

### Tissue Growth

- **Hyperplasia = tissue growth through cell multiplication**
- **Hypertrophy = enlargement of preexisting cells**
  - muscle grow through exercise
- **Neoplasia = growth of a tumor (benign or malignant) through growth of abnormal tissue**

### Changes in Tissue Types

- **Tissues can change types**
- **Differentiation**
  - **unspecialized tissues of embryo become specialized mature types**
    - mesenchyme to muscle
- **Metaplasia**
  - **changing from one type of mature tissue to another**
    - simple cuboidal tissue before puberty changes to stratified squamous after puberty

### Stem Cells

- **Undifferentiated cells with developmental plasticity**
- **Embryonic stem cells**
  - **totipotent (any cell type possible)**
    - source = cells of very early embryo
  - **Pluripotent (tissue types only possible)**
    - source = cells of inner cell mass of embryo
- **Adult stem cells (undifferentiated cells in tissues of adults)**
  - **multipotent (bone marrow producing several blood cell types)**
  - **unipotent (only epidermal cells produced)**

### Tissue Shrinkage and Death

- **Atrophy = loss of cell size or number**
  - **disuse atrophy from lack of use (leg in a cast)**
- **Necrosis = pathological death of tissue**
  - **gangrene - insufficient blood supply**
  - **gas gangrene - anaerobic bacterial infection**
  - **infarction - death of tissue from lack of blood**
  - **decubitus ulcer - bed sore or pressure sore**
- **Apoptosis = programmed cell death**
  - **cells shrink and are phagocytized (no inflammation)**

### Tissue Repair

- **Regeneration**
  - **replacement of damaged cells with original cells**
  - **skin injuries and liver regenerate**
- **Fibrosis**

- replacement of damaged cells with scar tissue
  - function is not restored
    - healing muscle injuries, scarring of lung tissue in TB or healing of severe cuts and burns of the skin
- keloid is healing with excessive fibrosis (raised shiny scars)

#### Tissue Engineering

- Production of tissues and organs in the lab
  - framework of collagen or biodegradable polyester fibers
  - seeded with human cells
  - grown in “bioreactor” (inside of mouse)
    - supplies nutrients and oxygen to growing tissue
- Skin grafts already available
  - research in progress on heart valves, coronary arteries, bone, liver, tendons