



Foundations of Public Health

Part II: Biological Foundations for Public Health

CANCER

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Introduction

The oldest descriptions of cancer were written in Egypt as early as 3000 B.C. as part of an ancient Egyptian textbook on surgery. The name, “cancer” comes from the Greek word *carcinos*, which means crab. During the 16th century, when the theory of bodily humors prevailed, it was believed that an excess of black bile caused cancer. The renowned anatomist Andreas Vesalius searched diligently for this black bile and ultimately discarded this theory when he was unable to find it. In 1838, a botanist named Matthias Schleiden and Theodor Schwann, a physiologist, proposed that all living things were composed of fundamental units called cells. Shortly after the introduction of this idea, Virchow (the “father” of pathology) proposed that cells only arose from other cells and that growth could only occur as a result of hypertrophy or hyperplasia. Virchow studied cancers under with a microscope and recognized that they represented hyperplasia in an extreme form that he dubbed “neoplasia.” Evidence accumulated to support the idea that cancer was the result of uncontrolled cell division, but the cause was unknown. It was not until the last three decades of the 20th century that the biological origins of cancers began to be revealed. This module will provide our current understanding of the biological basis of cancer, determinants of the disease, and ways to prevent or reduce the risk of getting cancer.

Learning Outcomes

After completing this module, the student will be able to:

- Describe the distinguishing features of a cancer.
- Discuss the mechanism by which cancers evolve.
- Explain what is meant by “metastasis” and the mechanisms by which it occurs.
- Explain the difference between the “grade” and the “stage” of a cancer.
- Discuss risk factors for cancer and strategies for prevention.
- Define the following terms:
 - Cell differentiation
 - Malignant tumor
 - Carcinogen
 - Tumor-suppressor gene (anti-oncogene)
 - Benign tumor
 - Dysplasia
 - Proto-oncogene and oncogene
 - Apoptosis