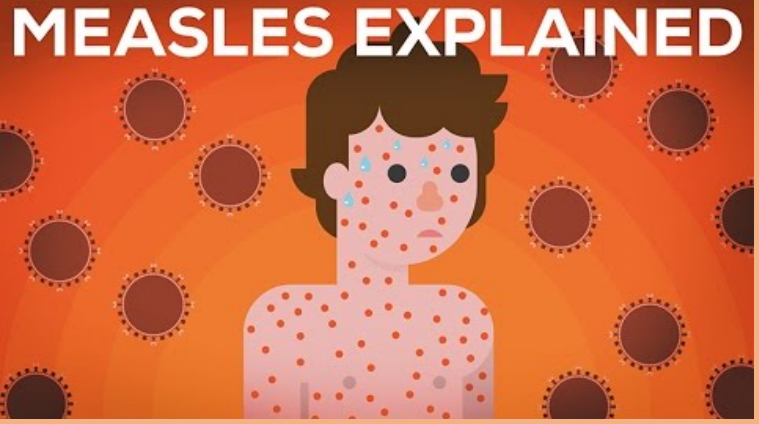
Sarampo

virus

From the following list select THREE items associated with Measles.

- Paramyxovirus
- dsDNA
- Flavivirus
- Hepadnav
- Respirato
- ssRna
- Blood-born



virus

virus

Genome	Family	Transmission	Disease
Picorna vírus/ssRNA			
Hepatitis A		Oral-anal	Hepatitis A
Rhinovirus		Respiratory Droplets	Common Cold
Herpesvirus/dsDNA			
Cytomeglovirus		Respiratory Droplets	Mononucleosis Syndrome
Epstein Barr		Respiratory Droplets	Infectious mononucleosis
HSV-1		Oral(saliva)	Gingivostomatitis, Herpes labialis
HSV-2		Genital(sexually transmitted disease	Genital Herpes
Paramyxovirus/ssRNA			
Respiratory syncytial virus		Oral-anal	Bronchiolisis and pneumonia in infants
Measles		Respiratory Droplets	Measles (rubéola)
Mumps		Respiratory Droplets	Rubella (German mesles)

virus

Genome		Transmission	Disease
ssRNA			
Hepatitis C	Flavivirus	Blood-borne	Hepatitis C
Hepatitis D	Deltavirus	Blood-borne	Hepatitis D (infect only cells previously infected with hepatite B)
Hepatitis E	Herpevirdae	Oral-anal	Hepatitis E
Influenza	Orthomyxovirus	Respiratory Droplets	Influenza
HIV	Retrovirus	Blood-borne, genital	AIDS
dsDNA			
Hepatitis B	Hepadnavirus	Blood-borne	Hepatitis B
Adenovirus	Adenovirus	Respiratory droplets	Pharingitis, Pneumonia,Conjunctivitis

From the following list select THREE items associated with Measles.

- Paramyxovirus
- dsDNA
- Flavivirus
- Hepadnavirus
- Respiratory droplets
- ssRna
- Blood-borne

Rotaviruses are the most common cause of gastroenteritis in children (and under)

Reoviruses have na icosahedral capsid composed of na outer and inner protein shell containing a double-segmented genome.

- both state
- both state
- the first st cond is false
- the first sta cond is true

Exception

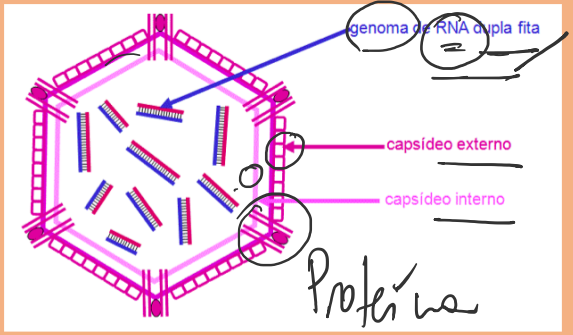
Exception

Reoviruses

- nonenveloped
- icosahedral capsid
- outer and inner protein shell – **double –stranded RNA**
- RNA – dependent RNApolymerase
- Important members:
  - Coltivirus (Colorado tick fever vírus)
  - Rotaviruses (gastroenteritis vírus type B)

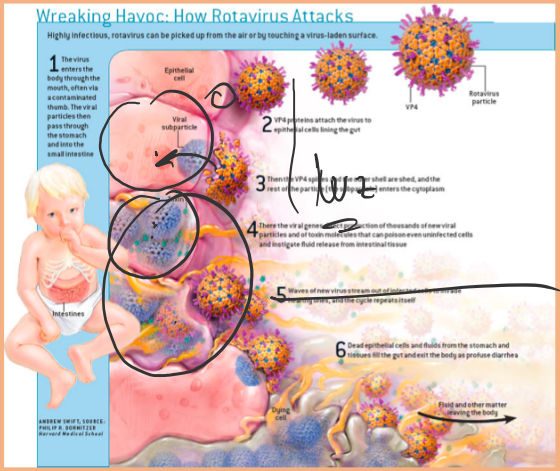
1. gastroenteritis in children (2 and under)
2. spread fecal-oral route
3. survive under acid condition
4. symptoms in adults – absent or mild

Viral gastroenteritis - self-limiting disease, often referred to as the 24-hours
An influenza virus does not cause it.
It is associated with RNA viruses
diagnosed by ELISA on fecal samples.



Reovirus

Rotavirus → grupo



Gastroenterite

virus

Rotaviruses are the most common cause of gastroenteritis in children (and under)

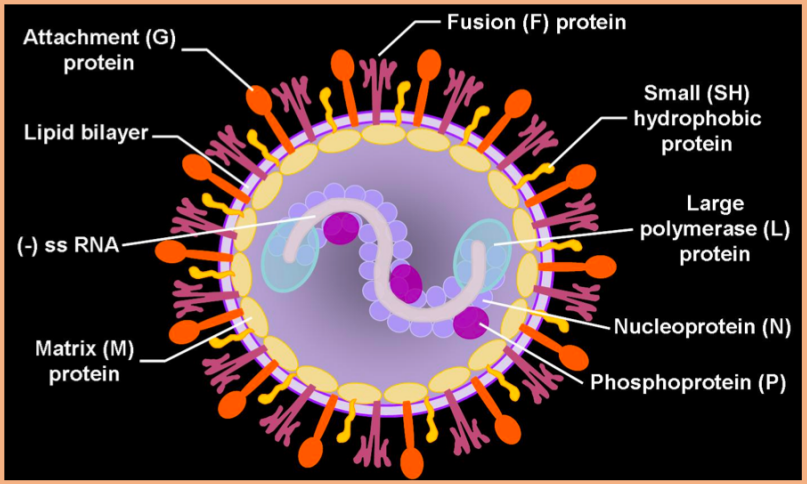
Reoviruses have na icosahedral capsid composed of na outer and inner protein shell containing a double-segmented genome.

- both statements are true
- both statements are false
- the first statement is true, t
- the first statement is flse, th

virus

Which of the following is a paramyxovirus that causes many respiratory infection epidemics each winter? It is a common cause of bronchiolitis in infants, complicated by pneumonia in approximately 10% of cases.

- ~~Influenza~~ — Orthomyxovirus
- ~~Rubella~~ — paramyxovirus
- ~~Coxsackievirus~~ → Picornovirus
- Respiratory syncytial virus (RSV)


Fusion (F) protein
Attachment (G) protein
Small (SH) hydrophobic protein
Lipid bilayer
Large polymerase (L) protein
(-) ss RNA
Nucleoprotein (N)
Matrix (M) protein
Phosphoprotein (P)

Paramyxovirus
(RSV,Measles, Mumps,Parainfluenza)

- RSV only member of the paramyxovirus that lacks the envelope glycoproteins (hemagglutinin & Neurminidase)
- RSV causes infection epidemics each winter from commom cold to pneumonia and bronchitis
- More severe in infants and immunocompromised
- Treatment with Ribavirin (hospitalized infants)

- *Influenza = Orthomyxovirus*
- *Rubeola = Paramyxovirus that causes cough, coryza and conjunctivitis – Koplic´s Spots*
- *Coxsackievirus = Picornavirus*

virus

Which of the following is a paramyxovirus that causes many respiratory infection epidemics each winter? It is a common cause of bronchiolitis in infants, complicated by pneumonia *in* approximately 10% of cases

- ~~influenza~~
- ~~Rubeola~~
- ~~Coxsackievirus~~
- Respiratory syncytial vírus (RSV)

The cytophatic effect (CPE) consists

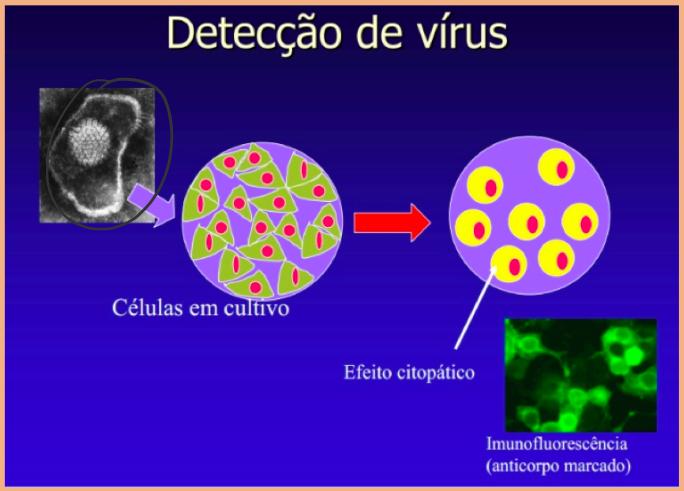
All viroses cause CPE

Cytophatic Effect (CPE)

The· hallmark of viral infection of the cell is the cytopathic effect (CPE). This change starts with alterations of cell morphology accompanied by marked derangement of cell function and culminates in the lysis and death of cells.

Not all viruses cause CPE; some can replicate while causing little morphologic or functional change in the cell. Such cytopathic changes include:

- necrosis
- hypertrophy
- giant cell formation
- hypoplasia
- metaplasia
- detachment from substrate
- lysis
- membrane fusion
- altered membrane permeability
- inclusion bodies



Efeito citopático

material genómico

material celular

vírus

MP

virus

The cytophatic effect (CPE) consists of a single mechanism of host cell damage.

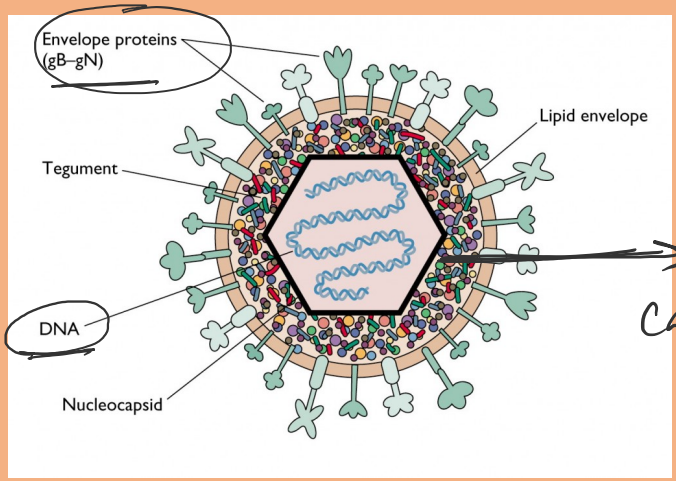
All viroses cause CPE

- both statements are true
- both statements are false
- the first statement is true, the
- the first statement is flse, the

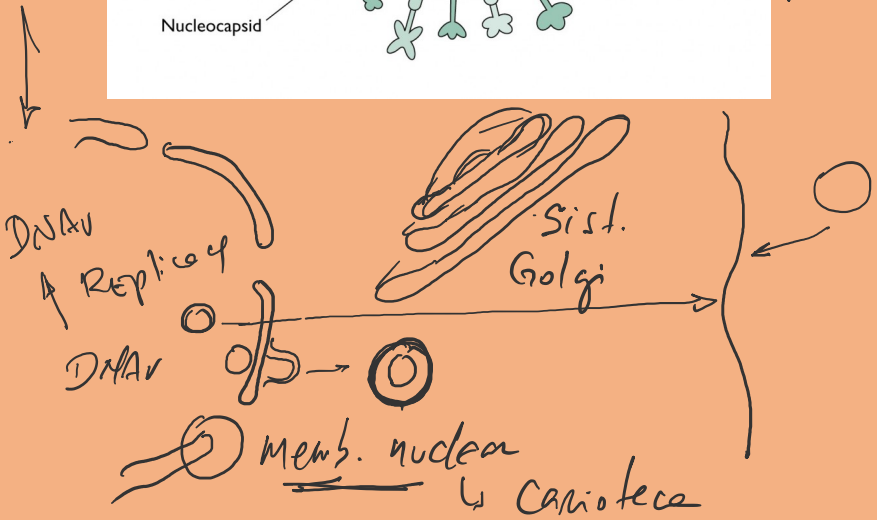
All of the following are associated with Herpesviruses EXCEPT one. Which one is the EXCEPTION?

- dsDNA
- envelope present
- nuclear membrane
- icosahedral

virus

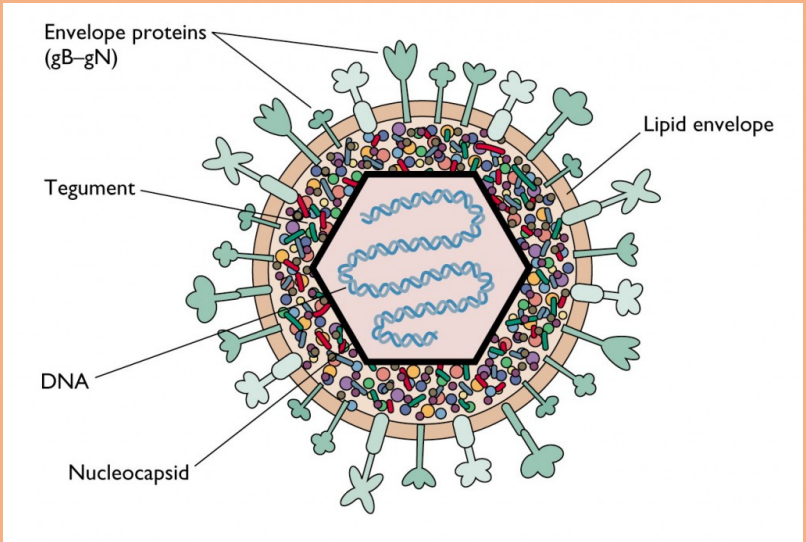


Capsideo



Herpesviruses

DNA viruses – double-stranded DNA (dsDNA)
ENVELOPED icosahedral nucleocapsid (like nuclear membrane)
Characterized by latent infections with recrudescence of disease.



All of the following are associated with Herpesviruses EXCEPT one. Which one is the EXCEPTION?

- ~~dsDNA~~
- no envelope present
- ~~nuclear membrane~~
- ~~icosahedral nucleocapsid~~

virus

Prions are generally quite resistant to proteases heat, radiation, and formalin treatments, although their infectivity can be reduced by such treatments.

Prion diseases are usually rapidly progressive and always fatal.

both state

- both state
- the first st cond is false
- the first sta cond is true

A Doença de Creutzfeldt-Jakob (DCJ)

- É uma desordem cerebral caracterizada por:

- Perda de memória;
- Tremores;
- Desordem na marcha;
- Postura rígida;
- Ataques epilépticos;
- Paralisia facial.

SNC

↓

Encéfalopatias

↓

Tec. esponja

Prion ➡ "Partícula Proteica infectante"

ñ ser vivo

Vaca louca

Proteína

cadeia de aa

Forma 3D

↓

fé

Forma Aberrante

Prion disease

Prion diseases, also known as transmissible spongiform encephalopathies (TSE's) are a group of progressive neurodegenerative conditions.

Prion diseases are usually **rapidly progressive and always fatal**.

Prions are generally **quite resistant to proteases, heat, radiation, and formalin treatments, although their infectivity can be reduced by such treatments.**
Note: Their ability to propagate within a host relies on inducing the conversion of endogenous prion protein PrP into a protease-resistant isoform

Prions are generally quite resistant to proteases, heat, radiation, and formalin treatments, although their infectivity can be reduced by such treatments.

Prion diseases are usually rapidly progressive and always fatal.

- both statements are true
- both statements are false
- the first statement is true
- the first statement is false

virus

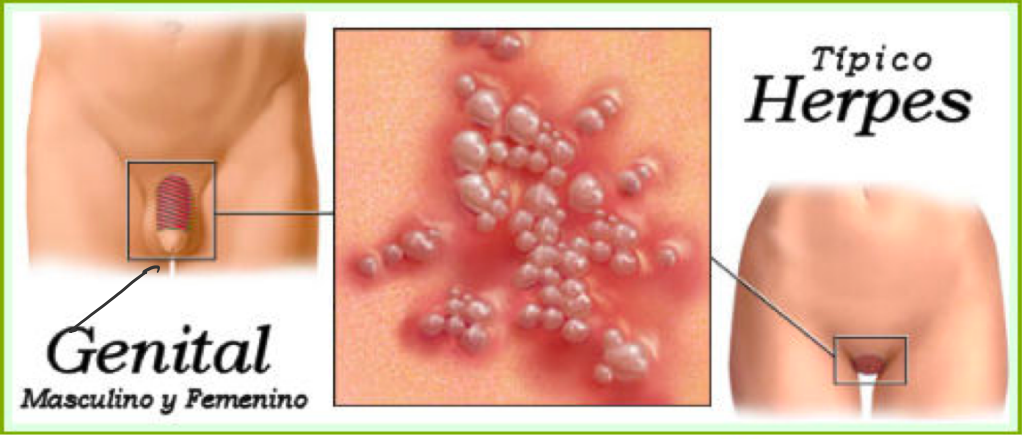
Herpes simplex virus type 2 is mainly spread through sexual contact.

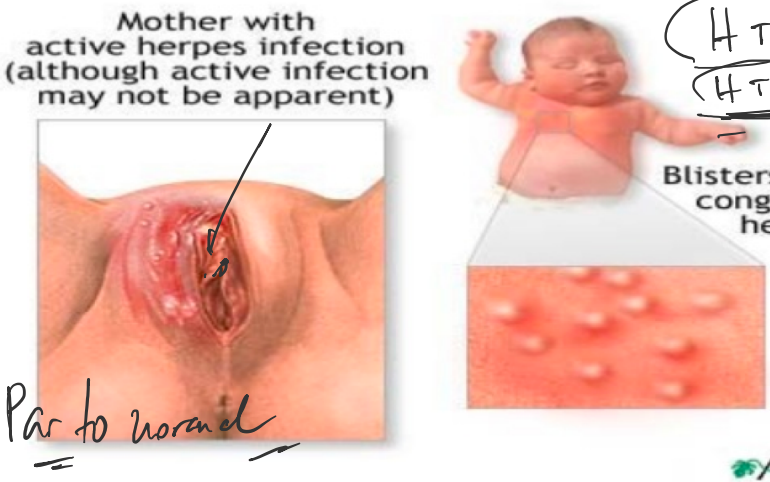
It cannot be spread from mother to infant during childbirth.

- both state
- both state
- the first st cond is false
- the first sta cond is true

Herpesviruses

DNA viruses – double-stranded DNA (dsDNA)
ENVELOPED icosahedral nucleocapsid (like nuclear membrane)
Characterized by latent infections with recrudescence of disease.
HSV-1 – oral lesions – “fever blisters” – person to person
HSV-2 – **acquired after the onset of sexual activity**. Associated with genital lesions and with neurologic disease. **It can be** spread from mother to infant during childbirth.


Típico
Herpes
Genital
Masculino y Femenino


Mother with
active herpes infection
(although active infection
may not be apparent)
Blisters due to
congenital
herpes
HT1 Oral
HT2 Sexual
Parto normal
ADAM.

virus

2 is mainly spread through sexual contact.

mother to infant during childbirth.

- both statements are true
- both statements are false
- the first statement is true, the second is false
- the first statement is flse, the second is true

Which of the following herpesvirus infections can be treated prophylactically by a vaccine?

- Herpes Simplex virus type 1 (HSV-1)
- Herpes Simplex virus type 2 (HSV-2)
- Varicella-zoster virus (VZV)
- Epstein-bar

Herpesviruses

DNA viruses – double-stranded DNA (dsDNA)
ENVELOPED icosahedral nucleocapsid (like nuclear membrane)
Characterized by latent infections with recrudescence of disease.
HSV-1 and 2 – treatment with antiviral – ACYCLOVIR
VZV – treatment with :

- acyclovir
- Human varicella zoster immunoglobulin (VZIG) – prophylactically
- **Attenuated varicella vaccine**

Medicamento antiviral ⇒ Bloqueio Metabólico

Acidose

Herpes

T1

T2

Vacina ⇒ injeção de antígenos atenuados

VZV ⇒ Varicela → Herpes Zoster

VEB ⇒ - Linfócito B

- mononucleose

virus

Which of the following herpesvirus infections can be treated prophylactically by a vaccine?

- Herpes Simplex vírus type 1 (HSV-1)
- Herpes Simplex vírus type 2 (HSV-2)
- Varicella-zoster vírus (VZV)
- Epstein-barr vírus (EBV)

A bacteriophage with the ability to form a stable, nondisruptive relationship within a bacterium is called a: _____

- Virulent phage
- Prophage
- Temperate phage
- Phage T4

Prófago

Bacteriofago T4

ú Temperado

Bacteriophage

Replication by an alternate method in which the phage genome is incorporatd into bacterial chromosome.
Non destroying the host (in contrast to a **virulent phage**)

A virus that can replicate ONLY WITHIN SPECIFIC HOST bacterial cells

Lysogenic Bacterium – contains **a temperate** bacteriophage (example – Corynebacterium diphtheriae)
Lysogenic conversion – alteration of the bacterium to a virulent strain by the transfer of a DNA temperate bacteriophage.

The integrated viral DNA is called prophage
Enterobacteria **phage T4** is a phage that infects E. coli bacteria.
Plasmids are extrachromosomal, double-stranded, circular DNA molecules
' that are capable of replicating independently of the bacterial chromosome.

DNA bact

Plasmídeo
DNA extracromossômico

virus

vírus

DNAv

Prófago

Bactéria

Bacteriófago

T4

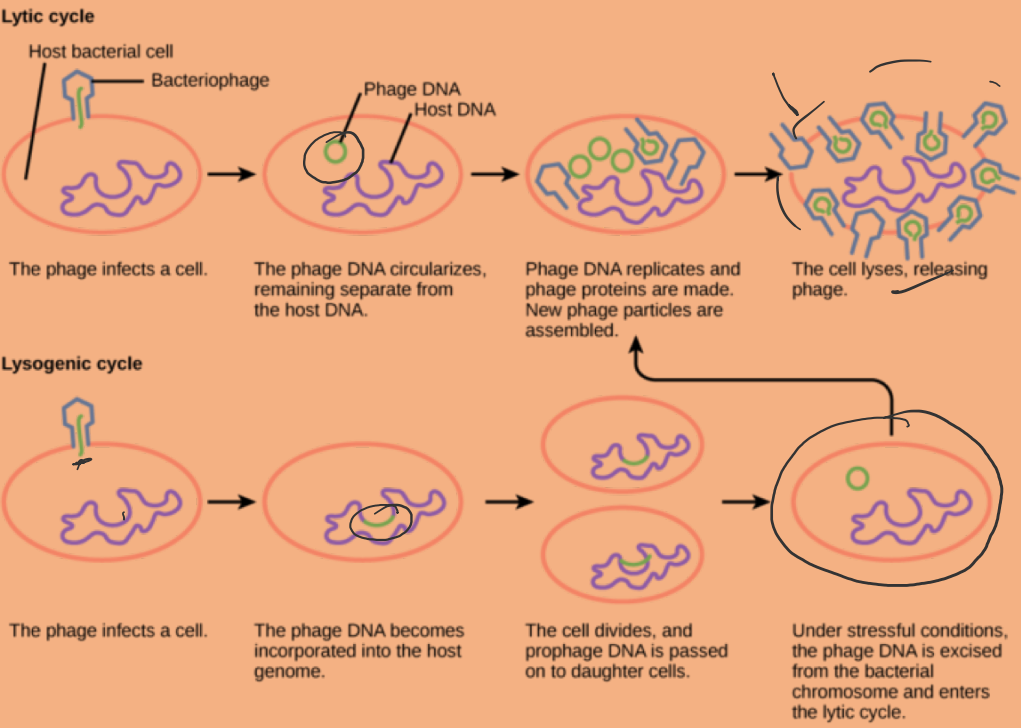
Fago ñ temperado

ciclo
- Lítico → o corre lise celula
- Lisogênico → ñ ocorre lise celula
  - ↳ estabilidade

Fago temperado

Bacteriophage

virus



virus

A bacteriophage with the ability to form a stable, nondisruptive relationship within a bacterium is called a:

- virulent phage
- plasmid
- temperate phage
- phage T4

lisogenico

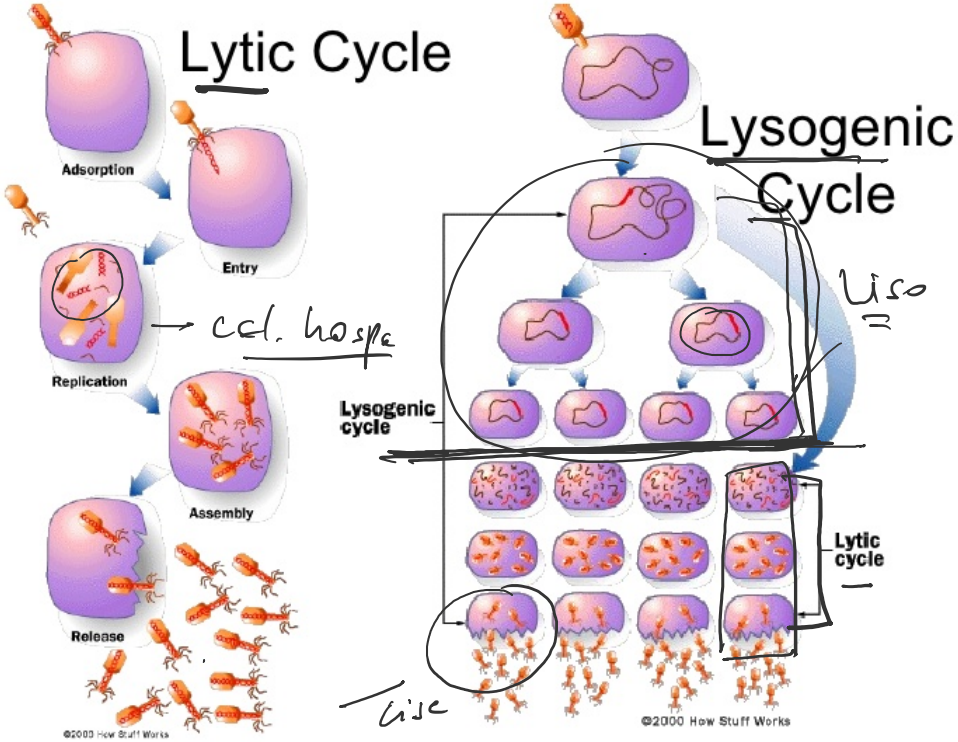
For each numbered definition below, select the most closely linked term the list provided.

1. A bacterial virus
2. A cell within a virus replicates
3. Integration into the host genome without killing the host
4. Viral multiplication within a host cell leading to destruction
5. Transfer os DNA from donor cell to a recipiente cell with the DNA packaged within a bacteriophage

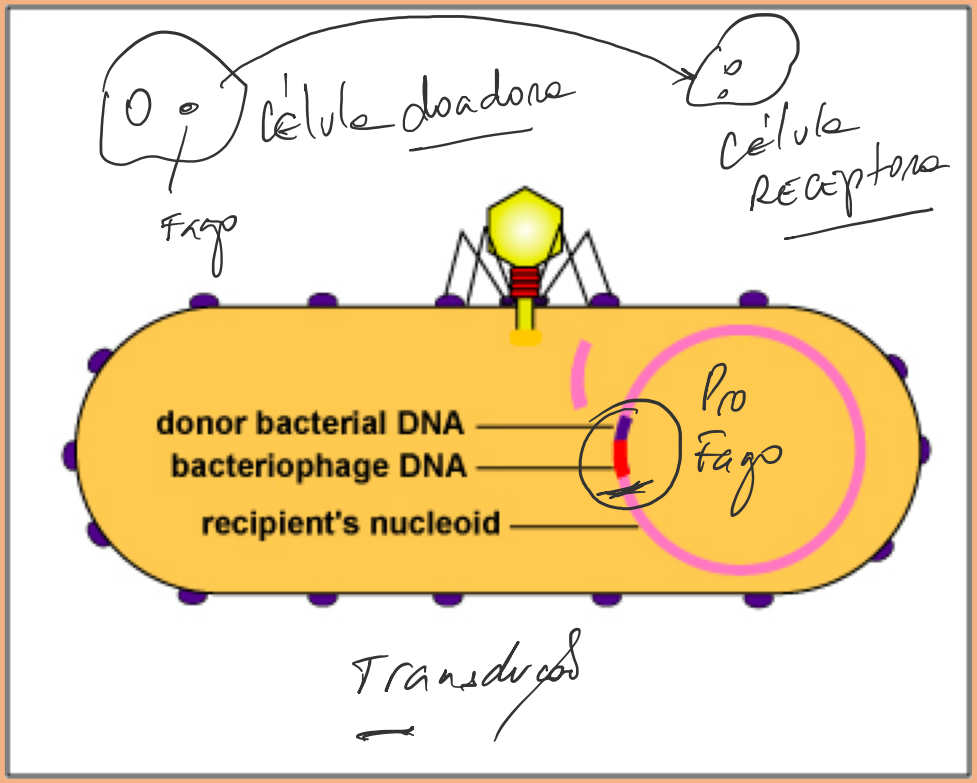
a. Lytic cycle → 4
b. Lysogenic cycle → 3
c. Transduction → 5
d. host cell → 2
e. Transformation
f. Conjugation
g. Bacteriophage → 1

Bacteriophage

virus

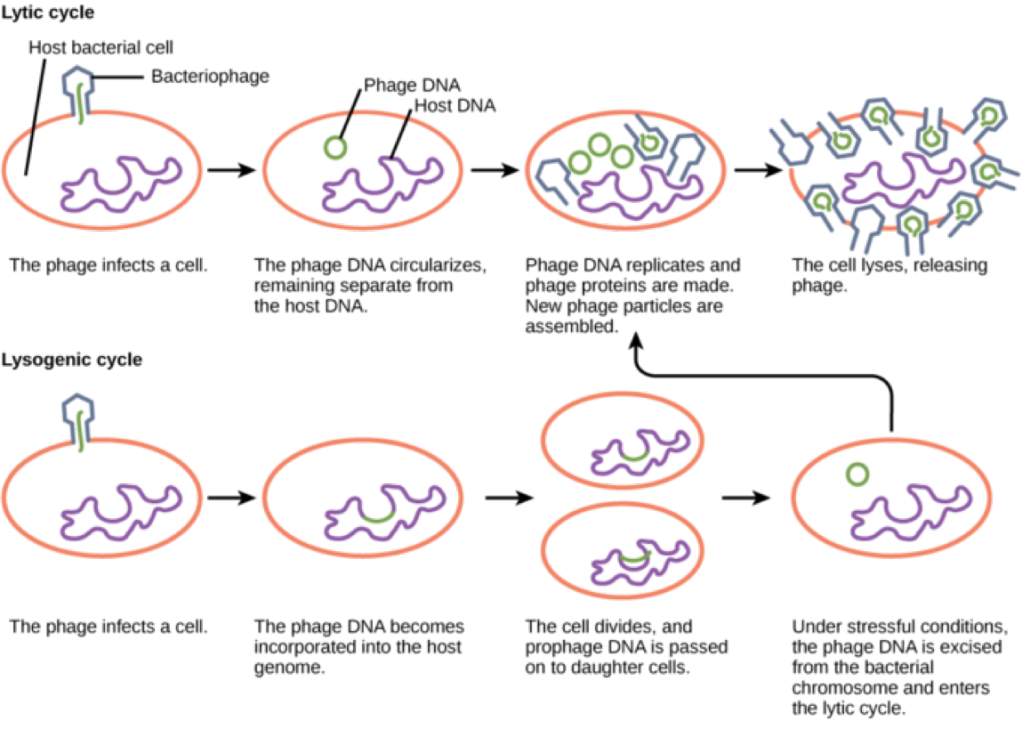


virus


Célula doadora
Célula RECEPTORA
Fago
donor bacterial DNA
bacteriophage DNA
recipient's nucleoid
Pro Fago
Transducção

Bacteriophage

virus



For each numbered definition below, select the most closely linked term the list provided.

1. A bacterial vírus
2. A cell within a vírus replicates
3. Integration into the host genome without killing the host
4. Viral multiplication within a host cell leading to destruction
5. Transfer os DNA from donor cell to a recipiente cell with the DNA packaged within a bacteriophage

a. Lytic cycle
b. Lysogenic cycle
c. Transduction
d. host cell
e. Transformation
f. Conjugation
g. Bacteriophage

virus

Retroviruses contain an RNA genome and reverse transcriptase

A provirus is formed as viral RNA is directly incorporated into the host DNA

- both state
- both state
- the first st cond is false
- the first sta cond is true

Retroviruses

virus

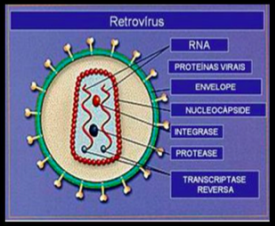
RNA viruses
Diploid single-straded RNA (ssRNA)
+ sense (RNA with the same base sequence as the mRNA)
RNA-dependente DNA polymerase – Reverse transcriptase

Once infected, this reverse transcriptase uses the viral RNA as a template to create viral DNA, which is then incorporated into the host DNA to form a provirus.

Are different to other RNA viruses by their ability to replicate through a DNA intermediate using an enzyme, *reverse transcriptase.*

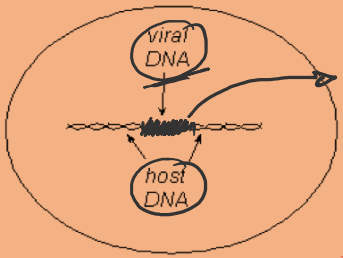
1. ONCOVIRUS
    - HTLV 1 (adult T-cell leukemia – ATL)
    - HTLV 2 (myelopathy)
2. LENTIVIRUS
    - HIV-1 – AIDS
    - HIV-2 – AIDS
3. SPUMAVIRUS
    - NON PATHOGENIC

São vírus de RNA que contêm a enzima **transcriptase reversa**, que produz uma cópia de DNA a partir do RNA viral.



O DNA viral, incorporado ao DNA celular, torna os retrovírus semelhantes aos vírus de DNA.

Ribovírus (RNA) ← Retrovírus → enz. transcriptase reversa



Provírus

RNA
↓ Retro transcrição
Provírus DNA

virus

Retroviruses contain an RNA genome and reverse transcriptase

A provirus is formed as viral RNA is directly incorporated into the host DNA.

- both statements are true
- both statements are false
- the first statement is true, the second is false
- the first statement is flse, the second is true

For each numbered site of latency below select the most closely linked virus the list provided.

1. sacral Ganglia → próximo a genitalia
2. Resting memory B Lymphocytes
3. Trigeminal ganglion → próximo a cavidade oral
4. T Lymphocytes
5. Dorsal root and cranial nerve ganglia

(CMV) — 4 ⇒ portadores de HIV

V) — 2

Virus Type2 (HSV-2) ← 1

er virus (VZV) — 5 — SNC

ex Virus Type 1 (HSV-1) ← 3

For each numbered site of latency below, select the most closely linked virus the list provided.

1. sacral Ganglia
2. Resting memory B Lymphocytes
3. Trigeminal ganglion
4. T Lymphocytes
5. Dorsal root and cranial nerve ganglia

a. Cytomegalovirus (CMV)
b. Epstein-Barr (EBV)
c. Herpes Simplex Virus Type2 (HSV-2)
d. Varicella – Zoster vírus (VZV)
e. Herpes Simplex Virus Type 1 (HSV-1)

virus

All of the following are DNA enveloped viruses EXCEPT one. Which one is the EXCEPTION?

nao apresenta envelope

allpox) vírus

5 vírus

irus

ein – barr virus

Herpex

Naked → Adenopapapo

Herpex Pox Hepatitis → no naked

DNA viruses

virus

HHAPPPy papapo !!

Herpes
HepaDNA
Adenovirus } NAKED
Papovavirus
Parvovirus } papapo
Poxvirus

} HHAPPPy

DNA naked

- Adenoviruses
- Papovavirus
  (Papilloma,Polyoma,vacuolating vírus)
- Parvovirus

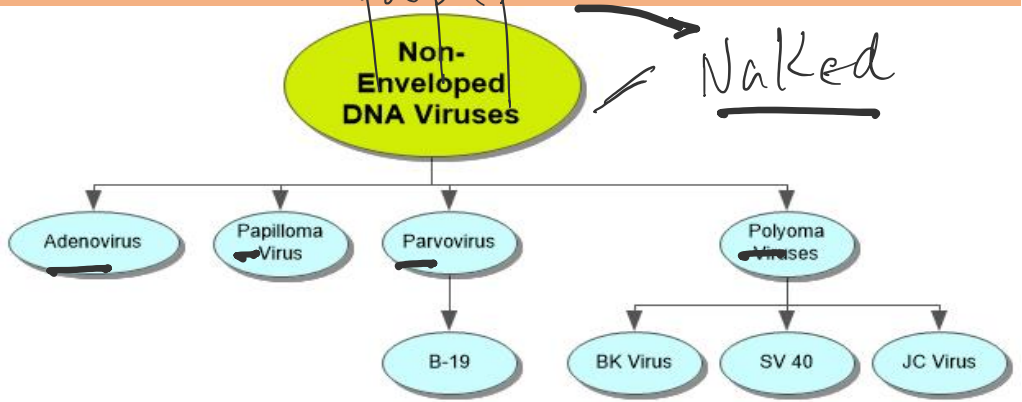
"Habemus papam"
Adeno papa naked

DNA enveloped

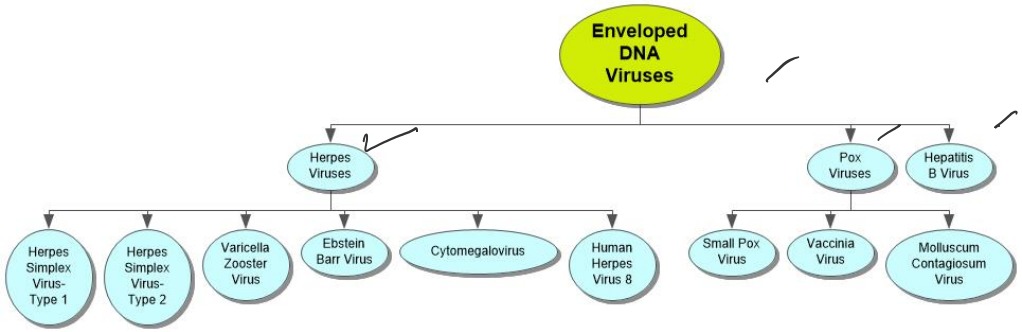
- Herpesviruses
  (HSV-1,HSV-2,VZV,EBV,CMV)
- Poxviruses
- Hepatitis B virus

DNA`S virus

Adeno papa po



Naked



Herpes Pox Hepatitis – no naked

virus

All of the following are DNA enveloped viruses EXCEPT one. Which one is the EXCEPTION?

- ~~Variola (smallpox) virus~~
- ~~Hepatitis B virus~~
- Adenovirus
- ~~Epstein – barr virus~~

virus

Human adenoviruses are unlikely to target the central nervous system BECAUSE adenoviruses prefer epithelial cells for replication

- both the statement and the reason are correct and related
- both the statement and the reason are correct but NOT related
- the statement is correct but the reason is NOT
- the statement is NOT correct but the reason is correct
- NEITHER the statement nor the reason is correct

Adenoviruses

virus

DNA Naked – icosahedral nucleocapsid
medium-sized
linear genome
dsDNA
glycoproteinaceous projections – spikes (formed by Hemagglutinin)

Spikes are involved in the adsorption or attachment of the vírus to EPITHELIAL derivatives of the host.

Subclinical infections transmitted in respiratory droplets and ocular secretions

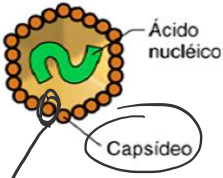
Diseases:

- accute respiratory disease – latente infection in tonsils, adenoids, lymphoid tissues
  Acute and self-limited - pharyngitis, fever, cough and malaise
- Acute febrile pharyngitis (infants and children)
- Conjunctivitis (pink eye)
- Diarrhea and gastrointeritis
- Urinary tract infections

Adenovírus papilo

Influenza gripe

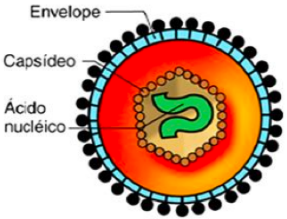
Vírus não envelopado



Ex: Rotavírus
Papilomavírus
Parvovírus
Adenovírus

H_1N_1

Vírus envelopado

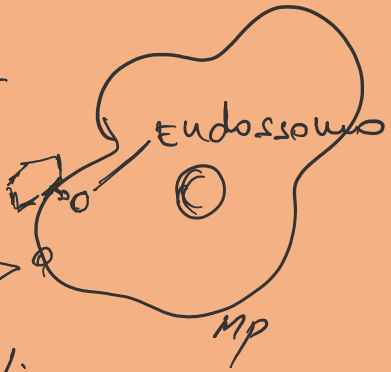


Ex: Herpesvírus
Ortomixovírus
Flavivírus

Fonte: www.nature.com

Hemaglutinina

monômero proteico



ácido siálico

Human adenoviruses are unlikely to target the central nervous system BECAUSE adenoviruses prefer epithelial cells for replication

- both the statement and the reason are correct and related
- both the statement and the reason are correct but NOT related
- the statement is correct but the reason is NOT
- the statement is N[illegible] on is correct
- NEITHER the state[illegible] correct

From the following list select THREE

- Reoviridae
- Salk vaccine
- Sabin vaccine
- transverse myelitis
- Picornaviridae
- MMR vaccine

causa doença

S Resp

S. gastro intes

Poliomielite

na porção da mielina branca

Família

sarampo, caxumba rubéola

Picornaviruses

virus

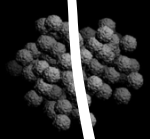
Pico = small
ssRNA
naked
+ sense
replication occurs in the cytoplasm of the host cell
Divided:

1. Enteroviruses (acid resistant)
    - Poliovirus
    - Coxsackie A and B
    - Echovirus
    - Enterovirus (Hepatitis A vírus)
2. Rhinoviruses (acid sensitive)

POLIOVIRUS
cause poliomyelitis
replicates in the motor neurons of the anterior horn of the spinal cord (the death of these cells leads to muscle paralysis.
Two vacines (both contain 3-types of poliovirus – trivalent):
Salk vaccine (inactivated viruses – intravenously)
Sabin vaccine)live and attenuated viroses – orally
SALK = Killed SabIn = LIve

POLIOMIELITE

Vírus: poliovírus (RNA não-envelopado)



Transmissão:

saliva

ingestão de água ou alimentos contaminados por excretas de pessoas contaminadas

Cinza

Medula

Jonas Salk

1º → vacina injetável

Sabin ⇒ gotinha

Via oral

A poliomielite pode ser evitada através da vacinação, da Sabin (oral, vírus enfraquecido), ou Salk (injetável, vírus inativo). Beber água apenas tratada. Lavar bem os alimentos antes da ingestão.

Campanha de vacinação (Sabin)

Vacinação Sabin

From the following list select THREE items associated with poliovirus

- Reoviridae
- Salk vaccine
- Sabin vaccine
- transverse myelitis
- Picornaviridae
- MMR vaccine

Which of the following is the largest and most complex DNA virus Family?

- Herpesvirus Family
- Adenovavirus Family
- Parvovirus Family
- Poxvirus Family

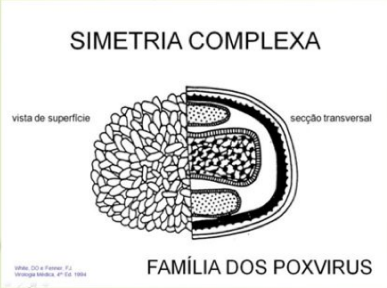
60 a 120 genes
fita dupla

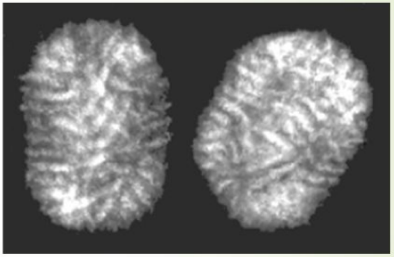
pg

pg → DNA pouco genes

DNA
- fita dupla
- fita simples

RNA





DNA grande 300 a 200 nm

Virus da Variola *mais comum*
Virus da Vaccinia
Virus do Molusco Contagioso

fita de dupla

Which of the following is the largest and most complex DNA vírus Family ?

- Herpesvirus Family
- Papovavirus Family
- Papovavirus Family
- Poxvirus Family

RNA

virus

All of the following are members of the

Polio

Unha, mexillones

pâncreas, bexiga urinaria..

Água

Sangue

Hepatite B (blood)

DNA

Resfriado comum

Picornaviruses

virus

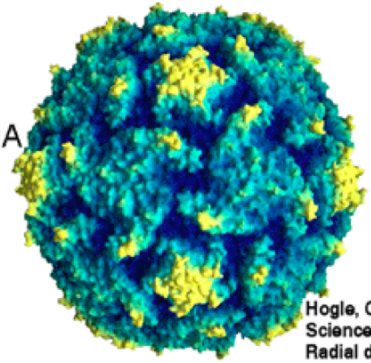
Pico = small
ssRNA
naked
+ sense
replication occurs in the cytoplasm of the host cell
Divided:

1. Enteroviruses (acid resistant)
    - Poliovirus
    - Coxsackie A and B
    - Echovirus
    - Enterovirus (Hepatitis A vírus)
2. Rhinoviruses (acid sensitive)

POLIOVIRUS
cause poliomyelitis
replicates in the motor neurons of the anterior horn of the spinal cord (the death of these cells leads to muscle paralysis.
Two vacines (both contain 3-types of poliovirus – trivalent):
Salk vaccine (inactivated viruses – intravenously)
Sabin vaccine)live and attenuated viroses – orally
SALK = Killed SabIn = LIve

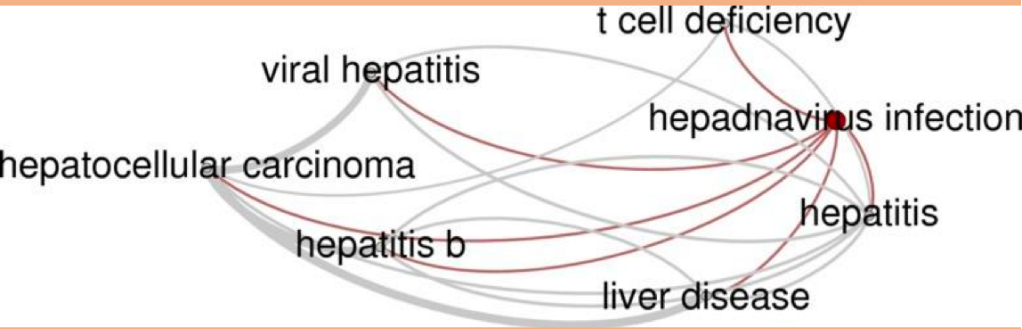
virus

- SMALL
- ICOSAHEDRAL
- POSITIVE SENSE RNA
- NON-ENVELOPED
- INCLUDE: poliovirus, hepatitis A virus, rhinoviruses, enteroviruses.



Poliovirus type 1

Hogle, Chow and Filman
Science 229:1358
Radial depth cue rendering
J.Y.Sgro



All of the following are members of the picornaviridae Family EXCEPT one. Which one is the EXCEPTION?

- Poliovirus
- Coxsackie virus
- Enterovirus
- Hepadnavirus
- Hepatitis A Virus
- Rhinovirus

Epstein-Barr vírus is the causative agente for

= Herpes =

câncer

monoclonse

linfócitos

Aids

Aios ← Hiv

Epstein-barr viruses

virus

Herpesviruses
dsDNA
enveloped icosahedral nucleocapid
replicates in ephitelial cells infecting B lymphocytes

Etiologic agent:

Primary –

- Infectious Mononucleosis (IM)

spread by saliva and respiratory secretions

Associated with:

Secondary –

- Burkitt Lymphoma
- Nasopharyngeal carcinoma
- Hairy local Leukoplakia (in particular population)

Kaposi sarcoma (KS) is a cancer that develops from the cells that line lymph or blood vessels.
It usually appears as tumors on the skin or on mucosal surfaces such as inside the mouth, but tumors can also develop in other parts of the body, such as in the lymph nodes (bean-sized collections of immune cells throughout the body), the lungs, or digestive tract. Note: The most common type of KS in the United States is epidemic or AIDS-related KS.

Epstein-Barr virus is the causative agente for the all of the following EXCEPT on. Which one is the EXCEPTION?

- Kaposi Sarcoma
- Infectious mononucleosis
- nasopharyngeal carcinoma
- Burkitt Lymphoma
- Oral Hairy Leukoplakia

Hiv

virus

Retroviruses are DNA viruses that have their genome surrounded by na inner protein envelope and na outer envelope that contains lipid and glycoprotein spikes, which serve to attach the vírus to host cells

The word "retro" refers to the possession of the enzyme reverse transcriptaase (and RNA-directed DNA polymerase), which transcribes RNA to DNA during the process of viral nucleic acid synthesis

Retro

- both state
- both state
- the first st cond is false
- the first sta econd is true

Retroviruses

virus

RNA viruses
Diploid single-straded RNA (ssRNA)
+ sense (RNA with the same base sequence as the mRNA)
RNA-dependant DNA polymerase – Reverse transcriptase

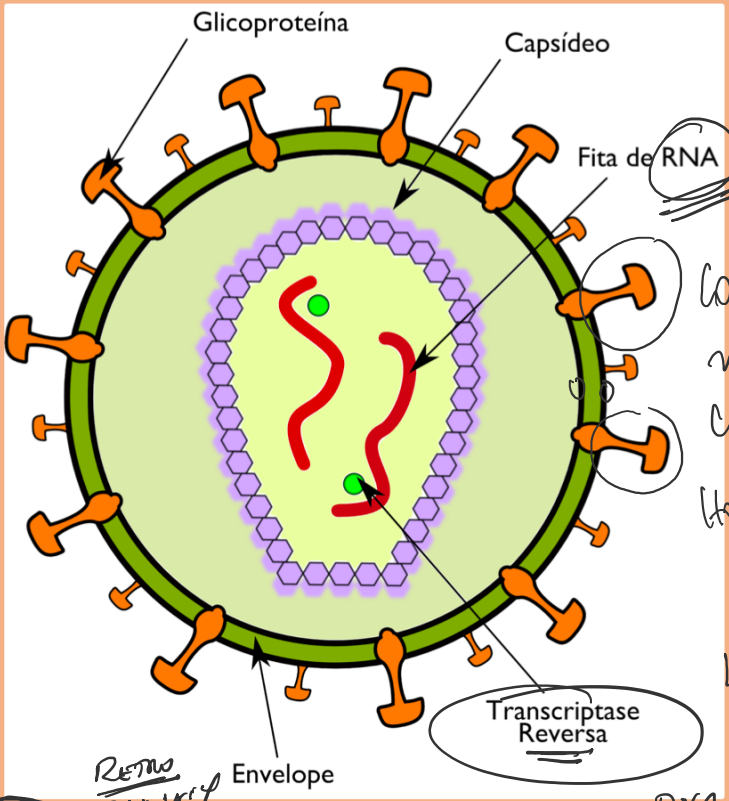
Once infected, this reverse transcriptase uses the viral RNA as a template to create viral DNA, which is then incorporated into the host DNA to form a provirus.

Are different to other RNA viruses by their ability to replicate through a DNA intermediate using an enzyme, *reverse transcriptase.*

1. ONCOVIRUS
    - HTLV 1 (adult T-cell leukemia – ATL)
    - HTLV 2 (myelopathy)
2. LENTIVIRUS
    - HIV-1 – AIDS
    - HIV-2 – AIDS
3. SPUMAVIRUS
    - NON PATHOGENIC

Ríbovirus

virus



Contato na célula hospedeira ! Linfócito

Retro transcrição

RNA → DNA → Próvirus → DNAc + DNAv

Retroviruses are DNA viruses that have their genome surrounded by na inner protein envelope and na outer envelope that contains lipid and glycoprotein spikes, which serve to attach the virus to host cells

The word "retro" refers to the possession of the enzyme reverse transcriptase (and RNA-directed DNA polymerase), which transcribes RNA to DNA during the process of viral nucleic acid synthesis

- ~~both statem~~
- ~~both stateme~~
- ~~the first statemen~~ ~~, the second is false~~
- the first statement is false, the second is true

virus

All of the following viroses have negative polarity

RNA e DNA

RNA (−)

RNA (+)

RNA Ac. nucléico

Pentose

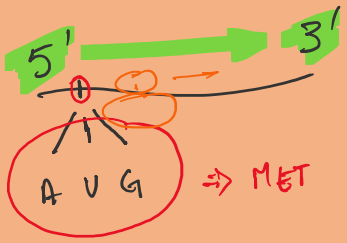
5C

sentido da vida

5' ⟶ 3'

(montagem de moléculas)

RNA (+)

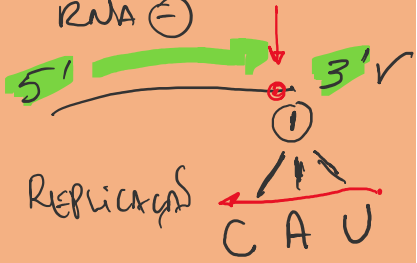


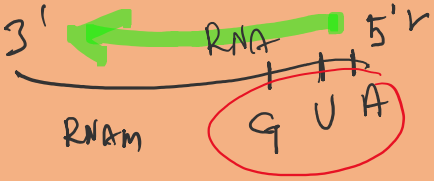
TRADUÇÃO

Proteína

RNA (+) → Material Genômico = RNAm

RNA (−)





Prot.

RNA (−) → Mat. geno ≠ RNAm

Retroviruses

virus

RNA viruses
Diploid single-straded RNA (ssRNA)
+ sense (RNA with the same base sequence as the mRNA)
RNA-dependant DNA polymerase – Reverse transcriptase

to REMEMBER:
The first step in viral gene expression. is mRNA synthesis
+ sense RNA can use their RNA genome directly as mRNA

+ SENSE
Togaviruses
Flavoviruses
Coronaviruses
Retroviruses
Picornaviruses

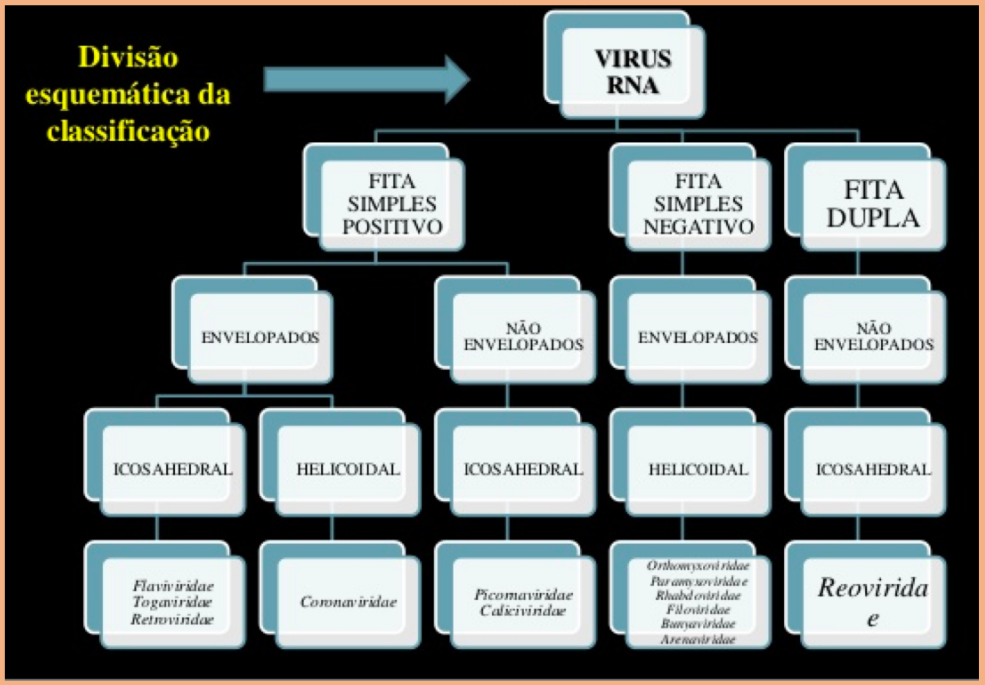
- SENSE
Orthomyxoviruses
Paramyxoviruses
Rhabdoviruses

Example

mRNA = G-U-C-A

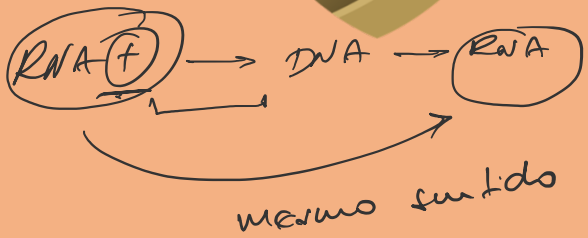
RNA = G-U-C-A
same sequence

RNA = C-A-G-U
complementary

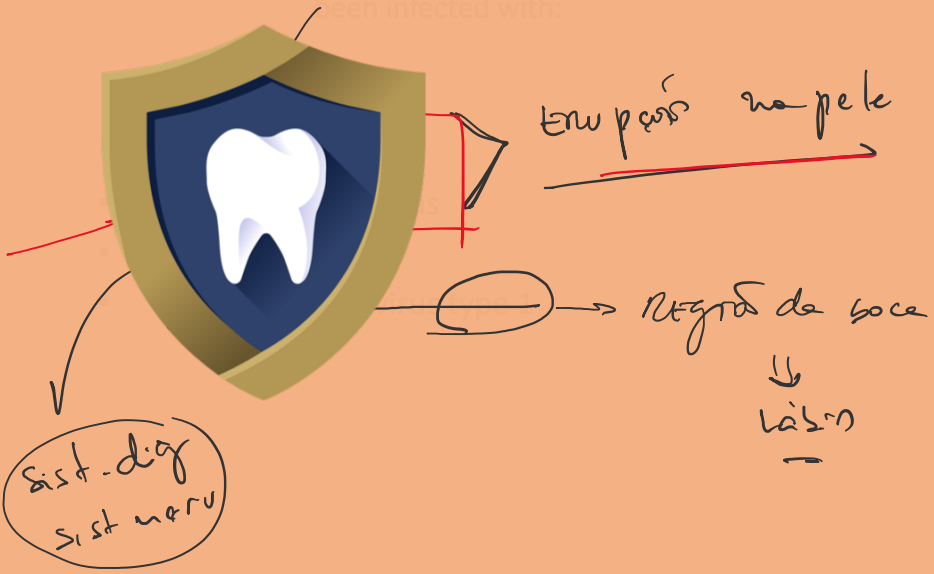

Divisão esquemática da classificação
VIRUS RNA
FITA SIMPLES POSITIVO
FITA SIMPLES NEGATIVO
FITA DUPLA
ENVELOPADOS
NÃO ENVELOPADOS
ENVELOPADOS
NÃO ENVELOPADOS
ICOSAHEDRAL
HELICOIDAL
ICOSAHEDRAL
HELICOIDAL
ICOSAHEDRAL
Flaviviridae
Togaviridae
Retroviridae
Coronaviridae
Picornaviridae
Caliciviridae
Orthomyxoviridae
Paramyxoviridae
Rhabdoviridae
Filoviridae
Bunyaviridae
Arenaviridae
Reoviridae

All of the following viroses have negative polarity or contain negative sense RNA EXCEPT one. Which one is the EXCEPTION?

- Orthomyxovirus
- Paramyxoviruses
- Rhabdoviruses
- retroviruses



A mother takes her child to their primary care physician. The child has a recent history of malaise and fever, and now presents with a widespread rash on his trunk and face. The mother states that the child has received the vaccinia vaccine. This child has most likely been infected with:



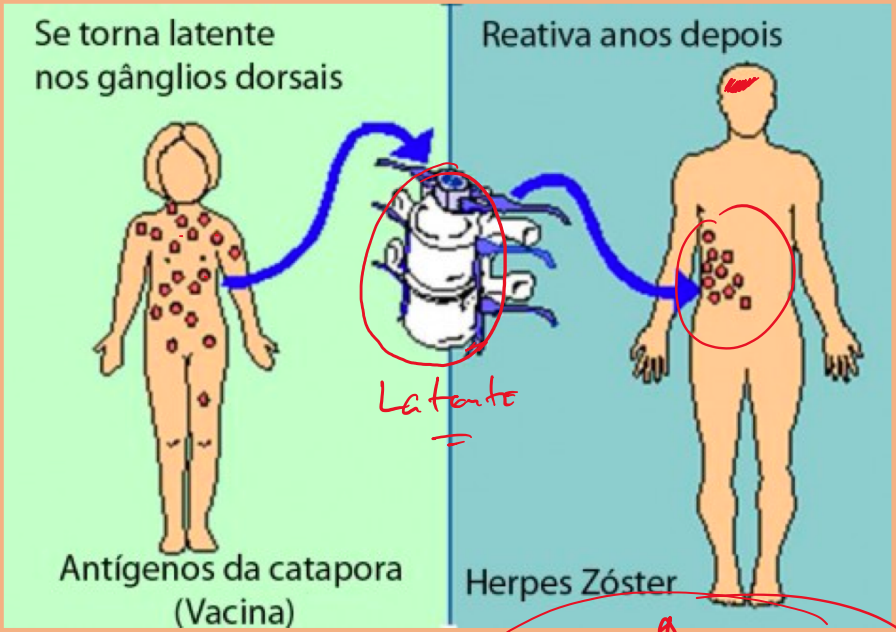
Varicella-Zoster virus

Herpesviruses
dsDNA
enveloped icosahedral nucleocapsid.
latent infections

two distincs diseases:
Primary - **Varicella (chickenpox)** – 90% occur in children under 9 years
vírus latent in dorsal root and cranial nerve ganglia
caused by herpes zoster vírus
fewer followed by a macular, them papular, eruption on skin and mucous membranes
spread by respiratory secretions
Chickenpox + aspirin = REYE SYNDROME *(encephalitis and liver impairment)*

Secundary – **Shingles** – reactivation of a latent varicela-zoster vírus that remained within the body (chickenpox)
paintful vesicules on the skin or mucsal surfaces along the distribution of a senory nerve.

The vaccinia vaccine is a highly effective immunizing agent that enabled the global eradication of smallpox.



Varicela

stress
imuno comprometido
linfoma

A mother takes her child to their primary care physician. The child has a recent history of malaise and fever, and now presents with a widespread [illegible] on his trunk and [illegible]. The mother states that the child has received the vaccinia vaccine. This child has most likely been infected with:

- [illegible] virus
- varicella-zoster virus
- cytomegalovirus
- herpes simplex virus [illegible]

Influenza viruses have all of the following features EXCEPT one. Which one is the EXCEPTION?

Grippe ⇒ RNA

- single-stranded DNA
- hemagglutinin
- neuraminidase
- negative-sense
- lipoprotein coat
- segmented genome

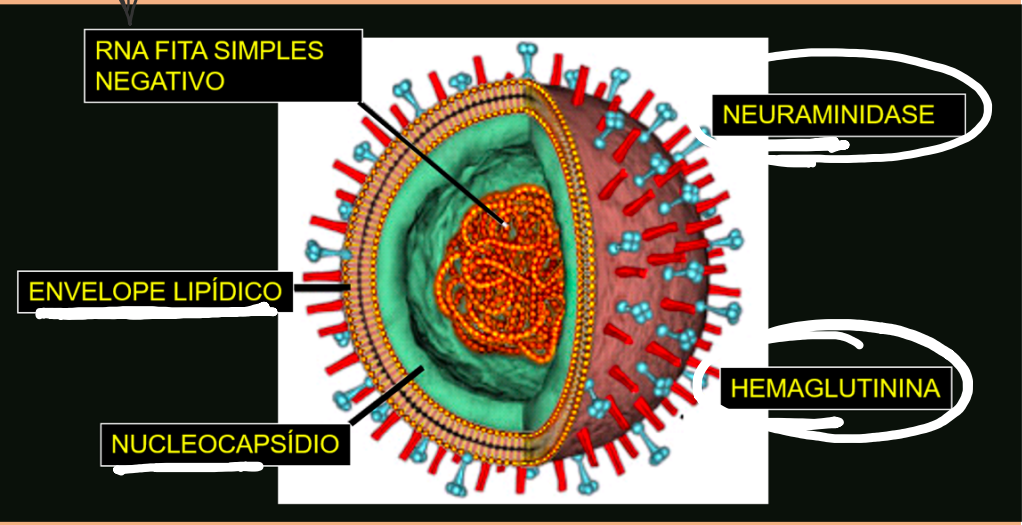
Orthomyxovirus

virus

RNA viruses
single-stranded RNA (ssRNA)
segmented RNA
(-)sense
enveloped
Only representative – **INFLUENZA A,B and C**
Influenza A – most intensively studied – There are 8 RNA segments !
Influenza A and B – most importante in human disease
Nucleocapsid is hellical
Virions contain RNA polymerase packaged within the vírus particle.
Envolved by <u>two</u> membrane glycoproteins :
Hemagglutinin & neuraminidase

Pleomorphic virions (vary in shape)

Passed by respiratory droplets
The ability of the **influenza virus** to cause epidemics is dependent on **antigenic changes** in the hemagglutinin and neuraminidase. There are two types of changes:
antigenic shifts - MAJOR – PANDEMIC – reassortment of genome pieces
antigenic drifts – MINOR – ENDEMIC – point mutations


RNA FITA SIMPLES NEGATIVO
NEURAMINIDASE
ENVELOPE LIPÍDICO
HEMAGLUTININA
NUCLEOCAPSÍDIO

$H_1 N_1$

Influenza viruses have all of the following features EXCEPT one.

Which one is the EXCEPTION?

- single-stranded DNA
- hemagglutinin
- neuraminidase
- negative-sense
- lipoprotein envelope
- segmented genome

For each numbered characteristic below, select the most closely linked from the list provided.

1. [illegible] of the parotid glands
2. [illegible] spots
3. [illegible] and lymphadenopathy followed by a [illegible] body
4. [illegible] the pharynx
5. [illegible] 102°F that begins suddenly,muslce/body [illegible] redness and sudden onset

a. Measles – sarampo → 2
b. Mumps – caxumba → 1
c. Influenza – gripe → 5
d. Rubella – 3
e. Pharyngitis – Faringite → 4

Diseases

virus

MEASLES
Rubeola (paramyxovirus)
Koplik spots
3C – Cough, Coryzia, Conjunctivitis
MMR Vacine

RUBELLA (German Measles)
Arbovirus - Togaviruses
ONLY NON TRANSMITTED BY ARTHROPOD
Erithematous rash, lymphadenopathy
Congenital Rubella – pregnancy !!
MMR Vaccine

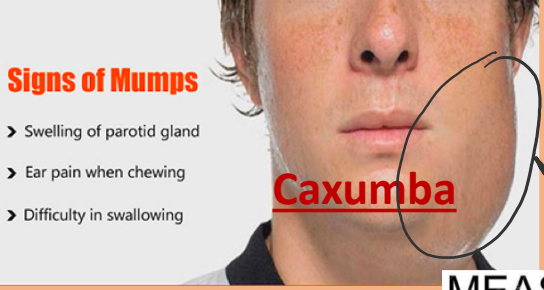
MUMPS
paintfull swelling **parotid** glands
Accute contagious
complication – orchitis
MMR Vaccine

PHARYNGITIS
Inflammation of pharynx
sore throat and cough

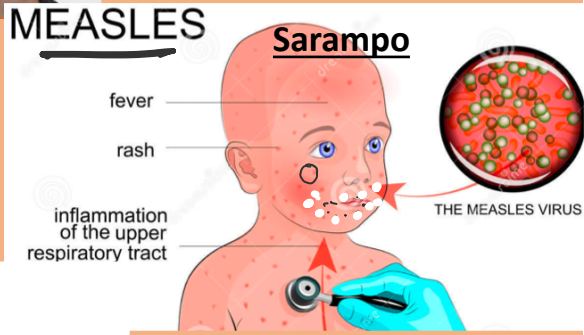
INFLUENZA
Orthomyxovirus
High fever (101-102ºF that begins suddently,muslce/body aches,chills,tiredness and sudden onset

COMMON COLD
Runny nose, sore throat, cough
most common - rhinovirus

PARAINFLUENZA
Paramyxovirus
Runny nose, fewer, cough



Parótida

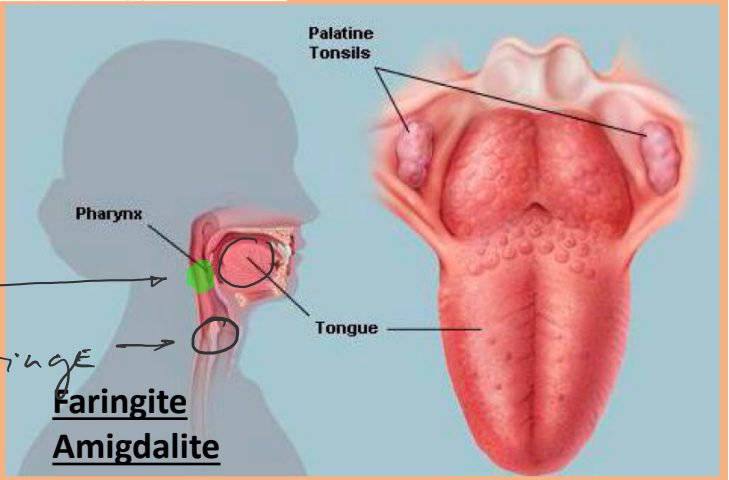


Rubéola

- Sintomas:
- Dores na cabeça, ao engolir, articulação e músculos;
- Coriza;
- Linfonodomegalias;
- Febre;
- Exantemas (inicialmente no rosto)

Influenza

gripe



Faringe

laringe

Faringite

Amigdalite

For each numbered characteristic below, select the most closely linked from the list provided.

1. paintful swelling of the parotid glands
2. Skin hash with Koplik spots
3. Flu-like symptoms and lymphadenopathy followed by a rash on the entire body
4. Inflammation of the pharynx
5. High fever (101-102°F that begins suddently, muscle/ body aches,chills,tiredness and sudden onset

a. Measles
b. Mumps
c. Influenza
d. Rubella
e. Pharyngitis

Order the steps in the replicative cycle of viruses. Match each letter with its proper sequence number.

A. Release by [illegible] plasma membrane or plasma membrane

B. Replicatio[illegible] uction

C. Attachme[illegible]

D. Assembly o[illegible]

E. Entry via rec[illegible] endocytosis or membrane fusion

F. Uncoating trigge[illegible] changes in endosomes

1 C 2 E 3 F 4 B 5 D 6 A

STEPS IN THE REPLICATIVE CYCLE OF VIRUSES

1. ATTACHMENT – Through a receptor

2. ENTRY – receptor-mediated endocytosis or membr. fusion

3. UNCOATING – triggered by pH changes in endosomes

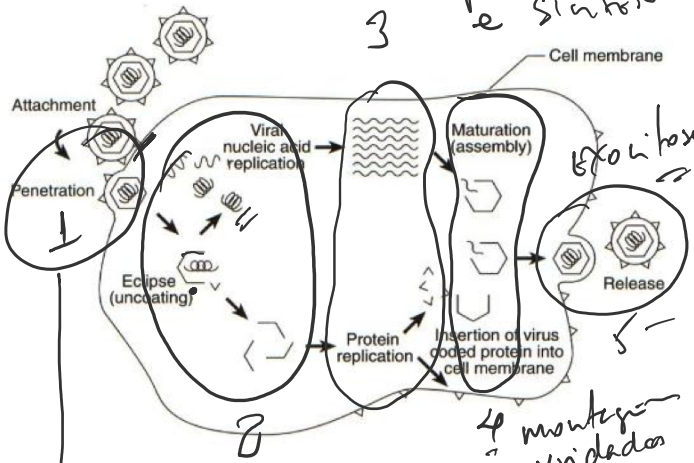
4. REPLICATION AND VIRAL PROTEIN PRODUCTION – transcription and translation

5. ASSEMBLY – The new viral nucleic acid and capsid protein are packaged

6. RELEASE – Either by budding through the host plasma membrane or by host plasma membrane rupture

virus

Replicação e síntese Proteica

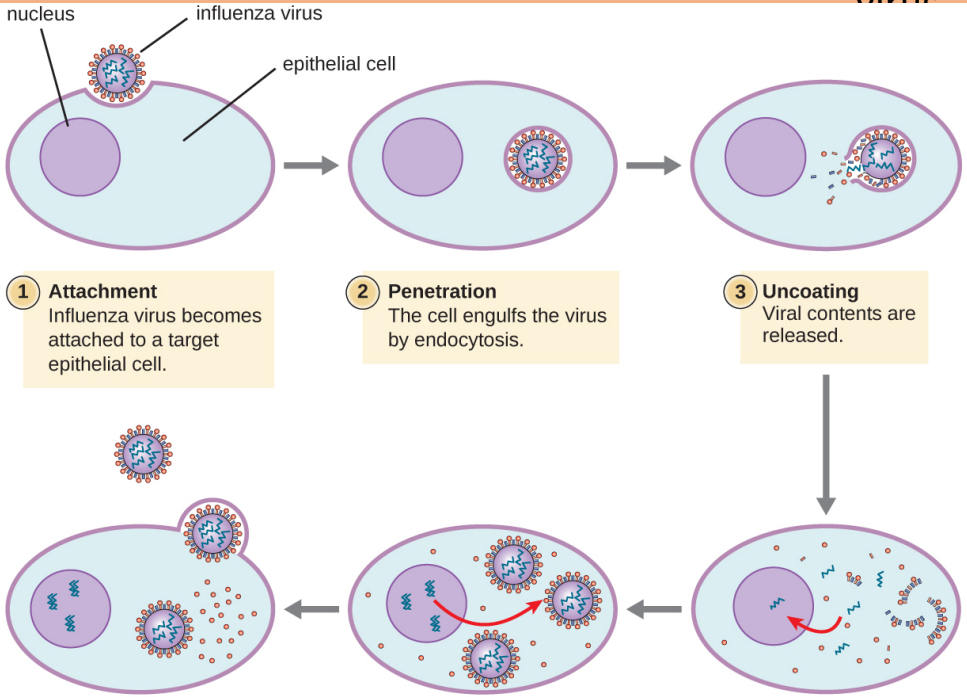


Etapas:

- Adsorção
- Penetração
- Desnudamento
- Síntese de proteínas e de ácido nucléico
- Montagem
- Liberação

Contato e reconhecimento

Liberação do mat. genômico



1 **Attachment**
Influenza virus becomes attached to a target epithelial cell.

2 **Penetration**
The cell engulfs the virus by endocytosis.

3 **Uncoating**
Viral contents are released.

4 **Biosynthesis**
Viral RNA enters the nucleus, where it is replicated by the viral RNA polymerase.

5 **Assembly**
New phage particles are assembled.

6 **Release**
New viral particles are made and released into the extracellular fluid. The cell, which is not killed in the process, continues to make new virus.

Order the steps in the replicative cycle of viruses. Match each letter with its proper sequence number.

A. Release budding through h[illegible]lasma membrane or plasma membrane ruptu[illegible]

B. Replication and v[illegible]

C. Atttachment thro[illegible]

D. Assembly of new v[illegible]

E. Entry via receptor-r[illegible]s or membrane fusion

F. Uncoating triggered b[illegible] endosomes

1 C 2 E 3 F 4 B 5 D 6 A

virus

Orthomyxoviruses and Paramyxoviruses

Ortho

RNA segmentado

Para

Ortho

- fita simples
- envelopado
- RNA ⊖

Para

RNA

- segmentado

Orthomyxovirus

RNA viroses √
single-stranded RNA (ssRNA) √
segmented RNA
(-)sense √
enveloped √

Paramyxovirus

RNA viroses √
single-stranded RNA (ssRNA) √
NON segmented RNA
(-)sense √
enveloped √

Remember:

l.Influenza viruses (A,B and C) are the only members of the **orthomyxovirus** family. It is the uniquely segmented genome that contributes to antigenicity of their two membrane glycoproteins, hemagglutinin (HA) and neuraminidase (NA).

2. **Paramyxoviruses** include measles, mumps, respiratory syncytial, and parainfluenza viruses 1-4. Note: The cytopathic effect for paramyxoviruses is syncytia formation (they induce cells to form multinucleated giant cells).

Property	orthomyxovirus	paramyxovirus
viruses	Influenza A,B,C	Measles,mumps, RSV,& parainfluenza
genome	Segmented	Non segmented
Virion RNA polymerase	yes	yes
Capsid	helical	helical
Envelope	yes	yes
size	Smaller(110 nm)	Larger(150 nm)
Surface spikes	H&N diff. spikes	H&N same spikes
Giant cell formation	no	yes

Orthomyxoviruses and Paramyxoviruses share all the following characteristics EXCEPT one. Which one is the EXCEPTION?

- ~~single-stranded RNA~~
- segmented RNA
- ~~enveloped~~
- ~~negative-sen~~

Each of the following viruses cross the placenta EXCEPT one. Which one is the EXCEPTION?

- rubella
- herpes
- HIV
- sarampo

rubéola

Mãe vacinada

tem anticorpo

Placenta

criança

virus

Placenta Crossing Organisms

Congenital Diseases

TORCHeS

- S → SYPHILIS
- e → Herpes Zoster / Hepatitis BCE / HIV
- H → CYTOMEGALOVIRUS - CMV
- C → RUBELLA (GERMAN MEASLES)
- R → OTHERS (varicela, mumps, parvovirus)
- O → TOXOPLASMA GONDI Protozoário
- T

Each of the following viruses cross the placenta EXCEPT one. Which one is the EXCEPTION?

- rubella
- herpes
- HIV
- measles
- cytomegalovi

virus

Which family comprises two genera: the rubiviruses (which include rubella virus) and the alphaviruses (which include some of the arthropod-borne viruses)?

virus

RNA viruses

Picornaviruses
- **Polioviruses**
- **Echoviruses**
- **Coxsackieviruses**
- **Enterovirus 72**
- **Rhinoviruses**

Orthomyxoviruses → **Influenza A,B and C**

Paramyxoviruses
- **Parainfluenza**
- **Measles**
- **Mumps**
- **Rsv (respiratory syncytial Virus)**

Togaviruses
- **Alphaviruses**
- **Rubivirus (Rubella)**

Flaviviruses - Virus da dengue

Calicivirus- doenca dos felinos

Rabdoviruses - Virus da raiva

Retroviruses -HIV

Reovirus-rotavirus

virus

Which family comprises two genera: the rubiviruses (which include rubella virus) and the alphaviruses (which include some of the arthropod-borne viruses)?

- ~~picornavirus family~~
- ~~reovirus family~~
- ~~flavivirus fam~~
- ~~calicivirus fa~~
- togavirus fam