

Hong Kong College of Radiologists

Basic Training Course in Radiobiology & Cancer Science

Teaching Time Table (2018)

DATE: 18th August 2018 – 15th December 2018

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, HK Jockey Club Cancer Research Laboratory,
Department of Clinical Oncology, QEH

COURSE COORDINATOR: Dr. Timothy TC YIP

TUTORS: Dr. Timothy TC YIP (Laboratory Director, ACT Genomics Biotechnology HK Ltd)
Dr. William C CHO (SO i/c, Radiobiology & Cancer Research Unit)

Cancer Science Lectures

| No. | Date | Session | Time | Topic |
|-----|---------|---------|------------|---|
| 1 | 18/8/18 | Lecture | 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 |
| 2 | 25/8/18 | Lecture | 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 |

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| 3 | 1/9/18 | Lecture | 9:00-11:30 | Causation of human cancers: <ul style="list-style-type: none"> • Environmental factors • Carcinogenesis • Viral carcinogenesis (HPV, EBV, etc) • Radiation carcinogenesis <ul style="list-style-type: none"> 1. Ionising & non-ionising radiation 2. DNA damage & repair, nucleotide excision repair 3. Repair genes & gene products |
| A&B | 1/9/18 | Workshop | 11:00-13:00 | Molecular biological techniques for cancer studies (I) <u>(identical to workshop on 8/9/18)</u> |
| 4 | 8/9/18 | Lecture | 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 |
| A&B | 8/9/18 | Workshop | 11:00-13:00 | Molecular biological techniques for cancer studies (II) <u>(identical to workshop on 1/9/18)</u> |
| 5 | 15/9/18 | Lecture | 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 | 22/9/18 | Lecture | 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 |

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| 7 | 29/9/18 | Lecture | 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 |
| C | 29/9/18 | Workshop | 11:45-13:00 | Immunological techniques for cancer studies |
| 8 | 6/10/18 | Lecture | 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 | 20/10/18 | Lecture | 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 Lectures

| No. | Date | Session | Time | Topic |
|-----|----------|---------|------------|---|
| 1 | 13/10/18 | Lecture | 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 | 27/10/18 | Lecture | 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 & |

| No. | Date | Session | Time | Topic |
|-----|----------|----------|-------------|--|
| | | | | potentially lethal damages by radiation (i.e. SLDR & PLDR) |
| D | 27/10/18 | Workshop | 11:45-13:00 | Cell culture & mouse models in radiobiology study |
| 3 | 3/11/18 | Lecture | 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.) |
| E | 3/11/18 | Workshop | 11:45-13:00 | Biological dosimetry techniques |
| 4 | 24/11/18 | Lecture | 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 | 1/12/18 | Lecture | 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 | 8/12/18 | Lecture | 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 | 15/12/18 | Lecture | 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 |