Hong Kong College of Radiologists
Basic Fellowship Training Course (Clinical Oncology)
in Radiobiology & Cancer Science 2014

DATE: **23rd August 2014 – 3rd January 2015**

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

VENUE: **Lecture: Conference Room (Room 1203), 12/F, Block R, Department of Clinical Oncology, QEH**

Workshop: 13/F, Block R, Cancer Biology Unit, Department of Clinical Oncology, QEH

COURSE COORDINATOR: **Dr. Timothy TC YIP (SO i/c, Radiobiology & Cancer Research Unit)**

TUTORS: **Dr. Timothy TC YIP (SO i/c, Radiobiology & Cancer Research Unit)**
Dr. William CS CHO (Senior Secretariat Executive, Food & Health Bureau)

Cancer Science Lectures

No	Date	Session	Tutor	Time	Topic
1	23/8/14	Lecture	Dr. Timothy Yip	9:00-11:30	**Techniques in molecular biology:** • Nucleic acid analyses including electrophoresis, • hybridisation, blotting, PCR, sequencing, transfection • Microarray techniques • Transgenic models
A	23/8/14	Workshop	Dr. Timothy Yip	11:45-13:00	**Molecular biological techniques for cancer studies (I)**
2	30/8/14	Lecture	Dr. Timothy Yip	9:00-11:30	**The epigenetics of normal and malignant cells:** • DNA hypermethylation, hypomethylation & association with cancer • Methylation reversal • Histone acetylation & deacetylation & association with cancer • Protein-protein interactions
3	6/9/14	Lecture	Dr. William Cho	9:00-11:30	**General principles of tumour biology & aberrant cell growth control:** • Definitions of growth disorders, dysplasia and CIS • Mechanisms of local invasion & metastasis

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					• Basic on cell cycle • Control of cell growth • Autocrine, paracrine & endocrine growth factors • Altered expression in malignancy
B	6/9/14	Workshop	Dr. William Cho	11:45-13:00	**Molecular biological techniques for cancer studies (II)**
4	13/9/14	Lecture	Dr. Timothy Yip	9:00-11:30	**Growth of normal and malignant cells:** • Tumor kinetics • Signal transduction (MAP kinase pathway etc), kinase inhibitors & cancer • Cyclin, cyclin kinases & inhibitors & cancer • Gene promotors
5	20/9/14	Lecture	Dr. Timothy Yip	9:00-11:30	**Cancer susceptibility & inheritance genetics:** • Inherited syndromes: AT, XP, Nijmegin break syndrome • Li-Fr, Lynch, MEN, Cockayne, FPC, inherited breast cancer syndromes • Genes conferring susceptibility to cancer • Familial linkage analysis • Genetic counseling
6	27/9/14	Lecture	Dr. William Cho	9:00-11:30	**Causation of human cancers:** • Environmental factors • Carcinogenesis • Viral carcinogenesis (HPV, EBV etc) • Radiation carcinogenesis 1. Ionising & non-ionising radiation 2. DNA damage & repair, nucleotide excision repair 3. Repair genes & gene products
7	4/10/14	Lecture	Dr. William Cho	9:00-11:30	**The genetics of normal and malignant cells:** • Point mutations, translocations, deletions, gene amplification • and over-expression • Oncogenes, proto-oncogenes, TS genes (with examples) • DNA repair mechanisms • Point mutations, translocations, deletions • Polymorphism, mini & microsatellites • Brief chromatin & chromosomal structure • Gene therapy

No	Date	Session	Tutor	Time	Topic
8	11/10/14	Lecture	Dr. William Cho	9:00-11:30	**The physiology of haemopoiesis:** • Marrow structure and organisation • The haemopoietic microenvironment • Cell lineages and hierarchies • Control mechanisms in normal haemopoiesis • Tumour vasculature and angiogenesis
9	18/10/14	Lecture	Dr. William Cho	9:00-11:30	**The immune system:** • Cellular immune system • Antigen recognition & processing • Dendritic cells • Immunological surveillance • Tumor immunology • Immuntherapy
C	18/10/14	Workshop	Dr. William Cho	11:45-13:00	**Immunological techniques for cancer studies**

Radiobiology Lectures

No	Date	Session	Tutor	Time	Topic
1	25/10/14	Lecture	Dr. Timothy Yip	9:00-11:30	**Assays for cell survival & radiation damage:** • 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 • Acute radiation syndromes & biological dosimetry techniques (dicentric chromosomes & micronuclei etc.)
D	25/10/14	Workshop	Dr. Timothy Yip	11:45-13:00	**Cell culture & mouse models in radiobiology study**
1/11/2014		**22nd ASM HKCR**			
2	8/11/14	Lecture	Dr. William Cho	9:00-11:30	**General principles of radiobiology:** • 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, cytoplasmic, nuclear)

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3	15/11/14	Lecture	Dr. Timothy Yip	9:00-11:30	**Cell survival curves, radiation damage & repair:** • 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)
E	15/11/14	Workshop	Dr. Timothy Yip	11:45-13:00	**Biological dosimetry techniques**
4	22/11/14	Lecture	Dr. Timothy Yip	9:00-11:30	**Oxygen effects, hypoxia & biological modifiers:** • Oxygen effects, hypoxia & its model • Radiosensitizers, halogenated pyrimidines; radioprotectors
5	29/11/14	Lecture	Dr. Timothy Yip	9:00-11:30	**Physical factors affecting cell survival, fractionation & 4R:** • Relative biological effectiveness (RBE) • RBE & LET, dose, dose rate and fractionation • Hyperfractionation and accelerated treatment • Repair, reoxygenation, redistribution, repopulation)
6	6/12/14	Lecture	Dr Timothy Yip	9:00-11:30	**Factors affecting therapeutic ratio & hyperthermia – Part I** • Influence on therapeutic ratio by dose, dose-rate &, RT fraction numbers • Isoeffect curves, NSD system, quality of irradiation • Biologically effective dose (BED)
7	13/12/14	Lecture	Dr. Timothy Yip	9:00-11:30	**Factors affecting therapeutic ratio & hyperthermia – Part II** • Influence on therapeutic ratio by dose, dose-rate &, RT fraction numbers • Isoeffect curves, NSD system, quality of irradiation • Biologically effective dose (BED) • Hyperthermia
8	27/12/14	Lecture	Dr. William Cho	9:00-11:30	**Tumor and normal tissue radiobiology – Part I** • 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

No	Date	Session	Tutor	Time	Topic
9	3/1/15	Lecture	Dr. William Cho	9:00-11:30	**Tumor and normal tissue radiobiology – Part II** • 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