

BTCH-CC-401: Immunology

Unit	Topic	Method	No. of classes needed
I	Historical perspective	Lecture, Discussion	01
	Innate and adaptive immunity	do	08
	Cells of immune system	do	02
	Haematopoiesis, Cytokines, clonal selection theory	do	03
	Tissues of immune system	do	04
	Development and maturation of lymphocytes	do	03

Learning Outcomes

After going through this unit student shall be able to:

- Trace the history and development of immunology.
- Describe surface membrane barriers and their protective functions.
- Explain the importance of phagocytosis and natural killer cells in innate body defense.
- Describe the roles of different types of T cells, B cells and APCs.
- Compare and contrast the origin, maturation process, and general function of B and T lymphocytes.

Activities

- Preparation of assignment on different topics by each student.
- Preparation of PPT for presentation in the class.
- Students delivered presentations on different topics during the semester.
- Discussions on various hot burning scientific topics were conducted.

Points for discussion

- How aging affects the efficiency of our immune system.
- What is the importance of self tolerance.
- Organization of immune system.
- Now we have understood that Innate and adaptive immunity act in cooperative and interdependent ways to protect the host. Discuss the collaboration of these two forms of immunity.

Unit	Topic	Method	No. of Classes Needed
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II	Antigens and their properties, Superantigens	Lecture, Discussion	04
	Structure and types of antibodies	do	05
	Antigen antibody interactions	do	03
	Immunological memory	do	01
	Hypersensitivity and its types	do	05

Learning Outcomes

After going through this unit, students will be able to:

- Define antigen and describe how antigens affect the adaptive defenses.
- Discuss the properties of antigens.
- Understand the importance of haptens and adjuvants.
- Explain the structure, properties and functions of antibodies.
- Compare and contrast primary and secondary immune response.
- Describe the mechanisms of hypersensitivity reactions (I-IV)
- Give detailed description of various types of tests.

Activities

- Preparation of assignment by each student on topics of their interest;
- Preparation of PPT for presentation in the class;

Points for the discussion:

- Although the five immunoglobulin isotypes share many common structural features, the differences in their structures affect their biological activities. How would you have to modify the diagram of IgG to depict an IgA molecule isolated from saliva?
- How can an investigator make the rabbit antiserum specific for mouse IgG that only reacts specifically with IgG and not with other mouse isotypes?
- How agglutination reactions can be used to determine whether a patient has ever had a Salmonella typhi infection.

Unit	Topic	Method	No. of classes needed
III	Antigen Processing	Lecture, PPT, Discussion	16
	Introduction to Antigens and recognition of antigens. Major Histocompatibility Complex. Types of MHC, Role of MHC. Genetics of MHC.	Lecture, Discussion.	5
	Antigen Processing by MHCI, MHCII, MHCIII, antigen presenting cells, plasma cells and their role in recognition of antigens. Processing of Non protein antigens. Role of TLRs, Cytokines, IL, Interferons.	Lecture, Discussion	5
	Immunity to pathogens, How pathogens avoid immunity, AIDS and immunity, Cancer and Immunity. Autoimmune diseases	Lecture, Discussion	4
	Transplantation and responses by immune cells. Kinds of transplant. Utilizations of transplant. Present day perspectives.	Lecture, Discussion	2

Learning Outcomes

After going through this unit student shall be able to:

- Discuss about role of MHC in immune system.
- Understand about how APC and other cell are involved in antigen processing, Role of TLRs in immunity.
- Explain about AIDS, Cancer and autoimmune diseases.

Activities

- Assignments were prepared on the different sub topic by individual students;
- Talks and PPT were delivered by each student during the semester.

Points of Discussion

- How MHC are involved in medical decisions for acceptance and rejection transplants.
- How cancer defeats the immune system.
- What are the reasons of autoimmune diseases and who are vulnerable.

Unit	Topic	Method	No. of classes needed
IV	Vaccines & Immunotechniques)	Lecture, PPT, Discussion	14
	Introduction to Vaccines, historical perspective, Current advances on vaccination.	Lecture, Discussion.	2
	Types of Vaccines, DNA, recombinant, bacterial and viral vaccines their synthesis and how these are utilized. Different generations of Vaccines.	Lecture, Discussion	4
	Immunization types, immunogenicity of antigen, adjuvants, Haptens	Lecture, Discussion	2
	Monoclonal antibodies, production of MAb. Hyberdoma technique.	Lecture, Discussion	2
	Immunological techniques, Procedure and uses. RIA, ELISA, Western Blot, Double diffusion, Mancini radial immunodiffusion,	Lecture, PPT/Discussion	4

Learning Outcomes

After going through this unit student shall be able to:

- Understand the vaccines and there importance.
- Production of different types of vaccines, storage, transport.
- Various techniques used to know about Ag-Ab reaction.
- Production of Monoclonal Ab

Activities

- Assignments were prepared on the different sub topic by individual students;
- Talks and PPT were delivered by each student during the semester.

Points of Discussion

- How vaccines are able to boost immune system.
- How vaccines could be designed for non communicable diseases. Like cancer, diabetes.
- Use of Immunological techniques for diagnostic of diseases.

References

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BTCH-CC-402: Molecular Biology II

Units	Topic	Method	No. of Classes Needed
I	Translation	Lecture, PPT, Discussion	15
II	Regulation of gene expression	do	15
III	Human Genetics	do	15
IV	Cancer Biology	do	15

Learning Outcomes

After going through this unit student shall be able to:

- Learn about the mechanism of translation and differences in translation between pro and eukaryotes.
- Know the role of amino acyl tRNA synthetases, inhibitors of translation.
- Understand the levels at which gene expression can be regulated.
- Differences and mechanism of gene regulation in pro and eukaryotes.
- Know the aims, findings and ELSI of human genome project.
- Understanding of genomic imprinting and the concept of gene therapy.
- Able to differentiate between normal and cancer cells.
- Learn how cell culture is used for research in cancer.
- Learn about tumor suppressor genes and proto oncogenes.
- Learn the mechanism of apoptosis.

Activities

- Preparation of assignment by each student on topics of their interest;

- Preparation of PPT for presentation in the class;

Points for discussion

- Role of amino acyl tRNA synthetases in fidelity of protein synthesis.
- Mechanism of different antibiotics.
- Differences between gene regulation in pro and eukaryotes.
- Pros and cons of gene therapy.
- Genetic counseling and prenatal diagnosis.
- Modern approaches used in the treatment of cancer.

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