

SCPA 607

Pathobiology and mechanisms of cancer

Semester 2/2018

Department of Pathobiology

Faculty of Science

Mahidol University

Course Syllabus

(Lecture-Lab-Self-study)

SCPA 607 Pathobiology and mechanisms of cancer 2(2-0-4)

Introduction to cancer, characteristics of benign and malignant tumors, histopathology of cancer, basic mechanisms of cancer development, invasion, and metastasis, carcinogenesis and carcinogenic agents, molecular basis of cancer, biological markers for diagnosing cancer and predicting treatment outcomes, chemotherapy and the development of novel therapeutics, cell culture and animal models for studying cancer

Prerequisite	None
Type of Course	Elective courses
Session	2 nd Semester
Course Conditions	class size : None

Course Objectives

At the completion of the course, students should be able to:

1. Describe terms of benign and malignant tumors
2. Describe characteristics and histopathology of benign and malignant tumors
3. Discuss the roles of molecular basis on cancer development and cancer invasion and metastasis
4. Discuss biological markers for diagnosing cancer and predicting treatment outcomes
5. Discuss chemotherapy and the development of novel therapeutics
6. Create the research concept of cancer field by using the knowledge of cell culture and animal models

Course Outline

Weeks	Topic	Hour			Lecturer
		Lecture/ Discussion	Lab	Self- study	
1	Introduction to cancer	2	0	4	PS
2	Molecular basis of cancer	2	0	4	WP
3	Benign and malignant tumors	2	0	4	PS
4	Host defense against tumors	2	0	4	NC
5	Identification and histopathology of cancer	2	0	4	SN
6	Biological markers for cancer diagnosis	2	0	4	WJ
7	Chemotherapy and the development of novel therapeutics	2	0	4	SN
8	Q&A, Discussion I	2	0	4	PS, WP, NC, SN, WJ
Examination I (L1-L7)					
9	Epigenetics and cancer	2	0	4	ANJ
10	Mechanisms of cancer invasion and metastasis	2	0	4	WP
11	Tumor microenvironment	2	0	4	WP
12	Stem cells and cancer	2	0	4	PC
13	Carcinogenesis and carcinogenic agents	2	0	4	PS
14	Experimental models for cancer research	2	0	4	NK
15	Q&A, Discussion II	2	0	4	ANJ, WP, PC, PS, NK
Examination II (L9-L14)					
	Total	30			

Teaching methods

Lecture and discussion in class 30 hours.

Teaching Media

1. Handouts
2. Power point presentation
3. Research article

Measurement and Evaluation of Students Achievement

1. Discussion, Participation, Presentation and Interactive performance 40%
2. Written Examination 60%
3. Student Examination Grade = A, B+, B, C+, C, D+, D, F

Course Evaluation

1. Students gain knowledge according to the course objectives.
2. Students give written course evaluation at the end of the course.
3. Evaluate students' satisfaction towards teaching and learning of the course using a questionnaire.
4. The lecturer will be notified with the result of the course evaluation from students to further improve the lecturing process.

References

1. Robert A. Weinberg. The Biology of Cancer 2nd Edition. 2013.
2. Vinay Kumar, Abul K. Abbas, Jon C. Aster. Robbins Basic Pathology 9th Edition. 2013.
3. The Biology of Cancer (http://sphweb.bumc.bu.edu/otlt/MPH-Modules/PH/PH709_Cancer/index.html)
4. Cancer Invasion and Metastasis: Molecular and Cellular Perspective (<https://www.ncbi.nlm.nih.gov/books/NBK164700/>)

Instructors

1. ANJ = Assistant Professor Amornrat Naranuntarat Jensen, Ph.D
2. NC = Nisamenee Charoenchon, Ph.D
3. NK = Niwat Kangwanrangsan, Ph.D
4. PC = Assistant Professor Pornthip Chaichompoo, Ph.D
5. PS = Associate Professor Prasit Suwannalert, Ph.D
6. SN = Somphong Narkpinit, M.D.
7. WJ = Associate Professor Wannee Jiraungkoorskul, Ph.D
8. WP = Witchuda Payuhakrit, Ph.D

Coordinator

Associate Professor Prasit Suwannalert, Ph.D
Department of Pathobiology, Faculty of Science,
Mahidol University
Tel. 02-201-5558, E-mail: prasit.saw@mahidol.ac.th

Leading questions:**L1-Introduction to cancer**

What is cancer?

L2-Molecular basis of cancer

What are the oncogenes?

L3-Benign and malignant tumors

What are the major characteristics of benign and malignant tumors?

L4-Host defense against tumors

What is the host defense mechanism against tumors in the over view?

L5- Identification and histopathology of cancer

Describe the characteristic of malignant cell morphology.

L6-Biological markers for cancer diagnosis

What is the biomarker?

What are the characteristics of an ideal tumor marker?

L7-Chemotherapy and the development of novel therapeutics

Describe the principals of chemotherapy

L9-Epigenetics and cancer

What is epigenetics?

How does epigenetics affect gene expression?

L10-Mechanisms of cancer invasion and metastasis

How the cancer cells invasion?

L11-Tumor microenvironment

What is the tumor microenvironment?

L12-Stem cells and cancer

What are the important issue of reprogramming technique that changed mature cells to became pluripotent cells by Shinya Yamanaka and John B. Gurdon?
Defined the term of "cancer stem cells" and "stem cells for cancer therapy".

L13-Carcinogenesis and carcinogenic agents

What is carcinogenesis?

L14-Experimental models for cancer research

How many categories of cancer research? What are they?

What kind(s) of cancer research that need the experimental model?

Lesson plan

1. Topic	L1-Introduction to cancer
2. Name Lecturer	Dr. Prasit Suwannalert
Education	Ph.D. (Pathobiology)
Position	Associate Professor
Contact	02-201-5558, Email: prasit.suw@mahidol.ac.th
3. Course	SCPA607: Pathobiology and mechanisms of cancer
4. Programme Title	M.Sc. in Pathobiology Ph.D. in Pathobiology
5. Date and Time	12 February 2019, Time 1.00 - 3.00 pm
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Describe basic terms of cancer 2. Discuss the cellular responses to toxic damage and cancer development
7. Topic Detail	
	<ol style="list-style-type: none"> 1. Basic terms of cancer 2. Cellular responses to toxic damage 3. The steps of cancer development and progression
8. Learning Methods	Lecture, Discussion, and Self study
9. Teaching Media	PPT, Handout, Text book, Research article
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Short answer questions, Class participation
12. Date of Improvement	31 January, 2019

Lesson plan

1. Topic	L2-Molecular basis of cancer
2. Name Lecturer	Witchuda Payuhakrit
Education	Ph.D. (Pathobiology)
Position	Lecturer
Contact	02-201-5572, Email: witchuda.pay@mahidol.ac.th
3. Course	SCPA607: Pathobiology and mechanisms of cancer
4. Programme Title	M.Sc. in Pathobiology Ph.D. in Pathobiology
5. Date and Time	14 February 2019, Time 1.00 - 3.00 pm
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Explain the role of molecular basis in carcinogenesis 2. Describe the function of oncogenes 3. Describe the function of tumor suppressor cells 4. Describe the essential alterations for malignant transformation
7. Topic Detail	
	<ol style="list-style-type: none"> 1. The role of molecular basis in carcinogenesis 2. Function of oncogenes 3. Function of tumor suppressor cells 4. The essential alterations for malignant transformation
8. Learning Methods	Lecture, Discussion, and Self study
9. Teaching Media	PPT, Handout, Text book, Research article
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Written examination
12. Date of Improvement	11 February, 2019

Lesson plan

1. Topic	L3-Benign and malignant tumors
2. Name Lecturer	Dr. Prasit Suwannalert
Education	Ph.D. (Pathobiology)
Position	Associate Professor
Contact	02-201-5558, Email: prakit.suw@mahidol.ac.th
3. Course	SCPA607: Pathobiology and mechanisms of cancer
4. Programme Title	M.Sc. in Pathobiology Ph.D. in Pathobiology
5. Date and Time	26 February 2019, Time 1.00 - 3.00 pm
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Describe the characteristics of benign and malignant tumors 2. Discuss the pathological changes in grading and staging of cancer
7. Topic Detail	
	<ol style="list-style-type: none"> 1. Characteristics of benign and malignant tumors 2. Cancer grading and staging
8. Learning Methods	Lecture, Discussion, and Self study
9. Teaching Media	PPT, Handout, Text book, Research article
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Short answer questions, Class participation
12. Date of Improvement	31 January, 2019

Lesson plan

1. Topic	Host defense against tumors
2. Name Lecturer	Dr. Nisamane Charoenchon
Education	Ph.D. (Medicine)
Position	Lecturer
Contact	02-201-5573, nisamane.cha@mahidol.ac.th
3. Course	SCPA607: Pathobiology and mechanisms of cancer
4. Programme Title	M.Sc. in Pathobiology Ph.D. in Pathobiology
5. Date and Time	28 February 2019, Time 13.00 - 15.00 pm
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Describe the characteristics of host defense mechanisms in roles of antitumor (humoral mechanisms, cellular mechanisms and host defense peptides) 2. Discuss about mechanisms and effects from immunomodulators in the roles of antitumor
7. Topic Detail	
	<ol style="list-style-type: none"> 1. Concepts and characteristics of humoral mechanisms, cellular mechanisms and host defense peptides in a roles of of antitumor 2. Immunomodulators' mechanism and effects in a roles of antitumor
8. Learning Methods	Lecture, Discussion, and Self study
9. Teaching Media	PPT, Handout, Text book, Research article, Video clips
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Short answer questions, Class participation
12. Date of Improvement	11 February, 2019

Lesson plan

1. Topic	L5-Identification and histopathology of cancer
2. Name Lecturer	Somphong Narkpinit
Education	M.D.
Position	Lecturer
Contact	02-201-5550, email : somphong.nar@mahidol.ac.th
3. Course	SCPA607: Pathobiology and mechanisms of cancer
4. Program Title	M.Sc. in Pathobiology Ph.D. in Pathobiology
5. Date and Time	5 March 2019, Time 1.00 - 3.00 pm
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Explain the cell morphology of neoplastic cell. 2. Give histopathology picture of some important neoplastic disease (benign and malignant)
7. Topic Detail	
	<ol style="list-style-type: none"> 1. Cell morphology of neoplastic cell 2. Histopathology picture of some important neoplastic disease
8. Learning Methods	Lecture
9. Teaching Media	Power point presentation, Handout, Text book
10. Teaching Equipment	Computer, LCD, Microscope
11. Examination and Evaluation	Examination
12. Date of Improvement	31 January, 2019

Lesson plan

1. Topic	L6-Biological markers for cancer diagnosis
2. Name Lecturer	Dr. Wannee Jiraungkoorskul
Education	Ph.D. (Biology)
Position	Associate Professor
Contact	02-201-5571, Email: wannee.jir@mahidol.ac.th
3. Course	SCPA607: Pathobiology and mechanisms of cancer
4. Programme Title	M.Sc. in Pathobiology Ph.D. in Pathobiology
5. Date and Time	5 March 2019, Time 1.00 - 3.00 pm
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Describe the definition, purpose of use, and classification of tumor marker. 2. Describe the most common tumor marker used in various cancers.
7. Topic Detail	
	Definition, use, and classification of tumor marker
8. Learning Methods	Lecture, Discussion, and Self study
9. Teaching Media	PPT, Handout, Text book, Research article
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Short answer questions, Class participation
12. Date of Improvement	31 January, 2019

Lesson plan

1. Topic	L7-Chemotherapy and the development of novel therapeutics
2. Name Lecturer	Somphong Narkpinit
Education	M.D.
Position	Lecturer
Contact	02-201-5550, email : somphong.nar@.mahidol.ac.th
3. Course	SCPA607: Pathobiology and mechanisms of cancer
4. Program Title	M.Sc. and Ph.D. in Pathobiology
5. Date and Time	12 March 2019, Time 1.00 - 3.00 pm
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Describe the principals of chemotherapy 2. Describe the mechanisms of malignant tumor and pathogenesis 3. Describe the action and mechanism of medication treated malignant tumor
7. Topic Detail	
	<ol style="list-style-type: none"> 1. Principals of chemotherapy 2. Mechanisms of malignant tumor and pathogenesis 3. Action and mechanism of medication treated malignant tumor
8. Learning Methods	Lecture
9. Teaching Media	Power point presentation, Handout, Text book
10. Teaching Equipment	Computer, LCD, Microscope
11. Examination and Evaluation	Examination
12. Date of Improvement	31 January, 2019

Lesson plan

1. Topic	L9-Epigenetics and cancer
2. Name Lecturer	Dr. Amornrat Naranuntarat Jensen
Education	Ph.D. (Pathobiology)
Position	Assistant Professor
Contact	02-201-5579, Email: amornrat.nar@mahidol.ac.th
3. Course	SCPA607: Pathobiology and mechanisms of cancer
4. Programme Title	M.Sc. in Pathobiology Ph.D. in Pathobiology
5. Date and Time	21 March 2019, Time 13.00 - 15.00
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Explain major mechanisms of epigenetics 2. Describe the effect of epigenetics on gene expression 3. Discuss the involvement of epigenetics in cancer
7. Topic Detail	
	<ol style="list-style-type: none"> 1. Major mechanisms of epigenetics 2. Effect of epigenetics on gene expression 3. The involvement of epigenetics in cancer with examples of related research
8. Learning Methods	Lecture, Discussion, and Self study
9. Teaching Media	PowerPoint slides, Handout, Research article
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Short answer questions, Class participation
12. Date of Improvement	8 February, 2019

Lesson plan

1. Topic	L10-Mechanisms of cancer invasion and metastasis
2. Name Lecturer	Witchuda Payuhakrit
Education	Ph.D. (Pathobiology)
Position	Lecturer
Contact	02-201-5572, Email: witchuda.pay@mahidol.ac.th
3. Course	SCPA607: Pathobiology and mechanisms of cancer
4. Programme Title	M.Sc. in Pathobiology Ph.D. in Pathobiology
5. Date and Time	26 March 2019, Time 1.00 - 3.00 pm
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Describe the concept of cancer invasion and metastasis 2. Explain the mechanism of cancer invasion and metastasis
7. Topic Detail	
	<ol style="list-style-type: none"> 1. Cancer invasion and metastasis 2. Mechanism of cancer cell metastasis
8. Learning Methods	Lecture, Discussion, and Self study
9. Teaching Media	PPT, Handout, Text book, Research article
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Written examination
12. Date of Improvement	11 February, 2019

Lesson plan

1. Topic	L11-Tumor microenvironment
2. Name Lecturer	Witchuda Payuhakrit
Education	Ph.D. (Pathobiology)
Position	Lecturer
Contact	02-201-5572, Email: witchuda.pay@mahidol.ac.th
3. Course	SCPA607: Pathobiology and mechanisms of cancer
4. Programme Title	M.Sc. in Pathobiology Ph.D. in Pathobiology
5. Date and Time	28 March 2019, Time 1.00 - 3.00 pm
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Describe the concept of tumor microenvironment 2. Describe the components of tumor microenvironment 3. Describe the effect of tumor microenvironment with cancer progression
7. Topic Detail	
	<ol style="list-style-type: none"> 1. Tumor microenvironment 2. Tumor microenvironment components 3. Tumor microenvironment promote cancer progression
8. Learning Methods	Lecture, Discussion, and Self study
9. Teaching Media	PPT, Handout, Text book, Research article
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Written examination
12. Date of Improvement	11 February, 2019

Lesson plan

1. Topic	L12-Stem cells and cancer
2. Name Lecturer	Pornthip Chaichompoo
Education	Ph.D. (Immunology)
Position	Assistant Professor
Contact	E-mail: pornthip.chh@mahidol.ac.th
3. Course	SCPA 607 Pathobiology and mechanisms of cancer 2(2-0-4)
4. Programme Title	M.Sc. and Ph.D. in Pathobiology
5. Date and Time	Apr 2, 2018 at 1.00-3.00 p.m.
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Classified types of stem cells 2. Apply stem cell and gene modification as cell model for cancer biology 3. Design stem cells and gene engineering techniques for cancer therapy
7. Topic Detail	
	<ol style="list-style-type: none"> 1. History and classification of stem cell and gene therapy 2. Principle of stem cell and gene therapy for cancer biology 3. Application of stem cell and gene therapy for treatment patients with cancer
8. Learning Methods	Presentation, Group discussion on related article(s)
9. Teaching Media	Power point presentation
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Examination
12. Date of Improvement	January 6, 2019

Lesson plan

1. Topic	L13-Carcinogenesis and carcinogenic agents
2. Name Lecturer	Dr. Prasit Suwannalert
Education	Ph.D. (Pathobiology)
Position	Associate Professor
Contact	02-201-5558, Email: prakit.suw@mahidol.ac.th
3. Course	SCPA607: Pathobiology and mechanisms of cancer
4. Programme Title	M.Sc. in Pathobiology Ph.D. in Pathobiology
5. Date and Time	4 April 2019, Time 1.00 - 3.00 pm
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Describe the process of carcinogenesis 2. Discuss the pathological changes in carcinogenesis process
7. Topic Detail	
	<ol style="list-style-type: none"> 1. Carcinogenesis 2. Carcinogenic agents 3. Pathological changes in carcinogenesis process
8. Learning Methods	Lecture, Discussion, and Self study
9. Teaching Media	PPT, Handout, Text book, Research article
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Short answer questions, Class participation
12. Date of Improvement	31 January, 2019

Lesson plan

1. Topic	L14-Experimental models for cancer research
2. Name Lecturer	Niwat Kangwanransan
Education	Ph.D. (Medical Sciences)
Position	Lecturer
Contact	02-201-5576, Email: scnkw@mahidol.ac.th
3. Course	SCPA607: Pathobiology and mechanisms of cancer
4. Programme Title	M.Sc. in Pathobiology Ph.D. in Pathobiology
5. Date and Time	9 April 2019, Time 1.00 - 3.00 pm
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Understand the important of models in cancer research 2. Describe the various types of cell lines and animal models for cancer research 3. Explain how to choose the in appropriate models for each type of cancer research
7. Topic Details	
	<ol style="list-style-type: none"> 1. Cancer research and experimental models 2. Cancer cell lines; animal and human tissues 3. Animal models for cancer
8. Learning Methods	Lecture and discussion
9. Teaching Media	Power point presentation, Handout, Text books, Publications
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Written examination and participation in class
12. Date of Improvement	31 January, 2019