

Hong Kong College of Radiologists

Basic Training Course in Radiobiology & Cancer Biology

Teaching Time Table (2022)

DATE: 13th August 2022 – 17th December 2022

TIME: Lecture: 9:00 a.m.– 11:30 a.m. (Sat)
Workshop: 11:45 a.m. – 1:00 p.m. (Sat)

FORMAT: All lectures and workshops will be conducted virtually via Zoom platform
16 lectures (9 for cancer biology; 7 for radiobiology)
4 workshops (A-D; 2 for cancer biology; 2 for radiobiology)

COURSE COORDINATOR: Dr. Timothy TC YIP

TUTORS: Dr. Timothy TC YIP (TY; Adjunct Professor, City University of Hong Kong)
Dr. William CS CHO (WC; Laboratory Director & SO i/c, QEH HK Jockey Club Cancer Research Laboratory)

Cancer Biology

No.	Date	Session	Time	Topic
1	13/8/22	Lecture (TY)	9:00-11:30	Techniques in molecular biology: <ul style="list-style-type: none"> • Nucleic acid analyses including electrophoresis, hybridisation, blotting, PCR, sequencing, transfection • Microarray techniques • Transgenic models
A	13/8/22	Workshop (WC)	11:45-13:00	Molecular biological techniques for cancer studies
2	20/8/22	Lecture (WC)	9:00-11:30	General principles of tumor biology & aberrant cell growth control: <ul style="list-style-type: none"> • Definitions of growth disorders, dysplasia and carcinoma <i>in situ</i> • Mechanisms of local invasion & metastasis • Basic on cell cycle • Control of cell growth • Autocrine, paracrine & endocrine growth factors • Altered expression in malignancy

No.	Date	Session	Time	Topic
3	27/8/22	Lecture (WC)	9:00-11:30	Causation of human cancers: <ul style="list-style-type: none"> • Environmental factors • Carcinogenesis • Viral carcinogenesis (HPV, EBV, etc) • Radiation carcinogenesis <ol style="list-style-type: none"> 1. Ionising & non-ionising radiation 2. DNA damage & repair, nucleotide excision repair 3. Repair genes & gene products
4	10/9/22	Lecture (WC)	9:00-11:30	The genetics of normal and malignant cells: <ul style="list-style-type: none"> • Point mutations, translocations, deletions, gene amplification and over-expression • Oncogenes, proto-oncogenes, tumor suppressor genes (with examples) • Polymorphism, mini & microsatellites • Brief chromatin & chromosomal structure • Gene therapy
5	17/9/22	Lecture (TY)	9:00-11:30	The epigenetics of normal and malignant cells: <ul style="list-style-type: none"> • DNA hypermethylation, hypomethylation & association with cancer • Methylation reversal • Histone acetylation & deacetylation & association with cancer • Protein-protein interactions
6	24/9/22	Lecture (WC)	9:00-11:30	The physiology of haemopoiesis: <ul style="list-style-type: none"> • Marrow structure and organisation • The haemopoietic microenvironment • Cell lineages and hierarchies • Control mechanisms in normal haemopoiesis • Tumour vasculature and angiogenesis
7	8/10/22	Lecture (WC)	9:00-11:30	The immune system: <ul style="list-style-type: none"> • Cellular immune system • Antigen recognition & processing • Dendritic cells • Immunological surveillance • Tumor immunology • Immunotherapy

No.	Date	Session	Time	Topic
B	8/10/22	Workshop (WC)	11:45-13:00	Immunological techniques for cancer studies
8	15/10/22	Lecture (TY)	9:00-11:30	Growth of normal and malignant cells: <ul style="list-style-type: none"> • Tumor kinetics • Signal transduction (MAP kinase pathway, etc), kinase inhibitors & cancer • Cyclin, cyclin kinases & inhibitors & cancer • Gene promoters
9	22/10/22	Lecture (TY)	9:00-11:30	Cancer susceptibility & inheritance genetics: <ul style="list-style-type: none"> • Inherited syndromes: AT, XP, Nijmegen break syndrome • Li-Fr, Lynch, MEN, Cockayne, FPC, inherited breast cancer syndromes • Genes conferring susceptibility to cancer • Familial linkage analysis • Genetic counseling

Radiobiology

No.	Date	Session	Time	Topic
1	29/10/22	Lecture (WC)	9:00-11:30	General principles of radiobiology: <ul style="list-style-type: none"> • Cellular systems (hierarchical, flexible) and their response to radiation • Parallel and linear systems • LET and its relevance to cellular damage • Radiation damage at the cellular level (membrane, cytoplasm, nucleus)
2	5/11/22	Lecture (TY)	9:00-11:30	Cell survival curves, radiation damage & repair: <ul style="list-style-type: none"> • Current formulae applied to cell survival curves determination (e.g. Linear quadratic model, α & β cell kill, α/β) • Cell cycle sensitivity to radiation, repair of sublethal & potentially lethal damages by radiation (i.e. SLDR & PLDR)
C	5/11/22	Workshop (WC)	11:45-13:00	Cell culture & mouse models in radiobiology study

No.	Date	Session	Time	Topic
3	19/11/22	Lecture (TY)	9:00-11:30	Assays for cell survival & radiation damage: <ul style="list-style-type: none"> • Radiation biology models (monolayer, spheroids, animal) (normal and transgenic), regrowth curves, clonogenic assay, MTT • In vitro, in vivo & in situ methods for cell survival & damage determination • Biological dosimetry techniques (dicentric chromosomes & micronuclei etc.)
D	19/11/22	Workshop (TY)	11:45-13:00	Biological dosimetry techniques
4	26/11/22	Lecture (TY)	9:00-11:30	Oxygen effects, hypoxia & biological modifiers: <ul style="list-style-type: none"> • Oxygen effects, hypoxia & its model • Radiosensitizers, halogenated pyrimidines; radioprotectors
5	3/12/22	Lecture (TY)	9:00-11:30	Physical factors affecting cell survival, fractionation & 4R: <ul style="list-style-type: none"> • Relative biological effectiveness (RBE) • RBE & LET, dose, dose rate and fractionation • Hyperfractionation and accelerated treatment • Repair, reoxygenation, redistribution, repopulation
6	10/12/22	Lecture (TY)	9:00-11:30	Factors affecting therapeutic ratio & hyperthermia: <ul style="list-style-type: none"> • Influence on therapeutic ratio by dose, dose-rate & RT fraction numbers • Isoeffect curves, NSD system, quality of irradiation • Biologically effective dose (BED) • Hyperthermia
7	17/12/22	Lecture (WC)	9:00-11:30	Tumor and normal tissue radiobiology: <ul style="list-style-type: none"> • Normal tissue damage (early & late) • Concept of normal tissue tolerance • Factors influencing tolerance • Effects of radiation on different tissues & organs • Organ tolerance to retreatment with radiation • Scheme for reporting normal tissue damage • Effects on embryo & foetus • Parenchymal & stromal injury