

# CHAPTER 11

## THE IMMUNE RESPONSE

Prof. Win Win Maw  
MBBS, PhD(Shimane),  
FACTM(Australia),  
Dip MedEd

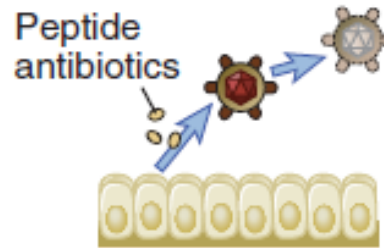
## 3 Levels of Defense

- (a) Numerous surface barriers
- (b) Innate immune response
- (c) Adaptive immune response

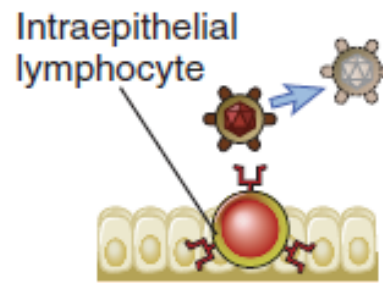
Physical barrier  
to infection



Killing of microbes  
by locally produced  
antibiotics



Killing of microbes  
and infected cells  
by intraepithelial  
lymphocytes



**Two different types** of responses to invading microbes:

- (1) Innate (natural) responses
- (2) Acquired (adaptive) responses ;
- both have **cellular and humoral components**

# INNATE OR NON-SPECIFIC IMMUNITY

- Innate immunity is the **initial response to microbes** that **prevents, controls, or eliminates infection** of the host by many microbes.
- Innate immune mechanisms **recognize the products of damaged and dead host cells** and served to eliminate these cells and to initiate the process of tissue repair
- Innate immunity to microbes **stimulates adaptive immune responses** and can influence the nature of the adaptive responses to make them optimally effective against different types of microbes

## Two types of responses of innate immune system that protect against microbes are

- Inflammation and
- Antiviral defense.

# ADAPTIVE IMMUNE RESPONSE

## Characteristic features

- elicit complex variety of response
- takes 3-5 days ( clonal selection, expansion )
- **more than enough time** for most pathogens to damage host
- involve **specific proliferation** of T & B cells
- each lymphocytes display unique receptor
- **receptor – so diverse**
- can bind to microbial , environmental, self Ag

# Differences between Innate and Adaptive immune responses:

- (1) Specificity (Adaptive)
- (2) Memory (Adaptive)
- (3) Discrimination between Self and Non-self (Innate)
  
- Cellular components of the adaptive immune system  
Cells - T lymphocytes ( Th, Tc, Treg ),  
APC – Macrophages, DC, B lymphocyte
  
- Humoral - Antibodies



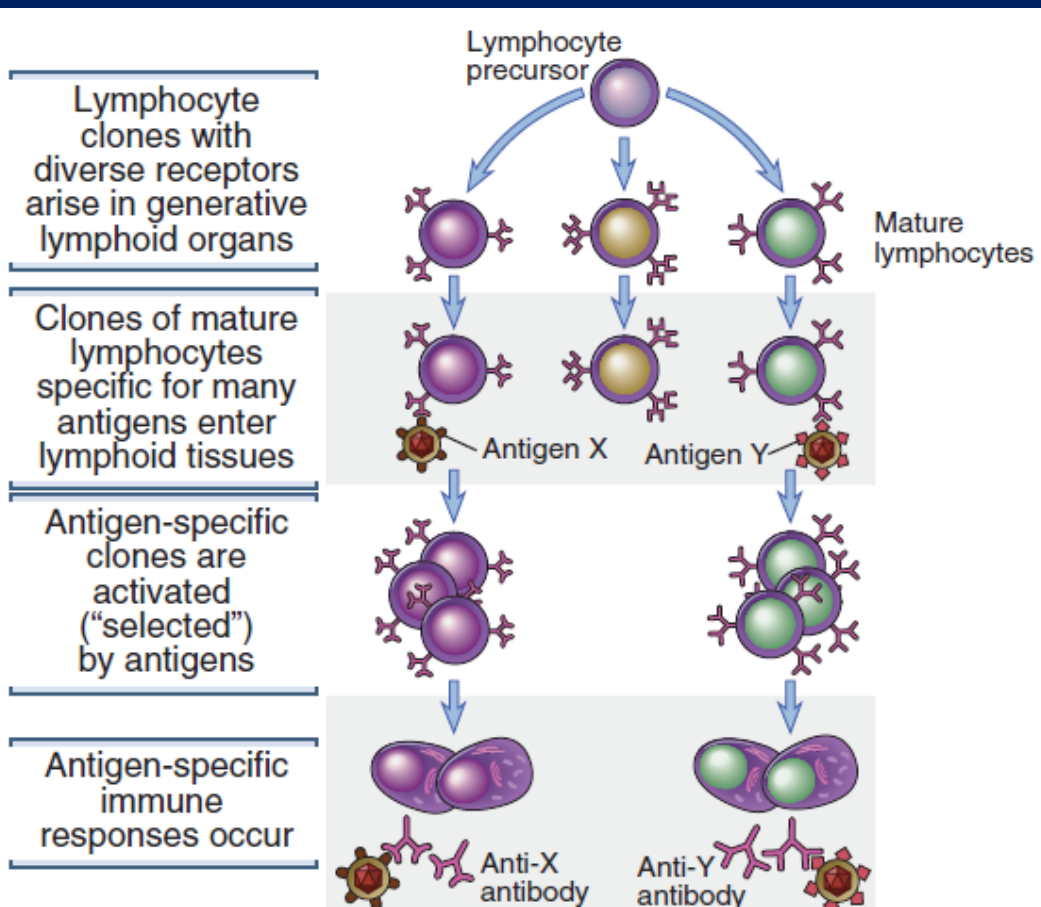
# THE IMMUNE RESPONSE

- A **complex and regulated sequence of events** involving several cell types.
- localized or systemic
- **highly specific**
- little or no damage to host tissues
- terminate soon after Ag is eliminated

# Cardinal features of adaptive immune responses

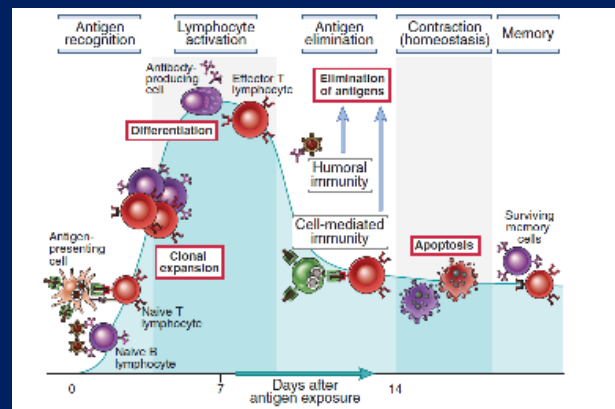
- Specificity and diversity – specific for distinct antigens; recognize a very large number of antigens – diversity
- Memory – respond to second and subsequent exposure to the same antigen
- Clonal expansion – undergo considerable proliferation after exposure to that antigen
- Specialization – distinct and special ways to different microbes, maximizing the effectiveness of antimicrobial defense mechanism.

# Clonal selection and clonal expansion



# Cardinal features of adaptive immune responses

- **Contraction and homeostasis** – All normal immune responses **wane with time** after antigenic stimulation, thus **returning to the resting basal state**
- **Non-reactivity to self**



# Steps of adaptive immune responses

- Antigen processing and presentation
- Immune recognition
- Activation of Helper T lymphocytes
- Activation of B cells
- Activation of Cytotoxic T cells and
- Elimination of antigen
- Contraction
- Memory

# Antigen processing and presentation

- Two different classes of MHC proteins - recognized by two major subsets of T cells
- Class I MHC - CD8; **Cytosolic Pathway**
- Class II MHC - CD4 by TCR **Endocytic Pathway**

