20BT019 CANCER BIOLOGY AND THERAPY

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
-	-	-	-	-	-

Course Description and Objectives:

This course deals with the understanding of physiological and molecular behavior of cancer cells. The main intention of this course is to acquaint students with the biological principles of cancer in human beings and its therapies. In addition, current concepts in cancer biology and cancer genetics will be introduced to students.

Course Outcomes:

Upon successful completion of the course, the students will be able to:

- Fundamentals of cancer biology
- Tumor suppressor genes and onco genes
- Principles of physical and chemical carcinogenesis; molecular cell biology of cancer and metastasis
- Screening and detection of cancer; and different cancer therapeutic approaches

SKILLS:

- ✓ Handling animal cells, CO_2 incubator
- ✓ Culturing cancer cell lines
- ✓ Passaging and trypsinization of cells
- ✓ Identification of cancer cells based on physical appearance
- ✓ Basic HE staining to differentiate cancer cells

UNIT - I

FUNDAMENTALS OF CANCER BIOLOGY: Regulation of cell cycle, mutations that cause changes in signal molecules, signal switches, tumour suppressor genes, modulation of cell cycle in cancer, different forms of cancers, diet and cancer.

UNIT - II

PRINCIPLES OF CARCINOGENESIS: Theory of carcinogenesis, Chemical carcinogenesis, metabolism of carcinogenesis, principles of physical carcinogenesis, x-ray radiation-mechanisms of radiation carcinogenesis.

UNIT - III

PRINCIPLES OF MOLECULAR CELL BIOLOGY OF CANCER: Signal targets and cancer, activation of kinases; Oncogenes, identification of oncogenes, retroviruses and oncogenes, Oncogenes/proto oncogene activity. Growth factors related to transformation. Role of Telomerases in cancer.

UNIT - IV

PRINCIPLES OF CANCER METASTASIS: Clinical significances of invasion, metastatic cascade, basement membrane disruption, three step theory of invasion, proteinases and tumour cell invasion.

UNIT - V

SCREENING, DETECTION, DIAGNOSIS AND NEW MOLECULES FOR CANCER THERAPY: Cancer screening, early and advanced detection, Detection using biochemical assays, tumor markers, molecular tools for early diagnosis of cancer. Different forms of therapy-chemotherapy, radiation therapy, Gene therapy and immunotherapy. Use of signal targets towards therapy of cancer.

TEXT BOOKS:

1. Maly B.W.J, "Virology A Practical Approach", IRLI Press,Oxford, 1987.
2. Dunmock N.J And Primrose S.B., "Introduction to Modern Virology", Blackwell Scientific Publications, Oxford, 1988.
3. Franks, L.M. & Teich, N.M, "An Introduction to Cell and Molecular Biology of Cancer", Oxford Medical Publications, First edition, 1991.

REFERENCE BOOKS:

1. Margaret A Knowlies, Peter J Selby - Introduction to the Cellular & Molecular Bioilogy of Cancer, Oxford, 4th Edition, 2005.
2. Raymond W. Ruddon - Cancer Biology, Wiley Publications, 4th Edition, 2007.
3. Robert T.A. Weinburg - The Biology of Cancer, Garland Science, First Edition, 2007.

ACTIVITIES:

- Preparation of cell culture specific media
- Calculation and preparation of buffers
- Maintaining aseptic conditions of Laminar Air Flow Chamber
- Inducing cancer in animal models
- Evaluation of anticancer activities of medicinal plants