Histopathology

Lecture 8 and Lecture 9

Neoplasia

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Neoplasia

Neoplasia is new growth. The terms benign and malignant correlate to the course of the neoplasm. Benign neoplasms stay localized in one place; malignant neoplasms invade surrounding tissue and, in most cases, can metastasize to distant organs. To become neoplastic, a normal cell must develop mutations that allow it to no longer obey boundaries of adjacent cells, thus allowing for uncontrolled growth, and the neoplasm must be able to produce its own blood supply. If the neoplasm is malignant, the cells must also gain the ability to invade the basement membrane and surrounding tissue, enter the blood stream, and spread to and grow within distant organs.

TERMINOLOGY OF NEOPLASIA

Overview: The terms tumor, nodule, and mass are nonspecific terms that refer to an abnormal proliferation of cells. The term neoplasm means new growth and does not imply benign or malignant (i.e., there are benign neoplasms, and there are malignant neoplasms)

Nomenclature for general categories of neoplasms

■ **Adenoma**: Benign neoplasm derived from glandular cells.

■ **Carcinoma**: Malignant neoplasm derived from epithelial cells (Figures 1 and 2).

■ **Sarcoma**: Malignant neoplasm derived from mesenchymal cells (e.g., fat, muscle).

■ **Lymphoma**: Malignant neoplasm derived from lymphocytes.

■ **Melanoma**: Malignant neoplasm derived from melanocytes.

■ **Germ cell tumor**: Malignant neoplasm derived from germ cells

Nomenclature for benign neoplasms

In general, the name of a benign neoplasm often ends with –**oma**.

■ Examples: Adenoma (benign neoplasm of glandular epithelium), fibroadenoma (benign neoplasm of the breast), and leiomyoma (benign neoplasm of smooth muscle).

■ Some exceptions: Hepatoma (malignant neoplasm of liver), melanoma (malignant neoplasm of melanocytes), mesothelioma (malignant neoplasm of mesothelial cells), and seminoma (malignant germ cell neoplasm of testis).

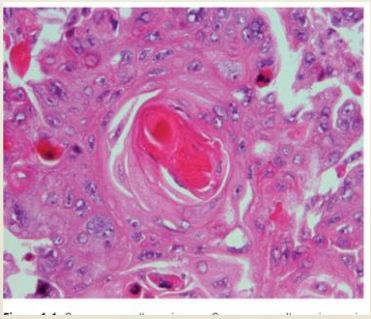

Figure 1. Squamous cell carcinoma. Squamous cell carcinoma is one of the major forms of carcinoma, occurring within many organs including the mouth, upper respiratory tract, and lungs. In the center of the photomicrograph is a keratin pearl, a characteristic feature of a well or moderately differentiated squamous cell carcinoma.

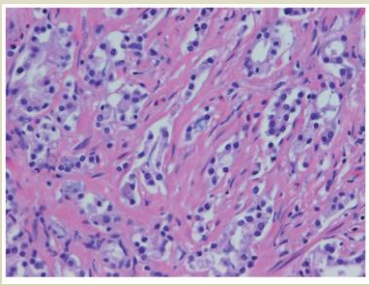

Figure 2. Prostatic adenocarcinoma. Adenocarcinoma is one of the major forms of carcinoma. In well and moderately differentiated forms, the glandular histology is readily apparent (as in this section).

Nomenclature for malignant neoplasms

In general, the name of a malignant neoplasm often ends with –carcinoma or –sarcoma.

■ Examples: Adenocarcinoma (malignant neoplasm of glandular tissue), rhabdomyosarcoma (malignant neoplasm of skeletal muscle), and leiomyosarcoma (malignant neoplasm of smooth muscle).

Terminology related to microscopic appearance of neoplasms

■ **Differentiation**: How histologically similar to the normal tissue the neoplasm is (i.e., how analogous the neoplastic cells look to the tissue type from which they arose)—terms used are well differentiated, moderately differentiated, or poorly differentiated.

■ **Anaplasia**: Lack of differentiation.

■ **Dysplasia**: Disordered growth of epithelium. There is a loss of cellular uniformity and architectural orientation. The cells may have an increased number of mitotic figures. Dysplasia does not necessarily form a mass or tumor. In many cases, dysplasia is a precursor of malignancy, but dysplasia does not always progress to malignancy. Dysplasia can be reversible, if the inciting agent is removed (Figure 3).

■ **Carcinoma in situ**: Full-thickness dysplasia of the epithelium.

FEATURES USED TO DISTINGUISH BENIGN NEOPLASMS FROM MALIGNANT NEOPLASMS

Histologic features of malignancy Histologic features are reliable indicators of malignancy in many organs, although in some sites (e.g., the endocrine system), histologic features do not always distinguish benign neoplasms from malignant neoplasms (Figures 4). The histologic features of malignancy are listed below.

■ **Pleomorphism**: Variation in nuclear and cytoplasmic shape between cells.

■ **Abnormal mitotic figures** and increased numbers of mitotic figures.

■ **Hyperchromasia**: Increased basophilia of the nucleus.

■ **Hypercellularity**, with a loss of normal polarity.

■ *Benign neoplasms tend to grow slower; malignant neoplasms tend to grow more quickly.*

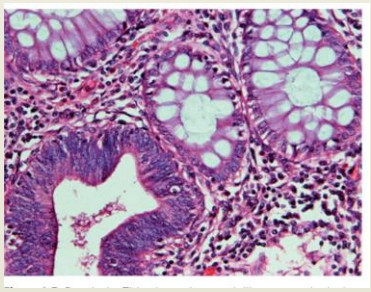

Figure 3. Dysplasia. This photomicrograph illustrates colonic dysplasia in a tubular adenoma. The gland in the left lower corner is dysplastic. The epithelial cells have features of neoplasia (i.e., increased cellularity, hyperchromatic nuclei, and mitotic figures). The remainder of the glands shown in the photomicrograph are histologically normal. Dysplasia is often a precursor of malignancy.

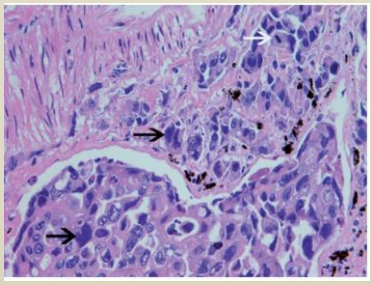

Figure 4. Cellular features of malignancy. The photomicrograph illustrates an anaplastic neoplasm with hypercellularity, nuclear hyperchromasia (black arrows), and mitotic figures (white arrow). However, in most cases, cellular features alone cannot distinguish a benign neoplasm from a malignant neoplasm.

Lecture 9

Nutritional Diseases

Nutritional Diseases

Marasmus

Basic description: Malnutrition due to inadequate calories.

Manifestations: Growth retardation, decreased muscle mass.

Important point: Albumin level is normal.

Kwashiorkor

Basic description: Malnutrition due to protein deprivation, which is out of proportion to the total reduction in calories.

Manifestations: Edema due to hypoalbuminemia; fatty liver.

Anorexia

Basic description: Self-induced starvation.

Bulimia

Basic description: Binge eating followed by purging (i.e., vomiting).

Effects of bulimia: Cardiac arrhythmias due to hypokalemia, esophageal rupture.

Vitamin deficiencies

Vitamin B12 deficiency

■ **Causes**: Strict vegetarians; pernicious anemia, which results in decreased levels of intrinsic factor; Diphyllobothrium latum infection, which impairs absorption of vitamin B12 in the terminal ileum.

■ **Clinical presentation**: Megaloblastic anemia, peripheral neuropathy.

Folate deficiency

■ **Causes**: Pregnancy; diet low in fresh vegetables.

■ **Clinical presentation**: Megaloblastic anemia with hypersegmented neutrophils. A peripheral neuropathy is not seen.

Vitamin A deficiency

■ **Causes**: Fat malabsorption, laxative abuse, and alcohol use.

■ **Clinical presentation**: Night blindness (earliest manifestation); xerosis and corneal ulceration.

Vitamin C deficiency (scurvy)

■ **Cause**: Malnourishment.

■ **Clinical presentation**: Bleeding gums, ecchymoses on extremities, poor wound healing, and classic "corkscrew hairs."

Vitamin D deficiency: Rickets in children and osteomalacia in adults.

Vitamin E deficiency: Gait disturbances, ophthalmoplegia.

Vitamin K deficiency

■ **Causes**: Fat malabsorption and use of warfarin, which is a competitive inhibitor of vitamin K.

■ **Features**: Bleeding; prolonged prothrombin time.