University of Gondar
College of Veterinary Medicine and Animal Sciences
Department of Veterinary Paraclinical Studies
'Comparative Vertebrate Immunology'
Course code: VMI-7062
Credit hrs.: 2

February 2020

Instructor: Dr. Anmaw Shite

Course description:

A comparison of the immune systems of different vertebrate species, from poikilothermic fish to homoeothermic mammals, facilitates a more comprehensive understanding of how the immune system has evolved and integrated its many functions. With each species, novel responses and/or structures have developed in response to the changing physiology and environment of each animal. However, throughout evolution function has been conserved and the interspecies variation in structure informs us of the complexity, redundancy, and integration of the immune system.

Course contents:

1. **Introduction**
2. **Evolution of the immune system**
3. **Lymphoid organs and their anatomical distribution in**
   - 3.1. Fish
   - 3.2. Avian spp.
   - 3.3. Canine and Feline
   - 3.4. Ruminant: bovine, sheep, goat
   - 3.5. Equine
   - 3.6. Camel
4. **Leukocytes and their Markers in**
   - 4.1. Fish
   - 4.2. Avian spp.
   - 4.3. Canine and Feline
   - 4.4. Ruminant: bovine, sheep, goat
   - 4.5. Equine
   - 4.6. Camel
5. **Cytokines and chemokines in**
   - 5.1. Fish
   - 5.2. Avian spp.
   - 5.3. Canine and Feline
   - 5.4. Ruminant: bovine, sheep, goat
   - 5.5. Equine

5.6. Camel

6. **Ontogeny of the immune system in**

   6.1. Fish
   6.2. Avian spp.
   6.3. Canine and Feline
   6.4. Ruminant: bovine, sheep, goat
   6.5. Equine
   6.6. Camel

7. **Innate Immunity in**

   7.1. Fish
   7.2. Avian spp.
   7.3. Canine and Feline
   7.4. Ruminant: bovine, sheep, goat
   7.5. Equine
   7.6. Camel

8. **Antigen-binding molecules: Immunoglobulins, TCR and MHC**

   8.1. Fish
   8.2. Avian spp.
   8.3. Canine and Feline
   8.4. Ruminant: bovine, sheep, goat
   8.5. Equine
   8.6. Camel

9. **Mucosal Immunity**

   9.1. Fish
   9.2. Avian spp.
   9.3. Canine and Feline
   9.4. Ruminant: bovine, sheep, goat
   9.5. Equine
   9.6. Camel

10. **Neonatal/chick Immunity: Chicken immunity and passive mathernal immunity**

11. **Reproductive Immunology**

12. **Ecoimmunology**

Refernces

1. Paul-Pierre Pastoret, Philip Griebel, Herve Bazin and Andr~ Govaerts 1998. Handbook of Vertebrate Immunology. ACADEMIC PRESS
2. Fred Davison Bernd Kaspers Karel A. Schat. 2008. Avian Immunology. Elsevier
3. Ian R. Tizard. 2008. Veterinary Immunology: An Introduction. Seventh edition
4. EDITOR WILLIAM E. PAUL, MD 2003. Fundamental Immunology. Sixth Edition
5. Gil Mor 2006. Pregnancy Immunology

University of Gondar
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Course syllabus

Course title: Vaccinology and Immunotherapy

Course code: VMI-7110

Credit hrs.: 3 (2+1)

Course description: the course vaccinology and immunotherapy discuss about means of manipulating the immune response against microbial pathogens and immunopathological disorders. In this unit conventional and novel methods and principles of vaccine design and production; clinical conditions calling for immunotherapeutic interventions; methods and types of immune therapeutic approaches will be explored. Both classical (killed and live) as well as novel (subunit, multivalent, recombinant, DNA) vaccine design strategies will be thoroughly discussed as applied for prevention of various health problems in humans and animals. Furthermore, adjuvant and vaccine delivery technologies have also been important components of vaccinology. Therefore, old and novel adjuvants, including alum, complete and incomplete Freud's adjuvants, bacterial toxins, cytokines, and dendritic cells that have been used in enhancing immunity by vaccines will be discussed. Novel vaccine delivery systems including liposomes, virosomes, gene guns, etc. will also be discussed. The difficulties in designing effective vaccines against some pathogens such as HIV, malaria and also some diseases such as cancer, allergy, etc. will be covered so as to show students potential areas for future research. Finally, the process of bringing vaccines to market will be covered including government oversight and licensure. Potential applications of antibody as well as cellular immunotherapeutic for various infectious and non-infectious diseases of animal and human health importance will be explored using current literature.

Course objectives: this course aims to discuss the various aspects of classical and modern vaccines: their immunologic basis, design, development, preclinical and clinical evaluation. It will provide students with an up to date information on modern vaccines and technologies including recombinant protien vaccines, RNA vaccines, DNA vaccines, vectored vaccines, plant-based vaccines and particulate based vaccines, and novel vaccine delivery platforms. It also explains vaccines and immunotherapies for non-infectious disease such as cancer vaccines. It is designed to broaden students thought on how to address challenges of modern-day vaccinology such as vaccines for Malaria, HIV, and tuberculosis. Finally, the course will provide an insight into the manufacturing, storage, handling, registration, licensing of vaccines and biological products.

Prerequisite: advanced immunology, molecular biology, microbiology, and parasitology.

Course Methodology: Lecture, Practical Sessions, journal clubs, seminars, attachments at different vaccine producing laboratories of the country.

Assessment and Evaluation of students: Seminar presentation and lab attachment reports 30% and written Examination 70%

Course logistics:

- Location: Atse Tewodros campus, CVMAS hall
- Course duration: three weeks (2+1)

Attendance: 100% attendance is compulsory

S.N.	Course content	Duration	Instructor
1	History of vaccines and vaccination	1	Dr. Anmaw S.
2	Veterinary immunology for vaccine production: *principles of vaccination*	2	Dr. Anmaw S.
3	Classification of vaccines	3	Dr. Anmaw S.
4	Adjuvants and their application	4	Dr. Anmaw S.
5	**Clinical vaccine development**	**8**	
5.1	Vaccine design and antigen selection	2hrs.	Dr. Saddam M.
5.2	Testing for vaccine safety	2hrs.	Dr. Saddam M.
5.3	Testing for vaccine immunogenicity and efficacy	2hrs.	Dr. Saddam M.
5.4	Testing for vaccine effectiveness	2hrs.	Dr. Saddam M.
5.5	Vaccine storage, transportation, handling and administration	2hrs	Dr. Saddam M.
6	**Modern vaccine platforms/technology**	**13**	
6.1	*Glycoconjugated vaccines*	1hr.	Dr. Anmaw S.
6.2	*Recombinant DNA technology*	2hr.	Dr. Anmaw S.
6.3	*Reverse vaccinology*	1hr.	Dr. Saddam M.
6.4	*Vectored vaccines*	1hr.	Dr. Saddam M.
6.5	*Virus like particle (VLP) based vaccines*	1hr.	Dr. Saddam M.
6.6	*RNA-based vaccines*	1hr.	Dr. Saddam M.
6.7	*DNA-based vaccines*	2hr.	Dr. Anmaw S.
6.8	*Plant-based vaccines*	1hr.	Dr. Anmaw S.
6.9	*Particulate vaccines*	1hr.	Dr. Saddam M.
6.10	*Mucosal vaccines*	2hrs.	Dr. Saddam M.
7	Vaccines for viral disease	3hrs.	Dr. Saddam M.
8	Vaccines for bacterial and parasitic disease	3hrs.	Dr. Saddam M.
9	**Vaccines against challenging pathogens**	**6**	
9.1	*HIV*	2hrs.	Dr. Saddam M.
9.2	*malaria*	2hrs.	Dr. Saddam M.
9.3	*tuberculosis*	2hrs.	Dr. Anmaw S.
13	Cancer vaccines	2hrs.	Dr. Saddam M.
14	Vaccine Delivery Technologies	2hrs.	Dr. Anmaw S.
15	Regulatory aspects of veterinary vaccines	2hrs.	Dr. Anmaw S.
16	Monitoring of vaccination program	2hrs.	Dr. Anmaw S.

17	Immunotherapy	3hrs.	Dr. Saddam M.

References:

1. New generation vaccines: Myron M. Levine, 2010, 4th edition
2. Development of vaccines: Manmohan Singh, 2011
3. Vaccinology Principles and Practice: W.John.W
4. Immunology: Roitt. Brostoff, Male, 2012, 12th edition.
5. Immunology: Richard A., Thomas J., Barbara A., Janis K., 2003, 5th edition.
6. Cellular and Molecular Immunology: Abul K., Andrew H., Jordan S., 2012, 7th edition.
7. Principles of Cellular and Molecular Immunology: Jonathan M., Austin and Kathryn I wood, 1991.
8. Cellular and Molecular Immunology: Abul K. Abbas, Andrew H.Lichtman, 2003,5th edition.
9. Immunobiology: Janeway, Travers, Walport, Shlomchik, 2012, 8h edition

University of Gondar
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Course syllabus

Course title: Infection Immunity

Course code: VMI-7072

Credit hrs.: 2

Course description: Infection immunity explores effector immune mechanisms that are mounted by the body against the diverse types of microbial pathogens (viruses, bacteria, fungi) with the aim of designing effective immunological control and/or preventive strategies. The orchestration of diverse types of host defense mechanisms (innate, antibody mediated, cell mediated) relevant to defend against bacteria, viral and fungal pathogens will be explored. In addition, immune evasion mechanisms employed by microbes to subvert the host immunity will be explored using recent literature. Thus, microbial mechanisms of escaping innate immunity, antibody and cell mediated immunity as well as antigen processing and presentation will be discussed in depth. Furthermore, adverse consequences of immune response to bacteria, virus, fungus and parasite will also be examined.

Prerequisite: basic immunology, cellular and molecular immunology, microbiology, and parasitology.

Course Methodology: Lecture, journal clubs, seminars

Assessment and Evaluation of students: Seminar presentation 30% and written Examination 70%

Course logistics:

- Location: Atse Tewodros campus, CVMAS hall
- Course duration: three weeks

Attendance: 100% attendance is compulsory

S.N.	Course content	Duration	Instructor
1	**Introduction to host-pathogen interaction**	**1hr.**	**Dr. Saddam M.**
2	**Immunity to virus**	**8hrs.**	

2.1	Innate immunity to virus		
2.2	Adaptive immunity virus		
2.3	Evasion mechanisms of virus		
2.4	Immunopathology caused by virus		
3	**Immunity to bacteria**	**12hrs.**	
3.1	Innate immunity to extracellular bacteria		
3.2	Adaptive immunity to extracellular bacteria		
3.3	Evasion mechanisms by extracellular bacteria		
3.4	Innate immunity to intracellular bacteria		
3.5	Adaptive immunity to intracellular bacteria		
3.6	Evasion mechanisms by intracellular bacteria		
3.7	Immunopathology caused by bacteria		
4	**Immunity to parasites**	**8hrs.**	
4.1	Immunity to helminth parasites		
4.2	Immunity to protozoal parasites		
4.3	Evasion mechanisms by parasites		
4.4	Focus on Malaria & trypanosomiasis		
5	**Immunity to fungi**	**7hrs**	
5.1	Innate immunity to fungi		
5.2	Adaptive immunity to fungi		
5.3	Focus on *C.albicans* and *H.capsulatum*		
5.4	Evasion mechanism by fungi		

References:

1. Roitt's Essential Immunology (2011). Peter J. Delves, Seamus J. Martin, Dennis R. Burton, Ivan M. Roitt**.** 12th ed. A John Wiley & Sons, Ltd., Publication ohn Wiley & Sons, Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK.
2. Cellular and Molecular immunology (2015). Abul K. Abbas, Andrew H. Lichtman, Shiv Pillai. 8th ed. Elsevier Saunders. 1600 John F. Kennedy Blvd. Ste 1800 Philadelphia, PA 19103-2899.
3. Kuby immunology (2013). Judith A. Owen, Jenni Punt, Sharon A. Stranford, Patricia P. Jones. 7th ed. Susan Winslow. W. H. Freeman and Company 41 Madison Avenue New York, NY 10010.
4. Janeway's Immunobiology (2012). Murphy, Kenneth P. 8th ed. Garland Science, Taylor & Francis Group, LLC, an informa business, 711 Third Avenue, 8th floor, New York, NY 10017, USA.

UNIVERSITY OF GONDAR

COLLEGE OF VETERINARY MEDICINE AND ANIMAL SCIENCES

DEPARTMENT OF VETERINARY EPIDEMIOLOGY AND PUBLIC HEALTH

COURSE GUIDE

Course information

Course title: Biostatistics and researcher methodology **Course code**: BMS7102

Credit hours: 3 hrs **Ac. Year**: 2019/20

Target students: Masters of Vet Immunology

Instructors: Dr. Wudu Temesgen (course coordinator) (unit 2 and unit 3.1);
Email: wudutemesgen@gmail.com
Dr. Sefinew Alemu (unit 1); Email; a.sefinew@gmail.com
Dr. Araya Mengsitu (unit 3); Email: Armen.kassa@gmail.com

Course descriptions:

The course provides a formal introduction to the basic theory and methods of probability and statistical tests. It coves basic concepts and principles of study design, descriptive statistics, and analysis of statistical models with one or two predictor variables. Tests of mean differences and proportions and rates, one- and two-way analysis of variance, simple linear regression, and analysis of covariance will covered. It also covers statistical inference and statistical models for discrete, continuous and categorical outcomes. Both parametric and non-parametric techniques are explored. Topics in categorical modeling and data analysis/contingency tables; measures of association and hypothesis testing; logistic regression; models for sparse data; Poisson regression; models for ordinal categorical data, and longitudinal analysis will be dealth. The course deals also with basic of research design, scientific paper writing and research ethics.

Course objectives

After the end of this course the students will be able to:

- Explain concepts of research methods and biostatistics.
- Apply necessary methodology and statistical tools and techniques in designing and conducting clinical and field research
- Determine the appropriate statistical test for a given study design and type of data
- Interpret results of simple statistical tests
- Explain basic principles of scientific research method, research paper writing and research ethics

Course schedule

Units & time		Content	Instructor
Unit I.	12 hrs	1. Introduction to Biostatistics o Definition, data/variable types 1.1. Descriptive statistics (summarizing data using tables, graphics, central measurer (mean, median, mode), measures of dispersion (range, quartile, quartile range, mean and standard deviation), and measures of shape of distribution (kurtosis and skewness) 1.2 Inferential statistics (probability theory, sampling distribution, confidence interval estimation and statistical hypothesis testing)	Dr Sefinew
Unit II.	24 hrs	2. Modeling biomedical data (statistical analysis of biomedical data) 2.1 continuous data (correlations, t-tests, linear regressions, ANOVA) 2.2 categorical data (chi-square, logistic regressions) 2.3 count data (poison regression and negative binomial regression) 2.4 Non parameteric data (rank correlations, wilcoxon sign test, Wilcoxon rank sum test, Kruskwal test)	Dr. Wudu
Unit III	4 hrs	3. Research methods and methodology 3.1 Observational and experimental study designs	Dr Wudu
	8hrs	3.2 Proposal and scientific paper writing 3.3 Ethics in scientific research	Dr Araya

Reading materials

- Dohoo I, Martin W, Stryhn H (2004). Veterinary Epidemiologic Research. AVC Inc., Prince Edward Island, Canada
- Downie, N.M, and R. W. Heath. (1983). Basic Statistical Methods, 5th Edition. New York: Harper and Row Publ.
- Frank, H. and Althoen, S.C. (1994): Statistics: concepts and applications. Cambridge university press.

- Kaps, M and Lamberson, M. (2017). Biostatistics for Animal Science. Third edition. CABI. UK.
- Mead R, Curnow R, Hasted A (2002). Statistical Methods in Agriculture and Experimental Biology. 3rd edit. Chapman & Hall.
- Moore, D.S. and G.P. McCabe. (1989). Introduction to the Practice of Statistics. New York: W.H. Freeman and Company.

Petrie A, Watson P (2006). Statistics for veterinary and Animal Science. 2nd edit, Blackwel

Clinical Immunology
Course code: VMI-7082
Credit hrs.: 2 (1+1)
Course description

The course clinical immunology aims to teach the mechanisms of diseases caused by disorders of the immune system (malfunction, aberrant action, and malignancies of its component). This course will also address diseases of other system in which pathology is primarily mediated by immune reaction. The course has six chapters which includes:

1. Mechanisms of tolerance: central and peripheral
2. Autoimmunity, autoinflammatory disease, and immunopathology of some selected disease
3. Immunodeficiency: primary and secondary
4. Transplantation immunology
5. Hypersensitivity reactions and allergy
6. Cancer/tumor immunology

1. Tolerance and Immunoregulatory mechanisms

- Central and peripheral
- Idiotypic networks and apoptosis

2. Autoimmunity and autoinflamatory diseases

Deals with autoimmune diseases: spectrum of autoimmune diseases, organ-specific and systemic autoimmune diseases, genetic factors and pathogenesis, animal models, aetiology, mechanisms of induction of autoimmunity and therapeutic approaches

3. Tumor immunology

Addresses issues that include tumor antigens, difference between tumor induced by chemical carsinogens and viruses, role of ocogenes and antioconeges in cancer, immune respons to tumor in animals, natural killer cells, interferon, immunosurveillance, specific immune response of tumor cell and its mechanism, immunodiagnosis of cancer, tumor immunotherapy and prophylaxis, advances in antitumor vaccine, gene therapy etc.

4. Immunodeficiency

The section of immunodeficiency addresses primary immunodeficiencies: Lymphoid immunodeficiencies, immuno-deficiency of myeloid lineage, defects in complement proteins,

experimental models of immunodeficiencies and other acquired or secondary immunodeficiencies

5. Transplantation immunology

Transplantation immunology discusses about immunological adverse reaction against transplanted organs or transfrred cells to animals and humans; reducing immunological rejection using immunosuppresive drugs and the problem of immunosuppression; and future directions in the area.

- Principles of graft rejection and tolerance
- Graft versus host reactions (GVH)

6. Hypersensitivity reaction

The section of allergy studies diversity of allergens, diversity of allergic diseases, types of hypersensitivity reactions - IgE-mediated (Type I) hypersensitivity, Antibody-mediated (Type II) hypersensitivity, Immune complex-mediated (Type III) hypersensitiyivity, and type IV or delayed-type hypersensitivity (DTH); cellular and molecular biology of allergy; diagnosis of allergic problems, etc.

Practical: Immune complexes, quantification and determination by various techniques, Enumeration of various populations of lymphocytes by different techniques, Determination of C3 levels, autoimmune reaction by demonstrating: autoantibodies and Hypersensitivity reactions (class IV and others); Delayed hypersensitivity reaction, Separation of leukocyte from blood of domestic animals for leukocyte/macrophage migration test; immune response patterns in known animal tumors such as Marek's disease in chicken, observation and study of tumor, immunodiffusion test using bovine leukemia virus, assay of cellular immune response to virus induced tumor.