

1. Identification data:	
Name of the institution:	Universidad Autónoma de Nuevo León
Name of the department:	Faculty of Medicine
Name of the educational program:	Clinical Biochemist
Name of the learning unit:	Basic Immunology
Total classroom hours—theory and/or practice:	80
Classroom frequency per week:	4
Total extra-class hours:	10
Type of modality:	Schooled
Type of academic period:	Fifth Semester
Type of learning unit:	Mandatory
Curricular area:	ACFP-F
UANL credits:	3
Date of preparation:	13/04/2018
Date of update:	27/06/2024
Designer(s):	Dr. Ernesto Torres López
Updater(s):	Dr. Mario César Salinas Carmona, Dr. Anna Velia Vázquez Marmolejo, Dr. Nallely

	López López, Dr. Manuel Mejía Torres. Dr. Adrián G. Rosas Taraco, Dr. Noé Macías Segura
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2. Presentation:

The first phase involves understanding the historical origins of immunology, its components, and the cellular and molecular elements of the immune response. It also covers the contributions of immunology to the prevention, diagnosis, and treatment of infectious and non-infectious diseases, as well as cancer and transplants.

The second phase focuses on identifying and analyzing the cellular and molecular mechanisms involved in immune responses that provide protection or cause tissue damage. It examines the cells and molecules of both the innate and acquired immune systems that participate in cellular and tissue protection or damage.

The third phase primarily concentrates on identifying the immunophysiological processes of anti-infectious, anti-cancer, autoimmune reactions, as well as primary and secondary immunodeficiencies. Additionally, it includes the analysis of transplant tests and immune response products as candidates for immunotherapy. Laboratory tests will be examined to validate and select the most appropriate for the immunotherapeutic diagnosis, prognosis, and treatment of infectious, tumor-related, autoimmune diseases, and immunodeficiencies, as well as compatibility in organ and tissue transplantation.

As an integrative learning product, the student will present a seminar that integrates a clinical case with an immunological background, focusing mainly on the problem of a global immunological diagnosis.

3. Purpose(s):

This Learning Unit (LU) aims to provide the basic elements for applying immunological diagnostics of infectious and immunocompromised diseases, as well as transplants, in order to meet the requirements for effective immunological analysis and diagnosis according to national and international standards.

It promotes the development of general competencies, enabling students to use traditional and cutting-edge research methods and techniques for academic work, professional practice, and knowledge generation. During this LU, students will face challenges related to the values promoted by UANL and societal issues by selecting immunological diagnostic tests within the regional, national, and global regulatory framework concerning the presence or absence of immunological biomarkers in biological samples such as serum, plasma, cells, and/or human tissues. This contributes to consolidating well-being and sustainable development. Students will be able to resolve specific personal and social conflicts by appropriately selecting analysis techniques applicable to different population groups, considering the biomarker to be determined, matrix type, required accuracy and sensitivity, number of samples to be analyzed, and the concentration of the biomarker in the matrices used.

Students will understand the fundamentals for performing useful tests for the immunological diagnosis and prognosis of infectious, autoimmune, allergic, tumor-related, endocrine diseases, immunodeficiencies, and compatibility studies in organ and tissue transplants. They will select pertinent clinical immunological diagnostic procedures to ensure high-quality control in their immunological analyses to identify the immunological biomarkers that determine accurate diagnosis of diseases associated with immunophysiopathological phenomena.

This learning unit leverages knowledge acquired in Biochemistry regarding biological molecules responsible for regulating and immunomodulating the immune response; Cell Biology, as it analyzes membrane receptors involved in signaling and cellular elements in the immune response; and Basic Microbiology, which is key in studying the protective immune response against infectious diseases. The study of Immunology will provide the Blood Bank with the foundations for blood compatibility and immunological testing for safe transfusions. Additionally, Immunology will support the study of diagnostic Medical Microbiology to identify antigens in the immunological diagnosis of infectious diseases.

4. Competencies of the Graduation Profile:

General competencies contributed by this learning unit:

Instrumental Competencies

8. Use traditional and cutting-edge research methods and techniques for the development of academic work, professional practice, and knowledge generation.

Personal and Social Interaction Competencies

11. Practice the values promoted by UANL: truth, equity, honesty, freedom, solidarity, respect for life and others, peace, respect for nature, integrity, ethical behavior, and justice in personal and professional spheres to contribute to building a sustainable society.

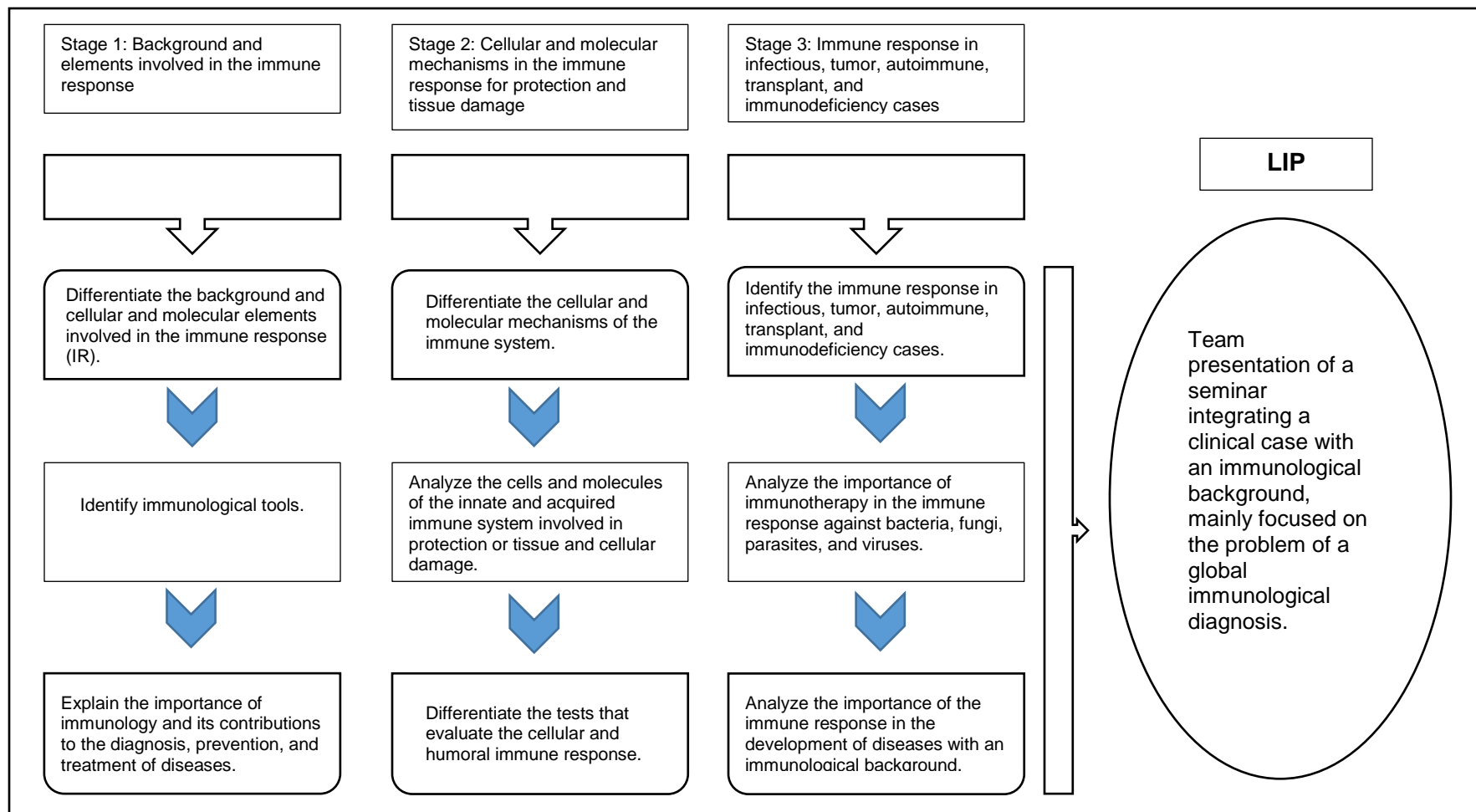
Integrative Competencies

14. Resolve personal and social conflicts using specific techniques within the academic and professional domains to make informed decisions.

Specific competencies of the graduation profile contributed by the learning unit:

2. Execute physical, chemical, and biological procedures for the collection, handling, storage, and analysis of samples to contribute to a reliable clinical, chemical, food, forensic, and environmental diagnosis.
4. Validate bioanalytical methods based on established performance criteria to ensure the reliability of results obtained from chemical-biological samples.
5. Incorporate new analytical methodologies that contribute to the functional, economic, and environmental improvement of laboratory processes to address needs in health-related areas.

5. Graphic representation



6. Structuring in stages or phases:

Stage 1: Background and elements involved in the immune response

Competency Element(s):

Recognize the importance of Immunology based on historical contributions and the application of tools to contribute to the diagnosis and treatment of diseases.

Learning Evidence	Performance Criteria	Learning Activities	Contents	Resources
1. PowerPoint presentation of the chronology of the most representative studies on the origin of Immunology.	<p>Submit via the MS/Teams platform a 10-slide PowerPoint presentation, numbered, with text, diagrams, images, and/or figures.</p> <p>List in chronological order, with dates from 1796 to 2023, the names of scientists who made significant contributions to the development of immunology.</p> <p>Identify the most relevant basic experiments in vaccine development.</p> <p>Includes a cover page, title of the work, correct grammatical</p>	<p>The student reads (outside of class) the relevant chapters from the textbook and the recommended online resources on the topic to be reviewed.</p> <p>The student answers a diagnostic questionnaire on the topic to be reviewed, administered by the professor in person (weighted activity 1.1).</p> <p>The professor gives an oral presentation on the history of immunology, the organs, cells, and molecules of the immune system.</p> <p>Students, guided by the professor, participate in the discussion of the topic, and the professor provides feedback on the students'</p>	<p>The origin of vaccination and immunology; the microbiological and serological eras.</p> <p>The discovery of the chemical structure of antibodies.</p> <p>Significant discoveries that allowed for the identification of the role of cells in the immune system.</p> <p>The origin of antibody diversity.</p> <p>The valuable tools developed by immunology for the diagnosis and treatment of human diseases.</p> <p>The importance of immunology in</p>	<p>Textbook: : Immunology in Health and Disease by M. Salinas, 3rd edition, Panamericana, 2022, Part I, Chapters: 1, 2, and 3.</p> <ul style="list-style-type: none"> • Basic and Clinical Immunology by Parslow, Stites, Terr, and Imboden, 9th edition, 1998, The Modern Manual, Section I, Chapters: 1, 2, and 3. • MS/Teams Platform of the Faculty of Medicine, UANL. <p>-Video on the History of</p>

	<p>structure, spelling, and bibliography.</p> <p>It must contain the date, name, group, and list number.</p> <p>Develops it individually and submits it within the specified time..</p>	<p>comments and concludes the activity.</p> <p>The student submits a conceptual map via the MS/Teams platform that integrates primary and secondary organs, immune system cells, and their main functions (weighted activity 1.2).</p>	<p>transplants.</p> <p>Nobel Prizes and the future of immunology.</p> <p>The structure and function of primary and secondary organs.</p> <p>Characteristics and functions of immune system cells: T and B lymphocytes, natural killer cells, phagocytes, mononuclear cells, dendritic cells, polymorphonuclear cells, and platelets.</p>	<p>Immunology</p> <p>-Video on Immune Response Cells and Organs</p> <p>-UANL Databases</p> <p>-MEDLINE/PubMed</p>
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Stage 2: Cellular and molecular mechanisms in the immune response of protection and tissue damage

Competency element(s):

It analyzes the cellular and molecular mechanisms of the immune system, innate and acquired, to explain cellular and tissue protection or damage.

Evidence of learning	Performance criteria	Learning activities	Contents	Resources
2. PowerPoint presentation of a comic strip about the cellular and molecular mechanisms for recognizing, processing and presenting antigens in the context of MHC I and II molecules to T lymphocytes.	<p>Send a comic strip in 10 PowerPoint format slides through the MS/Teams platform, numbered, with text, diagrams, images and/or figures.</p> <p>It identifies the cells and molecules of innate and acquired immunity involved in the recognition and processing of antigens in the context of MHC I and II for presentation to T lymphocytes.</p> <p>It includes title page, title of the work, correct grammatical structure, spelling and bibliography.</p> <p>It must contain date, name, group, list</p>	<p>The student reads (outside the classroom) the chapter(s) of the textbook and the recommended internet links of the topic to be reviewed. The student answers a diagnostic questionnaire on the topic to be reviewed, applied by the teacher in person, (weighted activity 2.1)</p> <p>The professor gives an oral presentation on the characteristics of the innate and acquired immune response, the role of cytokines, complement and inflammation. Immunogens and antigens and the biological properties of antibodies.</p> <p>The professor explains the mechanisms of acquired immune response and tissue and cellular injury.</p>	<p>Characteristics of the innate immune response: physical and chemical and biological, cellular and molecular barriers.</p> <p>The complement system and its relationship with immunity; The inflammatory and phagocytic process and its relationship with the immune response</p> <p>The most relevant cytokines and chemokines and their biological function in the process of activation, amplification and suppression of the immune response, as well as their relationship</p>	<ul style="list-style-type: none"> • Textbook: Immunology in Health and Disease. M. Salinas, 3rd edition, Panamericana. Part I, Chapters: 4, 6, 7, 8, 9, 10, 11, 12 and 14. • Basic and Clinical Immunology. Parslow, Stites, Terre Imboden. 9th ed. 1998. The Modern Manual. Section I. Chapters 4,5,6,7,8,9,10,11,12 and 13. • MS/Teams platform of the Faculty of Medicine, UANL. • UANL Databases • MEDLINE / PubMed

	<p>number. It develops it individually and sends it in the established time.</p>	<p>The students, guided by the teacher, participate in the discussion of the topic and the teacher provides feedback on the students' comments and concludes the activity.</p> <p>The student individually makes a conceptual map containing the mechanisms of cellular and tissue injury and sends it in PDF format through the MS/Teams platform (weighted activity 2.2)</p> <p>At the end of the stage, the teacher prepares and applies the written evaluation.</p> <p>The student responds to the written assessment individually and in person (weighted activity 2.3)</p>	<p>with infectious, allergic, autoimmune and neoplastic diseases. Concepts of: antigen, antigenic determinant, immunogen, adjuvant, hapten, carrier and antibody.</p> <p>Structure of the five antibody isotypes and their biological activity. Antigen-antibody reaction and the surface molecule of cells involved in the acquired immune response (antigen-presenting cells and lymphocytes).</p> <p>Cellular interactions and distribution of MHC I and II molecules, as well as methods for their identification.</p> <p>The characteristics of the primary and secondary acquired immune response.</p> <p>The immunological mechanisms of tissue injury based on</p>	
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			Gell-Coombs classification: those that correspond to humoral mechanisms and those that involve cellular mechanisms of tissue damage	
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Stage 3: Anti-infectious, tumor, autoimmune, transplant and immunodeficiency immune response. Competency element(s): It selects immunological tests, based on validation criteria and according to their application, to contribute to the diagnosis and/or prognosis of infectious, tumor, autoimmune, immunodeficiency and compatibility diseases in the transparent of organs and tissues.				
Evidence of learning	Performance criteria	Learning activities	Contents	Resources
3. Power Point presentation containing the mechanisms of the anti-infectious immune response for intra- and extracellular bacteria, viruses, fungi and macroparasites.	Send through the MS/Teams platform a presentation of 10 slides in Power Point format, numbered, with text, diagrams, images and/or figures containing the cellular and molecular elements of the innate and acquired immune response that participate in the	<p>The student reads (outside the classroom) the chapter(s) of the textbook and the recommended internet links of the topic to be reviewed. The student answers a diagnostic questionnaire on the topic to be reviewed, applied by the teacher in person (weighted activity 3.1)</p> <p>The professor gives an oral presentation on the cellular</p>	<p>Humoral and cellular immune response against bacteria and fungi.</p> <p>Humoral and cellular immune response against parasites and viruses.</p> <p>Answer immune antitumor.</p>	<ul style="list-style-type: none"> Textbook: Immunology in Health and Disease. M. Salinas, 3rd edition, Panamericana. 2022 Part II, Chapters: 18, 20, 21, 22, 23 and 24. Part III: Chapter 28.

	<p>immune response towards intra and extracellular bacteria, viruses, fungi and macroparasites.</p> <p>It includes title page, title of the work, correct grammatical structure, spelling and bibliography.</p> <p>It must contain date, name, group, list number.</p> <p>It develops it individually and sends it in the established time.</p>	<p>and molecular elements of the innate and acquired anti-infective, anti-tumor, autoimmune immune response and in transplant rejection.</p> <p>The student individually prepares in PDF format a conceptual map containing the mechanisms of the innate and acquired antitumor immune response and sends it through the MS/Teams platform (weighted activity 3.2)</p> <p>The professor defines the fundamentals of laboratory tests useful in the immunological diagnosis of infectious, autoimmune, tumor, and organ transplant diseases.</p> <p>The students, guided by the teacher, participate in the discussion of the topic and the teacher provides feedback on the students' comments and concludes the activity.</p> <p>The teacher guides the students to carry out the laboratory practices as a team:</p> <ul style="list-style-type: none"> • Agglutination • ELISA 	<p>Immune tolerance and autoimmune response.</p> <p>Immune response in organ and tissue transplants.</p> <p>Vaccines and Immunotherapy.</p>	<ul style="list-style-type: none"> • Basic and Clinical Immunology. Parslow, Stites, Terr and Imboden. 9th ed. 1998. The Modern Manual. Section II. Chapters 15, 16, 17, 18, 18 and 20. • MS/Teams platform of the Faculty of Medicine, UANL. • UANL Databases • MEDLINE / PubMed
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		<ul style="list-style-type: none"> • Western Blot • Flow Cytometry • Immunofluorescence <p>The student prepares the reports of the practices as a team and delivers them in handwritten form (weighted activity 3.3)</p> <p>At the end of the stage, the teacher prepares and applies the written evaluation.</p> <p>The student responds to the written assessment individually and in person (weighted activity 3.4)</p>		
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7. Comprehensive evaluation of processes and products:

STEP 1		%
Evidence 1	Presentation of the contributions of immunology from its inception to the present day (16 August)	10
Weighted activity 1.1	Diagnostic questionnaire in each theoretical class (at the beginning of the class)	5
Weighted activity 1.2	Conceptual map for the identification of the elements of the immune system (30 August)	5
STEP 2		
Evidence 2	Antigen Presentation Comic Strip Presentation (27 September)	10
Weighted activity 2.1	Diagnostic questionnaire in each theoretical class (at the beginning of the class)	5
Weighted activity 2.2	Conceptual map of the mechanisms of cellular and tissue injury. (October 3)	5
Weighted activity 2.3	First written evaluation. (4 October)	15
STEP 3		
Evidence 3	Presentation of the anti-infectious immune response. (November 1)	5
Weighted activity 3.1	Diagnostic questionnaire in each theoretical class (at the beginning of the class)	5
Weighted activity 3.2	Conceptual Map of the Innate and Acquired Antitumor Immune Response. (8 November)	5
Weighted activity 3.3	Lab reports (one week after attending practice).	5
Weighted activity 3.4	Second written evaluation. (28 November)	15
Integrative product of the Learning (PIA)	Presentation and submission (20 November)	10
Total		100

8. Integrative Learning Product:

Team presentation of a seminar on the MS/Teams platform of a disease where the immunopathological mechanisms are addressed, the immunological laboratory tests useful in diagnosis or prognosis and the type of immunotherapy applied if it exists.

9. Sources of support and consultation:

Immunology in Health and Disease. Salinas Carmona, M. C., 3rd ed., 2022. Editorial Médica Panamericana.

Parslow, T.G., Stites, D.P., Terr, A.I., & Imboden, J.B. (2002). Basic and Clinical Immunology. Mexico: Editorial El Manual Moderno.

- **Internet links**

MEDLINE / PubMed

<https://www.ncbi.nlm.nih.gov/pubmed>

History of Immunology Video

<https://www.youtube.com/watch?v=CnHiz5VOo3g>

Video of organs and cells of the immune system

<https://www.youtube.com/watch?v=lqC9mdhdyz4>

- **UANL Databases**

http://www.dgb.uanl.mx/?mod=bases_datos



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