

Macao Polytechnic Institute

School of Health Sciences and Sports

Bachelor of Science in Biomedical Technology (Medical Laboratory Technology and Pharmacy Technology)

Module Outline

Academic Year 2020 / 2021 Semester 2

Learning Module	Immunology (免疫學)		Class Code	BSIM1102
Pre-requisite(s)	Nil			
Medium of Instruction	Cantonese & English		Credit	3
Lecture Hours	38 hrs	Lab/Practice Hours	7 hrs	Total Hours 45 hrs
Instructor	Lam Im Fong, Cristina		E-mail	iflam@ipm.edu.mo
Office	Rm. M706, Meng Tak Building, Main Campus		Telephone	8599 3432

Description

This 45-hour learning module is one of the foundation modules of the biomedical sciences program. It gives a comprehensive overview of the different components and processes of the immune system. The theoretical parts are treated during lectures, video and group presentations. It also includes several laboratory practices for immunological laboratory techniques training.

Learning Outcomes

After completing the learning module, students will be able to:

1. Understand basic immunology theory.
2. Master the basic immunology laboratory techniques.
3. Study successive modules; Clinical immunology, Haematology, Blood Bank ...etc.

Content

Theory

1. Introduction to immunology (2 class hours)
 - 1.1 Overview the immunology concepts
2. Innate immunity (3 class hours)
 - 2.1 Understand the mechanisms of combating infection/disease
 - 2.2 Know the humoral and cellular components of the innate immune response
3. Adaptive immunity (3 class hours)
 - 3.1 Identify cells and tissues of adaptive immunity
 - 3.2 Understand the importance and function of primary and secondary lymphoid organs in acquired immunity
4. Antigens (2 class hours)
 - 4.1 Compare and contrast immunogen, antigen & hapten
 - 4.2 Describe the factors influencing immunogenicity
 - 4.3 Define the chemical nature of immunogens
 - 4.4 Compare the structures of T-independent and T-dependent antigens
 - 4.5 Introduce the concept of hapten-carrier conjugates and their structure
 - 4.6 Characterize antigenic determinants
5. Immunoglobulins: Structure and function (2 class hours)
 - 5.1 Discuss the general properties of all immunoglobulins
 - 5.2 Describe the basic structure of immunoglobulins
 - 5.3 Relate immunoglobulin structure with function
 - 5.4 Define immunoglobulin hypervariable and framework regions
 - 5.5 Define immunoglobulin classes and subclasses, types and subtypes
 - 5.6 Describe the structures and properties of immunoglobulin classes
6. Immunoglobulins: Isotypes, Allotypes and idiotypes and Genetics (2 class hours)
 - 6.1 Explain the structural basis for immunoglobulin isotypes, allotypes and idiotypes
 - 6.2 Describe some of the uses of isotypes, allotypes and idiotypes
 - 6.3 Describe the organization and expression of the immunoglobulin gene families
 - 6.4 Explain the origins of antibody diversity
7. Complement (4 class hours)
 - 7.1 Understand different pathways of complement activation
 - 7.2 Know the enzymatic and nonenzymatic mechanisms of C activation
 - 7.3 Know the biological properties of C activation products

- 7.4 Know the significance of C system in host resistance, inflammation and damage to self
- 7.5 Understand the mechanisms of regulating C activation and its products

- 8. MHC Genetics and Function (2 class hours)
 - 8.1 Identify the major MHC classes
 - 8.2 Understand the genetics of MHC expression
 - 8.3 Know the major functions of the MHC

- 9. Innate immunity II cytokines (2 class hours)
 - 9.1 Introduction to cytokines
 - 9.2 Understand cytokines in the innate immune response
 - 9.3 Understand cytokines in the adaptive immune response

- 10. Autoimmunity (2 class hours)
 - 10.1 Introduction to autoimmunity
 - 10.2 Understand the immunologic finding

- 11. Transplantation (2 class hours)
 - 11.1 Introduction to transplantation
 - 11.2 Understand histocompatibility antigens
 - 11.3 Understand allorecognition

- 12. Biology of T lymphocytes: TCR structure and Function (2 class hours)
 - 12.1 Describe the structure and function of the TCR
 - 12.2 Discuss the genetic basis for generation of diversity in the TCR
 - 12.3 Describe the nature of the immunological synapse and the requirements for T cell activation

- 13. Antigen Presentation to T lymphocyte (2 class hours)
 - 13.1 Describe the cytosolic and endocytic pathways of antigen processing and presentation
 - 13.2 Identify key differences between the two pathways

- 14. T Cell Activation and T Cell-Mediated Immunity (2 class hours)
 - 14.1 Discuss the central role of Th cells in immune responses
 - 14.2 Describe the cell-cell interactions which occur in Ab responses to T-dependent Ag, generation of CTL, and activation of macrophage and NK cells
 - 14.3 Discuss responses to T-independent Ag
 - 14.4 Discuss the mechanisms of killing by CTL and macrophages

- 15. B Cell Activation and Humoral Immunity (2 class hours)
 - 15.1 Understand the process of B cell Activation

15.2 Distinguish between T-cell dependent and independent antigens

15.3 Understand the kinetics of protective and antibody responses

16. Mid-term exam (2 class hours)

17. Final-term exam (2 class hours)

18. Presentation (3 class hours)

Teaching Method

Lectures, discussion, videos

Practice

Laboratory

1. Rapid-plasma reagin and hCG test (1 class hours)

(Master: apply knowledge, familiar through practicing)

Students per group: 4

Requirement: Laboratory operation & Report

2. Isolation and identification of Mononuclear Cells from Whole Blood (3 class hours)

Students per group: 4

Requirement: Laboratory operation & Report

Attendance

Attendance requirements are governed by the “Academic Regulations Governing Bachelor’s Degree Programmes of Macao Polytechnic Institute”. Students are not eligible to attend the final examination and re-sit examination if the absence rate exceeds 30%. Moreover, an “F” will be given as the final grade to students who have less than the stated attendance for this enrolled module.

Assessment

Any students scoring less than 35% of the total mark in the final examination will be given an “F” grade for the course even if the overall grade is 50% or higher.

Any student whose final score is below 35% is not entitled to take the re-sit examination.

Examinations

The examinations are graded according to the percentage, with 100 being the full score and 50 the passing score.

Item	Description	Percentage	Submit Date
Mid-term exam	Class 1 – Class 8	36%	12/Mar/21
Final exam	The remain lectures	50%	25/May/21
Re-sit exam	All lectures		

Presentation reports

The reports are graded according to the percentage, with 100 being the full score and 50 the passing score.

Item	Description	Percentage	Submit Date
Case presentation	Discuss clinical cases relevant to lectures	8%	1 week after presentation

Laboratory reports

The reports are graded according to the percentage, with 100 being the full score and 50 the passing score.

Item	Description	Percentage	Submit Date
Lab Report 1	Experiment: Rapid-plasma regain Experiment: hCG	2%	1 week after lab
Lab Report 2	Experiment: Isolation of Mononuclear Cells from Whole Blood	4%	1 week after lab

Total Percentage: 100%

Reference

Reference Books:

1. Kuby immunology 8 th ed./2019, Jenni Punt · Sharon Stranford · Patricia Jones · Judy Owen, W.H. Freeman, ISBN 978-1-4641-8978-4
2. Immunobiology 9th ed/2017, K. Murphy, Garland, ISBN 978-0-8153-4505-3