SNS COLLEGE OF ALLIED HEALTH SCIENCE

Affiliated to The Tamil Nadu Dr MGR Medical University, Chennai

DEPARTMENT OF CARDIAC TECHNOLOGY

COURSE NAME: PATHOLOGY RELATED TO CARDIAC TECHNOLOGY

UNIT : 1

TOPIC : CELL INJURY - REVERSIBLE

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Cellular Injury

Contents

- Definition
- Causes of Cell Injury
- Pathogenesis and Morphology of Cell Injury
- Types of Cell Injury

Reversible - Cell Swelling & Fatty Change

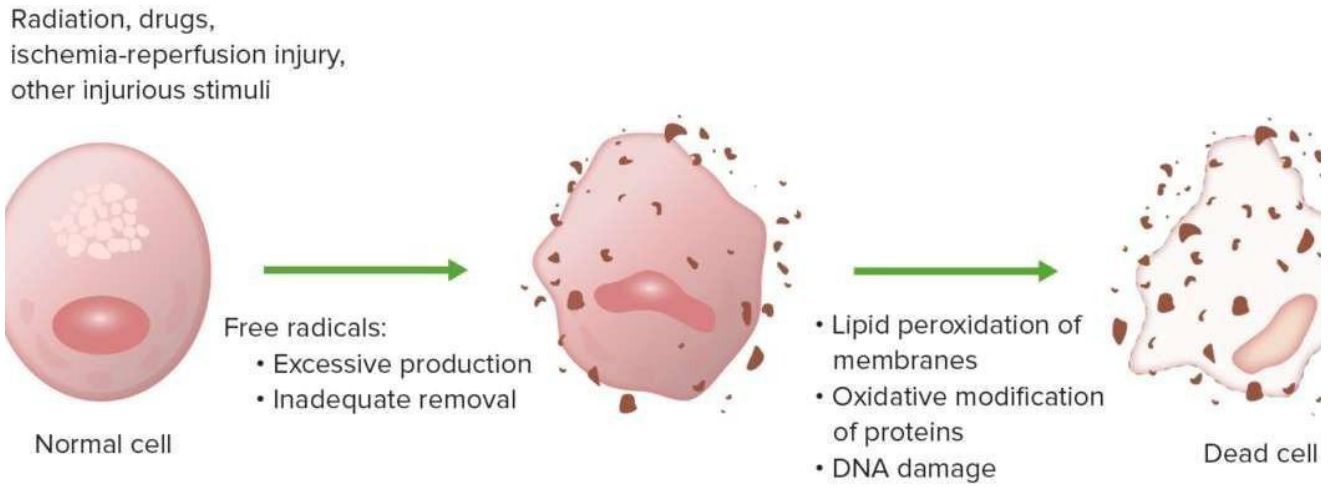
Irreversible - Apoptosis and Necrosis

Definition

Cell injury occurs when cells are exposed to stress or harmful stimuli that exceed their ability to adapt. It can be:

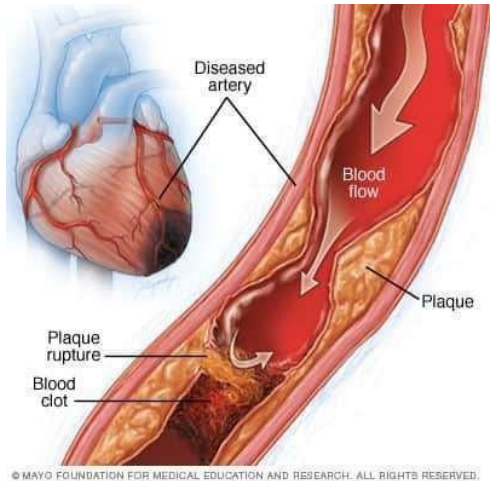
Reversible: Cell recovers once the stimulus is removed.

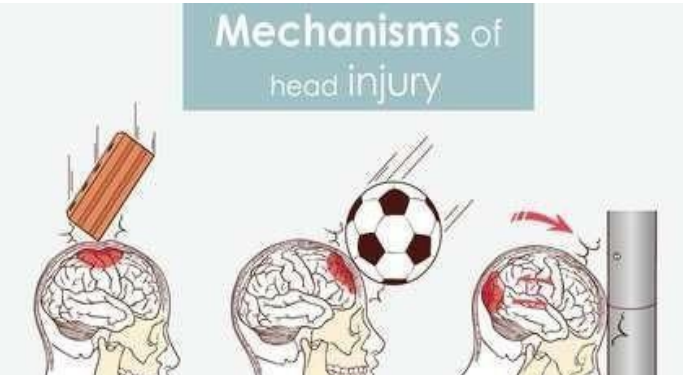
Irreversible: Cell undergoes death—either by **necrosis** or **apoptosis.**



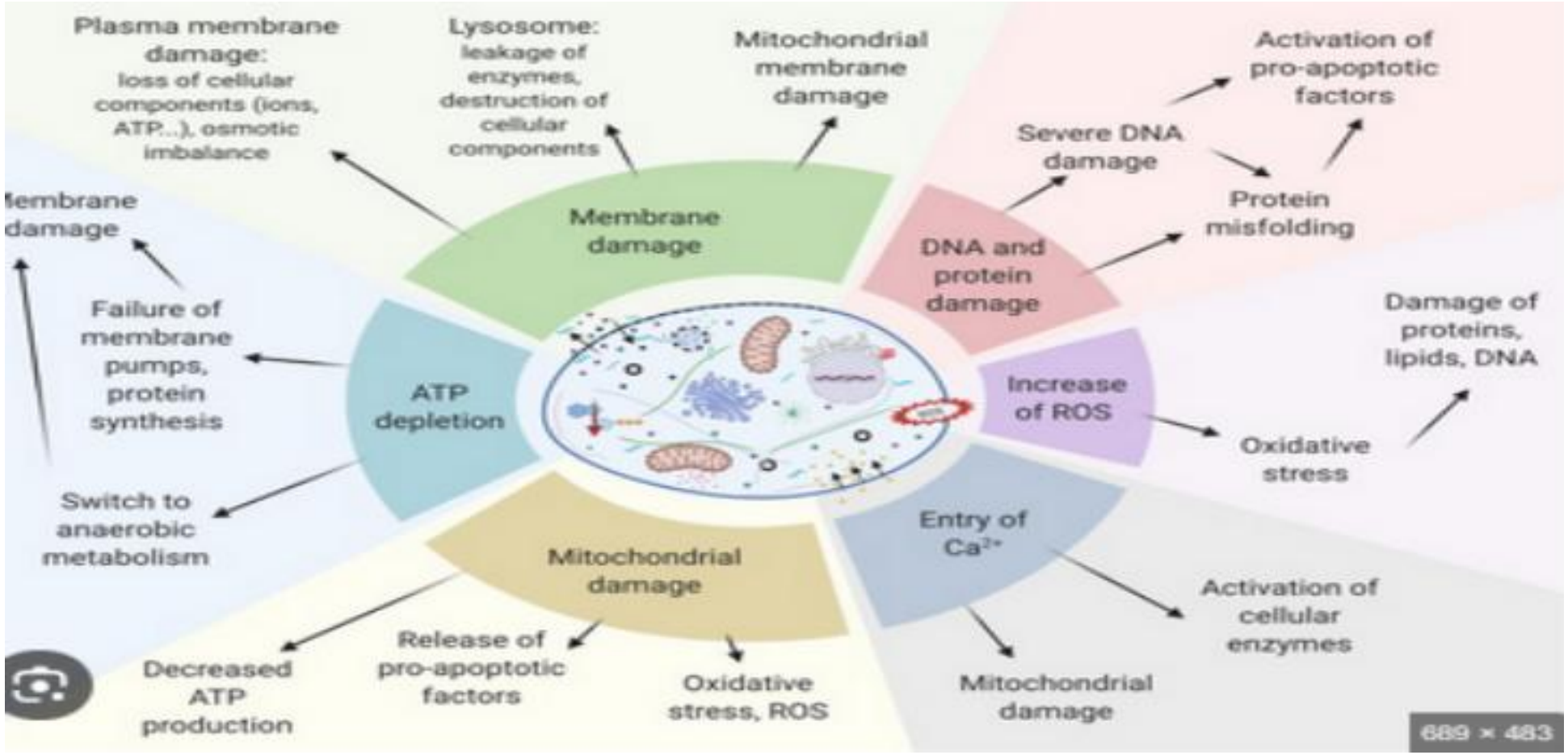
Causes of Cell Injury

- **Hypoxia/Ischemia:** Most common cause—lack of oxygen due to decreased blood flow.
- **Physical Agents:** Trauma, temperature extremes, radiation, electric shock.
- **Chemical Agents and Drugs:** Toxins, alcohol, pollutants, chemotherapy drugs.
- **Infectious Agents:** Bacteria, viruses, fungi, parasites.
- **Immunologic Reactions:** Autoimmune diseases, allergic reactions.
- **Genetic Defects:** Congenital disorders, enzyme deficiencies.
- **Nutritional Imbalances:** Deficiencies (e.g., vitamins), excess (e.g., obesity).
- **Aging:** Gradual decline in cellular function over time.





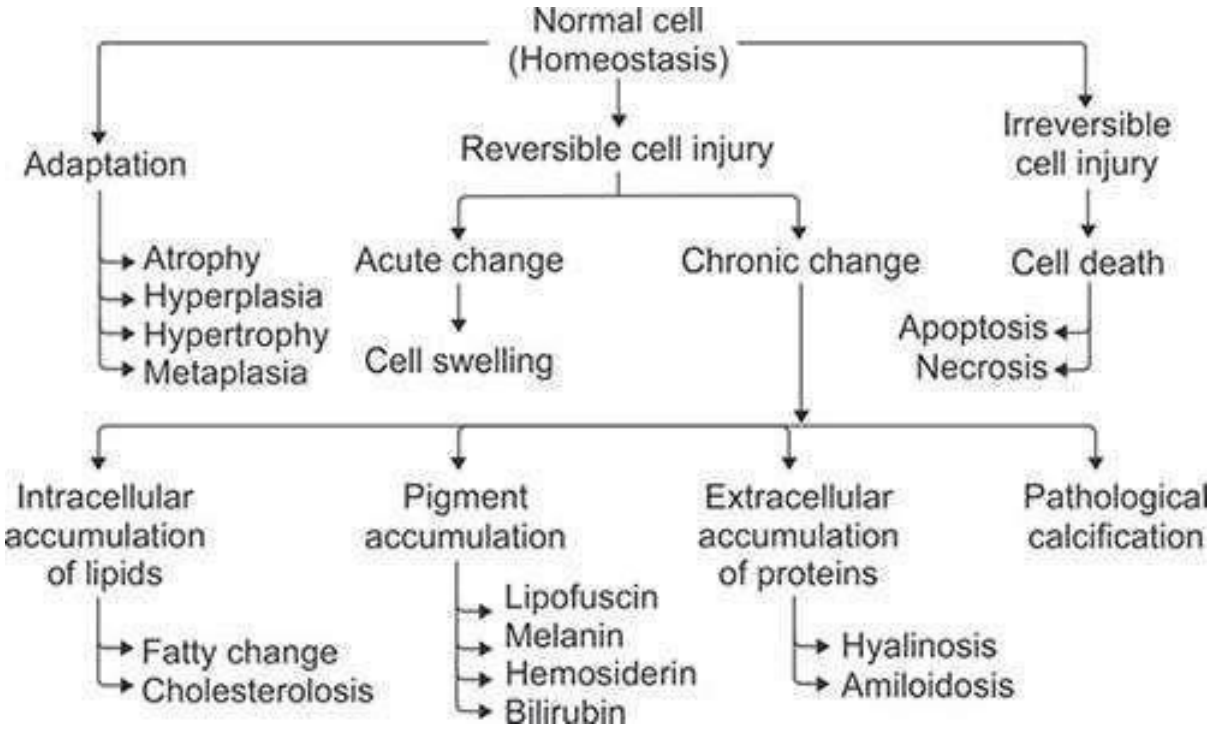
Mechanism of Cell Injury



Types of Cell Injury

Injury at one point induces a cascade of effects:

- Cellular Adaptation
- Reversible Cell Injury
- Irreversible Cell Injury
- Subcellular changes and Intracellular Changes



MORPHOLOGY

1. Reversible Injury:

Cell swelling (hydropic change)

Plasma membrane blebbing

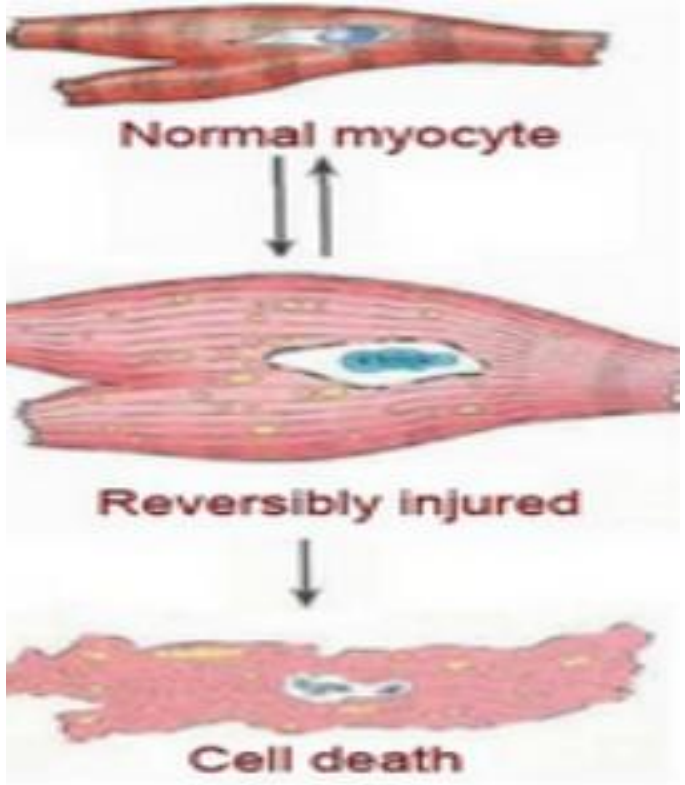
Fatty change (especially in liver, heart)

2. Irreversible Injury:

Membrane rupture

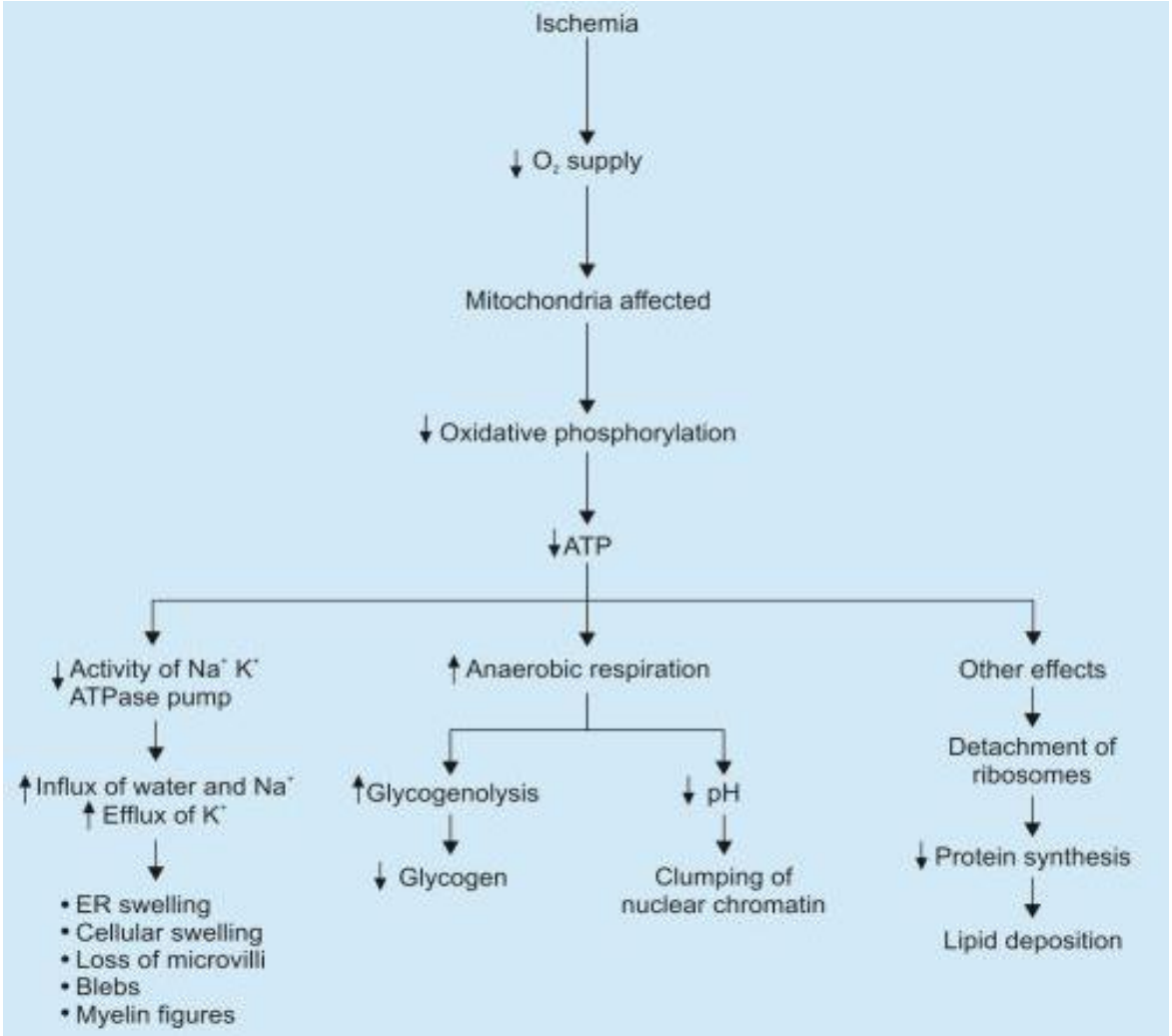
Nuclear changes (pyknosis, karyorrhexis, karyolysis)

Mitochondrial swelling with amorphous densities

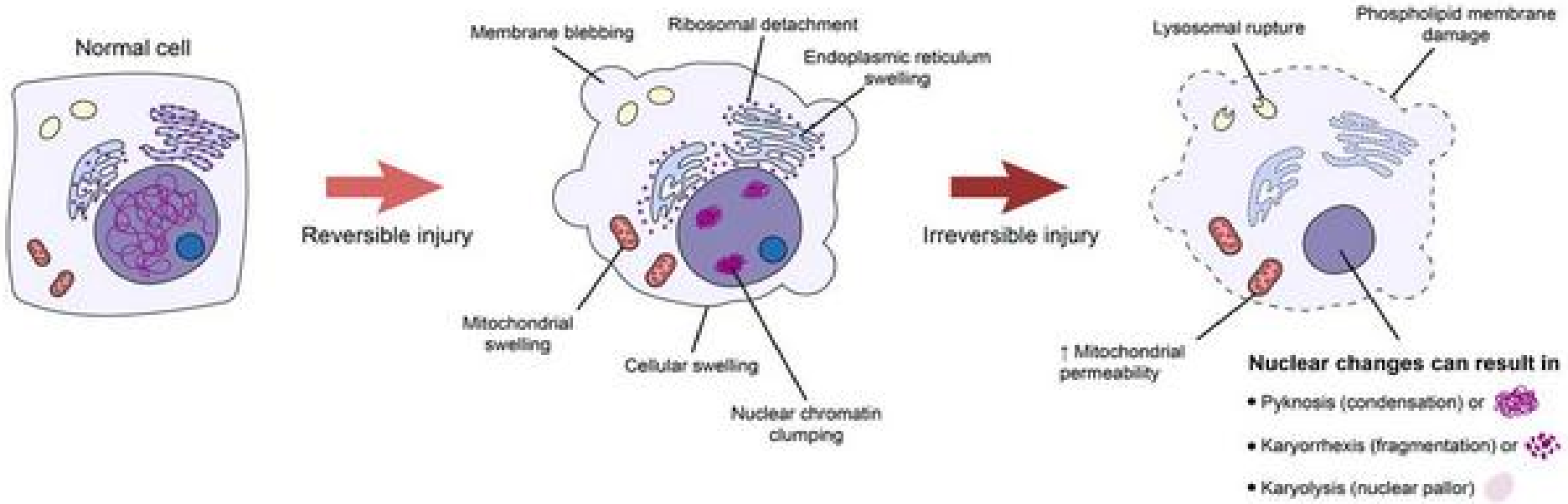


Reversible Cell Injury

- Reversible cell injury refers to **early-stage damage** to cells that can be **reversed** if the harmful stimulus is removed.
- It does **not** result in cell death and retains the cell's functional integrity



Morphological features



Steatosis (Fatty Change)

- **Definition:**
- Fatty change refers to the **abnormal accumulation of triglycerides** within **parenchymal cells**, especially in organs involved in fat metabolism.
- **Mechanism (Pathogenesis):**

- Excess delivery or impaired metabolism/export of lipids within cells
- Lipid droplets accumulate in the cytoplasm
- Associated with **hypoxia**, **alcohol**, **toxins**, **malnutrition**, and **metabolic disorders**
- **Morphological Features:**
- Presence of **clear lipid vacuoles** in the cytoplasm (seen under light microscope)
- Nucleus may be pushed to the cell periphery in severe cases
- Affected cells appear enlarged and pale (greasy appearance in gross pathology)

REFERENCE

Harshmohan book of pathology

https://share.google/1czL1JEVSM9fwyEtE

THANKYOU