

[Keywords] Osteoblast, osteoclast, osteocyte, histology, enzyme histochemistry, immunohistochemistry

[Academics] Kazuharu Irie

[Course aims]

In dental medicine, masticatory movement is caused by the passive movement of the mandible accompanied by the active contraction of the skeletal muscles. Bone generally outlines the morphological structure, which changes as skeletal muscles function. Additionally, bone structure partly changes in response to external stimuli, such as mechanical stress. Bone cells (osteoblasts, osteoclasts, and osteocytes) locally and specifically respond to stimulatory factors, like growth factors and cytokines derived from growing organs and inflammatory lesions. This response of bone cells can be controlled by region-specific mechanisms interlinking bone and growing organs and inflammatory lesions. Therefore, the local response of bone cells can result in specific structure of the bone. In this course, we will learn methods used in histology, enzyme histochemistry, and immunohistochemistry, and we will acquire a deeper understanding of the region-specific mechanisms of bone formation and bone remodeling, through scientific consideration.

[Course objectives]

The goals of this course are for the student to be able to:

- 1) Explain animal ethics in laboratory
- 2) Explain the mechanism of histological, enzyme histochemical, and immunohistochemical observations
- 3) Explain the visualization techniques
- 4) Plan an experimental design, considering the regulation of animal ethics
- 5) Prepare a series of products for experimental samples
- 6) Use experimental devices and machines precisely
- 7) Objectively evaluate results obtained
- 8) Logically explain the scientific significance of the experimental results, on comparison with already reported data

[Course content]

Class	Theme	Content	Academics
1	Classroom lectures for anatomy and histology of bone and laboratory animal ethics.		Kazuharu Irie
2	Laboratory courses focused on understanding the morphological approaches and their techniques.	a) Preparation of paraffin, frozen, and electron microscope sections, including methods for sample collection, fixation, sectioning, staining, and examination b) Preparation of enzyme histochemical sections for detection of enzyme activity, such as ALPase and TRAPase c) Preparation of indirectly immunohistochemically stained sections for specific peptides. d) Techniques for light, fluorescent, and electron microscope evaluation	Kazuharu Irie
3	Classroom lectures for evaluating experimental results and logically understanding their scientific significance.		Kazuharu Irie
4	Preparation of poster Presentations for meetings		Kazuharu Irie

[Class implementation method]

Combination of face-to-face learning and distance learning

Class implementation depends on the implementation policy of each department (graduate school) or school.

[Grading policies]

Your overall grade in the class will be based on your class attendance and reports.

[Textbook]

Inform students which textbook will be used.

[Reference book]

Inform students which textbook will be used.

[Preparation for course]

Students must understand the course objectives and prepare accordingly for the classes.