

BENG 100 Frontiers of Biomedical Engineering
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Chapter 17

KEY CONCEPTS AND DEFINITIONS

alpha particles – a helium nuclei composed of two protons and two neutrons that is the product of radioactive decay.

beta particles – an electron emitted from an atom during beta decay, a form of radioactive decay.

biopsies – tissue samples that are surgically removed to determine if cancer is present.

blood-brain barrier – a layer of cells covering the brain that prevent the passage of blood into the brain tissue.

brachytherapy – the implantation of radioactive materials, called seeds, into or near a tumor.

carmustine – an alkylating agent, $C_5H_9Cl_2N_3O_2$, used in the treatment of tumors.

cellular junctions – spaces between adjacent cells where cell to cell communication can occur either allowing or preventing the flow of ions and minerals between the cells. There are three types of cellular junctions that serve different purposes: adherens, gap, and tight.

chemotherapy – the use of chemical agents, or drugs in the treatment of cancer and other diseases.

chronic myelogenous leukemia (CML) – a form of cancer characterized by the abundant production of myeloid cells in the bone marrow.

electromagnetic rays – waves with both electric and magnetic characteristics.

external beam radiation therapy (EBRT) – a cancer treatment method produced by the use of external radiation beams generated by machines called linear accelerators that provide a high degree of focus for the beams, and careful planning of the radiation field.

genomic – the study of the human genome.

glioblastoma multiforme – an invasive form of primary brain tumor arising from the glial cells of the brain.

heterogeneous – containing cells that differ widely in their biology and therefore in their response to different treatments

hormonal therapy – the use of hormones for medical treatment.

hormones - a ligand that induces specific responses in target cells especially in the endocrine system; hormones regulate the growth, differentiation, and metabolic activities of various cells, tissues, and organs.

intensity modulated radiation therapy (IMRT) – a treatment for cancer that utilizes computer controlled x-ray accelerators to provide radiation delivery from different angular positions to target a tumor and provide minimal exposure to surrounding tissues.

luteinizing hormone-releasing hormone (LHRH) – a hormone that is responsible for controlling the sex hormones of humans.

malignant glioma – an invasive brain tumor.

methotrexate – the first modern chemotherapy agent that specifically targets and the enzyme dihydrofolate reductase and inhibits the action of DNA replication in cells.

neoplasm – cells with uncontrolled growth and division, also called a tumor.

neutrons – a subatomic particle with no net charge.

nitrosoureas – a class of chemicals containing nitroso groups and urea, commonly used in the treatment of cancer.

Ommaya reservoir – a device that is implanted under the scalp with the ability to deliver chemotherapeutic drugs to the cerebrospinal fluid.

proteomic – the study of human proteins.

radiation therapy – the treatment of a disease or cancer by the administration of radioactive materials or rays.

resection – surgical removal of a tissue from the body.

testosterone – a hormone, derived from cholesterol, that is secreted in the sex organs of males and females with the ability to effect libido and energy.

three-dimensional conformal radiation therapy (3D-CRT) – a treatment for cancer that utilizes computer controlled x-rays to provide radiation delivery through a beam with the ability to conform to the shape of a tumor.

Tumor, Node and Metastases (TNM) – a system used in the classification of cancer,

indicating the rate and extent of growth within the body.

x-rays - a type of electromagnetic radiation with wavelengths in the range of 10 to 0.01 nanometers.