

The background of the slide features a repeating pattern of white syringe icons on a purple gradient. The syringes are oriented horizontally and are scattered across the upper two-thirds of the slide.

PRINCIPLES OF VETERINARY VACCINOLOGY

VERSION 2

POWERPOINTS

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VETERINARY
BIOLOGICS
TRAINING
PROGRAM



IICAB



the Center for
Food Security
& Public Health

IOWA STATE UNIVERSITY*
College of Veterinary Medicine

Principles of Veterinary Vaccinology

Lecture Checklist

Lecture Title (approximate length)

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<input type="checkbox"/> Introduction to Veterinary Vaccinology (13.5 min)	pg. 5
<input type="checkbox"/> Basis of Protective Immunity (25 min)	pg. 7
<input type="checkbox"/> Veterinary Vaccine Regulations (23.5 min)	pg. 10
<input type="checkbox"/> Principles of Vaccine Labeling (6.5 min)	pg. 15
<input type="checkbox"/> Properties of Vaccine Types (8.5 min)	pg. 17
<input type="checkbox"/> New Technology for Improved Vaccine Safety, Efficacy, and/or Production (27.5 min)	pg. 19
<input type="checkbox"/> Adjuvants in Veterinary Vaccines: Modes of Action and Adverse Effects (9 min)	pg. 31
<input type="checkbox"/> Reasons for Vaccine Failure (27 min)	pg. 34
<input type="checkbox"/> Adverse Vaccine Reactions (36 min)	pg. 41
<input type="checkbox"/> Duration of Immunity (16.5 min)	pg. 49
<input type="checkbox"/> Vaccination in the Presence of Maternal Antibody (21.5 min)	pg. 55
Vaccination to Protect Mucosal Surfaces	
<input type="checkbox"/> General Concepts and Protection from Respiratory Diseases (14 min)	pg. 60
<input type="checkbox"/> Protection from Enteric Disease (10.5 min)	pg. 64
<input type="checkbox"/> Multifactorial Diseases and Herd Immunity (12.5 min)	pg. 69

Principles of Veterinary Vaccinology

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Risks of Vaccination

- Vaccine-related side effects
 - Vaccine-associated feline fibrosarcomas
 - Hypersensitivities
 - Anaphylaxis
 - Nonspecific systemic side effects
 - Fever, lethargy, loss of appetite
 - Localized reactions
- Alterations in immune homeostasis
 - Allergy?
 - Autoimmune disease?
 - Post-vaccinal polyneuropathy

Veterinary Vaccines are Essential for

- Safe and efficient food production
- Control of emerging and exotic diseases of animals and people
- Control of zoonotic diseases
- Reduction of transmission of food borne disease
- Reduction of animal suffering
- Reduction of the need for antibiotics to treat animals
- Control of diseases of companion animals and horses

AVMA Approved Principles of Vaccination

- Approved by AVMA Executive Board
April 2001; revised April 2007

- Introduction

"Selecting vaccine products and recommending vaccine programs are among the most complicated of medical decisions facing the veterinarian."

AVMA Approved Principles of Vaccination

Vaccination protects a population **of animals...** Vaccination does not protect every individual patient even when they are properly vaccinated

AVMA Approved Principles of Vaccination

Knowledge of immunology and vaccinology, including associated benefits and risks, and the pathobiology of infectious diseases, are necessary to implement an effective vaccination program.

Principles of Vaccinology Topics

- Basis of protective immunity
- Veterinary vaccine U.S. regulations
- Properties of vaccine types
- Reasons for vaccine failure
- Adverse vaccine reactions
- Duration of immunity
- Vaccination in the presence of maternal antibody
- Vaccination to protect mucosal surfaces
- Vaccination for multifactorial diseases and herd immunity

Basis of Protective Immunity

What is the Basis for Protective Immunity for the Disease in Question

- Circulating antibody?
- Mucosal antibody?
- Cell-mediated immunity?
 - Cytokine secretion?
 - Cytotoxic T cells?
 - Gamma delta T cells?
- What are the important antigens?

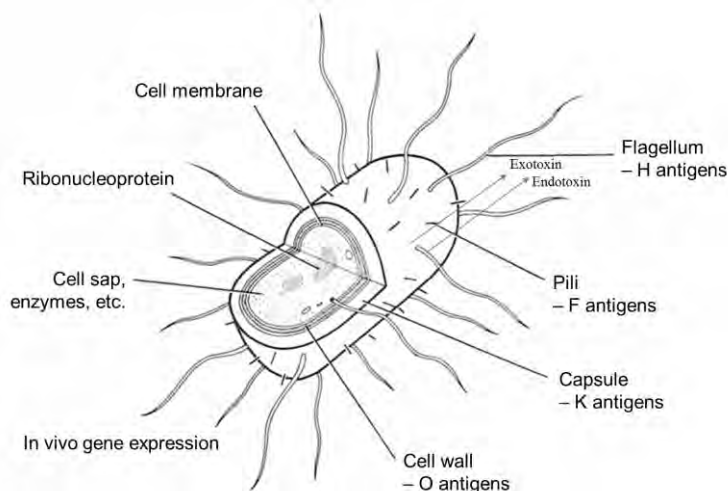
Basis for Protective Immunity

Pathogenic Mechanisms	Defensive Mechanisms
Adherence to mucosa	Mucosal antibody (IgA)
Parasites	TH2, IgE
Exotoxin/Endotoxin	Neutralizing antibody
Viremia	Neutralizing antibody
Septicemia	Opsonizing antibody
Intracytoplasmic growth	Cytotoxic T cells
Rapid virus replication	Types 1 and 2 Interferons
Intracellular growth	Th1 cytokines
Infect epithelial cells	Gamma delta T cells

Basis for Protective Immunity: Respiratory Virus Infection

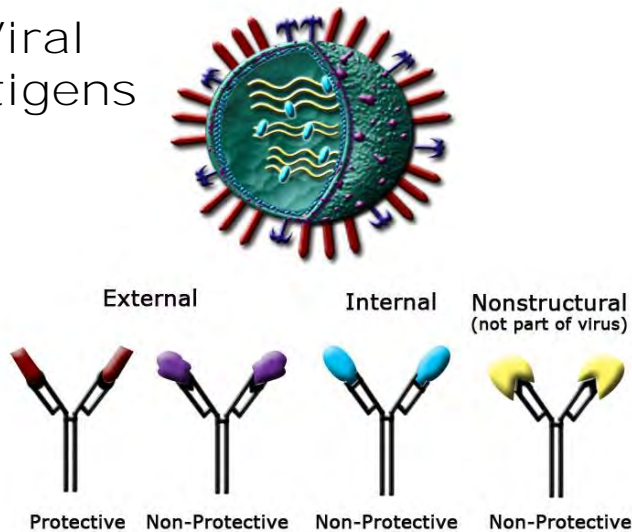
Pathogenic Mechanisms	Defensive Mechanisms
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Intracytoplasmic growth	Cytotoxic T cells
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Intracellular growth	Th1 cytokines
Infect epithelial cells	Gamma delta T cells

Bacterial Antigens



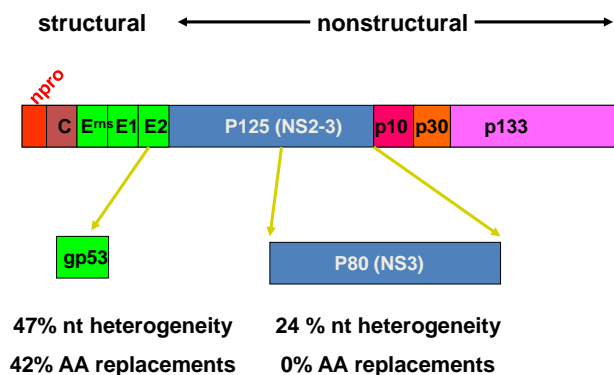
Tizard, Ian R. Veterinary Immunology: An Introduction, 6th ed., 2000.

Viral Antigens



Antibody Response to Viral Antigens Illustrated by Ann Atterberry, 2011

Genetic Diversity of BVDV



T Cell Mediated Immunity to Viral Antigens

- External viral antigens may be highly variable to avoid antibody neutralization (especially RNA viruses)
- Non-structural proteins are often highly conserved because they must interact with cell machinery for replication
 - Antibody does not bind to them
 - They are processed through the exogenous pathway and stimulate T_H cells
 - They are processed through endogenous pathway and stimulate CD8 T cells (CTLs)
 - CTLs and T_H cells can provide broad protection against some viruses that have antigenic variation in external proteins
 - Killed vaccines do not usually stimulate CD8 T cell immunity to non-structural proteins