

# Hong Kong College of Radiologists

## Basic Training Course in Radiobiology & Cancer Science

### Teaching Time Table (2018)

**DATE:** 18<sup>th</sup> August 2018 – 15<sup>th</sup> 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	<b>Techniques in molecular biology:</b> <ul style="list-style-type: none"> <li>• Nucleic acid analyses including electrophoresis, hybridisation, blotting, PCR, sequencing, transfection</li> <li>• Microarray techniques</li> <li>• Transgenic models</li> </ul>
2	25/8/18	Lecture	9:00-11:30	<b>General principles of tumor biology &amp; aberrant cell growth control:</b> <ul style="list-style-type: none"> <li>• Definitions of growth disorders, dysplasia and carcinoma <i>in situ</i></li> <li>• Mechanisms of local invasion &amp; metastasis</li> <li>• Basic on cell cycle</li> <li>• Control of cell growth</li> <li>• Autocrine, paracrine &amp; endocrine growth factors</li> <li>• Altered expression in malignancy</li> </ul>

3	1/9/18	Lecture	9:00-11:30	<b>Causation of human cancers:</b> <ul style="list-style-type: none"> <li>• Environmental factors</li> <li>• Carcinogenesis</li> <li>• Viral carcinogenesis (HPV, EBV, etc)</li> <li>• Radiation carcinogenesis <ul style="list-style-type: none"> <li>1. Ionising &amp; non-ionising radiation</li> <li>2. DNA damage &amp; repair, nucleotide excision repair</li> <li>3. Repair genes &amp; gene products</li> </ul> </li> </ul>
A&B	1/9/18	Workshop	11:00-13:00	<b>Molecular biological techniques for cancer studies (I) &amp; (II)</b> <u>(identical to workshop on 8/9/18)</u>
4	8/9/18	Lecture	9:00-11:30	<b>The genetics of normal and malignant cells:</b> <ul style="list-style-type: none"> <li>• Point mutations, translocations, deletions, gene amplification and over-expression</li> <li>• Oncogenes, proto-oncogenes, tumor suppressor genes (with examples)</li> <li>• Polymorphism, mini &amp; microsatellites</li> <li>• Brief chromatin &amp; chromosomal structure</li> <li>• Gene therapy</li> </ul>
A&B	8/9/18	Workshop	11:00-13:00	<b>Molecular biological techniques for cancer studies (I) &amp; (II)</b> <u>(identical to workshop on 1/9/18)</u>
5	15/9/18	Lecture	9:00-11:30	<b>The epigenetics of normal and malignant cells:</b> <ul style="list-style-type: none"> <li>• DNA hypermethylation, hypomethylation &amp; association with cancer</li> <li>• Methylation reversal</li> <li>• Histone acetylation &amp; deacetylation &amp; association with cancer</li> <li>• Protein-protein interactions</li> </ul>
6	22/9/18	Lecture	9:00-11:30	<b>The physiology of haemopoiesis:</b> <ul style="list-style-type: none"> <li>• Marrow structure and organisation</li> <li>• The haemopoietic microenvironment</li> <li>• Cell lineages and hierarchies</li> <li>• Control mechanisms in normal haemopoiesis</li> <li>• Tumour vasculature and angiogenesis</li> </ul>

7	29/9/18	Lecture	9:00-11:30	<b>The immune system:</b> <ul style="list-style-type: none"> <li>• Cellular immune system</li> <li>• Antigen recognition &amp; processing</li> <li>• Dendritic cells</li> <li>• Immunological surveillance</li> <li>• Tumor immunology</li> <li>• Immunotherapy</li> </ul>
C	29/9/18	Workshop	11:45-13:00	<b>Immunological techniques for cancer studies</b>
8	6/10/18	Lecture	9:00-11:30	<b>Growth of normal and malignant cells:</b> <ul style="list-style-type: none"> <li>• Tumor kinetics</li> <li>• Signal transduction (MAP kinase pathway, etc), kinase inhibitors &amp; cancer</li> <li>• Cyclin, cyclin kinases &amp; inhibitors &amp; cancer</li> <li>• Gene promoters</li> </ul>
9	20/10/18	Lecture	9:00-11:30	<b>Cancer susceptibility &amp; inheritance genetics:</b> <ul style="list-style-type: none"> <li>• Inherited syndromes: AT, XP, Nijmegen break syndrome</li> <li>• Li-Fr, Lynch, MEN, Cockayne, FPC, inherited breast cancer syndromes</li> <li>• Genes conferring susceptibility to cancer</li> <li>• Familial linkage analysis</li> <li>• Genetic counseling</li> </ul>

### Radiobiology Lectures

No.	Date	Session	Time	Topic
1	13/10/18	Lecture	9:00-11:30	<b>General principles of radiobiology:</b> <ul style="list-style-type: none"> <li>• Cellular systems (hierarchical, flexible) and their response to radiation</li> <li>• Parallel and linear systems</li> <li>• LET and its relevance to cellular damage</li> <li>• Radiation damage at the cellular level (membrane, cytoplasm, nucleus)</li> </ul>
2	27/10/18	Lecture	9:00-11:30	<b>Cell survival curves, radiation damage &amp; repair:</b> <ul style="list-style-type: none"> <li>• Current formulae applied to cell survival curves determination (e.g. Linear quadratic model, <math>\alpha</math> &amp; <math>\beta</math> cell kill, <math>\alpha/\beta</math>)</li> <li>• Cell cycle sensitivity to radiation, repair of sublethal &amp;</li> </ul>

No.	Date	Session	Time	Topic
				potentially lethal damages by radiation (i.e. SLDR & PLDR)
D	27/10/18	Workshop	11:45-13:00	<b>Cell culture &amp; mouse models in radiobiology study</b>
3	3/11/18	Lecture	9:00-11:30	<b>Assays for cell survival &amp; radiation damage:</b> <ul style="list-style-type: none"> <li>• Radiation biology models (monolayer, spheroids, animal)</li> <li>• (normal and transgenic), regrowth curves, clonogenic assay, MTT</li> <li>• In vitro, in vivo &amp; in situ methods for cell survival &amp; damage determination</li> <li>• Biological dosimetry techniques (dicentric chromosomes &amp; micronuclei etc.)</li> </ul>
E	3/11/18	Workshop	11:45-13:00	<b>Biological dosimetry techniques</b>
4	24/11/18	Lecture	9:00-11:30	<b>Oxygen effects, hypoxia &amp; biological modifiers:</b> <ul style="list-style-type: none"> <li>• Oxygen effects, hypoxia &amp; its model</li> <li>• Radiosensitizers, halogenated pyrimidines; radioprotectors</li> </ul>
5	1/12/18	Lecture	9:00-11:30	<b>Physical factors affecting cell survival, fractionation &amp; 4R:</b> <ul style="list-style-type: none"> <li>• Relative biological effectiveness (RBE)</li> <li>• RBE &amp; LET, dose, dose rate and fractionation</li> <li>• Hyperfractionation and accelerated treatment</li> <li>• Repair, reoxygenation, redistribution, repopulation</li> </ul>
6	8/12/18	Lecture	9:00-11:30	<b>Factors affecting therapeutic ratio &amp; hyperthermia</b> <ul style="list-style-type: none"> <li>• Influence on therapeutic ratio by dose, dose-rate &amp; RT fraction numbers</li> <li>• Isoeffect curves, NSD system, quality of irradiation</li> <li>• Biologically effective dose (BED)</li> <li>• Hyperthermia</li> </ul>
7	15/12/18	Lecture	9:00-11:30	<b>Tumor and normal tissue radiobiology</b> <ul style="list-style-type: none"> <li>• Normal tissue damage (early &amp; late)</li> <li>• Concept of normal tissue tolerance</li> <li>• Factors influencing tolerance</li> <li>• Effects of radiation on different tissues &amp; organs</li> <li>• Organ tolerance to retreatment with radiation</li> <li>• Scheme for reporting normal tissue damage</li> <li>• Effects on embryo &amp; foetus</li> <li>• Parenchymal &amp; stromal injury</li> </ul>