

Name: _____

Score: ____ / ____

Quiz 9 on Tough Times

Part 1

Hollywood films and science fiction generally often struggle to present science accurately on many levels. We can comment that this is entertainment and not education, however its influence is often substantial. The film Contagion

- A. is based on the alien invasion of a virus that takes over the planet that could actually happen (HxNv)
- B. is entirely science fiction, because a pandemic has not occurred in over one hundred years and depicts only a Hollywood version of a modern pandemic
- C. is a theoretical depiction based on what might happen in a serious global pandemic and is reasonably accurate.
- D. is about a global pandemic which entirely depicts a situation that could never possible happen anywhere in the world based on a Zika outbreak
- E. is a documentary based on the 1957-58 pandemic of the Hong Kong flu (H3N5)

How do new viruses evolve? Certainly, one mechanism involves mutation of individual bases in the viral genome which occur during replication. The emergence of several new influenza A virus subtypes have caused pandemics throughout recent history; one other important clue about their origins is that

- A. they have all been genetically engineered as bioweapons causing the 'dual use dilemma'
- B. they are not transmissible from human to human
- C. they all occurred only in large urban areas in Western Europe such as those which led to the bubonic plague of the Middle Ages
- D. they appeared with the onset of antibiotic use in Southeast Asia
- E. the viruses contain a combination of human and/or animal host species genes or changes in the genes which encode recognition of their receptors

Numerous pandemic flu outbreaks have occurred over history. Most virologists and epidemiologists believe that the next outbreak is not a matter of 'if but when'. The best measure to prevent a catastrophic outbreak would be

- A. preemptively develop annual flu vaccines
- B. quarantine any and all infected individuals early in a suspected problem outbreak
- C. cull birds or other zoonotic infectious cross species carriers when necessary
- D. Take all of the measures in the other answers
- E. work collaboratively with the WHO, the US CDC and other international institutions to genome sequence viruses and forecast possible outbreaks

An influenza pandemic is a global outbreak of disease that occurs when a new influenza A virus appears or “emerges”, often from a non-human source which crosses over to become infectious in the human population, causes serious illness, and then spreads easily from person to person worldwide. An influenza pandemic

- A. is of historical concern but one that has not occurred in the US since the famous 1918-1919 Spanish Flu.
- B. is not that serious and is a theoretical concern of the WHO and the CDC that wastes a lot of funding unnecessarily.
- C. none of the answers are correct.
- D. will not likely occur in the next fifty years but is a significant concern to the USDA
- E. is likely to occur in the future and has occurred several times in the last 100 years with devastating consequences.

How would a bioweapons attack be carried out? In a bioweapons attack, there are the unique challenges with first response because

- A. The release of biological agents is not likely to be immediately discernible
- B. Physicians, specifically ID specialists, are likely to be out of town
- C. Casualties will immediately in the first 24 hours, overwhelm medical attention
- D. Firefighters, police and paramedics would most likely desert immediately
- E. there are no known treatments for any of the sentinel six bioweapons agents

The next pandemic flu has been predicted and modelled to spread very quickly on a global scale. What is currently the largest contributing factor to a major pandemic outbreak of influenza A virus to rapidly spread globally?

- A. The fact of global travel within days and hours; the so-called Migratory SilverBird Flyways that could spread a virus
- B. the inability to develop vaccines
- C. the inability to rapidly identify viruses by sequencing
- D. global poor nutrition
- E. poor water sources in underdeveloped countries

Various methods could be used to prevent a large pandemic flu outbreak including the culling of infected reservoir species (such as bird), early detection, and effective quarantine of infected humans. Vaccines, would also be effective which could be made to protect against pandemic influenza viruses. However

- A. vaccines currently require 12 years and would cost over \$1.5 billion from bench to bedside.
- B. it would be too costly to be effective and therefore not manufactured by the military
- C. could never be over 10% effective so would not interrupt a full blown pandemic
- D. a vaccine probably would not be available in the early stages of a pandemic
- E. can only be produced using the attenuated vaccine approach in chicken eggs

The reasons that small pox is considered such a dangerous threat as a bioweapon include: its stability in aerosol form; infective dose low ~10-100 organisms; and, efficient person-to-person spread. The fact that a transmissible person can infect many other persons has created what possible threat since 9/11/2001 that was not previously seriously considered?

- A. that suicide terrorists could inject themselves with a virulent strain to spread it through an unsuspecting population
- B. that a strain of small pox could be never be fused with portions of the bird flu virus or other virus elements to be deployed as a bioweapon
- C. it is not important enough of a threat to be plausibly considered; the nuclear war threat is much more likely
- D. that a reliable vaccine against small pox cannot be constructed
- E. to unleash a bioweapon that would kill everyone on the planet will simply not ever be possible

Viruses that can cause flu in humans circulate each year. There are many different subtypes of Influenza or "flu" viruses. The subtypes differ based upon certain proteins on the surface of the virus and are used to classify the subtypes. These subtypes are designated

- A. when they reach Phase 3 pandemic level as HuHu3
- B. by common names, much the same as hurricanes, specifically by the WHO for seasonal flu vaccine production.
- C. only for bird flu subtypes
- D. as HN based on the hemagglutinin or "HA" protein and the neuraminidase or the "NA" protein
- E. by their animal host reservoir whether that are avian (AV), pigs (PG), or bats (BT)

A leading group of followers of Bhagwan Shree Rajneesh (later known as Osho) had hoped to incapacitate the voting population of the city so that their own candidates would win the 1984 Wasco County elections. This notorious attack used a bioweapon in an attempt to sway the upcoming election. Cult members were found to have contaminated commercial salad bars with what organism?

- A. Salmonella
- B. Ebola virus
- C. Anthrax
- D. Yersinia pestis
- E. Small Pox

The history on bioweapons used by humans goes back many centuries. The United States

- A. has effectively prevented bioweapons attacks in the US
- B. has never experienced a bioweapons attack yet on its own soil
- C. has no known research on bioweapons and has never conducted significant research on the use of bioweapons.
- D. has conducted significant research on the use of bioweapons
- E. secretly attacked the former Soviet Union because of their research on bioweapons in 2005

Many human infections involve human-to-human transmission. During the early 20th century the Spanish flu swept across the world in one year. Technology has changed our world since those times. How will the next major global pandemic most likely move most effectively?

- A. human to human transmission facilitated by air travel.
- B. As a computer virus which uses artificial intelligence (AI) transmitted through social media
- C. Infected military personnel returning from service overseas
- D. The internet will be able to transfer biological viruses, much the same as the viruses used by hackers.
- E. Contaminated vegetable food sources from the global market

In 2001, shortly after the Sept. 11 attacks, several anthrax bioweapons attacks were perpetrated. At the time, many people thought the events were connected. Bruce Edward Ivins

- A. was the highly suspected perpetrator of the 2001 Anthrax attack in the US who killed himself in 2008 after learning that the FBI was to file charges.
- B. was a Senator for Rhode Island during the first Gulf War leading to policies against bioweapons research in the US
- C. won the Nobel prize in medicine for research on bioweapons which solved the case.
- D. won the Nobel Peace prize in 2008 for his stance against bioweapons.
- E. conducted the research on Iraqi bioweapons with Saddam Hussein's regime at the Al-Shazam Institute that led to the Iraq war.

Anyone can make an atom bomb. It is easy. You can look up the instructions on the web. Getting the materials is considerably more difficult (consider Iran). The United States and many other countries have been concerned for decades about nuclear proliferation. On the other hand, the production of biological weapons of mass destruction is relatively simple as well, but getting the appropriate materials and expertise is very relatively easy. The best preventive measure(s) to prevent a catastrophic bioweapons attack would be

- A. Work with diplomatic and intergovernmental agencies to increase awareness and surveillance
- B. Intense internet surveillance (i.e. NSA), since these activities would most likely involve collaborations
- C. Use surveillance on (but do not overly regulate or prevent) possible Dual Use technologies that would give would-be terrorists any more information
- D. Realize that this is largely out of our collective control, like most terrorist attacks, but take every measure possible including all those measures in the other answers to prevent an attack
- E. Prevent open access to any and all known biological weapons of interest

Synthetic biology is the design and construction of new biological entities such as enzymes, genetic circuits, and cells or the redesign of existing biological systems. New viruses or bacterial genomes can be designed and constructed. Synthetic biology

- A. will most likely never be used on bioweapons
- B. can never be applied to bioweapons research
- C. is a problem considered the Dual Use Dilemma
- D. is not a large threat to the deployment of future bioweapons
- E. was used to develop weaponized bioweapons to produce the Anthrax used in the 2001 US attack by Saddam Hussein's regime.

During the 20th century, the emergence of several new influenza A virus subtypes have caused pandemics; all of which spread around the world within a year of being detected. One of these is suspected of killing over 675,000 in the US and over 50 million globally. That deadly pandemic was called the

- A. 1918-19, "Spanish flu," [A (H1N1)]
- B. 1968-69, "Hong Kong flu," [A (H3N2)]
- C. 1957-58, "Asian flu," [A (H2N2)]
- D. 1972-present West Nile Virus [WNV]
- E. 2003-2004 Severe Acute Respiratory Disorder [SARS]

During the historical development of bioweapons, it is known that:

- A. in 1942-73: US program of offensive and defensive BW, including human "volunteer" exposures with Ebola virus.
- B. 1998-03: US program of offensive and defensive BW, including human "military" exposures to genetically engineered agents.
- C. Anthrax was developed and weaponized by a a cult in Oregon to secure land during a controversial election.
- D. 1992-73: US program of offensive and defensive BW, including human "prisoner" exposures to Yersinia pestis and syphilis
- E. 1942-73: US program of offensive and defensive BW, including human "volunteer" exposures

Pandemic flu outbreaks follow various stages of development. The stages of a Pandemic, characterized by the World Health Organization recognizes a Phase 6 Pandemic when:

- A. Small cluster(s) with limited human to human transmission but spread is highly localized
- B. an emergent influenza virus is recognized in animal host species
- C. sustained transmission in general populations through increased human to human transmission.
- D. human infection(s) with a new subtype have occurred, but there is no human to human spread.
- E. the virus has become sexually transmissible.

Many people are familiar with the symptoms of seasonal flu outbreaks. Influenza (also known as the flu) is a contagious respiratory illness caused by various types of flu viruses. It can cause mild to severe illness, and at times can lead to death. The flu is different from a cold. The patient typically first feels 'out of sorts' as if first becoming ill. The percentage of the U.S. population that will get the flu, on average, each year is 5% to 20%. The average number of Americans hospitalized each year because of problems with the illness is 200,000 and the number of people who die each year from flu-related causes in the U.S is 3,000 to 49,000. The best way to protect from contracting the flu is

- A. avoid touching your eyes, nose or mouth if you have been in contact with infected people.
- B. obtain a flu vaccine before the start of flu season (October through April)
- C. frequent hand washing with soap and water
- D. avoid contact with infected people.
- E. all of these answers are correct.

The screening and detection of specific DNA sequences has been broadly applied in medical and life sciences. PCR is a useful molecular tool for use in plant genetics, pharmacogenomics, evolutionary studies, pandemic flu, and analysis of bioweapons.

- A. False
- B. only when a plant geneticist thinks his collaborator stole his work
- C. This is true for everything except its use on pandemic flu
- D. True
- E. only when forensic analysis involved bioweapons from an anthrax attack