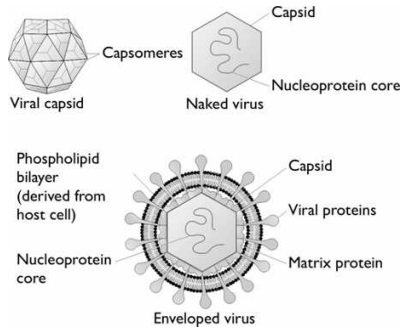
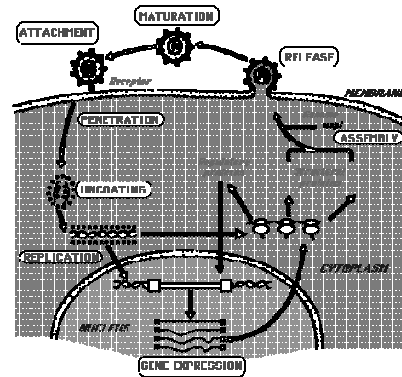


### What is a virus?



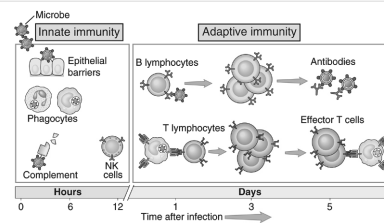
### How can a virus reproduce?



### How can a virus cause disease?

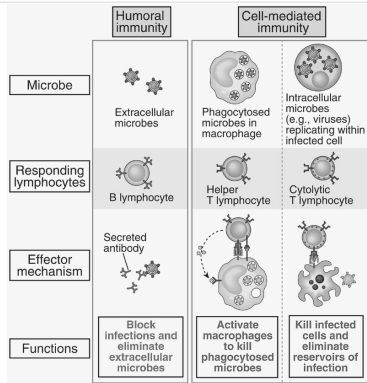
- Cytopathic effects
  - Killing of cells by lysis
  - Damage to cellular functions
  - Competition for cellular materials
  - Cell fusion
    - Transformation (events leading to cancer)
- Interaction with immune system (e.g., inflammation)
- Evasion of defenses
- Chronic or latent stages

### How do we defend ourselves against disease?



- Innate immunity
  - Barriers
  - Phagocytosis
  - NK cells
  - Complement
- Adaptive immunity
  - Humoral response
    - B lymphocytes produce antibody
  - Cell-mediated response
    - T cells kill infected cells

## How do we defend ourselves against disease?



## How do we defend ourselves against disease?

- Innate immunity
  - Non-specific:
    - responds similarly to any invader
    - responds similarly every time
  - Immediate or activated rapidly
  - Essential in triggering adaptive immunity
  - Important even after adaptive response begins
- Adaptive immunity
  - Specific response to specific pathogen
  - Activation takes time
  - Memory: faster, stronger response second time

## Problems

- One response of the immune system to a viral infection is the production of antibodies.
  - How could antibody production protect the body from the virus?
- There are very few viral diseases that you can get from your dog or cat.
  - Why is this true?
  - One exception is rabies – what might be different about the rabies virus to allow animal-human transmission?