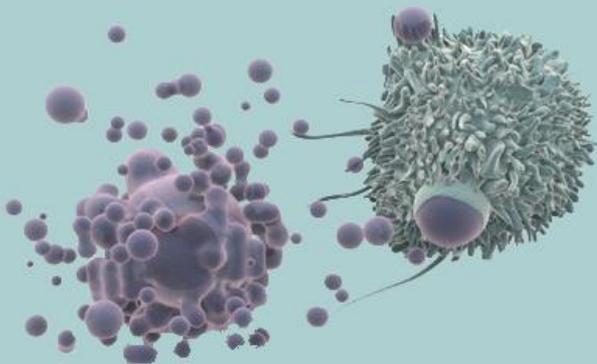




Pathophysiology

2nd Year, 2nd Semester
2025-2026

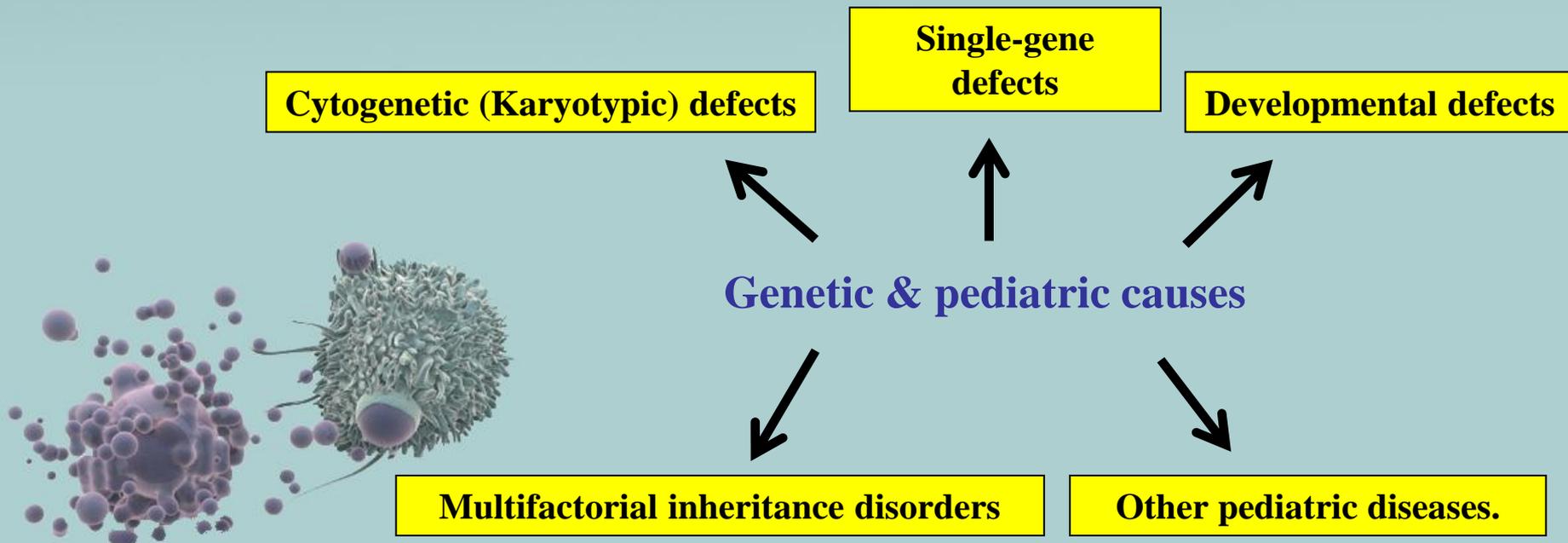
Lecture (3): Etiology of cellular injury

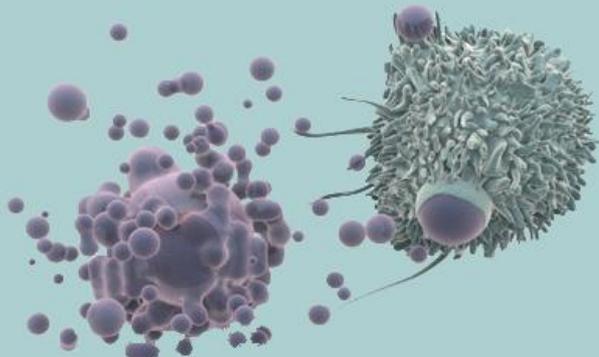
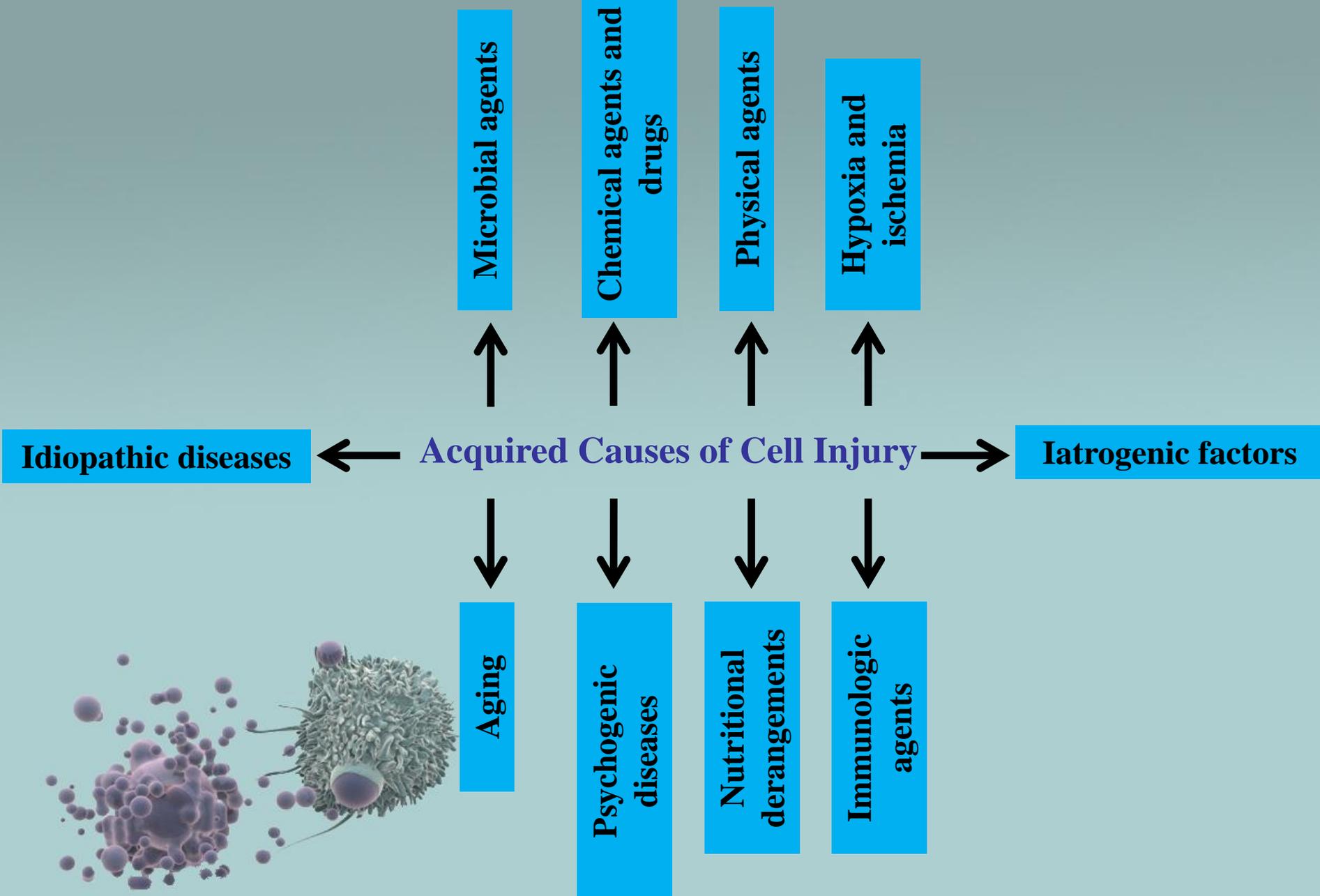


**Assist. Prof. Dr.
Hussein A. Al-Ghanimi**

The cells may be broadly injured by two major ways:

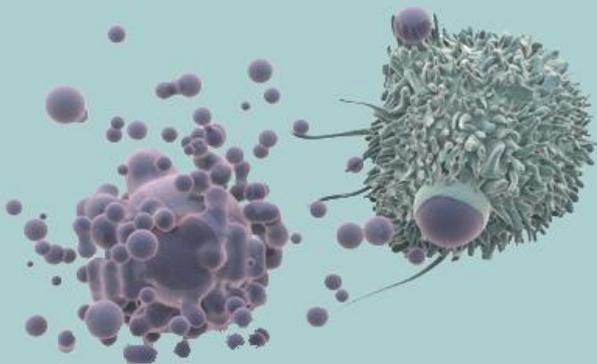
- Genetic & pediatric causes
- Acquired causes





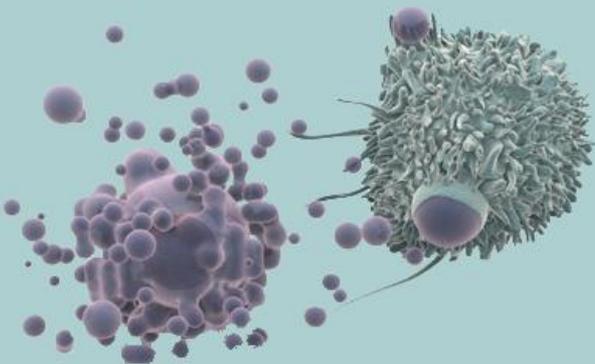
Hypoxia and ischemia

- Deficiency of oxygen.
- Hypoxia is the most common cause of cell injury.
- reduced supply of blood to cells due to interruption i.e. **ischemia**.
- Disorders of oxygen-carrying RBCs (e.g. **anemia**, **carbon monoxide poisoning**).
- heart diseases.
- Lung diseases and increased demand of tissues.



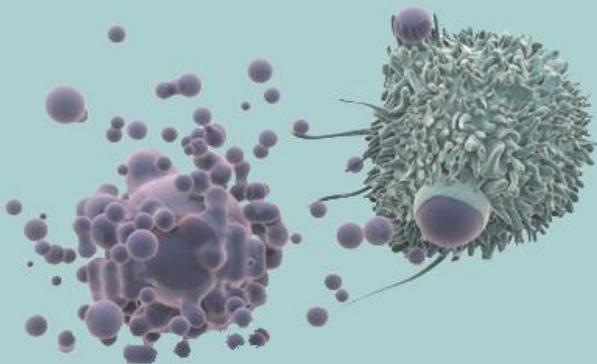
Physical agents

- Mechanical trauma (e.g. road accidents)
- Thermal trauma (e.g. by heat and cold)
- Electricity
- Radiation (e.g. ultraviolet and ionizing)
- Rapid changes in atmospheric pressure.



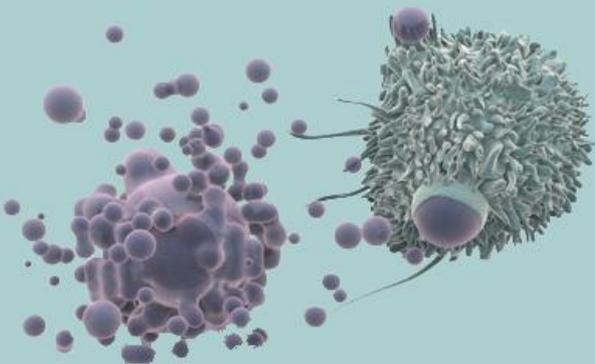
Chemicals and drugs

- ❖ Chemical poisons such as cyanide, arsenic, mercury
- ❖ Strong acids and alkalis
- ❖ Environmental pollutants
- ❖ Insecticides and pesticides
- ❖ Oxygen at high concentrations
- ❖ Hypertonic glucose and salt
- ❖ Social agents such as alcohol and narcotic drugs.



Nutritional derangement

- ✓ Nutritional imbalances
- ✓ Nutritional deficiency (e.g. **starvation**), of protein calorie (e.g. **marasmus**, **kwashiorkor**), of minerals (e.g. **anemia**), or of trace elements.
- ✓ Nutritional excess (e.g. **obesity**, **atherosclerosis**, **heart disease** and **hypertension**).





Marasmus

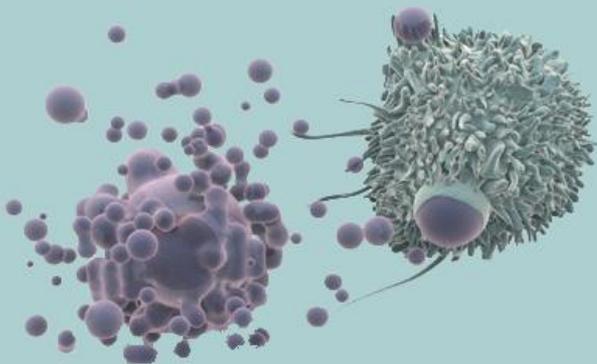
Vs



Kwashiorkor

- **Simian Face.**
- **Hair loss.**
- **Muscle wasting.**
- **Wrinkled skin.**

- **Moon Face.**
- **Hair changes.**
- **Fatty liver.**
- **Bulging abdomen (Ascites).**
- **Ankle edema.**



VITAMIN D DEFICIENCY SYMPTOMS



Dental abnormalities



Tetanic spasms



Affects bone growth



Increased risk of osteoporosis



Rickets in children



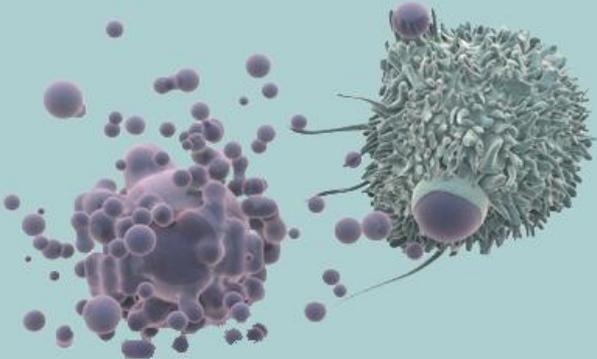
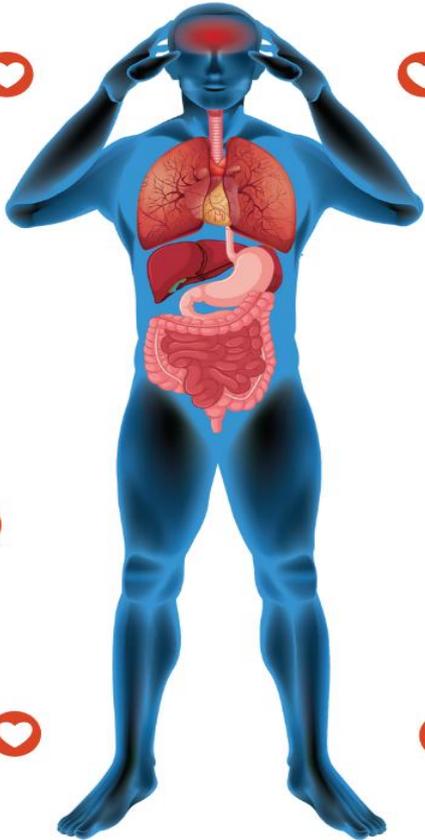
Compromises the integrity of the immune system



May affect insulin secretion & glucose tolerance



Muscle weakness and pain



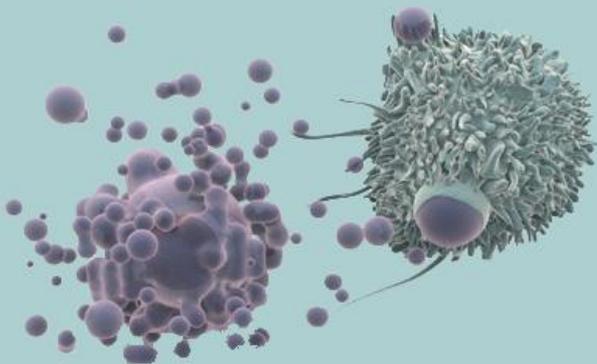
Evidence based content

Aging

- Cellular aging or senescence leads to impaired ability of the cells to undergo **replication** and **repair**, and ultimately lead to **cell death** culminating in death of the individual.

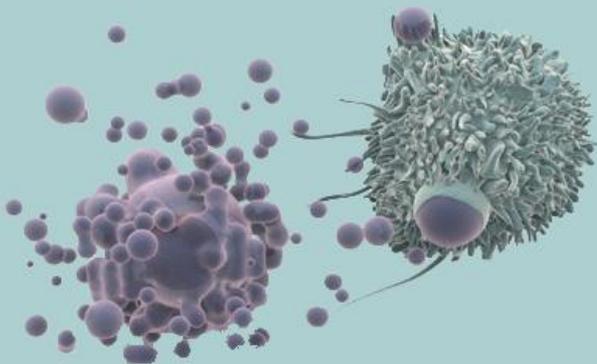
Immunologic agents

Immunity is a ‘**double edged sword**’ it protects the host against various injurious agents but it may also turn lethal and cause cell injury e.g. **hypersensitivity reactions; anaphylactic reactions; and autoimmune diseases.**



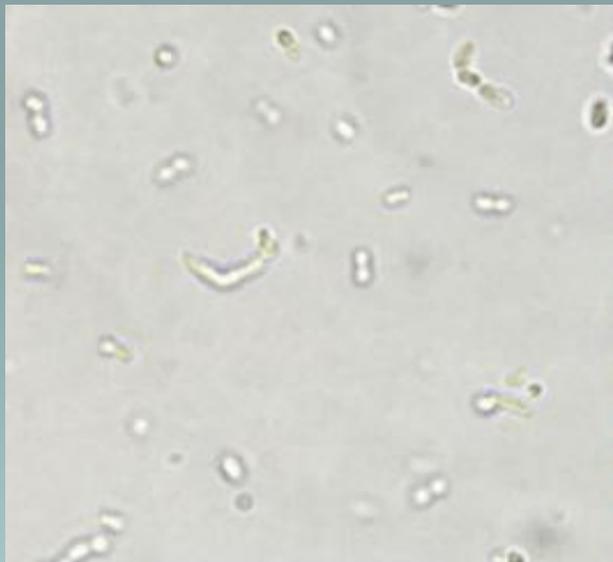
Microbial agents

- Injuries by microbes include infections caused by **bacteria, rickettsia, viruses, fungi, protozoa, metazoa, and other parasites.**



Next slide





Bacteria



Archaea



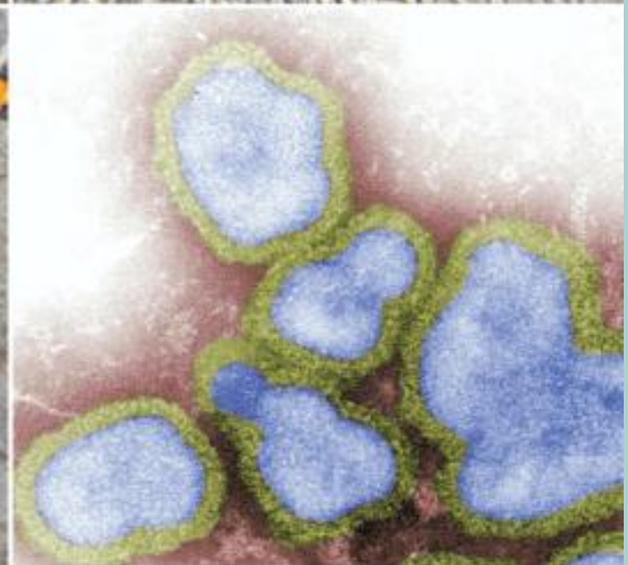
Fungi



Algae



Protozoa



Viruses

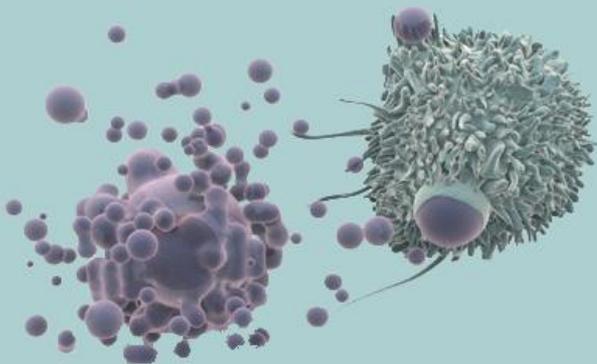
Psychogenic diseases

Mental diseases due to:

- Mental stress, Strain, Anxiety, Overwork and frustration e.g. depression, schizophrenia.

Problems of drug addiction, alcoholism, and smoking result in various organic diseases such as:

- ✓ Liver damage, chronic bronchitis, lung cancer, peptic ulcer, hypertension, ischemic heart disease etc.

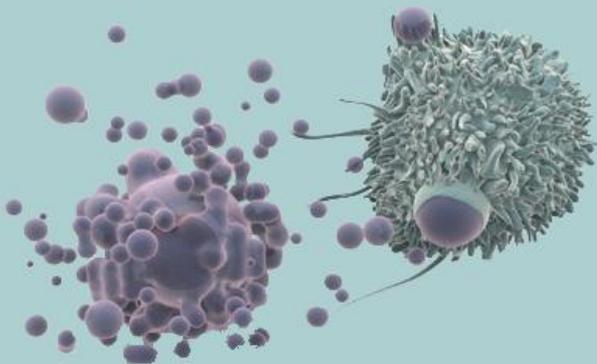


Iatrogenic causes

There are some diseases as well as deaths attributed to iatrogenic causes (**Owing to physician**).

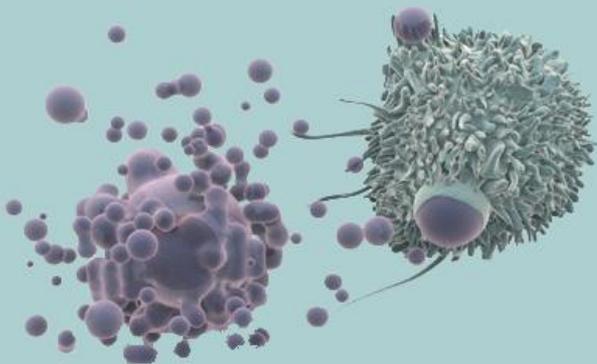
Examples include:

- occurrence of disease or death due to error in judgment by the physician
- Untoward effects of administered therapy (drugs, radiation).



Idiopathic diseases

- Idiopathic means “**of unknown cause**”.
- For example, most common form of **hypertension** (90%) is idiopathic.
- Similarly, exact etiology of many **cancers** is still incompletely known.



Thank you

