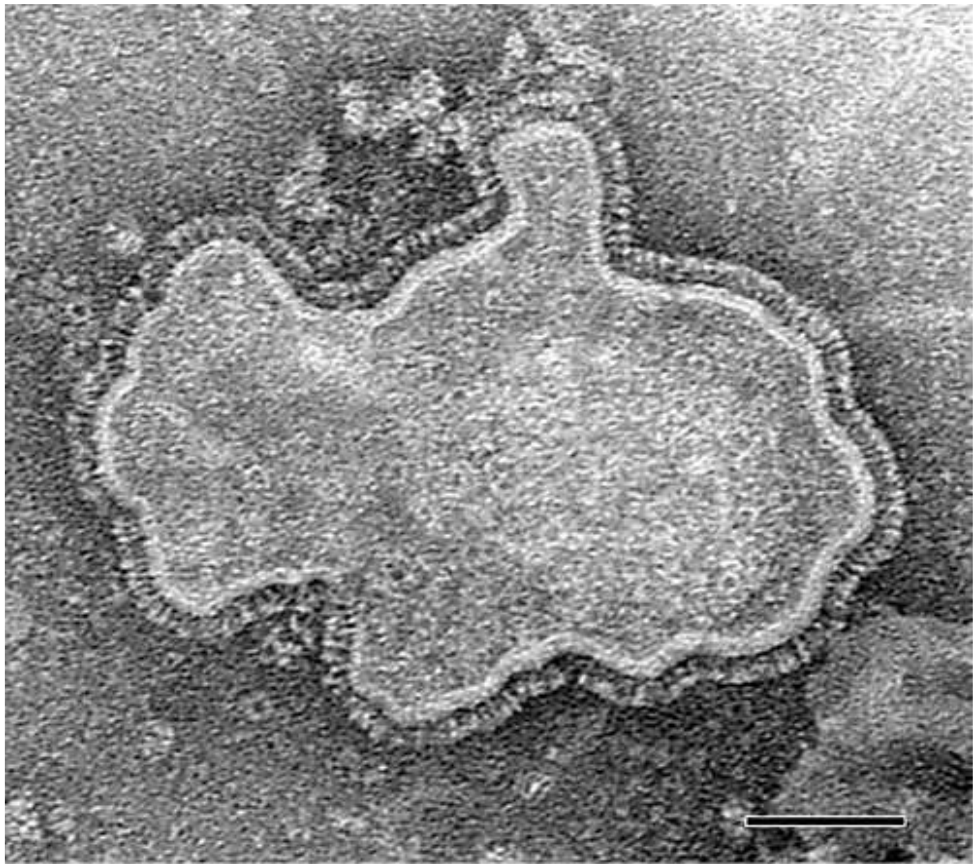
Human Metapneumovirus & its prevention

- HMPV was first described in 2001 following its isolation from infants and children experiencing HRSV-like disease of unknown aetiology.
- There is serologic evidence of extensive paediatric infection dating back more than 50 years, and thus HMPV is newly discovered rather than newly emerged.
- The virus had been overlooked because it grows slowly *in vitro,* has a delayed cytopathic effect, and usually requires added trypsin for activation of the fusion F protein.
- HMPV is recognized as an important agent of respiratory tract disease worldwide, especially in the pediatric and elderly populations, although its impact is less than that of HRSV.

Classification

- HMPV – Order – Mononegavirales,
- Family Pneumoviridae
- 2 genera- Orthopneumovirus & Metapneumovirus
- Orthopneumoovirus – RSV & a no of animal pathogens
- Metapneumovirus- HMPV & Avian pneumovirus (APV)

Negative -stain electron micrograph of hMPV

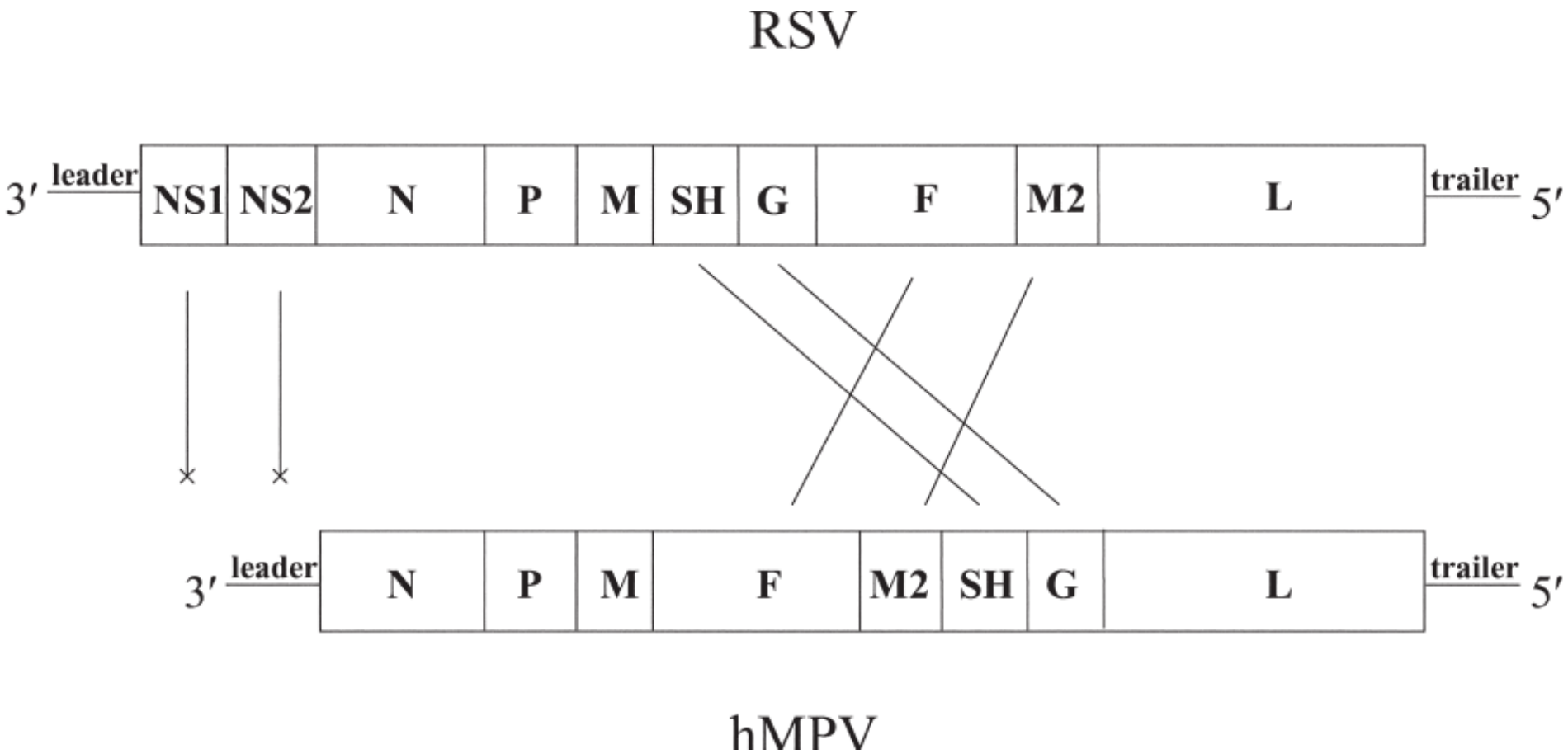


HMPV virions were visualized by electron microscopy as pleomorphic spheres and filaments

Schematic representation of the gene order & sequence of hMPV genomic RNA.

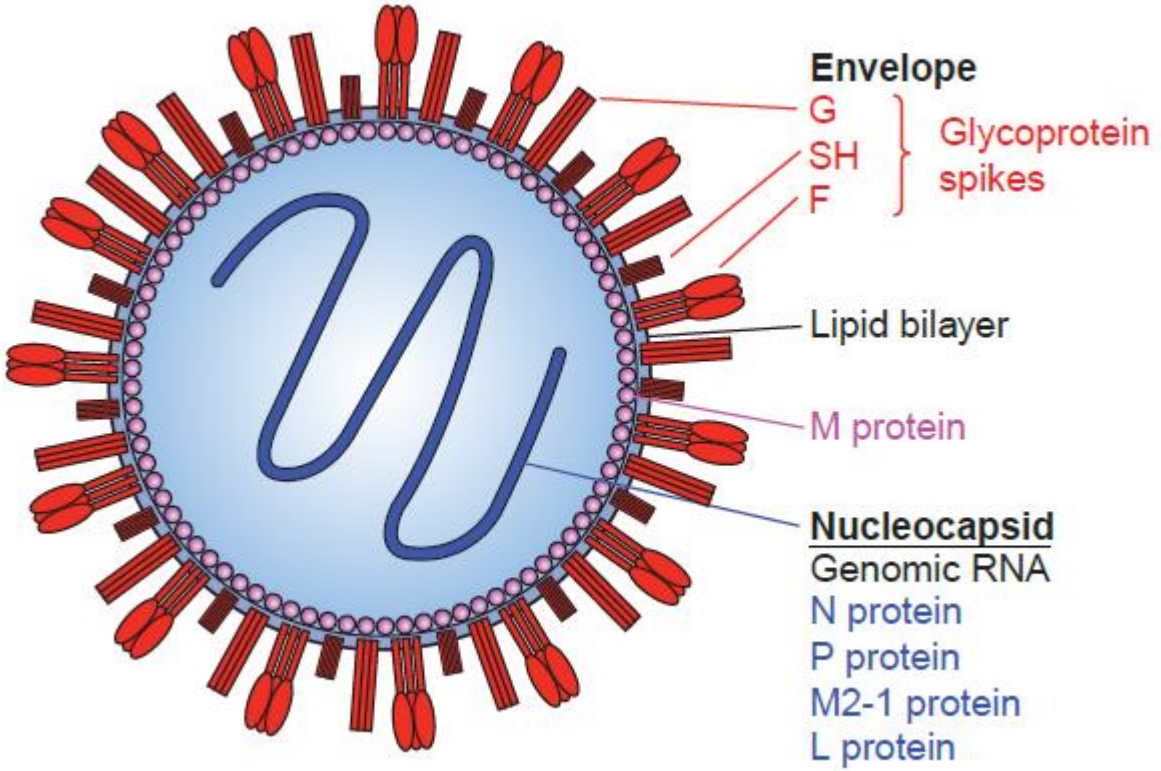
hMPV

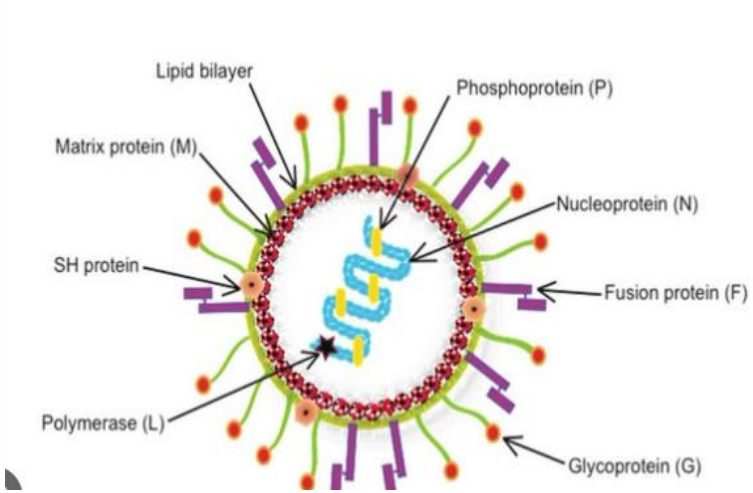
Schematic representation of RSV & HMPV genome



- HMPV- two major Genotypes –A & B
- Four subgroups with sublineages (A1, A2a, A2b,A2c, B1 & B2)
- Isolates representing the two major genotypes- sequenced & amino acid identities between genotypes were 80 & 90% respectively

HMPV


Envelope
G
SH
F
Glycoprotein spikes
Lipid bilayer
M protein
Nucleocapsid
Genomic RNA
N protein
P protein
M2-1 protein
L protein


Lipid bilayer
Phosphoprotein (P)
Matrix protein (M)
Nucleoprotein (N)
SH protein
Fusion protein (F)
Polymerase (L)
Glycoprotein (G)

HMPV proteins

Envelope spikes

- **G** — *Attachment, inhibits IFN induction*
- **F** — *Attachment, fusion*
- **SH**

Neutralization and protective antigens

Inner envelope face

- **M**

Ribonucleocapsid

- **N** — *Nucleoprotein*
- **P** — *Phosphoprotein*
- **L** — *Polymerase*

Encapsidation, RNA replication, transcription

- **M2-1**

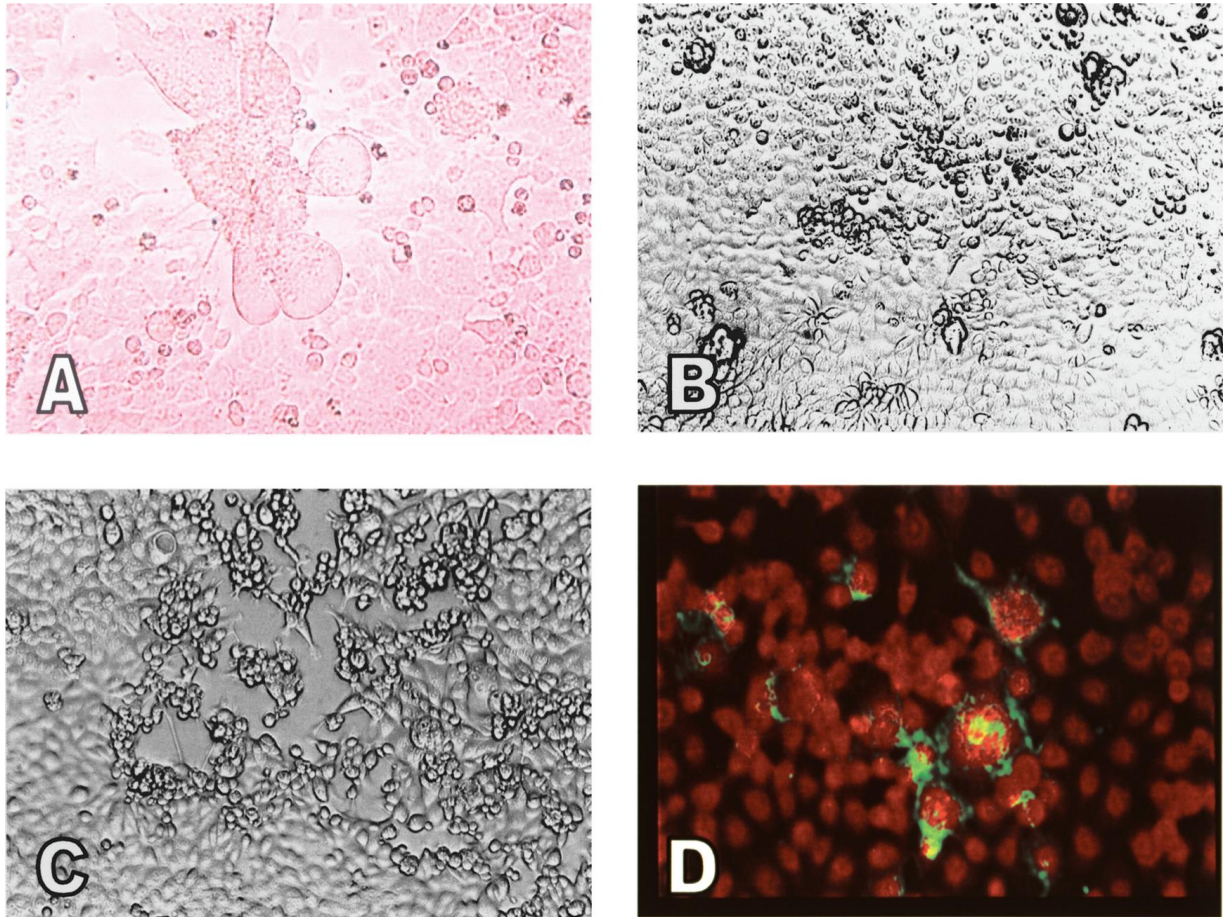
Regulatory

- **M2-2**

Transcription ↓
RNA replication ↑

B

Microscopic detection of RSV and hMPV in cell cultures. (A) RSV-infected HEp-2 cells showing cells that have fused, forming large syncytia. (B and C) hMPV infection causes a focus of infection with rounding of LLC-MK2 cells and loss of monolayer integrity. (D) Indirect immunofluorescence of an hMPV-infected LLC-MK2 centrifugation culture stained with monoclonal antibody MAb-8



Transmission

HMPV is primarily spread through contact with contaminated respiratory secretions, such as droplets from coughing or sneezing.-

The virus can also survive on surfaces for six hours, allowing for indirect transmission.

Prevention

- Vaccine is not available at the moment. Members of the public are advised to maintain good personal and environmental hygiene to reduce their chance of getting infection:
- Maintain good personal hygiene
  It is important to wear a mask properly, including hand hygiene before wearing and after removing a mask.
- Perform hand hygiene frequently, especially before touching one's mouth, nose or eyes; before eating; after using the toilet; after touching public installations such as handrails or door knobs; or when hands are contaminated by respiratory secretion after coughing or sneezing.
- Wash hands with liquid soap and water, and rub for at least 20 seconds..
- Cover your mouth and nose with tissue paper when sneezing or coughing. Dispose of soiled tissues into a lidded rubbish bin, then wash hands thoroughly.
- Prevention measures include frequent handwashing, avoiding close contact with infected individuals, and cleaning and disinfecting surfaces.

- 2. Maintain good environmental hygiene
  Regularly clean and disinfect frequently touched surfaces such as furniture, toys and commonly shared items Maintain good indoor ventilation. Avoid going to crowded or poorly ventilated public places; high-risk individuals may consider putting on surgical masks while in such places.