Genetic Medicine

Lecture Academic year 1,2 credits 1

[Academics] Toru Ohta

[Course aims]
Students will learn the basics of genetic medicine and human genomic medicine, gain a deep understanding of genetic disorders, and learn how to treat a variety of genetic disorders. Furthermore, they will learn the bioethics of pediatric medicine with genetic disorders as the main theme.
Currently, it is accepted that humans have over 20,000 genes. In addition, there has been progress in identifying genes responsible for diseases and in the genetic-level elucidation of not only single-gene disorders but also multifactorial disorders such as the common diseases of diabetes, hypertension, and cancer. As a result, it is necessary for medical personnel to learn about genetic medicine, genomic medicine, and the associated methods care, particularly genetic diagnosis, prenatal diagnosis, and gene therapy, as well as concepts related to ethical judgment corresponding to bioethics and the conditions in medicine associated with these issues.
In this class, we aim for the students to acquire a broad knowledge of genetics, from classical genetics such as Mendelian genetics through epigenetics known as “new genetics,” and we will touch upon additional ethical, legal, and social aspects of genetics and encourage students to deepen their thinking through discussions from the perspective of aid providers who deal with patients with genetic disorders.

[Course objectives]
The main goals are to learn the basics of genetic medicine and human genomic medicine, to gain a deeper understanding of genetic disorders, and to learn how to treat a variety of genetic disorders. Furthermore, students will study the bioethics of medicine concerning genetic disorders.

[Course content]

Class	Theme	Content	Academics
1	Genetic biology	We will cover the basic concepts of living organisms, including mitosis and meiosis, the concept of a gene, and human Mendelian genetics and non-Mendelian genetics, and we will connect these concepts to an overview of genetic medicine and treatments.	Toru Ohta
2	Classical genetic medicine: Mendelian genetics and cellular genetics	We will cover the basic concept of phenotypes/genotypes, focusing on single-gene disorders. We will also cover chromosomes as the location of genes in cells and the association between abnormalities in their number/structure and disease.	Toru Ohta
3	Molecular genetics: Molecular structure and variation	We will cover the fundamental information on the basic structure and function of genes, gene expression, and the mechanisms of genetic mutation.	Toru Ohta
4	New genetics and genomic medicine	We will begin with an overview of the structure of the human genome and human genome planning, and we will then discuss treatable genetic diseases, their treatment methods, and epigenetics.	Toru Ohta
5	Genetic services (1)	We will cover the basic concepts of pre-implantation diagnosis and prenatal diagnosis and consider the nature of genetic counseling.	Toru Ohta
6	Genetic services (2)	We will discuss the significance of tests such as presymptomatic testing and susceptibility testing and consider the nature of genetic counseling.	Toru Ohta
7	Genetic medicine and bioethics (1)	We will cover the ethical, legal, and social issues (ELSI) of genetic medicine as well as the	Toru Ohta

Class	Theme	Content	Academics
		basic principles of bioethics.	
8	Genetic medicine and bioethics (2)	We will discuss the nature of ethical judgment and assistance for minors with genetic issues and their parents.	Toru Ohta

[Grading policies]
Evaluation will be based on quizzes (oral) and short papers during each lecture (100%).

[Reference book]
Matsuda, Ichiro (trans.): Bioethics of Pediatric Medicine. Shindan to Chiryo Sha Inc.
Shinkawa, Norio, Tooru Futoda: Invitation to Genetic Medicine. Nankodo, Co. Ltd.
Shiraki, Kazuo, Tetsu Takada (eds.): Pediatrics for Nurses and Healthcare Providers. Japan Pediatric Affairs Publishing Company

[Preparation for course]
The reference books listed above should be read closely before the lectures.