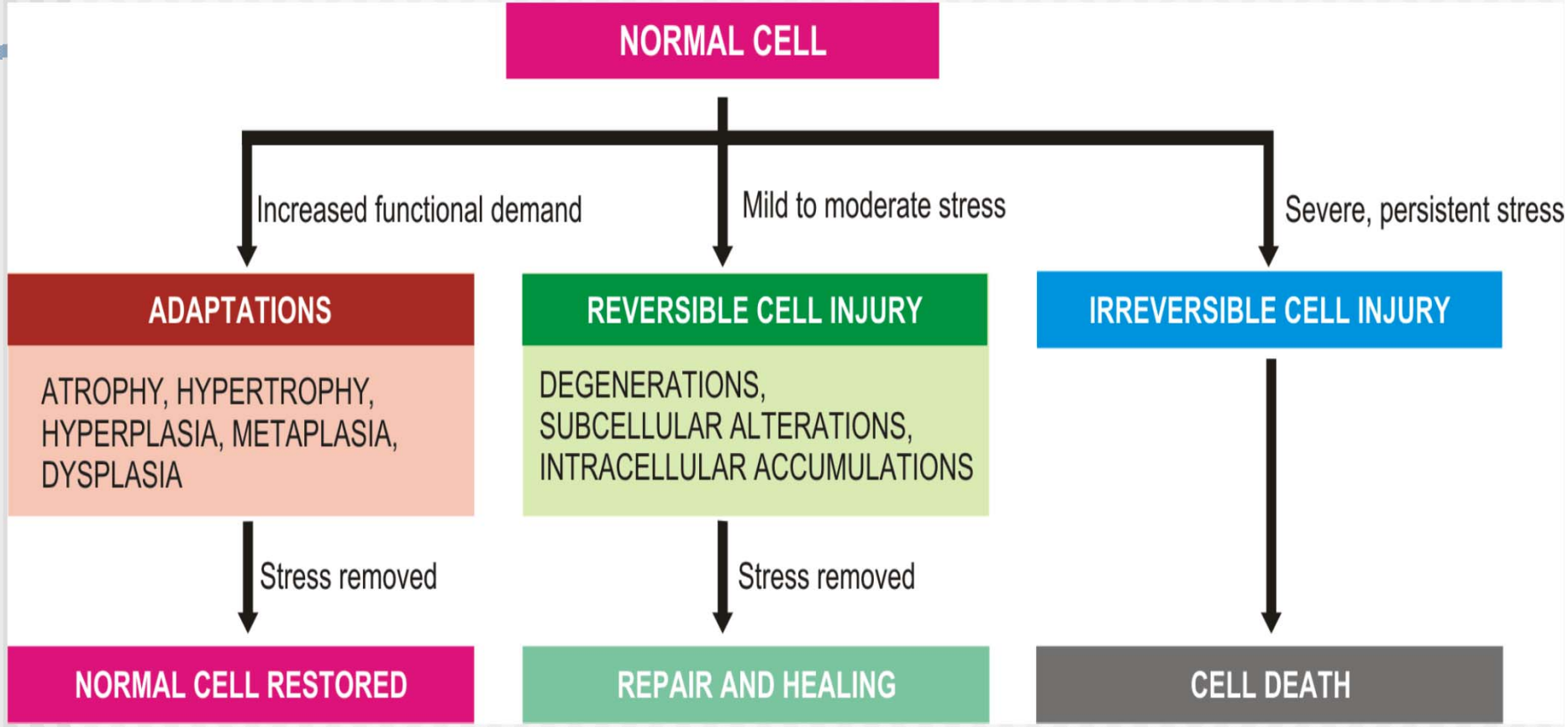
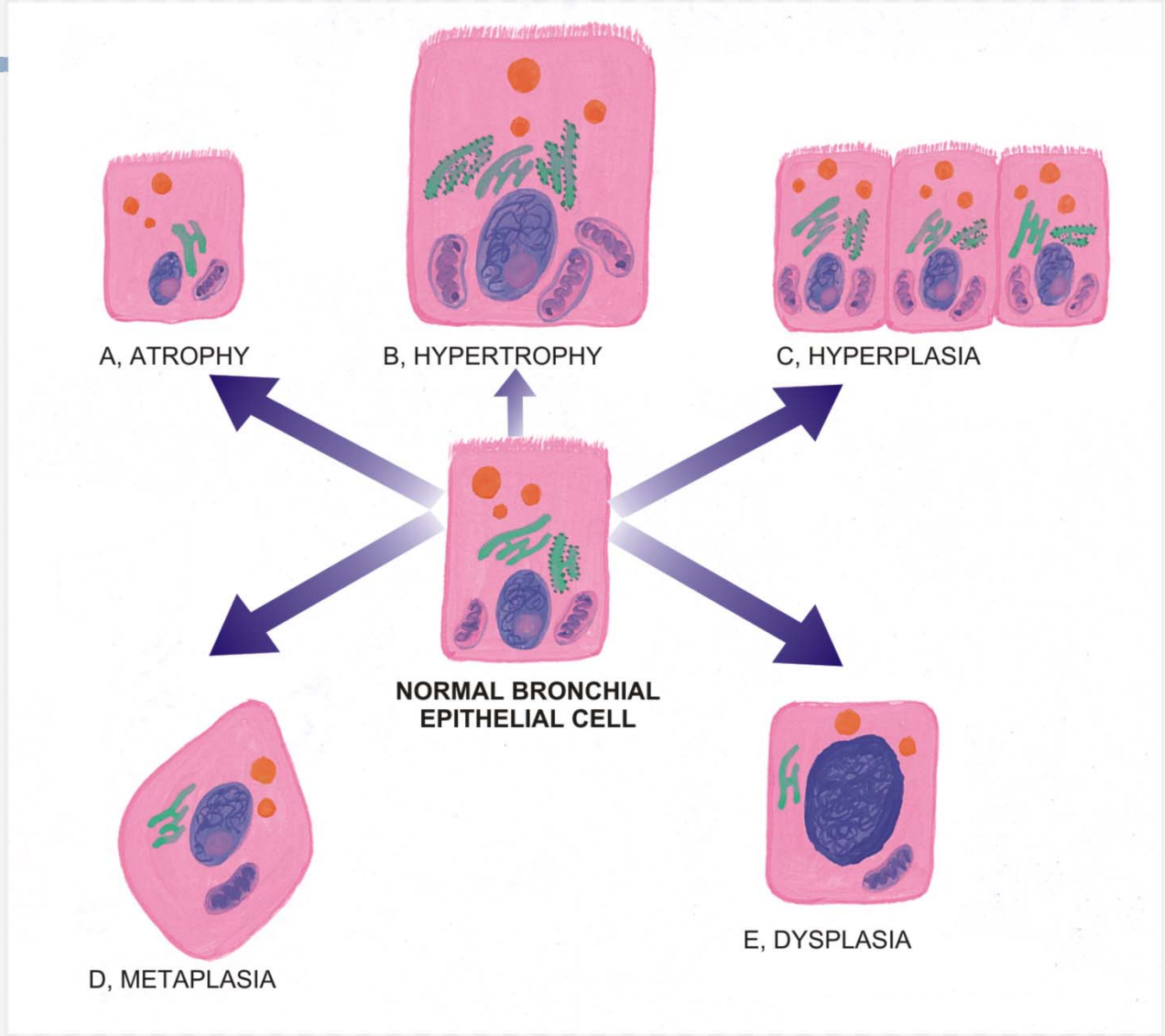
HM/CH-1/L-13

CELLULAR ADAPTATIONS

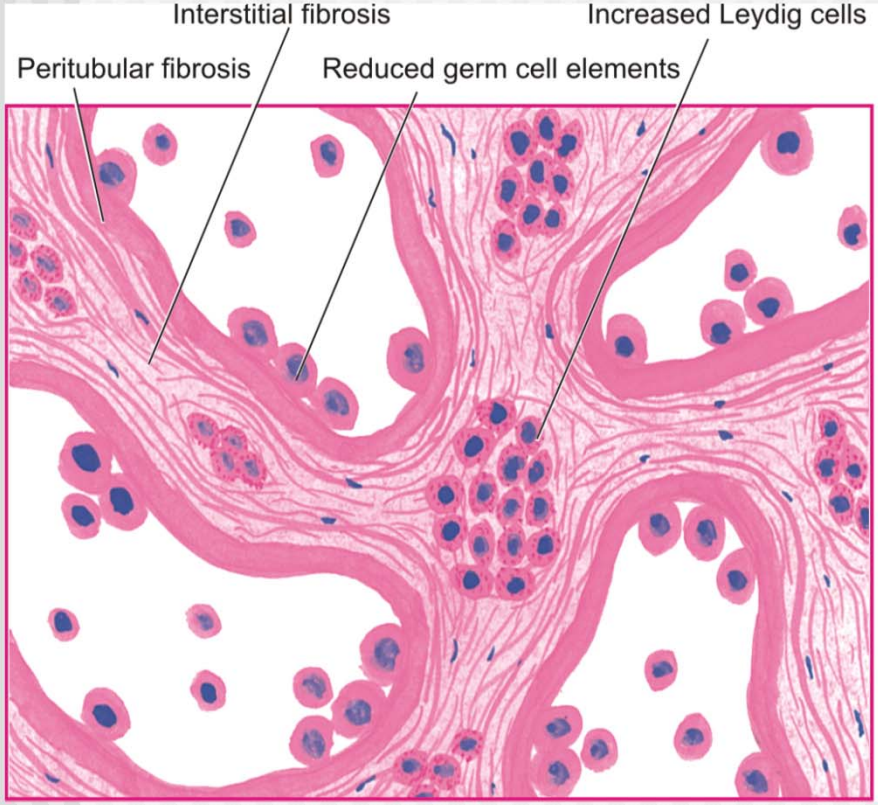

NORMAL CELL
Increased functional demand
Mild to moderate stress
Severe, persistent stress
ADAPTATIONS
ATROPHY, HYPERTROPHY, HYPERPLASIA, METAPLASIA, DYSPLASIA
REVERSIBLE CELL INJURY
DEGENERATIONS, SUBCELLULAR ALTERATIONS, INTRACELLULAR ACCUMULATIONS
IRREVERSIBLE CELL INJURY
Stress removed
Stress removed
NORMAL CELL RESTORED
REPAIR AND HEALING
CELL DEATH

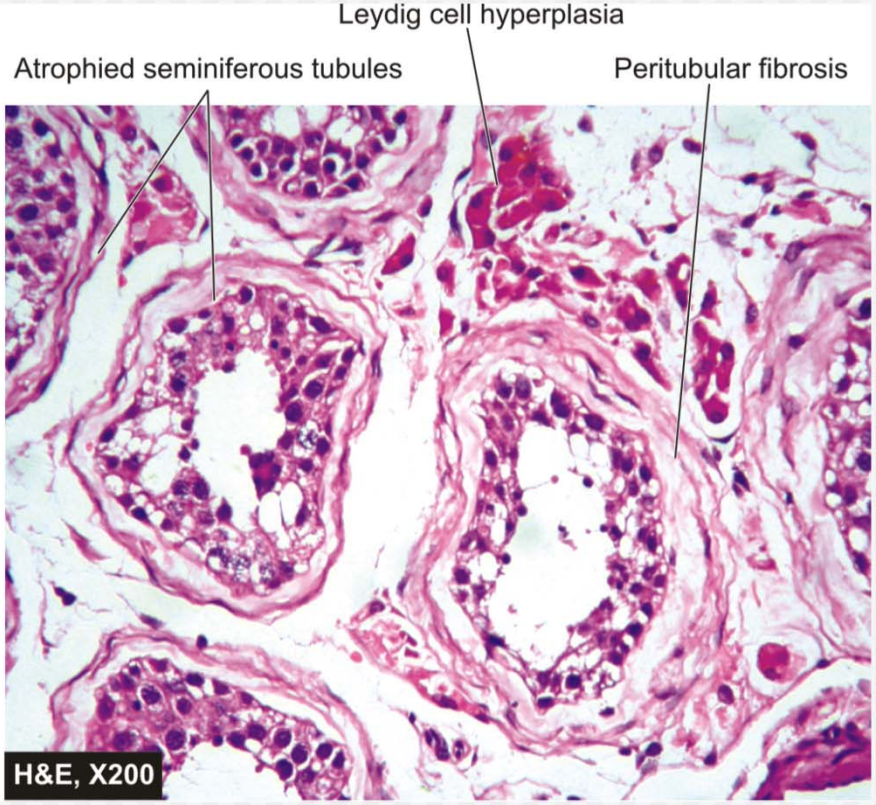

A, ATROPHY
B, HYPERTROPHY
C, HYPERPLASIA
NORMAL BRONCHIAL
EPITHELIAL CELL
D, METAPLASIA
E, DYSPLASIA

ATROPHY: CAUSES

- Physiologic
  - Lymphoid tissue
  - Gonads
  - Brain
- Pathologic
  - Starvation
  - Ischaemic
  - Disuse
  - Neuropathic
  - Endocrine
  - Pressure
  - Idiopathic

ATROPHY: PATHOLOGIC CHANGES

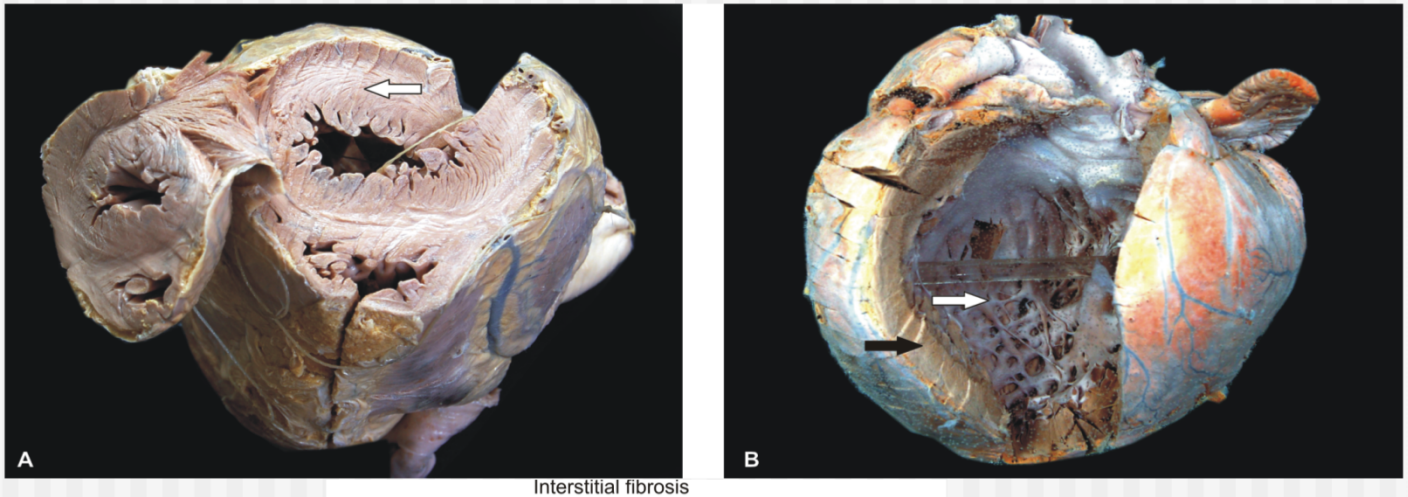


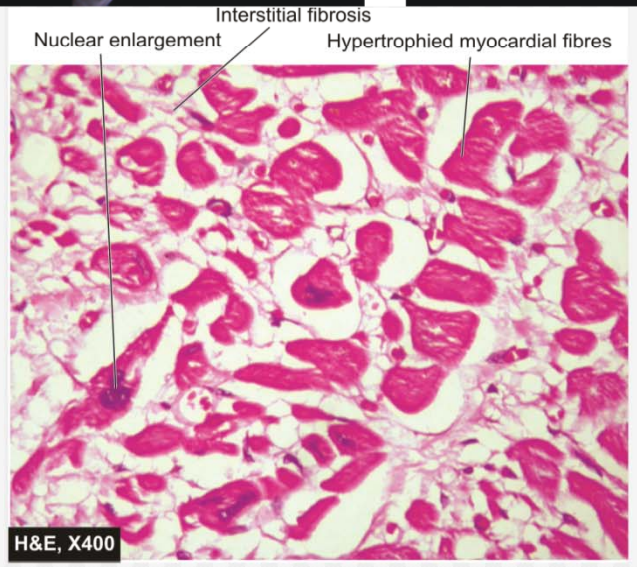


HYPERETROPHY: CAUSES

- Physiologic
  - Uterus in pregnancy
- Pathologic
  - Hypertrophy of cardiac muscle
  - Hypertrophy of smooth muscle
  - Hypertrophy of skeletal muscle
  - Compensatory hypertrophy

CARDIAC HYPERTROPHY: PATHOLOGIC CHANGES



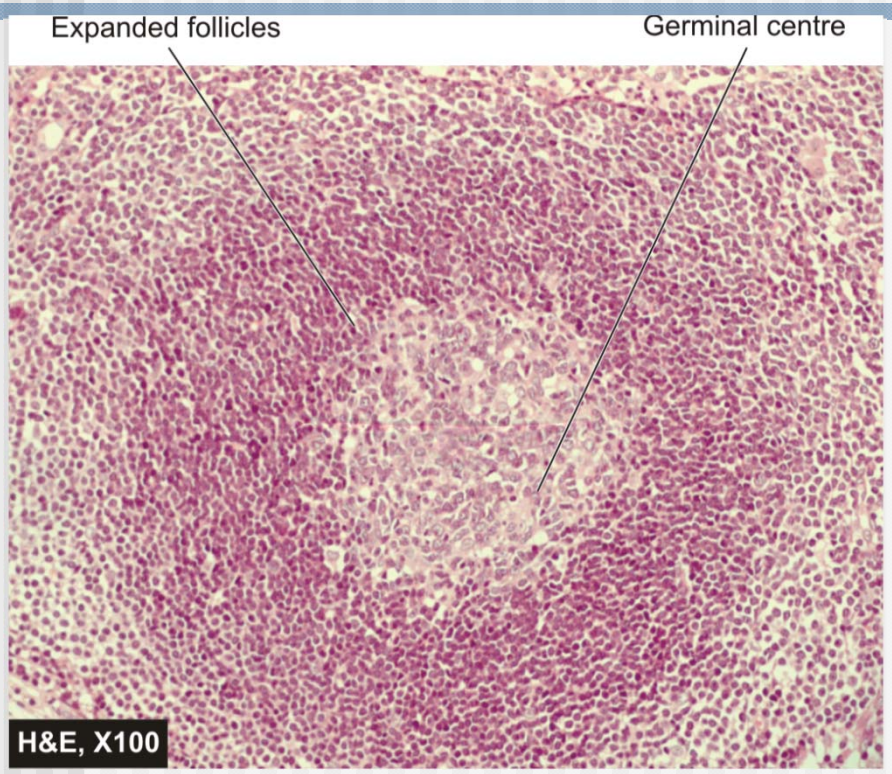


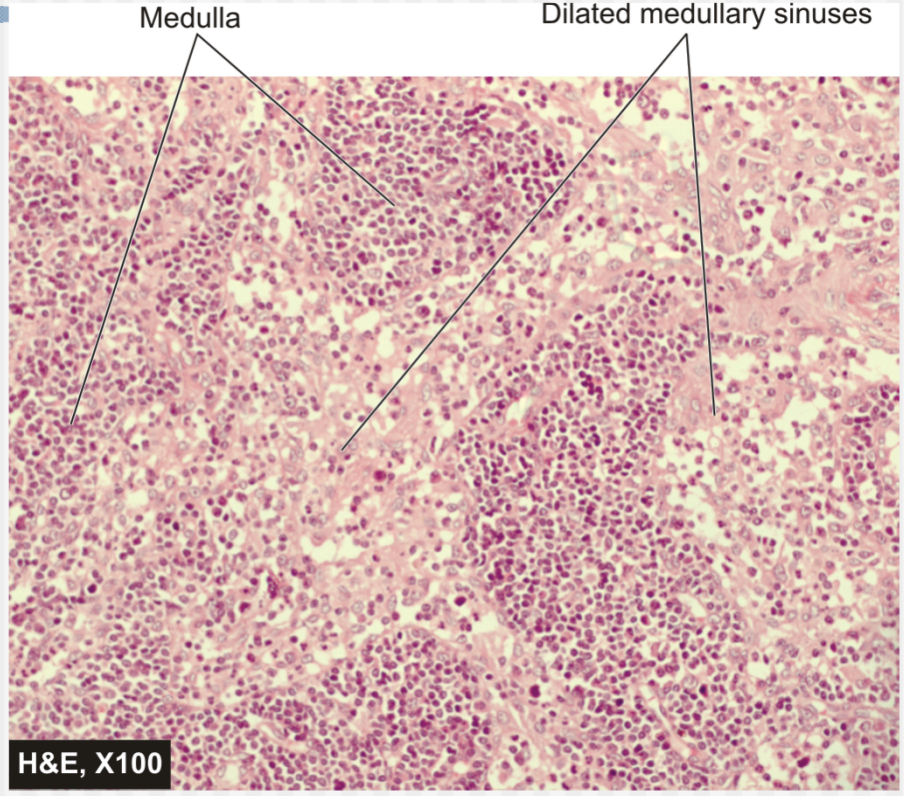
HYPERPLASIA: CAUSES

- Physiologic
  - Hormonal
  - Compensatory

- Pathologic
  - Endometrial hyperplasia
  - Wound healing
  - Skin warts
  - Pseudocarcinomatous hyperplasia
  - Intraductal hyperplasia breast

REACTIVE HYPERPLASIA LYMPH NODE

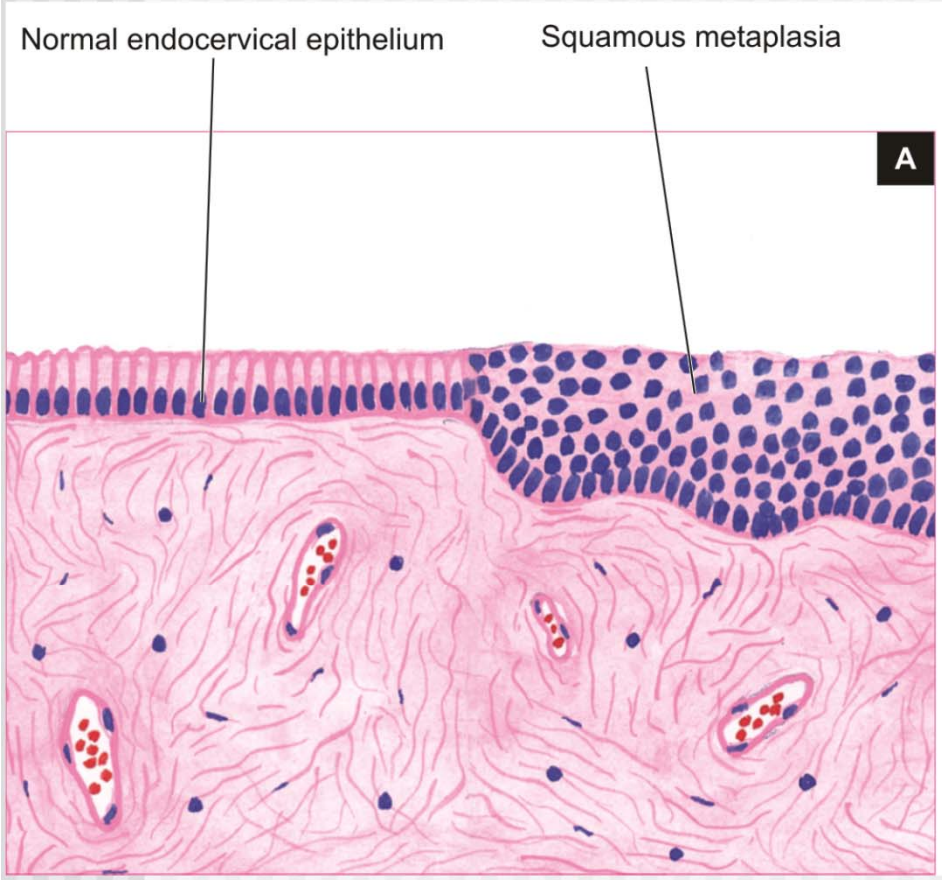


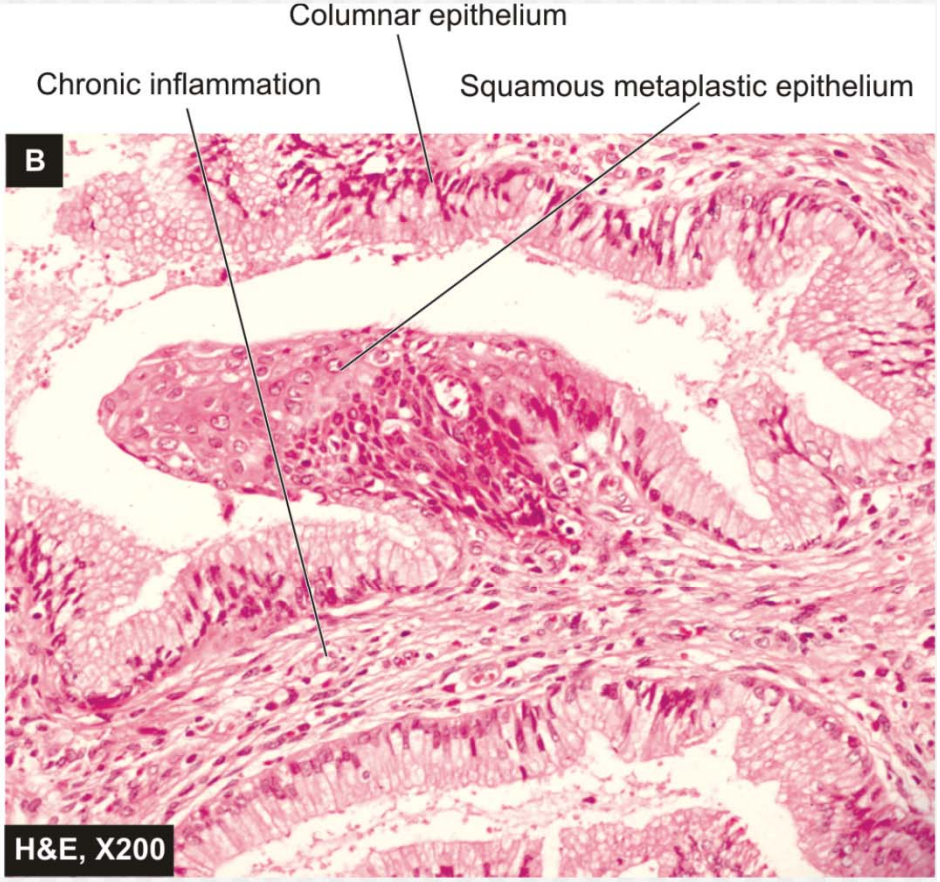


METAPASIA

- EPITHELIAL
  - Squamous
    - Bronchus
    - Uterine cervix
    - Gall bladder
    - Prostate
    - Renal pelvis and UB
    - Vit A deficiency
  - Columnar
    - Ch peptic ulcer
    - Bronchus
    - Cervical erosion
- MESENCHYMAL
  - Osseous
    - Arterial walls
    - Old age
    - Myositis ossificans
    - Fibrous stroma
  - Cartilaginous
    - Fracture healing

SQUAMOUS METAPLASIA CERVIX

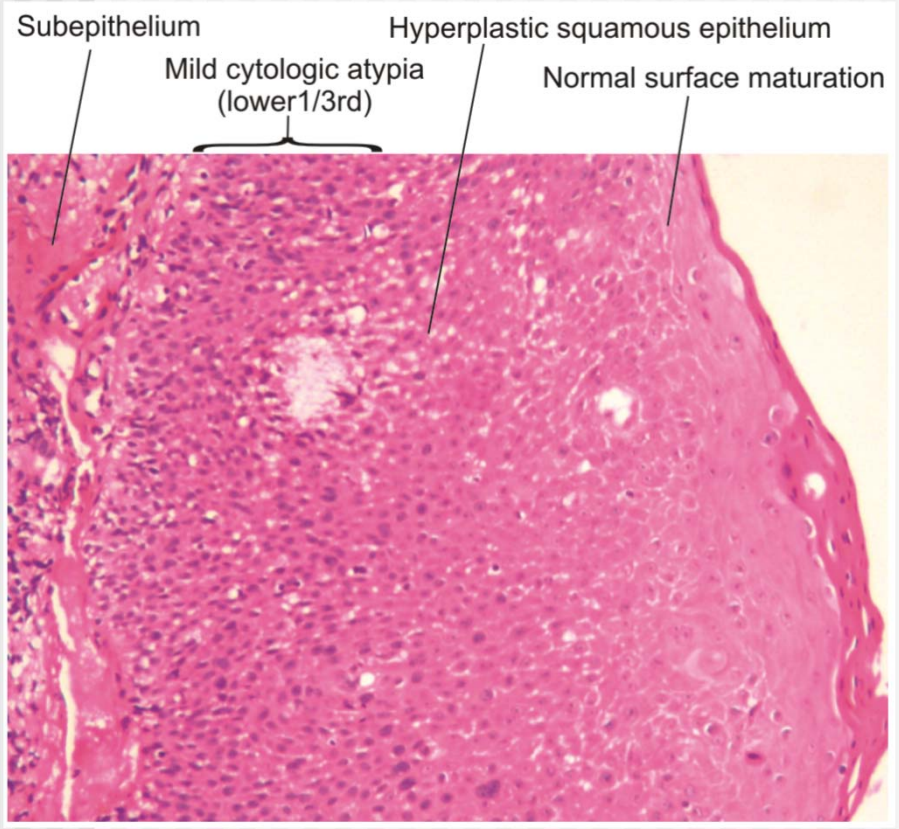


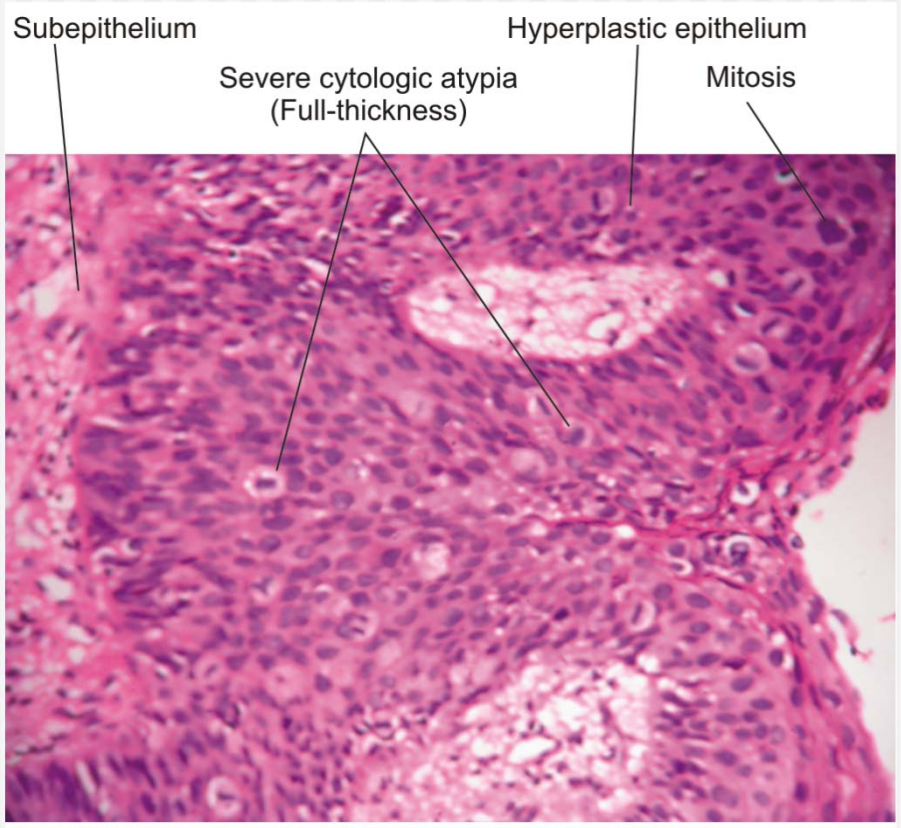


DYSPLASIA

- DEFINITION
- FEATURES
  - Increased number of layers
  - Disorderly arrangement
  - Loss of polarity
  - Pleomorphism
  - N:C ratio
  - Hyperchromatism
  - Mitotic activity

DYSPLASIA: PATHOLOGIC CHANGES





FEATURE	METAPLASIA	DYSPLASIA
i) Definition	Change of one type of epithelial or mesenchymal cell to another type of adult	Disordered cellular development, may be accompanied with hyperplasia or metaplasia
ii) Types	Epithelial (squamous, columnar) and mesenchymal (osseous, cartilaginous)	Epithelial only
iii) Tissues affected	Most commonly affects bronchial mucosa, uterine endocervix; others mesen-chymal tissues (cartilage, arteries)	Uterine cervix, bronchial mucosa
iv) Cellular changes	Mature cellular development	Disordered cellular development (pleomorphism, nuclear hyperchromasia, mitosis, loss of polarity)
v) Natural history	Reversible on withdrawal	May regress on removal of

CELLULAR AGING

- Average age of death
- Higher life expectancy in women
- LIFE EXPECTANCY DEPENDS UPON
  - Intrinsic genetic process
  - Environmental factors
  - Life style
  - Age-related diseases
- CELLULAR AGING
  - Experimental cellular senescence
  - Genetic control in invertebrates
  - Diseases of accelerated aging
  - Oxidative stress hypothesis

ORGAN CHANGES IN AGING

- CVS
- Nervous system
- Musculoskeletal system
- Eyes
- Hearing
- Immune system
- Skin
- Cancers

Number (percent) of classes attended (n=12).