

# Concepts of Neoplasia

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## OBJECTIVES/RATIONALE

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A neoplasm is an abnormal growth of tissue that may be benign or malignant. The student will identify terms related to neoplasia, classifications of tumors, and grading and staging of cancer.

TEKS: 121.15 (c) 3(D), 4(A-E), 5(A-D), 6(A-D), 7(B,C,D,E)

TAKS: ELA 1, 4  
Science 1, 2, 3

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## KEY POINTS

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### POWER POINT

#### I. General Aspects of Neoplasia

##### A. Cells

- a. Many cells of the body are constantly undergoing reproduction and maturation
- b. All cell lines go through the process of **differentiation** (primitive non-specialized cell that matures into a specific cell type based on function it will perform)
- c. A cell that is non-differentiated is one that has remained in a rudimentary state (or regressed back to earlier stage) - Cancer (Ca) cells are less differentiated (more primitive) or completely non-differentiated

#### II. Classification of Neoplasia by Tissue Origin

- A. Epithelial Tissue – malignant growths arising from this tissue are called **carcinomas** - tissue includes: internal organs, linings of body cavities, and glands
- B. Connective Tissue – malignant growths arising from this tissue are called **sarcomas** - Connective tissue includes: bone, muscle, and blood
- C. Special Tissue Malignancies - Glial Tissue – malignant growths arising from connective tissue of brain are called **gliomas**
- D. Benign Tumors Are Named On Basis of Involved Tissue - Name of tissue involved + suffix *oma* (e.g., *adenoma*, *lipoma*, *osteoma*, *chondroma*, *lipoma*, *glioma*); ex. *adenocarcinoma*, *liposarcoma*, *osteosarcoma*, *chondrosarcoma*, *glioblastoma*

<b>EPITHELIAL TISSUE:</b>		
<b>Tissue Type</b>	<b>Benign</b>	<b>Malignant</b>
Gland Papilloma	adenoma papill	adenocarcinoma papillo
<b>CONNECTIVE TISSUE:</b>		
Bone Cartilage Fat	oste chondr lip	osteo chondro lipo
Glia nerve tissue		gli

#### III. Uncontrolled Growth of Cancer Cells

- A. cancer cells grow without the stop controls that characterize normal cell growth

- a. there is rapid cell division and reproduction (mitoses)
  - b. at certain stage of development, cancer cells fail to mature
  - c. when squamous epithelial cancer has not moved past the basement membrane, it is temporarily contained and said to be in situ - this can be seen in early lesions of the cervix, mouth, and larynx
  - d. cancers break through the underlying tissue and metastasize
- B. cancer cells can metastasize in three ways:
- a. cancer can “shed” cells that can circulate into the blood and lymphatic systems
  - b. by accidental transplantation during invasive (surgical) procedures
  - c. progressive, invasive growth that spreads to adjacent organs

#### IV. Etiology of Cancer (Proven and Suspected)

- A. Carcinogenesis has no single cause.
- B. Carcinogenesis may result from complex interactions between viruses, physical and chemical carcinogens, and genetic, dietary, immunologic, and hormonal factors.
  - a. The Virus Aspect – animal research has shown that viruses can transform cells
    - i. Epstein-Barr virus that causes infectious mononucleosis is associated with Burkett’s lymphoma and nasopharyngeal Ca.
    - ii. Types of human papilloma virus are linked to cervical Ca.
    - iii. Hepatitis B virus can cause liver Ca.
    - iv. Human T-cell lymphotropic virus is suspected of causing adult T-cell leukemia
  - b. Exposure & Environmental Chemicals Factors – relationship between excessive exposure to sun’s UV rays and skin Ca is well established; substances in the environment can cause cancer by damaging DNA in cells
    - i. UV exposure and sunburn linked to melanoma
    - ii. radiation exposure suspected to provoke tumor development and leukemia
    - iii. also contributing to the exposure aspect are: individual’s tissue type, age, hormonal status, health status
    - iv. chemicals from tobacco contain common carcinogens and are related to cancers such as: lung, pancreatic, kidney, bladder, and esophageal Ca)
    - v. asbestos and airborne hydrocarbons are related to lung Ca
  - c. Specific Dietary Suspects – some types of foods, additives and preparation are considered cancer risks
    - i. High-protein and high-fat diets
    - ii. Food additives such as nitrates
    - iii. Charbroiling
  - d. Familial Tendencies: The Genetic Factor
    - i. Some cancers have a familial link and share the following characteristics:
      - 1. early onset
      - 2. increased incidence of bilateral cancer in paired organs (breasts, adrenal glands, kidneys)
      - 3. increased incidence of multiple primary cancers in nonpaired organs
      - 4. unique tumor site combinations
      - 5. two or more family members in same generation with same cancer
  - e. The Hormone Factor
    - i. The role hormones play in cancer is controversial
    - ii. excessive hormone use (estrogen) has shown increased risk for certain types of cancer (ovarian, breast)

#### V. Grading and Staging of Malignant Neoplasia

- A. Classification process that is helpful in determining prognosis and treatment
  - a. **Grading** – a histologic method used by pathologists when they examine tissue or cell specimens
    - i. Looking for differentiation

- ii. Severity of malignancy can be assessed by degree of dysplasia or anaplasia present (*remember*)

Recognized grades of malignancy:

- i. Grade I – cells are well differentiated (closely resemble tissue of origin), with little mitoses. Prognosis is good.
  - ii. Grade II – cells are moderately differentiated (some structural similarity to parent tissue), with moderate mitoses. Prognosis is fair.
  - iii. Grade III – Cells are poorly differentiated (little resemblance to their origin), with many mitoses. Prognosis is fair to poor.
  - iv. Grade IV – Cells are de-differentiated (bizarre and primitive with unrecognizable origins), with many mitoses. Prognosis is poor.
- c. – a classification based on clinical findings by the physician (often oncologist)
    - i. stage relates to degree of spread (whereas grade relates to malignancy)
    - ii. staging is based on size of primary tumor and amount of metastasis or secondary tumors
  - d. Rules of Staging
    - i. Follow **TNM**
      - T**            **tumor**
      - N**            **numbers**
      - M**                    **metastasis**

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### ACTIVITIES

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- I. Complete a Case Study on a specific type of cancer.

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### MATERIALS NEEDED

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Key Terms  
Key Terms Answers

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### ASSESSMENT

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Successful completion of Case Study

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### ACCOMMODATIONS

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For reinforcement, the student will define the key terms.

For enrichment, the student will report on a specific type of cancer. Present using multimedia technology.

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### REFLECTIONS

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Key Terms

CA or Ca -

Differentiation (cell) –

Stem cells -

Neoplasia –

Hyperplasia –

Dysplasia or Atypia –

Hypoplasia –

Anaplasia –

Hypertrophy –

Atrophy –

Agenesis –

Tumor -

Benign –

Malignant –

Mestastasis –

Carcinoma –

Sarcoma –

Carcinogen –

Carcinogenesis –

In situ –

Oncogenic viurses –

Oncologist –

Familial condition–

Grading –

Staging –

**Answers: Key Terms—Neoplasm**

CA or Ca – medical acronym for cancer

Differentiation (cell) – a process of changing from original unspecialized form to a different, more specialized form or function; a primitive nonspecialized cell that matures into a specific cell type according to function it is to perform

Stem cells – primitive, undeveloped cells

Neoplasia – “new growth”; formation is abnormal and serves no useful purpose

Hyperplasia – an increase in the *number* of cells that leads to increased mass in particular tissue (note: cells are normal size, the increase is in the number of cells)

Hypoplasia – a decreased number of cells leading to underdevelopment of tissue or organ

Anaplasia – “without form”; regression of fully developed cells to its primitive form (occurs in some tumors)

Dysplasia or Atypia– describes cells that looks abnormal or atypical

Hypertrophy – increased *size* of cells) Note: both hyperplasia and hypertrophy can exist within the same tissue.

Atrophy – decrease in size of cells that results in smaller tissue or organ

Agenesis – “without development/origin”; non-development of a part or organ

Tumor – a solid, localized mass or lump that new growth produces; space-occupying lesion

Benign – non-spreading; non-cancerous

Malignant – causing harm; serious condition; cancer that is invasive

Metastasis – spread of cancer from original tumor to other parts of body by means of tiny clumps of cells transported by blood or lymph

Carcinoma – a malignant tumor that starts in epithelium of organ or body part and may spread to other parts of body

Sarcoma – a malignant tumor that begins growing in connective tissue (muscle, bone, fat, cartilage)

Carcinogen – a substance or agent that can cause cancer (radiation exposure, certain chemicals, some viruses)

Carcinogenesis – cell’s transformation from normal to cancerous cell

In situ – in natural place or origin; has not spread

Oncogenic viurses – cancer producing viruses; virus genes transform normal cells into deviant mutations that grow wildly without a “stop” mechanism

Oncologist – physician who specializes in tumors

Familial condition – conditions that tend to run in certain families

Grading – classification process that is a tissue-based method used by pathologists when they examine a tissue biopsy or cell specimens; looking for differentiation as to the degree of dysplasia or anaplasia; relates to

Staging – classification based on size of primary tumor and amount of metastasis or secondary tumors; relates to degree of **spread**

# Pathology Report

**Disease**

**Alternate names**

**Definition**

**Etiology**

**Signs & Symptoms**

**Diagnostic Tests**

**Treatment**

**Complications**

**Prognosis**