Name: _____ Score: _____ /76

# Disease Detectives Test

**Instructions:** Answer the questions, don't cheat, get them right (maybe). Good luck :)

1. What is the difference between an epidemic and a pandemic? Give an example of each.

2. What are zoonoses? Give two examples.

3. What is the difference between a fomite and a reservoir?

4. Who is considered the father of epidemiology? Which epidemiological tool did he utilise?

5. What are Koch's postulates? Why can't they be used for every type of infectious agent?

6. List the 3 types of epi-curves and distinguishing characteristics of each.

7. Why does a large portion of the population need to get a flu shot? Who does this protect?

8. What type of bias is a result of the researcher's belief that their hypothesis is correct? Define two other types of bias.

9. Which study type uses relative risk and which uses odds ratio? Why is it split like that?

10. What the heck is a person year?

11. How do you reduce confounding in a study?

**Instructions:** Read the following article and answer the questions that follow

## Investigations of Two Cases of Isolated Local Transmission of Zika Virus

As of July 22, 2016, among the 321 cases of Zika virus infection in Florida residents or visitors, Miami-Dade County and neighboring Broward County reported the highest and second highest numbers of cases in Florida (93 and 51, respectively), accounting for 30.4% and 16.7% of travel-associated cases in nonpregnant women, respectively.

In early July 2016, an adult female resident of Miami-Dade County (patient A) sought treatment at a local hospital with fever, rash, and arthralgia. Serum and urine specimens, which were collected 3 days after symptom onset, were positive for Zika virus by rRT-PCR. Less than 1 week later, an adult male resident of Broward County (patient B) sought treatment for fever, rash, and arthralgia. Zika virus infection was confirmed by rRT-PCR on a urine specimen. Investigation of both cases indicated no recent travel to or sexual contact with a recent traveler to an area with active Zika virus transmission, no association with household contacts who recently traveled, and no close personal contact with a patient with confirmed Zika virus infection. There were no epidemiologic links between the two patients, and their residences were separated by >10 miles. BG-Sentinel (Biogents AG, Regensburg, Germany) mosquito traps, designed for researchers, collected a limited number of Ae. aegypti and Ae. albopictus specimens around the patients' residences, and PCR testing of pooled mosquitoes for Zika virus was negative (Sharon Isern, Department of Biological Sciences, Florida Gulf Coast University, personal communication, 2016).

To identify additional evidence of local transmission, household contacts of patients A and B were interviewed regarding recent illness and travel, and specimens were requested for Zika

virus testing. Among seven household contacts of the two patients, none reported symptomatic illness and only one had laboratory evidence of recent flavivirus virus infection (Zika virus IgM results and neutralizing antibodies for both Zika virus and dengue, indicating probable Zika virus infection). This person had moved from Haiti to Florida 1 month before onset of symptoms in patient A and was classified as having a travel-associated case of Zika virus disease.

To identify recent infections in the surrounding neighborhoods of patients A and B, systematic surveys were conducted of all households located within 150–300 meters (164–328 yards) of each patient's residence. In addition, an outdoor worksite near patient B's residence also was sampled; these areas were selected based on the typical flight range of Ae. aegypti (4). Surveys were conducted at the end of July and consisted of urine specimen collection and a standardized questionnaire regarding general risk factors. Three visit attempts were made for each occupied residence. Children aged <5 years and persons with recent travel to an area with ongoing Zika virus transmission were excluded. Among 116 urine specimens collected from persons from 54 households and one worksite, all were negative for Zika virus by rRT-PCR.

In addition, review of public health and commercial laboratory results, and notification by local health care providers did not identify any additional cases related to patients A and B.

12. What is Dengue Fever? What problems does it cause in the diagnosis of Zika?

13. Explain the RT-PCR method used in the case study.

14. Identify 1 other way to diagnose Zika. List two types of tests that fall under this category.

15. Identify the type of error in this test resulting in a large number of false positives and explain why this is the case for this specific kind of test.

16. Which aspect of this test needs to be adjusted for?

17. List 4 ways to prevent the spread of Zika.

18. What type of study are the surveys conducted in the article?

19. Name the weekly CDC publication this report most likely came from.

20. What is it called in the article when investigators interviewed family members of the patients? Explain what kind of disease is this important to do for, and also give an example.

21. Identify what type of surveillance is described in the last paragraph of the article and explain 1 weakness of it. Also, name the other type of surveillance.

22. What could be wrong with media coverage of every anything that has to do with Zika that happens ever?

23. Which link is the *Aedes aegypti* mosquito in Zika's chain of transmission?

**Instructions:** Answer the following questions that don't have to do with the article.

24. What is the difference between incidence and prevalence?

25. You own a restaurant. Although you might usually turn a blind eye to food safety violations, an inspector is coming today to check up on you. What four things do you tell your employees?

26. You goofed pretty hard. Some people who ate at your restaurant got sick, but you decided to take matters into your own hands. 121 total people ate at your restaurant yesterday, and 23 got sick. 21 of those 23 had the 100% real, 10/10 not fake seafood delight, and your records show that 35 people total ordered that dish. Construct a 2x2 table and calculate odds ratio.

27. Interpret the odds ratio.

28. You isolate the agent from the “seafood” dish. It has no nucleus or ribosomes, but appears to still have genetic information. Identify the type of disease causing agent this is and provide a specific example of one.

**Instructions:** Select all that apply. No partial credit.

29. Who first identified the plague agent?
    a. Alexandre Yersin
    b. Louis Pasteur
    c. Kitatso Shibasaburo
    d. Emil von Behring

30. Name a prion infection that is not Creutzfeldt-Jakob’s.
    a. Kuru
    b. MSA
    c. Fatal familial insomnia
    d. GSS syndrome

31. Which diseases are considered eradicated on a global scale?
    a. Ebola

b. Polio
c. Malaria
d. Smallpox

32. Who invented the polio vaccine?
a. Robert Koch
b. Albert Sabin
c. Jonas Salk
d. Alexander Fleming

33. Which British dude first found that scurvy could be treated with citrus fruit?
a. Edward Jenner
b. Percival Pott
c. William Farr
d. James Lind

34. When the symptoms are 'gastroenteritis', which disease(s) could it be?
a. Salmonella
b. Norovirus infection
c. Giardiasis
d. Legionellosis

35. Which of the following are not Fathers of Something That Relates To Disease?
a. Karl Pearson
b. Joseph Lister
c. Ronald Fisher
d. John Snow

**Instructions:** Show all work.

36. Some people wanna know if Science Olympians have higher IQs than Speech and Debaters. Does the data support this, assuming all conditions are met and $\alpha = 0.5$

| | n | $\bar{x}$ | s |
|---|---|---|---|
| Sci Oly-ians | 132 | 135 | 30 |
| Speech-Debaters | 100 | 125 | 23 |

$t_{n=100,\, q=.95} = 1.66$