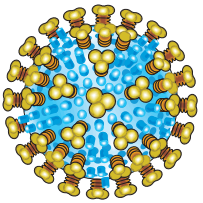
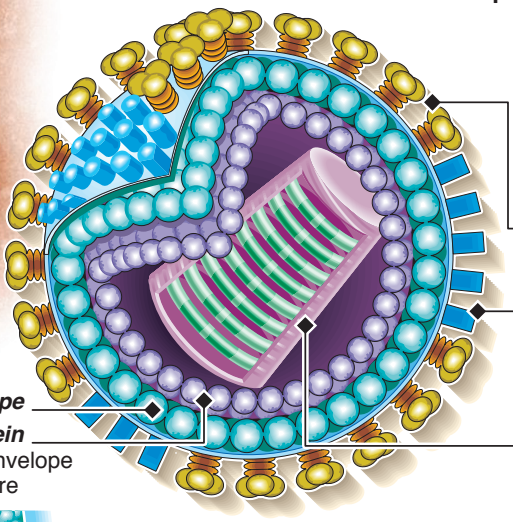
Inside the swine flu virus

The Mexican swine flu virus is a mixture of four different strains: North American swine flu, North American avian flu, human *A/H1N1* flu and a swine flu strain found in Asia and Europe





Influenza A: Most common cause of flu in humans. Unlike bacteria, viruses do not contain cellular machinery to reproduce – instead, they must hijack host cell in order to replicate

Haemagglutinin (HA protein) H of H1N1 enables virus to attach to ***receptor*** on host cell

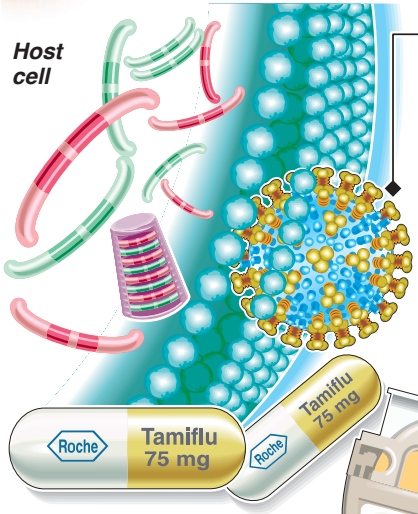
Neuraminidase (NA protein) N of H1N1 promotes ***budding*** – release of newly formed virus particles from host cell. These spread infection within victim

Viral envelope

Matrix protein Links viral envelope with virus core

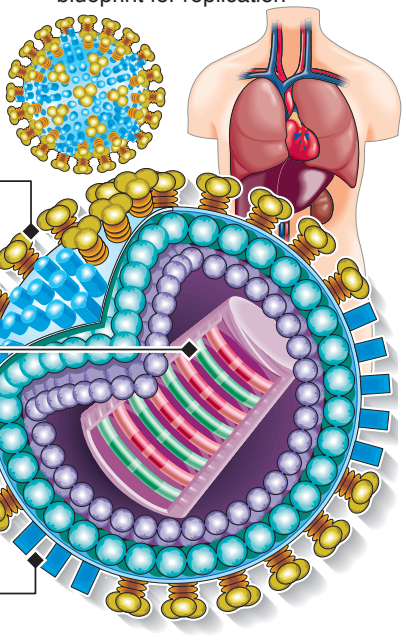
Virus core – nucleocapsid Eight single strands of ***RNA*** *(ribonucleic acid)* contain genetic blueprint for replication

Host cell



Reassortment: If different viral types infect host cell at same time, new viruses budding from cell can contain jumbled mixture of RNA strands. **New subtype emerges abruptly**

Human immune system: "Old" antibodies no longer recognize "new" HA and NA proteins. They may also trigger ***cytokine storm*** – harmful immune overreaction in body that may be lethal in itself

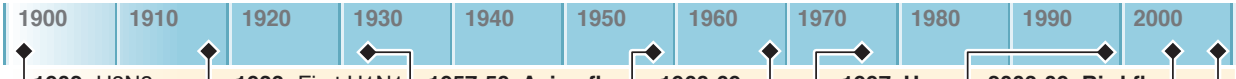


New RNA genome – Virus now has potential to spread rapidly between humans

Neuraminidase inhibitors – Tamiflu (oseltamivir phosphate) and Relenza (zanamivir) stop budding process

Treatment: Analysis of swine flu indicates NA protein should be sensitive to neuraminidase inhibitors ***Tamiflu*** and ***Relenza***

SHIFTS IN INFLUENZA A



1902: H3N2 strain detected

1918-19, Spanish flu: H1N1 subtype causes most lethal influenza pandemic ever, killing more than 50 million people

1933: First H1N1 strains isolated

1957-58, Asian flu: H2N2 pandemic starts in southwest China, claims over 750,000 lives worldwide

1968-69, Hong Kong flu: H3N2 pandemic kills 700,000 people

1977, Russian flu: Benign pandemic of H1N1+H3N2 originates in China

1997, Hong Kong: H5N1 avian virus kills 6

1999: Avian H9N2 infects children

2003-09, Bird flu: H5N1 strain kills 257 people in Asia

2009: Mexican swine flu: As cases rise WHO declares phase 4 pandemic alert

Sources: World Health Organisation, Science, Centers for Disease Control and Prevention

Picture: Associated Press/CDC