

# NEOPLASIA

## (Introduction)

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# OUTLINES

***By the end of this lecture; students should be able to learn the following:***

- Define the term neoplasia and identify other important terminologies
- Identify main features of neoplasms
- Differentiate between hyperplasia and neoplasia
- Know common tumor worldwide and common tumors in Egypt (Cancer epidemiology)

# **INTRODUCTION**

# Introduction

- **Definition:**

- Literally neoplasia means “New growth”
- Neoplasm: a **tissue mass** formed due to uncontrolled and unlimited proliferation of cells independent of stimuli.
- In neoplasia, the normal regulatory mechanisms of cell cycle, cell differentiation and cell contact are **defective**.
- Hyperplasia, metaplasia, and dysplasia represent three patterns of controlled non-neoplastic growth

# Introduction

- **Terminology:**

- **Hyperplasia:** Increase the size of an organ or tissue due to increased number of its cell constituent.
- **Hypertrophy:** Increase the size of an organ or tissue due to increased size of its cell constituent.

**Q: Which is more serious; hyperplasia or hypertrophy? Why?**

- **Metaplasia:** Change of one type of differentiated tissue to another differentiated type of the same category.
- **Dysplasia:** disorder of maturation in which epithelial cells vary in size, shape and orientation with hyperchromatic nuclei.

# Introduction

- **Terminology:**

- **Oncology:** Subject concerned with study of neoplastic growth.
- **Oncogenesis:** Mechanisms of tumor initiation, growth, invasion and spread or metastasis.
- **Tumor:** Originally refers to any swelling but currently used almost exclusively to refer to a neoplastic growth
- **Cancer:** A common term used for all malignant neoplasms
- **Differentiation:** Extent to which tumor cells resemble their normal cells; morphologically and functionally.
- **Anaplasia:** Lack of differentiation; a neoplasm composed of markedly less differentiated (less mature) or undifferentiated cells.

# Introduction

- **Terminology:**

- **Benign tumor:** A well differentiated neoplasm that tends to grow slowly, does not metastasize, and is mostly non-life threatening.
- **Malignant tumor:** A variably differentiated neoplasm that tends to grow rapidly, often metastasizes, and frequently causes death of the host.
- **Carcinoma:** Malignant tumor of epithelial cells
- **Sarcoma:** Malignant tumour of mesenchymal cells
- **Metastasis:** Migration of tumor cells to an organ or site that is remote from the primary site with formation of secondary tumor masses (**Is metastasis important from clinical point of view?**)

# **GENERAL FEATURES OF NEOPLASMS**

# Features of neoplasms

- **General features of neoplasms:**

- **Arise spontaneously** (have no stimulus) or due to pathological stimuli.
- **Continue to grow** even after removal of the stimulus, if any.
- **Purposeless** (have no useful function).
- **Do not obey control mechanisms** of cell growth and differentiation.
- **Monoclonality** is the basis of neoplasia and **divergent differentiation** occurs during tumour progression.
- **Variable degree of cellular maturation.**

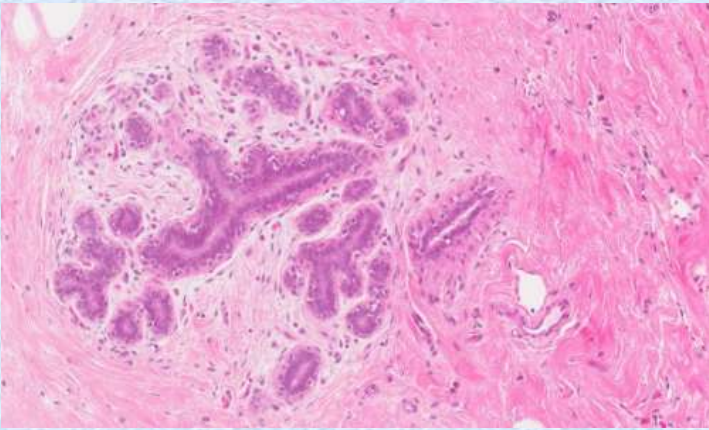
# Features of neoplasms

- **Differences between neoplasia and hyperplasia?**

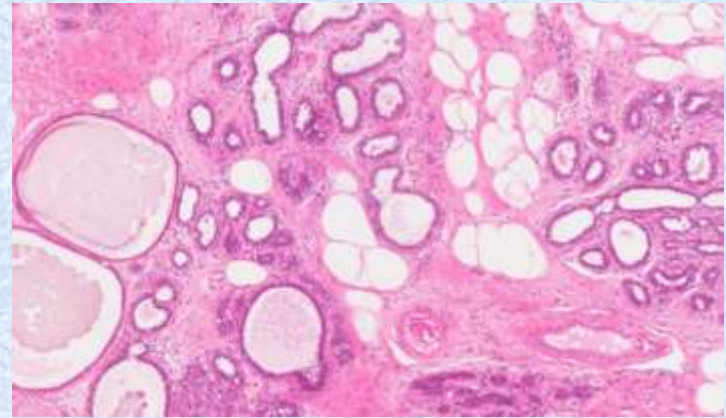
Hyperplasia	Neoplasia
Controlled growth disturbance	Uncontrolled growth disturbance
Growth regulatory mechanisms are preserved	Growth regulatory mechanisms are disturbed
Usually initiated by a stimulus	Independent of a stimulus
Limited cell proliferation	Unlimited cell proliferation
Reversible (after removal of the cause)	Irreversible
The cells are mature	Variable degree of maturation

# Features of neoplasms

- Differences between neoplasia and hyperplasia?



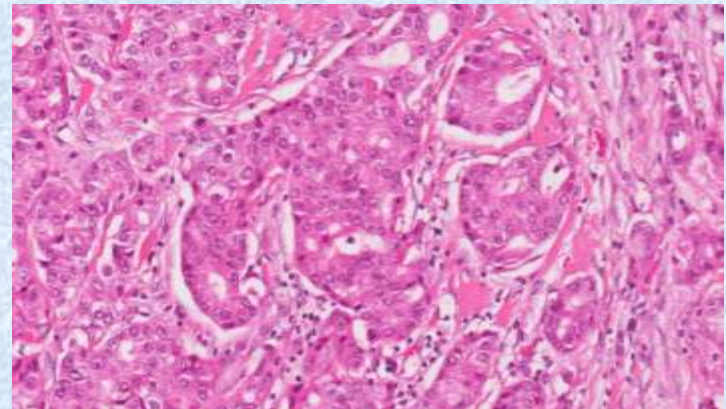
**Normal breast**



**Hyperplasia, breast**



**Benign tumour, breast**

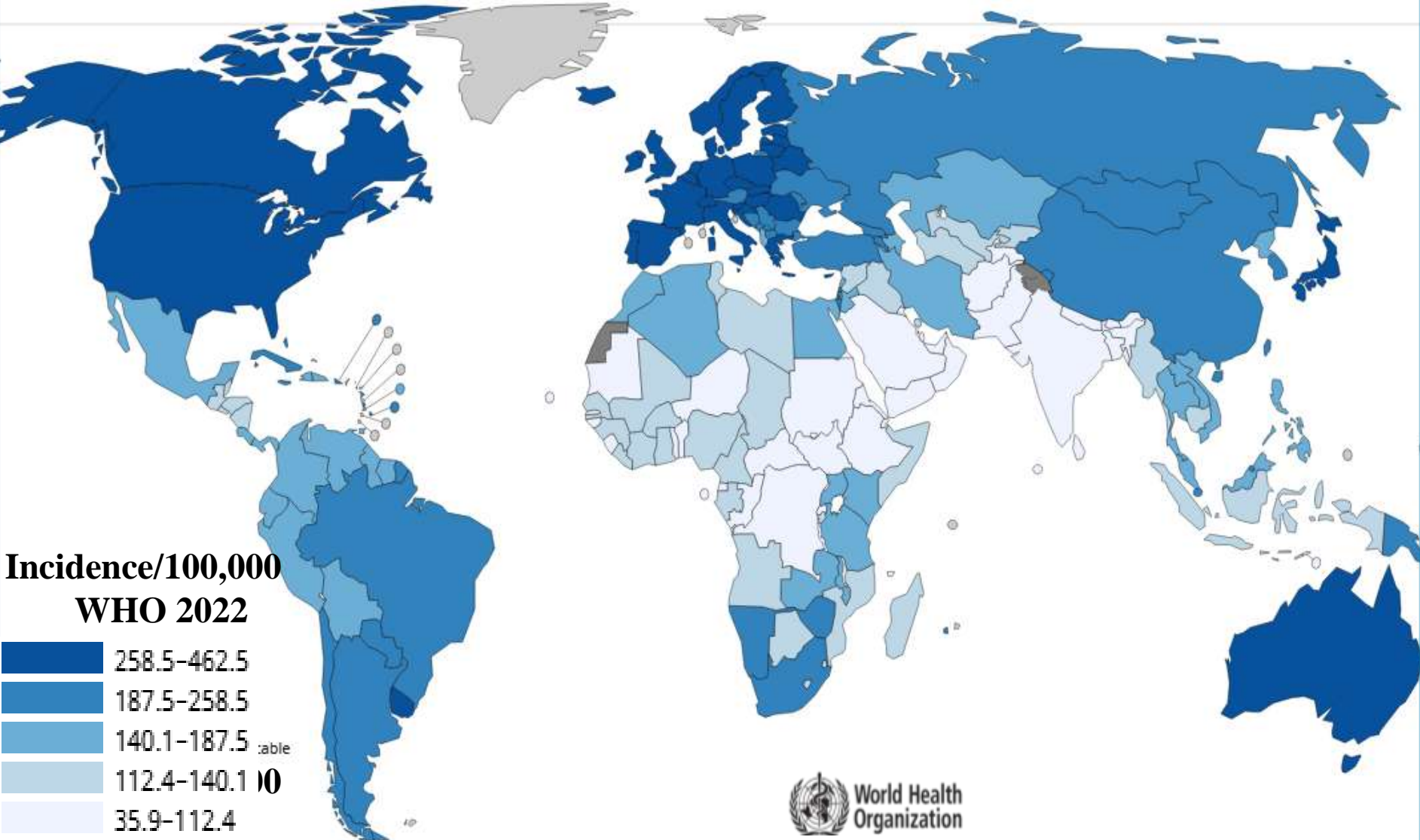


**Malignant tumour, breast**

# **CANCER EPIDEMIOLOGY**

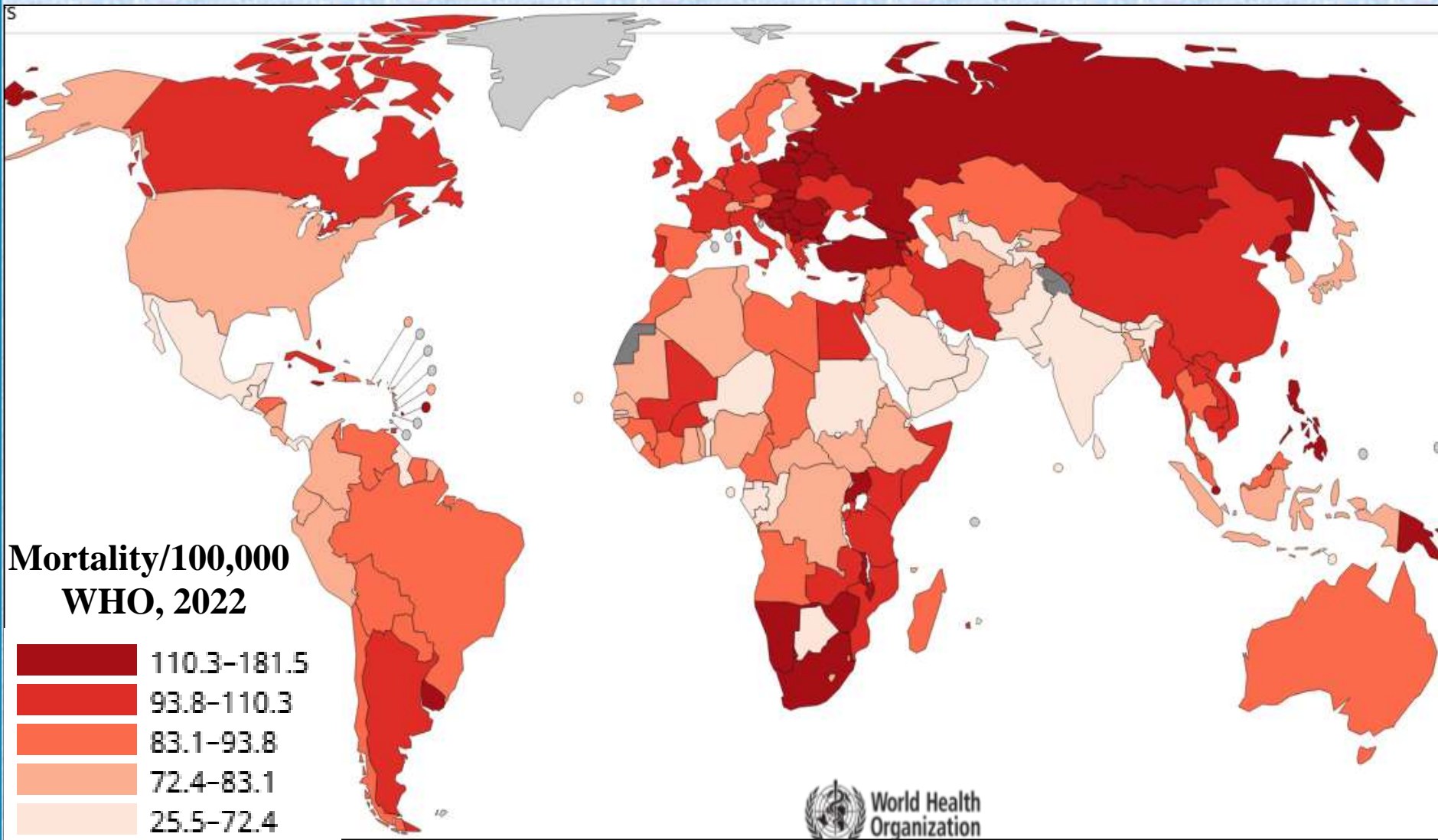
# Epidemiology

**Cancer is a common disease**



# Epidemiology

***Cancer is a common cause of death***



# Epidemiology

## Cancer in Egypt

WHO, 2022



Number of new cases

150 578

Number of deaths

95 275

Number of prevalent cases  
(5-year)

366 823

### Statistics at a glance, 2022

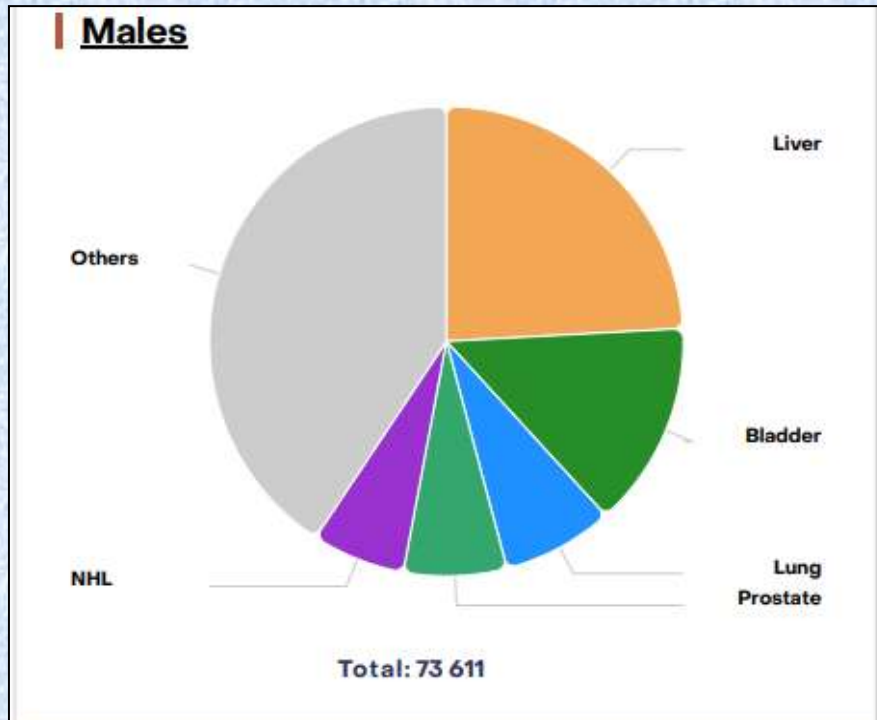
	Males	Females	Both sexes
Population	53 629 377	52 527 315	106 156 692
<b>Incidence*</b>			
Number of new cancer cases	73 611	76 967	150 578
Age-standardized incidence rate	175.1	161.1	166.1
Risk of developing cancer before the age of 75 years (cum. risk %)	18.3	16.1	17.1
Top 3 leading cancers (ranked by cases)**	Liver Bladder Lung	Breast Liver NHL	Liver Breast Bladder
<b>Mortality*</b>			
Number of cancer deaths	51 692	43 583	95 275
Age-standardized mortality rate	127.4	92.2	107.7
Risk of dying from cancer before the age of 75 years (cum. risk %)	12.9	9.5	11.2



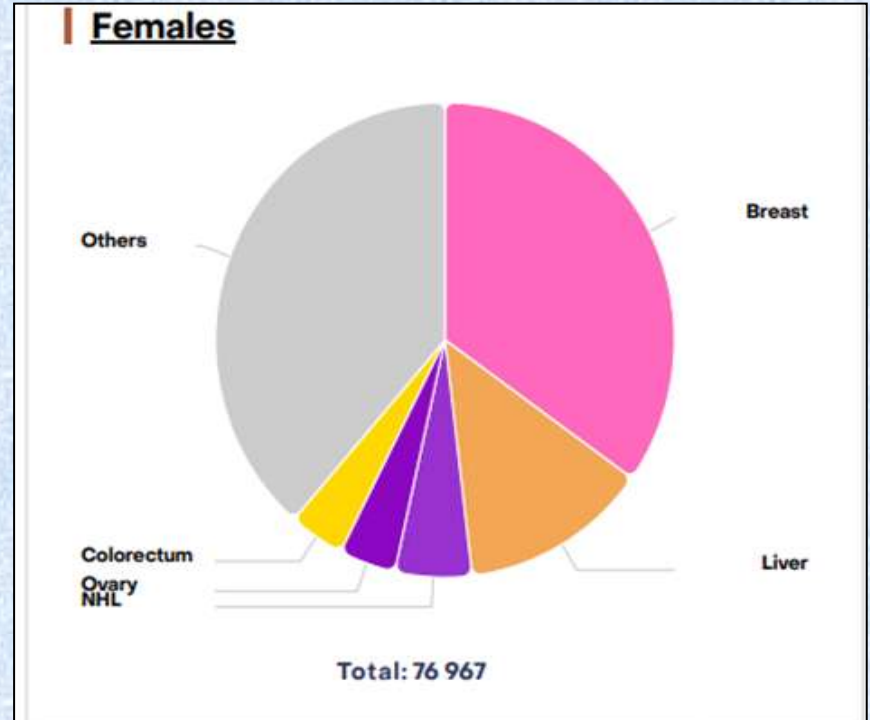
# Epidemiology

## Cancer in Egypt

WHO, 2022



Rank	Cancer site	Number of cases	Percent
1st	Liver	17 759	24.1%
2nd	Bladder	10 416	14.2%
3rd	Lung	5 599	7.6%
4th	Prostate	5 181	7.0%
5th	NHL	4 699	6.4%



Rank	Cancer site	Number of cases	Percent
1st	Breast	26 845	34.9%
2nd	Liver	10 187	13.2%
3rd	NHL	4 162	5.4%
4th	Ovary	3 070	4.0%
5th	Colorectum	3 001	3.9%

# Epidemiology

- ❑ Malignant tumors are **frequent** worldwide
- ❑ Malignancy is a **common cause of death** worldwide
- ❑ Tumors vary according to geographic distribution according to environmental, ethnic and social factors
- ❑ **Commonest tumors worldwide** are breast, prostate, lung, and colorectal cancer (*according to WHO registries 2020*)
- ❑ **Commonest tumors in Egypt** (*according to WHO registries 2020*)
  - **For males:** Liver, Urinary bladder and lung cancer in **males**.
  - **For females:** breast and Liver carcinoma
- ❑ **Clinically**; benign and malignant tumors can be similar to inflammatory and developmental lesions.

# Why should we study neoplasia?

- ❑ **Cancer is frequent and it is a common cause of death**
- ❑ **Clinically, many developmental and inflammatory lesions can simulate tumors.**
- ❑ **Cancer has variable clinical presentation: Studying pathological features of tumours would help to:**
  - *Explain the clinical picture*
  - *Select proper treatment*
- ❑ **Cancer is a fatal disease; so better understanding of tumor biology would help in:**
  - *Reducing incidence and mortality.* ↓ breast and prostatic cancer mortality by screening programs.
  - *Identification of new modalities for treatment.* gene therapy is currently evaluated.

# **CLASSIFICATION OF TUMORS**

# Classification

- **According to behaviour:**

**Benign  
(Innocent-acting)**



**Malignant  
(Evil-acting)**



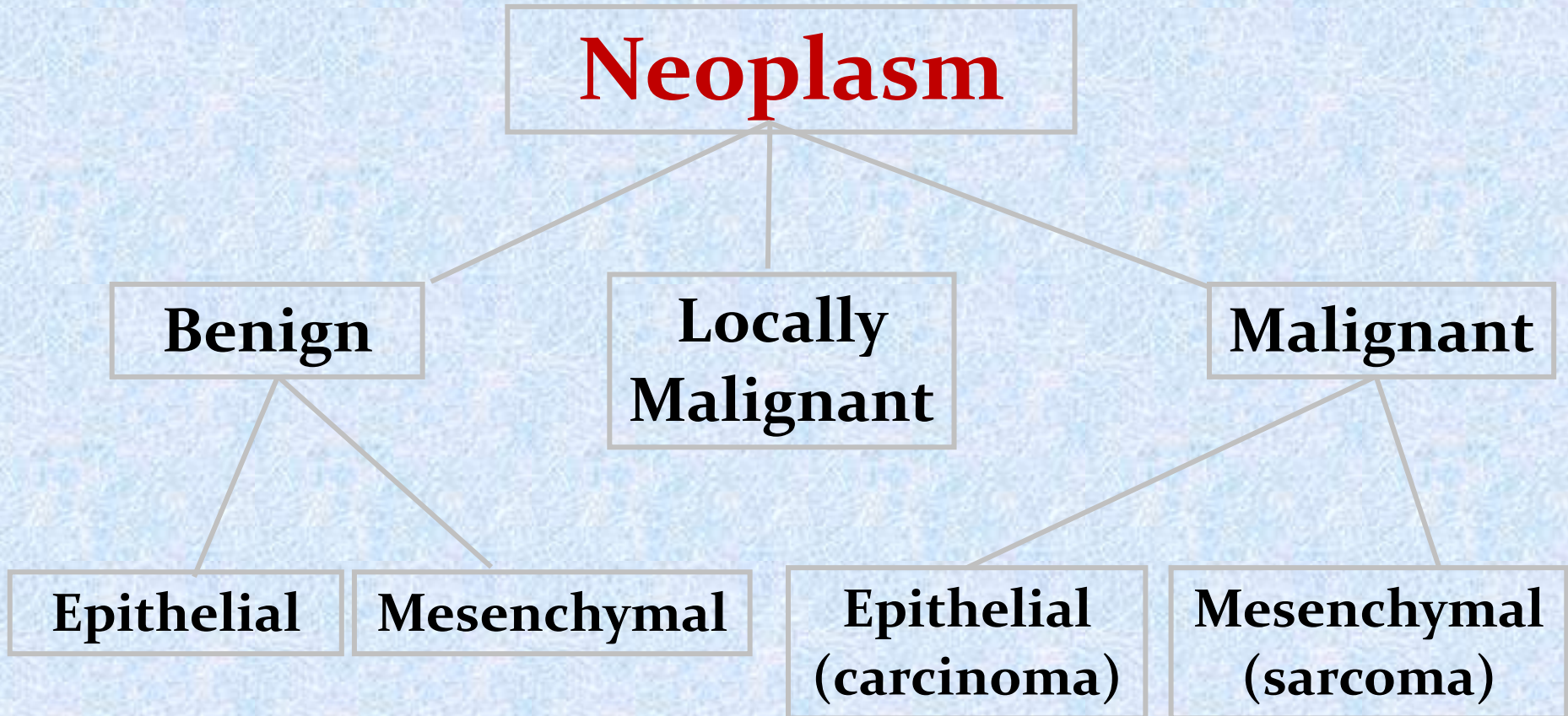
**Locally Malignant**



# Classification

- **According to cell of origin:**
  - Tumors of epithelial origin: epithelial cells
  - Tumors of mesenchymal origin: connective tissue.
  - **Mixed tumors:** Tumours that constitute both epithelial and mesenchymal components.

# Classification



**GOOD LUCK**

*Dr. Ahmed Roshdi*