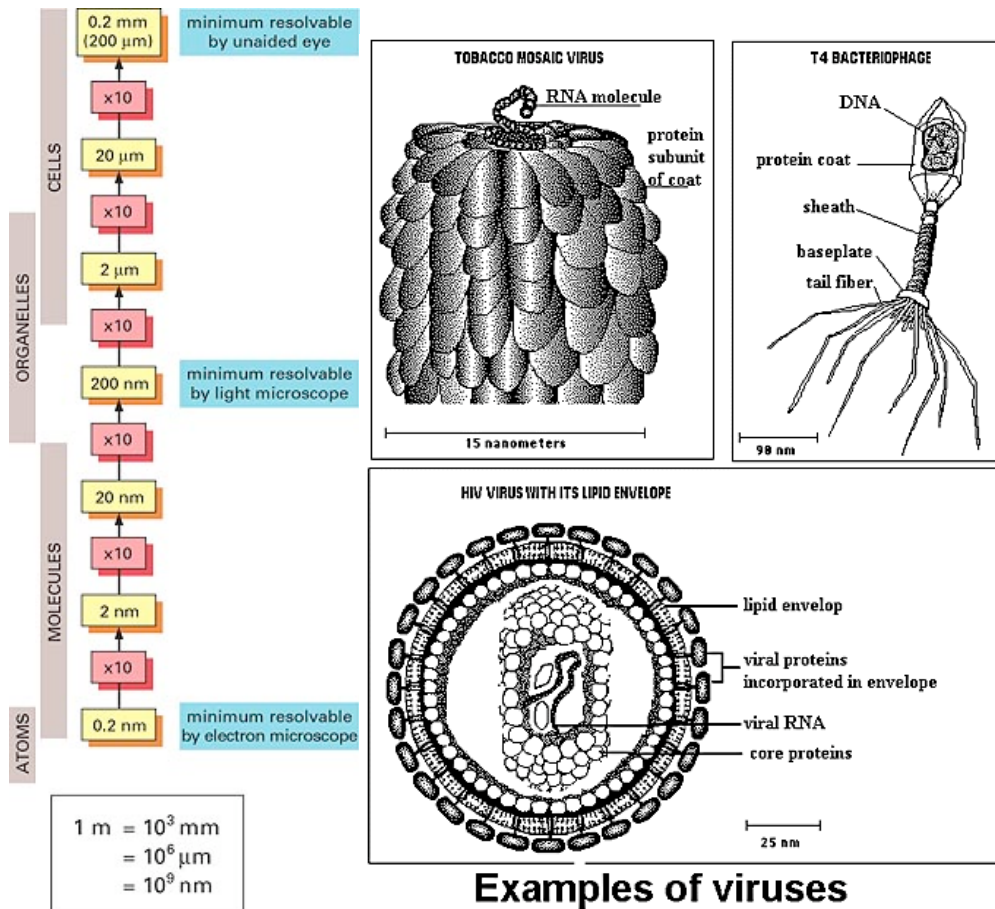


## Viruses-Influenza



**Examples of viruses**

### Features of Influenza

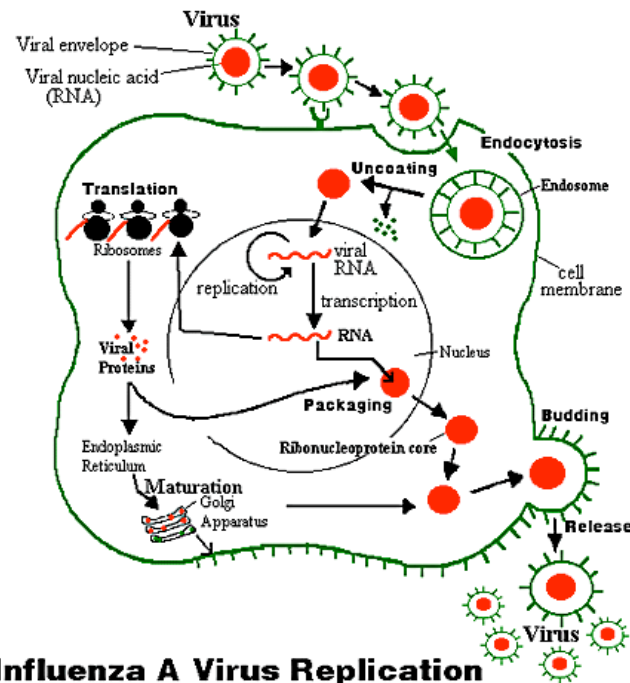
<http://www.cdc.gov/flu/about/fluviruses.htm>

Influenza, commonly called "the flu," is caused by viruses that infect the respiratory tract. Compared with most other viral respiratory infections, such as the common cold, influenza infection often causes a more severe illness. Typical clinical features of influenza include fever (usually 100 °F to 103 °F in adults and often even higher in children) and respiratory symptoms, such as cough, sore throat, runny or stuffy nose, as well as headache, muscle aches, and often extreme fatigue. Although nausea, vomiting, and diarrhea can sometimes accompany influenza infection, especially in children, gastrointestinal symptoms are rarely prominent. The term "stomach flu" is a misnomer that is sometimes used to describe gastrointestinal illnesses caused by other microorganisms.

Influenza viruses are divided into three types, designated A, B, and C. Influenza types A and B are responsible for epidemics of respiratory illness that occur almost every winter and are often associated with increased rates for hospitalization and death. Influenza type C differs from types A and B in some important ways. Type C infection usually causes either a very mild respiratory illness or no symptoms at all; it does not cause epidemics and does not have the severe public health impact that influenza types A and B do.

Type A viruses are divided into subtypes based on differences in two viral proteins called the hemagglutinin (H) and the neuraminidase (N). The current subtypes of influenza A are designated A(H1N1) and A(H3N2). So far 15 hemagglutinin and nine neuraminidase subtypes have been identified on type A influenzas, which are named according to the hemagglutinin and neuraminidase molecules they display: H1N1, H1N2, H2N2 and so on. Type B viruses infect only humans, and they cause regional

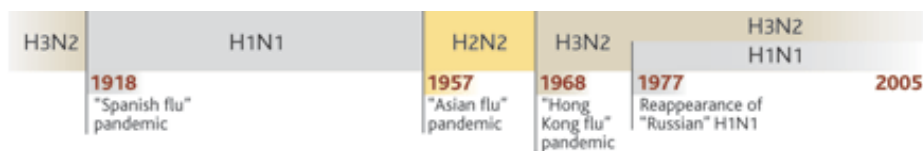
epidemics rather than pandemics. Type A influenzas, in contrast, affect pigs, horses, seals, whales and birds as well as humans, although not all strains infect all species. (Indeed, only four subtypes have been found in humans.) They are also responsible for all of this century's pandemics.



See Professor Carolyn Bertozzi's related LBL / You Tube Presentation:

<http://www.youtube.com/watch?v=VBwNMR3C0Ys&feature=Playlist&p=10F61E434B646DE1&index=1>

Influenza type A viruses undergo two kinds of changes. One is a series of mutations that occur over time and cause a gradual evolution of the virus. This is called antigenic "drift." The other kind of change is an abrupt change in the hemagglutinin and/or the neuraminidase proteins. This is called antigenic "shift." In this case, a new subtype of the virus suddenly emerges. Type A viruses undergo both kinds of changes; influenza type B viruses change only by the more gradual process of antigenic drift.

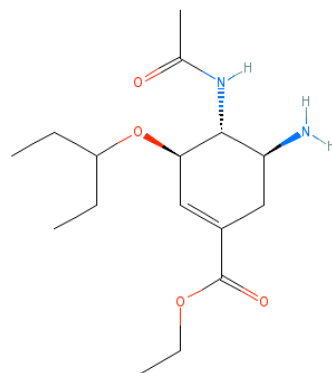
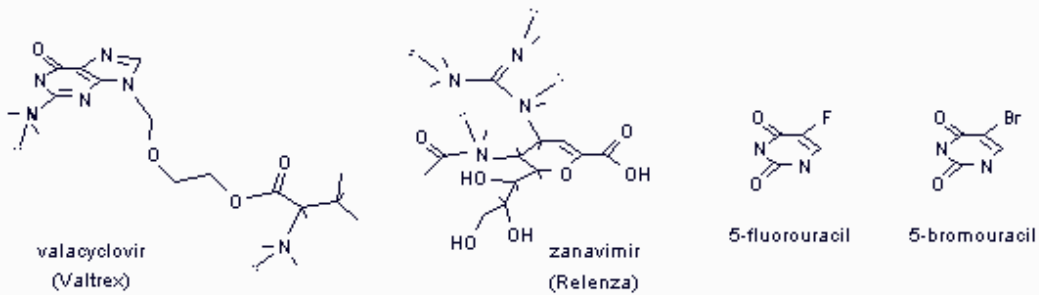
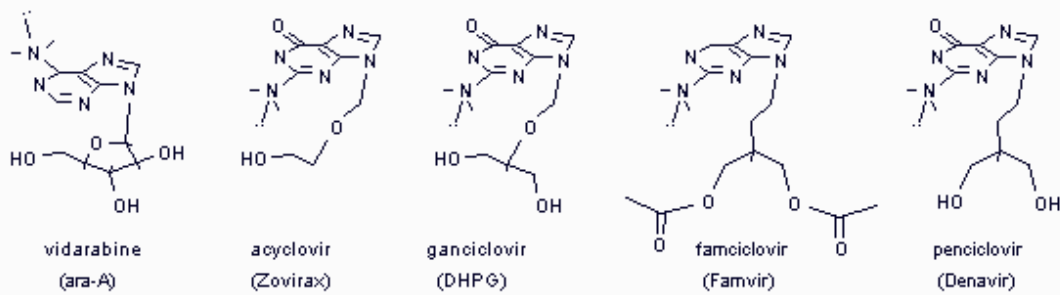
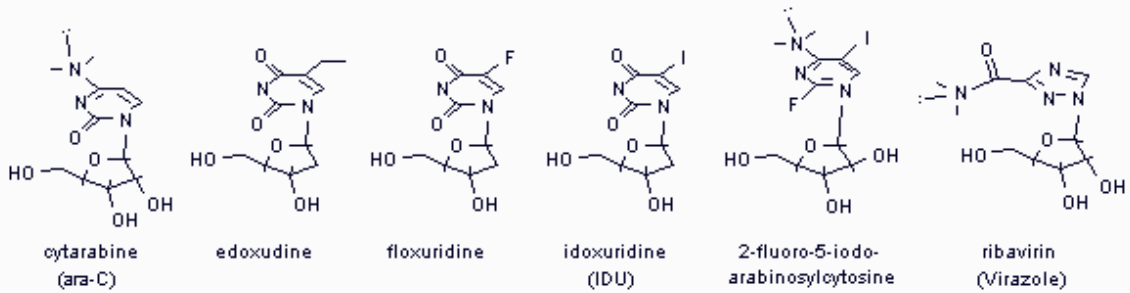


*Mortality associated with pandemics:*

- 1918-19 "Spanish flu" A(H<sub>1</sub>N<sub>1</sub>) -- Caused the highest known influenza-related mortality: approximately 500,000 deaths occurred in the United States, ~20 million worldwide.
- 1957-58 "Asian flu" A(H<sub>2</sub>N<sub>2</sub>) -- 70,000 deaths in the United States.
- 1968-69 "Hong-Kong flu" A(H<sub>3</sub>N<sub>2</sub>) -- 34,000 deaths in the United States.
- 2009 "Swine Influenza A" A(H<sub>1</sub>N<sub>1</sub>) -- ????? -- **29-April**: 148 cases officially reported. The United States Government has reported 91 laboratory confirmed human cases, with one death. Mexico has reported 26 confirmed human cases of infection including seven deaths. The following countries have reported laboratory confirmed cases with no deaths - Austria (1), Canada (13), Germany (3), Israel (2), New Zealand (3), Spain (4) and the United Kingdom (5).

<http://pandemicflu.gov/>

## Anti-virals



oseltamivir (Tamiflu)