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**MCB 55 Plagues and Pandemics Final      December 19th, 2019**

There are 100 points total. **Read each question carefully.** Choose the *best* answer. **GOOD LUCK!!!**

**PART A. True/False (25 pts).    Please fill-in the box for True or False for each statement below.**

**Make sure you fill in the box completely, and if you change your answer put an X through the box.**

- | <b>T</b>                 | <b>F</b>                 |   |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | 1. More than six out of every 10 known infectious diseases in people are spread from animals  |
| <input type="checkbox"/> | <input type="checkbox"/> | 2. There are more people currently living with HCV than HBV   |
| <input type="checkbox"/> | <input type="checkbox"/> | 3. 10% of the human cases of Ebola could be traced to a dog bite.   |
| <input type="checkbox"/> | <input type="checkbox"/> | 4. Ebola virus is the most deadly virus known to infect humans  |
| <input type="checkbox"/> | <input type="checkbox"/> | 5. Administration of hepatitis B vaccine, along with hepatitis B immune globulin injections, is effective in reducing the incidence of HBV cirrhosis. |
| <input type="checkbox"/> | <input type="checkbox"/> | 6. Zika virus infections are responsible for more birth effect than infections associated with human cytomegalovirus                                  |
| <input type="checkbox"/> | <input type="checkbox"/> | 7. 350 millions of individuals are infected annually worldwide with the hepatitis B virus. 5% of them will become infected chronically                |
| <input type="checkbox"/> | <input type="checkbox"/> | 8. Vertical transmission at birth is the main route of HBV infection in countries with high HBV prevalence  |
| <input type="checkbox"/> | <input type="checkbox"/> | 9. About 90% percent of the babies born from a HCV-infected mother will develop a persistent infection  |
| <input type="checkbox"/> | <input type="checkbox"/> | 10. The current Ebola outbreak (2018-2019) is worse than all the other Ebola outbreaks combined   |
| <input type="checkbox"/> | <input type="checkbox"/> | 11. Agricultural intensification is not linked to zoonoses emergence, in contrast to global warming and climate change                                |
| <input type="checkbox"/> | <input type="checkbox"/> | 12. Changes in burial practices in Western Africa have been implemented as a public health measure to reduce Ebola transmission.                      |

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- ☐ ☐ 13. Ribavirin is the drug of choice to treat Ebola patients
- ☐ ☐ 14. 80% of liver cancers are due to HCV
- ☐ ☐ 15. A recent new drug regimen, based on interferon injections, allows for cure rates up to 99% in people infected with hepatitis C virus.
- ☐ ☐ 16. Herpes simplex virus 1, the causal agent of cold sores, can also infect the genital areas
- ☐ ☐ 17. Most infection with Human Papilloma virus in the cervix are naturally cleared
- ☐ ☐ 18. More than 70% of all the cervical cancer in the US are associated with infection with HPV 6 and HPV11
- ☐ ☐ 19. It is estimated that in the US, 50% of young adults infected by HIV don't know their status
- ☐ ☐ 20. All the viruses that encode a reverse transcriptase are member of the retroviridae family.
- ☐ ☐ 21. CD4 T-cell counts that are below 200 per microliter is a diagnosis of AIDS
- ☐ ☐ 22. HSV1 and HSV2 are the most common sexually transmitted infection in the US
- ☐ ☐ 23. India accounts for a large fraction of the global death toll associated with Rabies infections.
- ☐ ☐ 24. Human herpesvirus 1 establishes latency in the epithelial cells of the lips. Episodes of reactivation are associated with the appearance of cold sores.
- ☐ ☐ 25. Herpes simplex transmission occurs only during symptomatic periods

**PART B. Make sure your markings are clear. The number of points (indicated in parenthesis) might vary for each question**

26. Name 3 viruses that are transmitted by mosquitoes (2)

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27. Name 3 viruses found in bats that are transmitted to humans **(2)**

28. Name 3 viruses whose infection is associated with cancers in human **(2)**

29. When considering HIV, rank the following potential modes of transmission from the least/not efficient to the most efficient (1 being the least efficient, 4 the most efficient) **(2)**

- \_\_\_\_\_ Blood transfusion.
- \_\_\_\_\_ Sexual intercourse.
- \_\_\_\_\_ Childbirth.
- \_\_\_\_\_ Kissing.

30. Indicate which one of the steps below is the most extreme bottleneck in the emergence of a zoonotic viral disease **(1)**

- ☐ The ability to transmit between humans.
- ☐ The ability to replicate in human.
- ☐ The ability to become human exclusive.

31. The following events are part of the HIV viral life cycle. Rank them by their order of appearance (1 being the first, 5 the last one) **(2)**

- \_\_\_\_\_ Integration
- \_\_\_\_\_ Fusion
- \_\_\_\_\_ Translation of viral proteins
- \_\_\_\_\_ Viral particle assembly
- \_\_\_\_\_ Reverse transcription

32. From the 1950s until the 1980s, the Egyptian Ministry of Health undertook large control campaigns using intravenous tartar emetic, the standard treatment for schistosomiasis, as community-wide therapy. What was the unfortunate outcome of this measure and why? **(2)**

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33. What is the viral protein targeted when nucleoside analogs are used as antiviral treatment? (2)

**PART C. Short questions (no more than 4 sentences allowed to answer). 5 points each**

34. Explain why it is beneficial to be homozygotes for a deletion in the CCR5 gene when facing an HIV infection?

35. Some scientists argue that herpesvirus infections might have unexpected beneficial outcomes on human health. What could be one of these outcomes and why?

36. Explain, in a few words, the process of oncogenesis associated with infection with human papilloma virus.

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37. How was the vaccine for Ebola virus engineered?

38. Although 2016 was the peak of the Zika epidemic in Brazil, no athletes were sick due to Zika infection during the Olympic games occurring in Rio de Janeiro that year. Give one reason to why this not surprising.

39. RNA viruses are generally more likely to cause zoonosis than DNA viruses. Can you propose one reason for why this might be the case?

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40. What is the main public health strategy for the prevention of rabies in humans?

41. Briefly explain contact tracing and its benefit during an Ebola epidemic.

42. Zika virus is closely related to Dengue virus. Why does this fact introduce a complication when attempting to develop a vaccine against Zika?

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43. Describe briefly how interferons (IFN) exert their antiviral properties.

44. What is unusual about the treatment given to people that are suspected to have been bitten recently by a rabid animal?

45. When considering West Nile virus, why are human and horses considered “dead end” host?