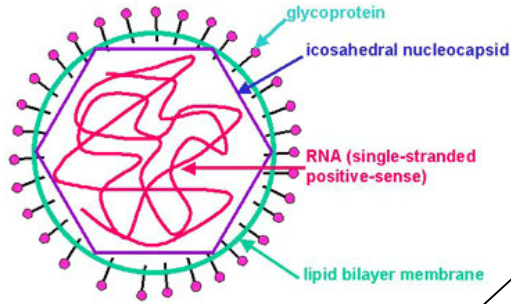


Mechanism of RNA Virus infection using Rubella as a model

RUBELLA VIRUS

Rubella virus is the sole member of the genus *Rubivirus* in the family *Togaviridae*



An **RNA virus** is a virus that either uses RNA as its genetic material, or whose genetic material passes through an RNA intermediate during replication. For example, Hepatitis B virus is classified as an RNA virus, even though its genome is double-stranded DNA, because the genome is transcribed into RNA during replication. **The basis for this classification is error-prone RNA replication:** All RNA viruses have very high mutation rates because they lack DNA polymerases which can find and edit out mistakes. DNA viruses have considerably lower mutation rates.

INHALATION is the mode of entry into the hosts' body: Rubella virus flies along on airborne snot droplets

Penetration into the Respiratory Epithelial Cell

Cells already have mechanisms designed to endocytose things, and viruses take advantage of this, fooling it to gain entry by pretending to be something else.

Clathrin-mediated endocytosis: a normal mechanism of endocytosis
Clathrin is common as mud; nerves use it to endocytose synaptic vesicle components, it's the usual way of getting stuff into the cell. The Clathrin protein assembles a basket-like protein complex which is a complicated machine for forming a "coated pit", manipulating the cytoskeleton to involute the lipid bilayer membrane, and close it again **forming a vesicle**.

The virus gains entry by getting bound to clathrin.. exactly what apt of the virus does the binding, nobody knows. All that is known is that clathrin-dependant endocytosis is responsible for its entry.

The endosomes travel to the lysosome where the low pH causes the endosome to break down, releasing the viral particle.

The free viral particle uses its glycoproteins to bind to the ribosomes in the rough endoplasmic reticulum

Binding to ribosomes causes discapsulation and the release of viral RNA into the ribosome

The parental genome acts as mRNA; this is great because the normal ribosomal reaction to mRNA is to translate it into proteins.

The first proteins that are made are non-structural proteins; these are vital for the production of viral RNA. They also cleave and shape the structural proteins.

Structural proteins are produced from a separate strand of +ve sense mRNA, from the last third of the viral genome. This strand is replicated separately by the non-structural protein enzymes. The same enzymes complete the structural protein formation by cleaving and folding them. (in rubella, a host enzyme (signalase) is also responsible for cleaving the capsule proteins. The complete progeny RNA triggers capsid proteins to fold around it, forming the nucleocapsid. Ultimately, the completed viral capsule is assembled and extruded from the surface of the rough endoplasmic reticulum.

The virus is exocytosed in the same way as normal cellular wastes, via a vesicle. The viraemia which results from this rapidly induces a lymphocytic and humoural antibody response, with the rash being a subcutaneous immune complex deposition reaction.

Replication

Cells already have mechanisms designed to produce proteins, and viruses can insert themselves into this process thus using the cell's own protein assembly lines to replicate.

POSITIVE SENSE means the RNA is in the same nucleotide sequence as mRNA. **NEGATIVE SENSE** RNA is the mirror image of that nucleotide sequence.

INCUBATION PERIOD of about 14 to 19days; Viremic by 7th; Infectious by 10th; Rash on the 15th infectious until 20th

Signs and symptoms of "GERMAN MEASLES"

