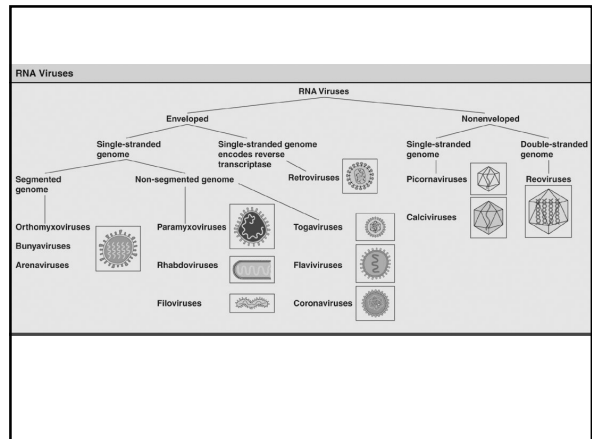


The RNA Viruses That Infect Humans



RNA Viruses

Orthomyxoviruses

Influenza (Type A most common)

Pandemics

Droplet spread

Secondary infections

Virus has protein spikes

Hemagglutinin (H)

Neuraminidase (N)

Responsible for virulence and infectivity

Used to type virus, vaccines

Antigenic drift

Small mutation in hemagglutinin

Antigenic variance in strain occurs

Host memory cells can't recognize and defend

Vaccines lose effectiveness

Antigenic shift

Sudden emergence of new strain

Mixing genome of two viruses

Simultaneous infection with 2 viruses

Co-existence of pigs, birds & humans

Naming—A/duck/Ukraine/63

Influenza

Prevention

- handwashing
- vaccination
- Guillain-Barré syndrome
- new vaccine—FluMist

Treatment

- treat symptoms
- nonaspirin—Reye syndrome
- four prescription antivirals
amantadine (resistant strains)
rimantadine (resistant strains)
zanamivir (Relenza)
eltamivir (Tamiflu)
- take early—reduce symptoms

Bunyaviruses

Arthropod vectors (arboviruses)
Encephalitis, hemorrhagic fevers
California encephalitis
Hantavirus

Arenaviruses

Aerosols or direct rodent contact
Hemorrhagic fevers
Lassa fever—Africa
Argentine hemorrhagic fever
Bolivian hemorrhagic fever
Lymphocytic choriomeningitis

Paramyxoviruses

Paramyxovirus

- Mumps and parainfluenza (croup)

Morbillivirus

- Measles (red, rubeola)
- One of most contagious

Respiratory Syncytial virus (RSV)

- Pneumovirus
- High mortality rate in infants

Rhabdoviruses

Rabies

Slow progressive zoonosis

Animal bite usual transmission

Filoviruses

Thready appearance
Ebola virus
Marburg virus

Coronaviruses

Common cold
Some forms of viral pneumonia
and myocarditis
Some enteric diseases
SARS (severe acute respiratory
syndrome)—emerging disease

Togaviruses

Rubivirus—Rubella

- Crosses placenta
- Congenital rubella
- Post natal rubella
- Prevention—vaccine

Flaviviruses

Hepatitis C (HCV)
Silent—liver failure—transplant
Blood contact
No vaccine—treat for remission

Arthropod-borne (arboviruses)

Arthropod vectors—tropics,
subtropics

Vector range determines locations
of disease

Control vector—control disease

Togaviruses, flaviviruses,
bunyaviruses, reoviruses

Acute, undifferentiated fever, rash
dengue fever, Colorado tick fever

Encephalitis

Eastern equine, California, St. Louis
most common

Animal reservoir—usually bird

West Nile

Hemorrhagic fevers

Dengue fever

- usually mild, can be fatal
- “breakbone fever”

Yellow fever

- 50% fatality rate
- Panama canal

Retroviruses

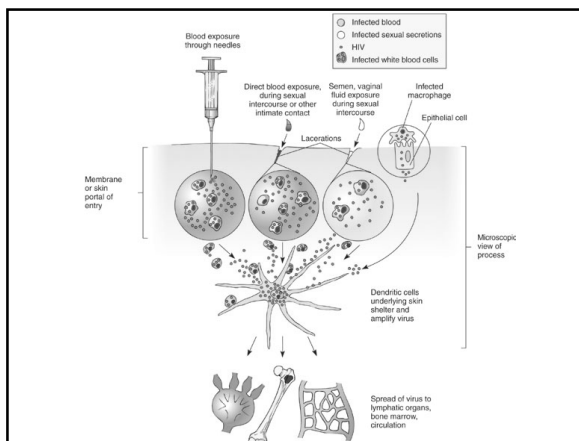
Contain reverse transcriptase

RNA → DNA → Host DNA insertion

Human immunodeficiency virus (HIV)

- AIDS
- Transmission—sexual contact, blood or blood products, crosses placenta

- Infects and grows in dendritic cells
- Sheds from dendritic cells without killing cells
- Spreads to lymph and blood



- Initial infection vague symptoms
- Incubation 2-15 years
- Usually seroconvert in 2 months
- 5% nonprogressors
- Secondary infections indicate development of AIDS

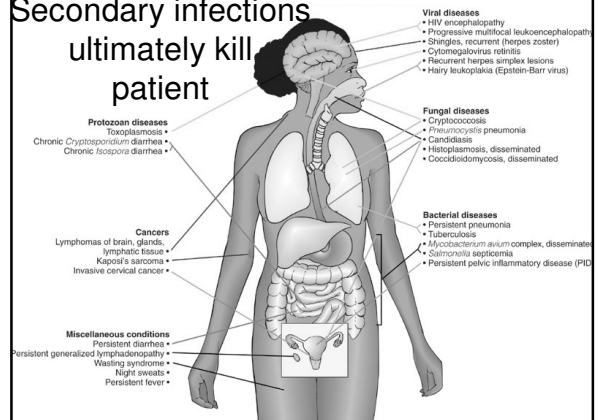
Clinical definition of AIDS

- Severe immunodeficiency due to infection with HIV
- Accompanied by life-threatening opportunistic infections

Primary effects of AIDS

- Virus infects cells with CD4 receptors—Helper T, macrophages, dendritic cells
- Cells cross blood-brain barrier

Secondary infections ultimately kill patient



Diagnosis of AIDS

- Marker diseases
- History
- Positive serology
- CD4 cells below 200 (800-1000 normal)

Human Leukemia Viruses (HTLV)

- HTLV-1 Adult T-cell leukemia
- HTLV-2 Hairy cell leukemia

Picornaviruses

Enterovirus

- Oral-fecal transmission

Polio virus

- Summer-fall prevalence
- Paralysis

Coxsackieviruses, echoviruses

Hepatitis A virus (HAV)

Picornaviruses

Human rhinovirus (HRV)

- Common cold
- year round, all ages
- no vaccine
- treat symptoms

Calciviruses

Norwalk agent

- Poorly defined group of enteric viruses
- One-third of all enteritis
- cruise ships

Reoviruses

Rotavirus

- Diarrhea in newborns
- common but mild disease

Virus-like Agents

Spongiform Encephalopathies

Transmissible, fatal, chronic
infections of CNS

Prions

Proteinaceous infectious particles

Kuru

Cruetzfeld-Jakob Disease (CJD)

Scrapie → Mad Cow Disease