

# Overview of Cancer:

## Cancer Biology, Pathology and Anatomy

(Code : 4820 1<sup>st</sup> – 2<sup>nd</sup> year, 1 unit)

(Course ID: GS-c4820-L)

### 1. Instructors

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### 2. Classroom/Lab Lecture Location

On-demand: on WebClass. The report assignments will be informed by e-mail.

### 3. Course Purpose and Outline

[Course Purpose]

- To understand methods and processes for pathological diagnosis of cancer (benign and malignant/infiltrating and metastatic) in cancer treatment medical practice.
- To understand the importance of judging malignancy grade with relevance to treatment methods.
- To understand diagnosis and treatment of early cancer in comparison with advanced cancer.
- To understand change in cancer lesions after treatment.
- To understand the lymphatic system as a metastasis pathway of cancer.
- To understand the position of the arteries used for intra-arterial infusion cancer therapy.
- To understand the functions of oncogenes and tumor suppressor genes and their abnormalities in cancer development.
- To understand carcinogens, infections associated with canceration and hereditary cancers.
- To understand factors regulating differentiation associated with cancer and differentiation therapy.

- To understand the association between cancer and vasculature and angiogenesis inhibition therapy.
- To understand of the characteristics of cancer cells based on their differences from normal cells, including cell morphology and material and energy metabolism.
- To understand of metastasis, the most serious form of cancer, based on a basic knowledge of cell adhesion and polarity.
- To acquire basic knowledge of hereditary and arcuate pediatric cancers, which have different treatment and prognosis, compared to cancers of the elderly, and to understand their biological characteristics.
- To understand cell death/life span, cell proliferation/cycle, and DNA damage repair, all of which are directly linked to cell fate, with particular emphasis on their relationship to cancer.
- To understand established and new theory regarding cell transformation as well as cancer stem cells and relevant ES/iPS cells.

#### [Outline]

- The types and functional roles of oncogenes and tumor suppressor genes, which are important for understanding the molecular mechanisms of carcinogenesis, are described. In addition, the abnormalities of these genes in human cancers and detection methods of these genes in human cancers, and their relationship with carcinogens, differentiation, and angiogenesis are explained. The significance of angiogenesis in cancer growth and malignant transformation and the usefulness of differentiation-inducing therapy are also explained. and the usefulness of differentiation-inducing therapies. In particular, the history of research on the cancer-suppressor gene p53 from its discovery to the present is explained to learn the characteristics of cancer cells, and our latest findings are introduced.
- Cells, the basic unit of life, is explained with emphasis on the differences between normal cells and cancer cells. The latest findings on cell fate (proliferation, differentiation, cell death, transformation, and genetic traits), are also described, including the cell cycle, DNA damage response, and repair.
- Using actual cases of pathological diagnosis in medicine, how benign and malignant cancer, invasion, and metastasis are observed and diagnosed are explained. The degree of malignancy of cancer varies, and the treatment plan differs depending on the degree of malignancy. How this information is utilized in clinical practice from the standpoint of pathology is explained.
- In Japan, early diagnosis of cancer has been progressing, and there are more opportunities for diagnosis and treatment of early-stage cancer than in other countries. The diagnosis and treatment of early-stage cancer by showing actual cases are explained.
- How cancer lesions are changed by chemotherapy and radiotherapy, and how the appearance of cancer in each organ differs are explained from the point of view of the differences in its origin. In addition, from an anatomical point of view, the anatomy of the vascular system, which is necessary for understanding cancer treatment and cancer metastasis, are explained .

#### **4. Course Objectives**

To understand cancer's behavior and true condition from the biological and morphological viewpoint with relevance to diagnosis and treatment.

#### **5. Format**

The subject consists of lectures and report assignments.  
All programs are conducted in an omnibus format.

## 6. Course Details

No.	Topics
1	Anatomy for diagnosis and treatment of cancer -Thorax and abdominal organs and related structures
2	Oncogenes and tumor suppressor genes
3	Role of Pathology in Cancer Chemotherapy
4	Development of multifaceted therapies targeting the cancer microenvironment
5	Cancer atypia and malignancy
6	Cancer Cell Diversity and Pathological Diagnosis
7	Hereditary cancer
8	Discovery of Novel Genetic Abnormalities in Brain Tumors and Elucidation of Their Pathogenesis

## 7. Assessment

The assessment will be by the report assignments.

## 8. Prerequisite Reading

To review basic anatomy and histology.

## 9. Reference Materials

None

## 10. Language Used

All classes are conducted in English.

## 11. Office Hours

Mon – Fri: 9:00 AM – 17:00 PM

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Please contact the instructor regarding questions or consultations.

## 12. Note(s) to Students

Closely related not only to the carcinogenic process but also to the latest cancer treatments.