

Neoplasia lec1

General overview of cancer

-cancer is the second leading cause of death worldwide, 70% occurring in low and middle income countries

-cancer's burden includes: mortality, morbidity, pain and loss of body function, economic costs and emotional problems.

-one third of cancer cases are caused by behavioral and dietary risks:

High body index, bad diet, lack of physical activity, tobacco use, alcohol consumption.

The most important one is tobacco use as it causes 22% of cancer deaths

Defeating cancer

-prevention and early detection are our hope in defeating cancer.

- Prevention: via educating the public about the risk factors.

Between 30-50% of all cancer cases are preventable.

Prevention offers the most cost-effective long-term strategy for the control of cancer.

National policies and programs should be implemented to raise awareness, to reduce exposure to cancer risk factors and to ensure that people are provided with the information and support they need to adopt healthy lifestyles

- Early detection: via screening and educating the public about the early symptoms of certain cancers.

Differences in cancer epidemiology among different countries

-there are differences in cancer epidemiology in different countries due to:

1) Environmental reasons

- Environmental factors and different life styles are the predominant cause of cancer
- When people move from one geographic area to another, subsequent generations acquire the same risk of cancer development as original population.
- Why subsequent generations: because it takes time for migrants to fully adapt the new country's life style!

Ex. Stomach cancer is common in Japan. However, Japanese who migrate to USA have lower incidence of gastric cancer than Japanese in Japan. and generation after generation Japanese US immigrants start showing cancer incidences close to that of native US people.

2) Genetics/heredity

Some cancers have inherited predisposition, but still the majority of these need environmental factors to develop cancer

- Only 5-10% of cancers are inherited.
- This inheritance is usually indirect and its effect is subtle

Inherited cancer usually occurs in children.

Cancer and age

- In general , frequency of cancer increases with age, as accumulation of mutations takes time and immunity declines with ageing.
- However, cancer occurs in children. It is responsible for 10% of all deaths in children younger than 15 years.
- Most common childhood tumors: leukemia, lymphomas, CNS tumors and soft tissue and bone sarcomas.

Changing trends

Cancer incidence and mortality can change according to treatments or to changes in environmental factors.

- Example 1: Colorectal cancer incidence has decreased in USA during the last decade due to awareness of risk factors and to screening programs. However in Jordan, Colorectal carcinoma is increasing.
- Example 2: Cervical cancer has decreased in the West due to screening (due to cervical smear tests).
- Example 3: Lung cancer was uncommon among women worldwide. But when more women started to smoke, lung cancer increased among them.

Language

-Neoplasm: new growth ورم

It can be benign or malignant. Malignant neoplasm is cancer.

-Tumor; generally means mass/ swelling/ increase in size etc.

It can be neoplastic which is characterized by a specific mutation in all tumor cells

Or non-neoplastic can be caused by inflammation, ex;choristoma

HOWEVER, in clinical practice we use tumor for neoplasms. للاورام

-tumor autonomy: they keep growing regardless of normal growth regulatory mechanisms.

- This autonomy is incomplete because they need host blood supply, hormones etc.

-tumor clonality: when we say neoplasms are clonal it means they originate from one parent mutated cell.

- However, tumor cells are not carbon copies, and they accumulate different mutations as the tumor progresses.

BENIGN VS MALIGNANT

| | |
|--|---|
| <p>Definition Excessive cell proliferation in a single mass; localized Can be removed surgically Patients survive</p> | <p>Definition Cancer Spread and damage adjacent structures Metastasizes to distant sites</p> |
| <p>Ex; nevi, benign tumors of melanocytes Very common, not fatal</p> | <p>Ex; melanoma, malignant tumors of melanocytes They can spread and be fatal</p> |
| <p>Exceptions: Brain benign tumors are highly dangerous</p> | <p>Exception Hodgkin lymphoma is malignant but highly curable</p> |

Nomenclature of tumors

According to: tissue they arise from/ benign vs. malignant

Benign tumors arising from epithelial or stromal tissue are named by adding "oma" at the end.

- A benign tumor arising from fatty tissue is called: lipoma, from fibrous tissue: fibroma and so on.
- Malignant tumors arising from epithelial tissues are called carcinomas (adenocarcinoma, squamous cell carcinoma), whereas malignant tumors arising from stromal tissues are called sarcomas (osteosarcoma, fibrosarcoma)

**stromal tissue is connective tissue, blood vessels, lymphatics and nerves

Examples of benign tumors

Adenoma

Glandular epithelium; cells surrounding a cavity with secretory functions (daisy flowers)

A benign tumor arising from glandular epithelium whether it formed glandular structures or not جوا الورم

Ex. Of adenoma forming glandular structures: colon adenoma

Ex. Of adenoma not forming glandular structure: adrenal gland adenoma.

Polyp

Mass projecting above mucosal surface

- This is a nonspecific term, usually used for the macroscopic appearance
- If neoplastic it's usually benign but some malignant tumors can be polypoid.
- The term polyp also is used for non-neoplastic conditions like nasal polyps (inflammatory in nature)

Papilloma: benign epithelial neoplasm producing macroscopic or microscopic finger-like projections.

Teratoma: a strange tumor!

- Is a mixed tumor containing elements of more than one germ cell layer. You can see different types of tissues mixed together in these tumors.
- They originate from totipotential germ cells (in ovary or testis)
- Because they originate from germ cells that can differentiate to any cell type, you can see any type of tissue in these tumors: skin, fat, nerve tissue, hair, teeth.

hamartoma

- Mass of disorganized tissue indigenous to a particular site
- In this example: pulmonary hamartoma, there are tissues normally found in the lung (alveoli, cartilage..) but are not in the normal organization

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Hamartomas were traditionally thought to be developmental malformations however, genetic studies demonstrated the presence of some acquired translocations suggesting a neoplastic nature.

Choristoma

- Heterotopic rests of cells, normal in appearance but present in an abnormal location
- Example: well organized pancreatic tissue present in the stomach.
- These are congenital anomalies, not neoplasms.

Examples of malignant tumors

Reminder:

malignant tumors of epithelial cells: carcinomas.

- carcinoma subdivided to adenocarcinoma (from glandular structures) and squamous cell carcinoma.. and other types (urothelial carcinoma)

-malignant tumors arising in solid mesenchymal tissue/stromal tissue: sarcoma .

- -sarcomas subdivided according to cell of origin: fibrosarcma, chondrosarcoma, leiomyosarcoma..
- Note: mesenchymal tissue – stromal tissue= supportive tissue. Examples of mesenchymal tissue: fat, muscle, cartilage, bone..

Blood neoplasms

- mesenchymal cells of blood: leukemias and lymphoma

(NOTE: lymphoma , although ends with oma is malignant)

The exceptions!! These are malignant oma's

- Melanoma • Seminoma • Lymphoma • Mesothelioma • Multiple myeloma

Summary

. Cancer is the second cause of death worldwide.

- One third of deaths from cancer are caused by obesity, physical inactivity, smoking, alcohol and low veg diet.

- Smoking is responsible for 20% of cancer deaths. • Up to 50% of cancers are preventable.

- Environmental and genetic factors play a role in cancer development.

- Geographic variations in cancer incidence are related to environmental risk factors and variations in life style.

- Hereditary plays a role in cancer, mainly through inheriting a predisposition to cancer which needs environmental factors to develop.

- Rarely: there are inherited cancer syndromes.. we will mention these in details later.

- Risk of cancer increases with age.

- Cancer can occur in children with the commonest being: leukemias, lymphomas, CNS tumours, Sarcomas and bone tumours.

- Neoplasms are new growths with certain genetic changes. They can be benign or malignant.

- Benign tumors are localised, well circumscribed, can be easily excised surgically and have a good outcome.

- Malignant: invade and destroy adjacent tissue, can metastasize to distant sites and have a poor outcome.

- Benign tumors are named after the tissue they arise from with adding the suffix: oma.

- Malignant tumours arising from epithelial tissues are carcinomas whereas malignant ones arising from stromal tissue are sarcomas.

- However, there are important exceptions: Melanoma, Seminoma, Lymphoma, Mesothelioma and Multiple myeloma are malignant.

- Adenomas are benign neoplasms arising from glandular tissue OR forming glands.

- Hamartoma is a benign neoplasm characterised by haphazardly arranged tissue components endogenous to the tissue or organ they are arising from
- Choristomas are non-neoplastic, congenital proliferations of normal tissue in an abnormal location (ectopic tissue)
- Teratomas are tumours arising in the ovary or testis and show tissue components from the three germ cell lines in different combinations.
- Polyp is a macroscopic, not microscopic term, that refers to a projection above a mucosal surface. The majority are benign neoplasms but they could be nonneoplastic (inflammatory polyps) or malignant tumours with a polypoid appearance (mainly in the GIT)

questions at the end of the slides