

Development and regenerative medicine**Subject code 22160****Lecture Series “Tokuron”: Transplantation immunology (Required: 2 credits)**

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【Objectives】

The aims of the lecture “Transplantation Immunology” are to understand the followings: (1) The mechanism of rejection in allo-transplantation, (2) Allo-antigens that induce allo-reactivity, (3) The structure and function of human major histocompatibility complex (HLA), (4) Basic immunology and clinical immuno-regulation therapy to avoid graft-rejection, (5) Current status and future direction of transplantation medicine

【Content Description】

To treat the patients with functionally impaired cells, tissues, and organs, transplantation of the cells, tissues, or organs obtained from donors is broadly carried out. Basic research on the regenerative medicine, where cells or tissues derived from allogeneic somatic stem cells or embryonic stem (ES) cells are used, is in progress and the application to clinical medicine is expected.

Immune system has originally developed as a defense system to exclude exogenous pathogenic microbes, foreign materials, and toxins. There are structural differences of proteins, lipids, and sugars between different individuals of the same species, due to genetic polymorphism. Therefore, following the transplantation of a graft obtained from an allogeneic donor, the recipient immune system is activated by such polymorphic molecules and work to reject the graft. Among such allogeneic antigens, Major Histocompatibility Antigens encoded by Major Histocompatibility Complex (MHC) gene are the strongest in stimulating allo-reactive immune response. MHC are the trans-membrane proteins and their role is to present oligo peptides derived from protein antigens to T cells. They are highly polymorphic and exist in the Cyclostomes and higher vertebrates. T cells and B cells of the immune system recognize MHC and other allogeneic antigens and reject allogeneic cells.

In the lectures, we will explain the molecular mechanisms of rejection of allogeneic cells by immune system and the characteristics of allogeneic antigens. We will also lecture on the basic and clinical immunology related to the methodology to avoid such rejection. In addition, we will provide the latest information on the issue of clinical transplantation and regenerative medicine.

We will lecture on the transplantation immunology at the level of cells, tissues, and organs, from the viewpoint of both basic and clinical medicine, including recent advances in the research by the instructors.

【Keywords】 organ and cell transplantation medicine, allogeneic antigens, human major histocompatibility antigen (HLA), minor histocompatibility antigens, rejection, allogenicity, Graft versus Host Reaction (GVHR), immune-suppression therapy, immune suppressants, immunological tolerance

【Class Style】 PowerPoint and/or OHP will be used in the lectures, and active participation in the discussion is encouraged. Extra classes or video lectures are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified, and handouts will be distributed.

【Recommended Readings】

- "The Immune System" by Peter Parham. Garland Publishing Inc. New York and London, 2004
- "Immunobiology" by Charles A. Janeway Jr., Paul Travers et al. Garland Publishing Inc. New York and London, 2001.
- "A history of transplantation immunology" (Leslie Brent) Academic Press 1997

【Office Hour】 If you have any questions on topics or specific research fields, please contact the instructors listed above by telephone, e-mail, or visiting them at the laboratories.

【Evaluation for Grades and Credits】 Achievement of the **Objectives** will be evaluated by active class participation and the reports of which the theme will be specified after the lectures.

【Lecture Schedule】

Please also refer to the timetable shown in Section 5.

The sessions marked with “e” are under preparation of e-learning contents. In some cases, the session that is not marked with “e” will be done by utilizing e-learning system, as soon as the e-learning contents are ready for use. Therefore, you must check the updated syllabus cited on the home page of the Graduate School of Medical Sciences, Kumamoto University to check the current status of the session before you take a session. If you cannot obtain enough information from the home page, please make contact with the instructors of the sessions.

There are six types of e-learning, those marked with “eE0”, “eEL”, “eJ0”, “eJL”, “eEJ-0” and “eEJ-L”. To know the meanings of these six markings and to learn how to use e-learning system, please see the section explaining about the e-learning system in this syllabus.

Session	Date & time	Instructors	Topics
1 eE-L eJ-L	Oct. 13 (Tue) 6th period	Yasuharu Nishimura	Structure and function of HLA class I
2	Oct. 19 (Mon) 4th period	Yasuharu Nishimura	Structure and function of HLA class II
3	Oct. 26 (Mon) 4th period	Atsushi Irie	Polymorphism of MHC and T cell- activation signals
4 eEJ-L	Nov.02 (Mon) 4th period	Satoru Senju	Recognition of allo antigens by T cells
5 eE-L eJ-L	Nov.09 (Mon) 4th period	Yasuharu Nishimura	HLA and anti-tumor immunity
6	Nov.16 (Mon) 4th period	Atsushi Irie	Major and minor histocompatibility antigens
7 eEJ-L	Nov.24 (Tue) 6th period	Satoru Senju	Immune response and dendritic cells
8 eEJ-L	Nov.30 (Mon) 4th period	Satoru Senju	Pluripotent stem cells and immune response
9	Dec.07 (Mon) 4th period	Nobuo Sakaguchi	Graft versus Host reaction (GVHR)
10	Dec.14 (Mon) 4th period	Kazuhiko Kuwahara	Transplantation immunology and NF-κB
11	Dec.21 (Mon) 4th period	Kazuhiko Kuwahara	Transplantation immunology and Stem cell
12	Jan. 04 (Mon) 4th period	Nobuo Sakaguchi	Immune-suppression
13	Jan.12 (Tue) 6th period	Kazuhiko Maeda	Steroid receptors and immune-suppression
14	Jan.18 (Mon) 4th period	Yukihiro Inomata	Transplantation in Japan and the world
15	Jan.25 (Mon) 4th period	Katsuhiro Asonuma	Liver transplant from living donor