Tumor Nomenclature

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Author: ScholarRx

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Learning Objectives (4)

After completing this brick, you will be able to:

1. Define neoplasia, and describe the principles of naming tumors according to tissue of origin.
2. Explain how benign tumors are named, give examples, and list common exceptions.
3. Explain how malignant tumors are named, give examples, and list common exceptions.
4. List examples of lesions that sound like neoplasms but are not.

Neoplasms can be benign or malignant. Benign tumors remain localized and do not metastasize (do not invade or spread to other sites in the body). Malignant tumors, on the other hand, are capable of metastasizing. The word "cancer" refers specifically to a malignant tumor.

What is the main difference between a benign and malignant tumor?

Beyond the difference in their ability to metastasize, certain features are common to each type of tumor. Benign tumors are usually well-differentiated (composed of cells that look very similar to their normal cell of origin), have little mitotic activity, and do not contain areas of necrosis. They also usually have well-demarcated (easy to identify) borders and are often surrounded by a capsule of fibrous tissue. They do not invade surrounding tissues but simply grow larger, "pushing" the adjacent tissue aside.

In contrast, malignant tumors may be anywhere on the differentiation spectrum (from poorly differentiated to well-differentiated). They often show high mitotic activity and contain areas of necrosis (dead cells). They are not encapsulated, and they typically grow in an invasive fashion, extending into the surrounding tissue and running over everything in their path.

CLINICAL CORRELATION

Remember the difference between necrosis and apoptosis. Apoptosis is energy-dependent programmed cell death without significant inflammation. Necrosis, on the other hand, is cell death via enzymatic degradation and protein denaturation due to exogenous injury, and it often elicits an inflammatory response.

Benign tumors are typically easily treated. Unless they occur in inaccessible areas (such as deep in the brain), surgical resection is usually curative. Malignant tumors are more difficult to treat successfully. Because of their invasiveness and metastatic potential, surgical excision may not be curative, and chemotherapy and radiation may be required. If a malignant tumor is caught at an early stage, treatment may be effective. Unfortunately, in many cases, the tumor has already spread by the time it is diagnosed, and treatment is less successful.

How Are Tumors Named?

In general, tumor names have two parts:

- The first part refers to the tumor's tissue of origin

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- The second part includes the suffix -oma.

Malignant tumors have an added naming convention we'll look at shortly, and there are some exceptions to these naming rules.

Benign Tumors

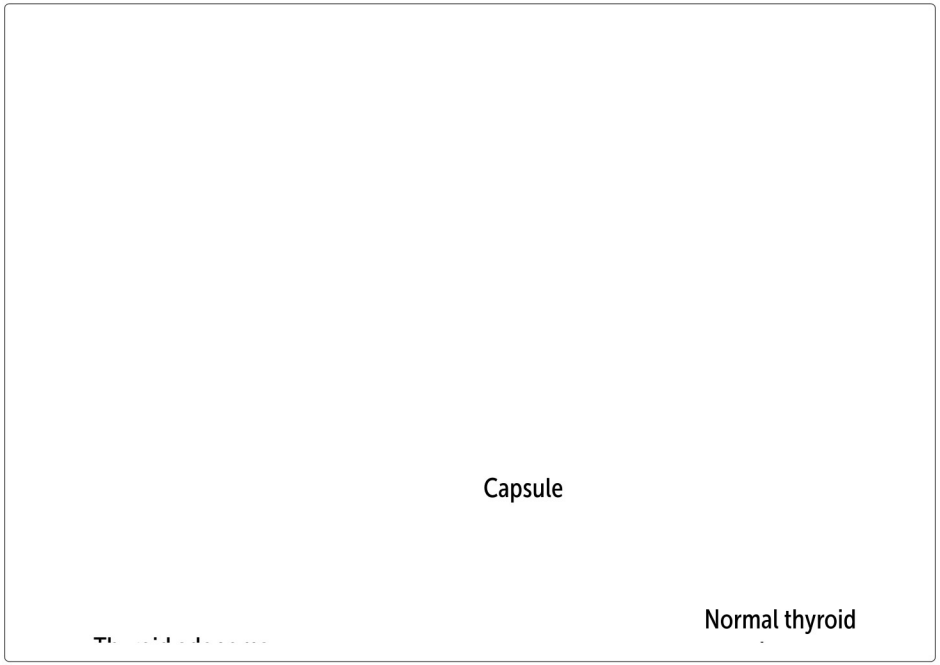
As noted, benign tumor names have two parts. The prefix refers to the cell or tissue of origin. The second part (suffix) is -oma. Many cell-of-origin prefixes will already be familiar to you: myo- refers to muscle cells; lipo- refers to fat cells, and osteo- refers to bone. Some may be new to you, but you'll catch on quickly! Here are some examples of prefixes:

- Adeno- refers to glandular cells.
- Leiomyo- refers to smooth muscle cells.
- Rhabdomyo- refers to skeletal muscle cells.
- Angio- refers to vessels of any type.
- Hemangio- refers to blood vessels.
- Lymphangio- refers to lymphatic vessels.

Here are some examples of benign tumor names:

- Benign tumor of glandular cells = adeno (glandular cells) + oma = adenoma
- Benign tumor of smooth muscle = leiomyo (smooth muscle) + oma = leiomyoma
- Benign tumor of bone = osteo (bone) + oma = osteoma

Figure 1 shows an adenoma of the thyroid gland. The adenoma is surrounded by a capsule, as is often the case in benign tumors. A small amount of normal thyroid tissue is present to the right.



QUIZ

Tap image for quiz

Figure 1

There are a couple of exceptions: papilloma and nevus. Papillomas are benign tumors of epithelial tissue that have tiny finger-like bumps (projections) at their surfaces. This finger-like growth pattern is called a papillary pattern. In Latin, papilla means a small elevation or swelling in the skin, like a nipple, so the name does have some logic to it!

A nevus (commonly called a mole) is a benign tumor of melanocytes.

Technically, a benign tumor of melanocytes should be called a melanoma, but for unknown reasons, the term melanoma is used for the malignant version of this tumor. So we're stuck with nevus.

What is the name for a benign tumor of blood vessels?

Malignant Tumors

Remember that the body is made up of two major classes of tissue: epithelial tissues and mesenchymal tissues. Epithelium consists of densely packed cells atop a basement membrane; this tissue covers various surfaces and lines cavities within the body.

Mesenchymal tissues are "soft" tissues, or connective tissues, that make up the bulk of the body (eg, muscle, bone, cartilage, fat, and connective tissue). These tissues are derived from mesenchyme, a gelatinous substance present during early embryogenesis. Mesenchyme arises from mesoderm, the germ cell layer sandwiched between the ectoderm and the endoderm.

When a malignant tumor is derived from epithelial tissue, "carcinoma" is added. For example:

- Malignant tumor of glandular cells = adeno (glandular cells) + carcinoma (glandular cells are epithelial) = adenocarcinoma
- Malignant tumor of squamous cells = squamous cell + carcinoma (squamous cells are epithelial) = squamous cell carcinoma

When a malignant tumor is derived from mesenchymal tissue, "sarcoma" is added. In Greek, sarx or sark means flesh, so you can think of sarcomas as malignant tumors of fleshy tissues. For example: malignant tumor of smooth muscle = leiomyo (smooth muscle) + sarcoma (smooth muscle is mesenchymal) = leiomyosarcoma.

What is the name for a malignant tumor of fat cells?

Exceptions to the Rule

Some malignant tumor names don't follow the rules. Some of these names sound like benign tumors, but they most definitely are malignant:

- Glioblastoma: malignant tumor of astrocytes in the brain and spinal cord
- Lymphoma: malignant tumor of lymphocytes
- Leukemia: malignant tumor of white blood cells
- Mesothelioma: malignant tumor of mesothelial cells
- Melanoma: malignant tumor of melanocytes
- Myeloma: malignant tumor of plasma cells
- Seminoma: malignant tumor of male germ cells

Names That Sound Like Tumors But Aren't

The names of some lesions include the -oma suffix, but these lesions are not actually neoplasms. Hamartomas are non-neoplastic regions of disorganized tissue that are indigenous to the site at which they are found. For example, a pulmonary hamartoma is a localized area of disorganized tissue within the lung.

Hamartomas are usually harmless but can sometimes cause bothersome or harmful effects. And the terminology is often inconsistent: many lesions that some consider hamartomas are considered by others to be neoplastic.

CLINICAL CORRELATION

A characteristic of the autosomal dominant disease tuberous sclerosis is hamartomas of the skin and central nervous system.

Another example of a name that ends in -oma but is not a neoplasm is the term choristoma, which refers to the growth of microscopically normal cells in an abnormal location. For example, a small nodule of normal-appearing thyroid tissue located in the thymus would be considered a choristoma.

What is a hamartoma?

CASE CONNECTION

BACK TO INTRODUCTION

Thinking back to SN, how do you speak to him about the significance of an adenoma?

You type a message back to SN: "Not to worry. The word adenoma means a benign, noncancerous growth of the normal glandular tissue of the colon. No cancer was found. That's good news. We will need to repeat the colonoscopy, and we can talk about when the best timing would be at your next visit.

Please let me know if you have any further questions." SN thanks you for your prompt reply. In his follow-up visit, you jointly decide to repeat the colonoscopy in 5 years.

Summary

- Neoplasia is the unregulated, monoclonal proliferation of cells; a neoplasm can be benign or malignant.
- Benign tumors remain localized and do not metastasize, while malignant tumors are capable of metastasizing; "cancer" refers to malignant tumors.
- In general, tumor names have two parts: the first part refers to the tumor's tissue of origin, and the second part includes the suffix -oma.
- Benign tumors are named by adding -oma to the tumor's tissue of origin (eg, adenoma).
- Malignant tumors are named by adding "carcinoma" (if the tumor is derived from epithelial cells) or "sarcoma" (if the tumor is derived from mesenchymal cells) to the tumor's tissue of origin (eg, adenocarcinoma).
- There are many exceptions to the general rules for tumor nomenclature; it's important to become familiar with the most common ones to avoid confusion.

Review Questions

1. **A patient receives a diagnosis of squamous cell carcinoma of the lung. According to the standard rules of tumor nomenclature, which of the following is true about this lesion?**

   A. It can also be called a papilloma

   B. It can invade locally and spread to distant anatomic sites

   C. It is a benign tumor

   D. It is not cancer

   E. The tissue of origin is mesenchymal

   Explanation (requires correct answer)

2. **A man is told he has a fibroma. According to the standard rules of tumor nomenclature, which of the following is true about this lesion?**

   A. It is a benign tumor

   B. It is cancer

   C. It is derived from muscle cells

   D. It has the potential to metastasize

   E. It will contain many areas of necrosis

   Explanation (requires correct answer)