
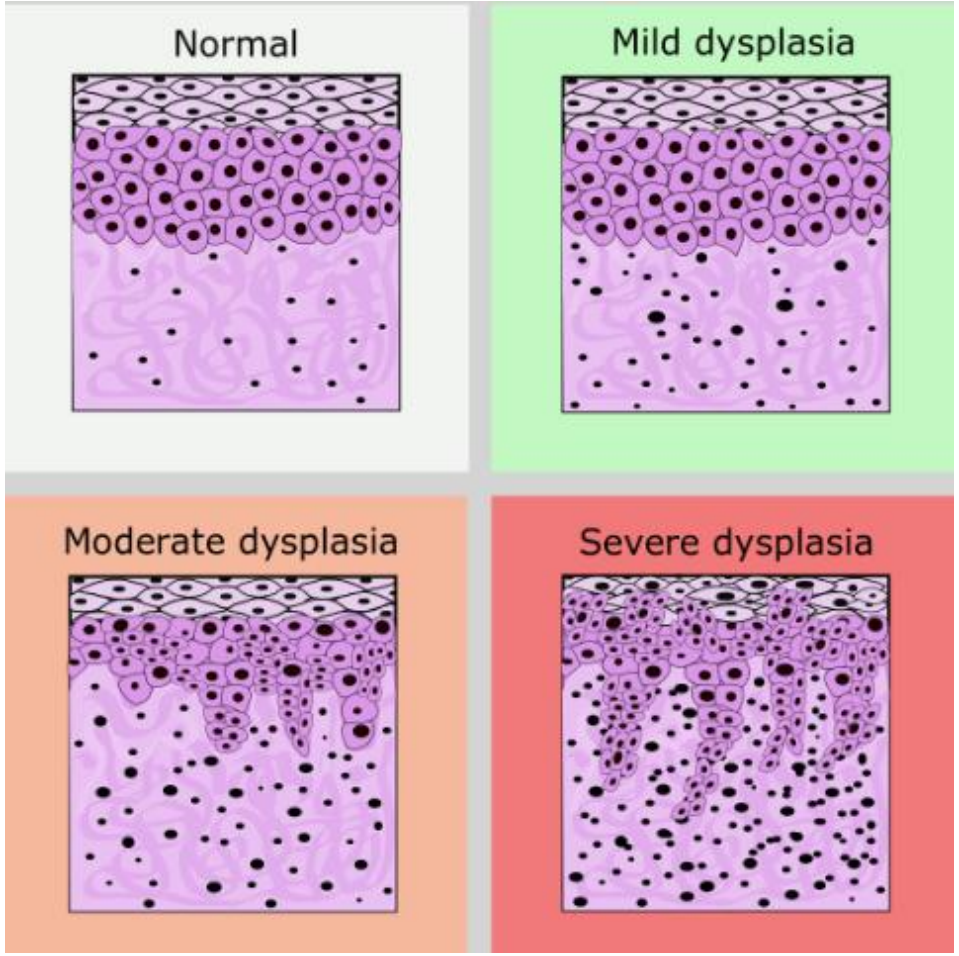


Dysplasia

- Dysplasia-Dysplasia refers to abnormal changes in cellular shape, size, and/or organization.
- Mechanism- mechanism of protein folding and the unfolded protein response

Examples of dysplasia:

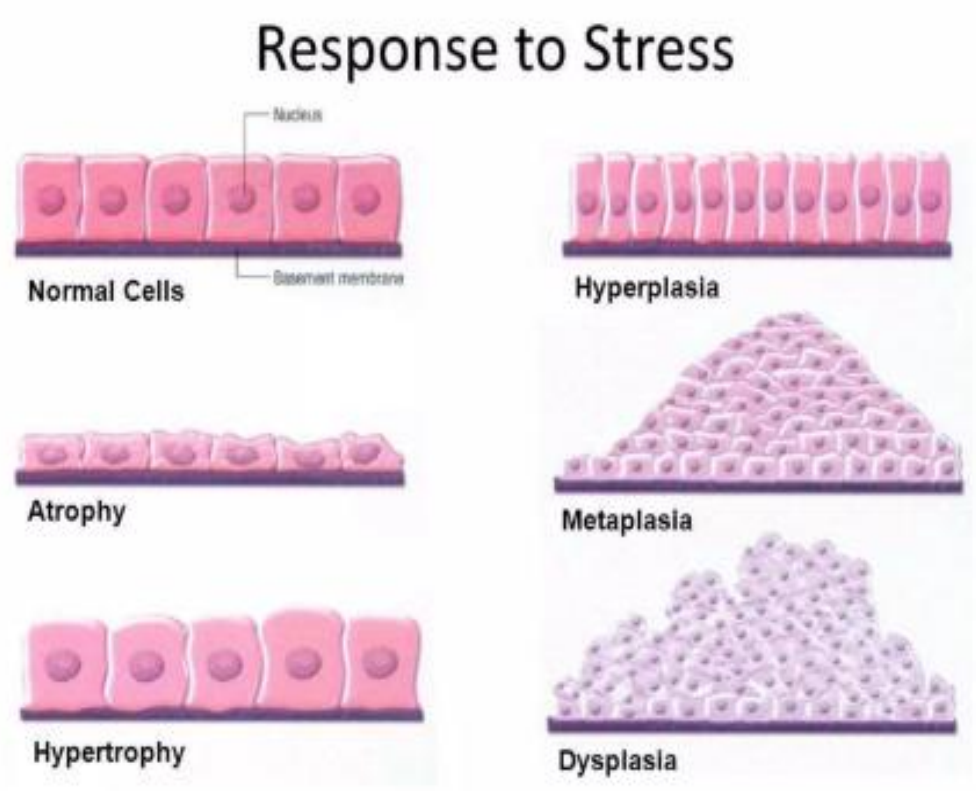
- Hip dysplasia.
- Skeletal dysplasia.
- Ectodermal dysplasia (affects the skin, hair, nails, teeth, and sweat glands)



Cellular response

- **Cellular response**, or a cell's response to a signal, is the final step in the signal transduction pathway

- **Cellular stress response** is the wide range of molecular changes that cells undergo in response to environmental stressors including extremes of temperature, exposure to toxins, and mechanical damage. Cellular stress responses can also be caused by some viral infections.



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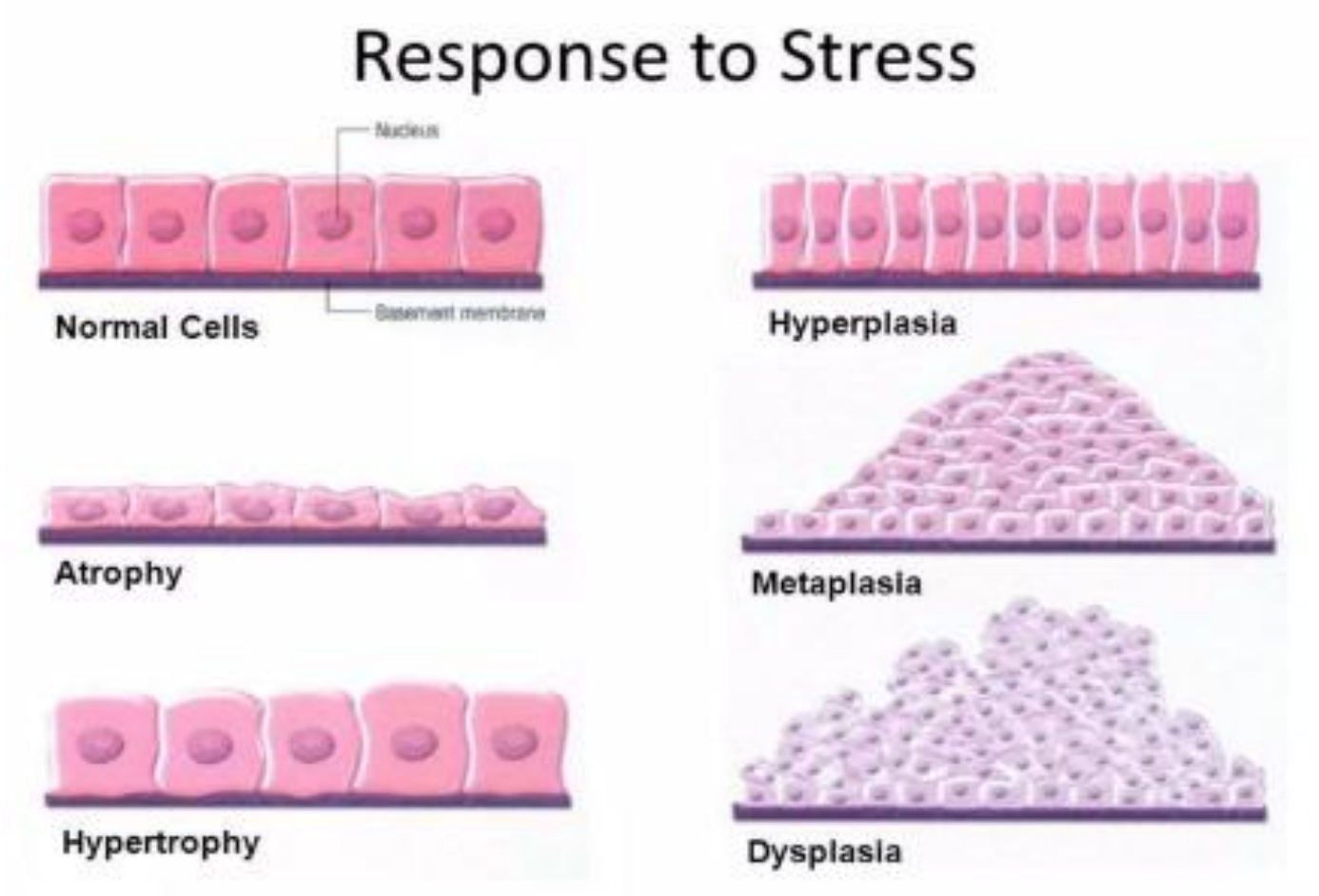
Response to Stress
Nucleus
Basement membrane
Normal Cells
Hyperplasia
Atrophy
Metaplasia
Hypertrophy
Dysplasia

ASSESSMENT

- What is detail of pathology?
- What is cellular adaptations?
- What are all the types of cellular adaptations?
- What is stress response?