中國醫藥大學九十六學年度研究所碩士班（含在職專班）入學招生考試試題

所別：環境醫學研究所

科目：生物統計學及流行病學　　考試時間：80 分鐘

考生注意：答案必須寫在答案卷上，否則不予計分。

第一大題：選擇題

1. A randomized clinical trial was designed to compare two different treatment approaches for asthmatic attacks. The purpose of randomization in this study was to: **(3 points)**
   A. Obtain treatment groups of similar size
   B. Increase patient compliance with treatment
   C. Decrease the likelihood that observed differences in clinical outcome are due to chance
   D. Select a representative sample of patients for study
   E. Obtain treatment groups with comparable baseline prognoses

2. Which of the following actions is most likely to result in an increase in the statistical power of a clinical trial comparing different weight loss programs: **(3 points)**
   A. Blinding of the clinicians who evaluate weight loss
   B. The use of a comparison group that receives only a pharmacologically inert substance
   C. Measurement of patient satisfaction with treatment rather than actual reduction in weight
   D. Increasing the number of patients studied
   E. Restricting the study population to patients with mild obesity

3. In a clinical trial comparing medical and surgical treatment of duodenal ulcers, 20% of the patients randomized to medical treatment ultimately underwent a surgical procedure and 10% of the patients initially assigned to surgery later required additional medical management. Analysis of this study according to initial treatment allocation, ignoring subsequent change in therapy, is best described as: **(4 points)**
   A. Blinding B. Intention to treat C. Type I error D. Observer bias E. Placebo effect

Questions 4-5: A prospective cohort study is conducted of the relationship between alcohol consumption and the rate of breast cancer development. A total of 2000 women who consume moderate levels of alcohol are followed for an average of 10 years. The comparison group consists of 2000 nondrinking women who also are followed for 10 years on average. A total of 30 newly diagnosed breast cancers developed among moderate drinkers, and 15 breast cancers were diagnosed among nondrinkers.

4. The incidence rate (per 10,000 woman-years) of breast cancer among moderate drinkers is: **(5 points)**
   A. 15 B. 30 C. 45 D. 60 E. 300

5. The rate ratio of breast cancer is: **(5 points)**
   A. 0.3 B. 0.5 C. 1.0 D. 2.0 E. 3.0

Questions 6-8: In a retrospective cohort study of occupational exposure to a particular pesticide, the risk ratio for development of lymphoma is 2.0, with a 95% confidence interval of (0.3, 4.0)

6. The point estimate of the RR suggests that the effect of pesticide exposure upon risk of lymphoma is: **(3 points)**
   A. To increase risk B. Unrelated to risk C. To decrease risk
   D. Only related to risk under certain conditions

7. At the 5% level of significance, the association between pesticide exposure and risk of lymphoma is: **(3 points)**
   A. Statistically significant B. Not statistically significant
   C. Of uncertain statistical significance without a hypothesis test
   D. Not appropriately assessed by statistical significance because randomization was not performed

8. Each of the following is likely to be an advantage of retrospective as opposed to prospective cohort studies EXCEPT: **(3 points)**
   A. Less expensive B. More rapidly completed
   C. Useful for the evaluation of discontinued medical treatments
   D. Allows more accurate assessment of exposure

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Questions 9-10: In a unmatched case-control study of risk factors for congenital defects of the neural tube, maternal deficiency of folate was found in 15 of 100 mothers of cases and 10 of 200 mothers of controls:

9. The odds of exposure among cases is: **(3 points)**
   A. 15/100 B. (15/100)/(85/100) C. (15/100)/(10/200) D. (15*190)/(85*10)
   E. (85*10)/(15*190)

10. The odds ratio for exposure is: **(3 points)**
   A. 15/100 B. (15/100)/(85/100) C. (15/100)/(10/200) D. (15*190)/(85*10)
   E. (85*10)/(15*190)

11. Each of the following is likely to be an advantage of case-control studies as opposed to prospective cohort studies EXCEPT: **(3 points)**
   A. Less expensive B. Can be completed more rapidly
   C. More efficient for the study of rare diseases
   D. More efficient for the study of diseases that develop slowly
   E. The temporal relationship between exposure and disease is better refined

12. In a case-control study of risk factors for ectopic pregnancies, the use of an intrauterine device (IUD) was more common among cases than controls. The strength of association increased with longer duration of use of an IUD. This is an example of: **(4 points)**
   A. Latency B. Confounding C. Dose-reponse D. Misclassification
   E. A cohort effect

Questions 13-14: In a case-control study of sunlight exposure and risk of cataracts, cases and controls were asked about participation in various outdoor activities and the use of eye protection. Errors in recall of exposure occurred with equal frequency among cases and controls:

13. Which one of the following biases occurred: **(3 points)**
   A. Selection bias B. Ecologic fallacy C. Nondifferential misclassification
   D. Differential misclassification E. Confounding

14. The most likely effect of this bias on the risk estimation process was: **(3 points)**
   A. Underestimation B. Overestimation C. No effect D. Cannot be determined

15. In a case-control study of maternal cigarette smoking as a hazard for low birth weight, it appeared that false-positive reports of cigarette smoking were more common among mothers of children of low birth weight than among mothers of children with normal birth weights. The reporting error most likely caused the odds ratio to: **(3 points)**
   A. Increase B. Decrease C. Remain unchanged D. Change, but direction was uncertain

16. Among patients with oral cancer, alcohol drinkers have a worse prognosis than non-drinkers. When compared with a case-control study based upon incident cases only, a case-control study utilizing prevalent cases of oral cancer would likely have which of the following effects on the association between alcohol use and elevated risk of developing oral cancer: **(3 points)**
   A. Increase B. Decrease C. Remain unchanged D. Change, but direction is uncertain

17. A rapid screening test for antibodies to syphilis was performed on a 19-year-old sexually active female college student who presented to the infirmary with acute abdominal pain. The antibody test result was reactive, suggesting the presence of syphilis. Further testing using a more definitive procedure indicated that the patient did not have syphilis, however. The original screening test was best described as: **(3 points)**
   A. True positive B. True negative C. False positive D. False negative

18. The latent period is defined as the time from: **(3 points)**
A. Birth until first exposure to a risk factor
B. Initial to final exposure to a risk factor
C. to a risk factor until occurrence of the disease
D. occurrence until death
E. First until last case occurrence

19. All of the following factors may explain the failure of a statistical test to detect a significant difference of a specified magnitude (effect size) between two comparison groups EXCEPT: **(3 points)**
A. Low power of the statistical test
B. Small sample size
C. Such a difference actually does not exist
D. High false negative rate for the statistical test
E. Little subject-to-subject variation in the response variable

Questions 20-21: An investigator finds a positive correlation between per capita alcohol consumption and mortality rates for breast cancer across 20 different countries:

20. This type of study is most useful for: **(3 points)**
A. Hypothesis generation B. Hypothesis testing C. Assessing confounding
D. Clinical importance E. Evaluating causality

21. If the individual women who develop breast cancer are not heavy drinkers, then the apparent positive correlation between national per capita alcohol consumption and breast cancer mortality most likely reflects: **(3 points)**
A. Recall bias B. Selection bias C. Ecologic Fallacy
D. Lack of complete disease registration E. Loss to follow-up

Questions 22-27: A study is conducted in which 10,000 women without breast cancer are enrolled, questioned about alcohol consumption, and then followed for future development of breast cancer:

22. The design of this study is best described as: **(3 points)**
A. Ecologic B. Case-control C. Prospective cohort D. Respective cohort
E. Randomized controlled clinical trial

23. If heavy alcohol drinkers who develop cancer are selectively lost from this study prior to the diagnosis of breast cancer, the apparent association between alcohol drinking and risk of breast cancer will be: **(3 points)**
A. Decreased B. Unchanged C. Altered, but the direction cannot be predicted
D. Increased

24. In this study, white females are more likely to drink than black females. White females also experience a higher risk of breast cancer. Failure to account for the effect of race could result in which of the following types of bias: **(4 points)**
A. Recall bias B. Selection bias C. Differential misclassification
D. Nondifferential misclassification E. Confounding

25. If the risk ratio for breast cancer increases with reported level of alcohol consumption, it can be inferred that there is: **(3 points)**
A. A biologically plausible relationship
B. A statistically significant result
C. A clinically important finding
D. A dose-response relationship
E. A consistent relationship across studies

26. If the estimated risk ratio of heavy to light drinking is 1.5, with a 95% confidence interval of (1.1, 2.2), it can be inferred that there is: **(3 points)**
A. A biologically plausible relationship
B. A statistically significant result
C. A clinically important finding
D. A dose-response relationship
E. A consistent relationship across studies

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27. The results of several analytic epidemiologic studies are combined into a summary comparison of the association between alcohol consumption and the risk of breast cancer. This summary is best described as: **(3 points)**

A. A cost-benefit analysis B. A decision analysis C. A correlation analysis
D. A matched analysis E. A meta-analysis

第二大題：計算題

1. The World Health Organization reports that in 1965, the number of suicides in Scotland averaged 8.0 per week. Assuming that the number of suicides is a Poisson random variable, find how frequently, on the average, 48 or more suicides might occurring a given 4 weeks: **(6 points)**

2. Suppose we know from large studies that the mean cholesterol level in children age 2-14 is 175 mg%/mL and the standard deviation is 30 mg%/mL. We wish to see if there is a familial aggregation of cholesterol levels. Specifically, we identify a group of fathers who have had a heart attack and have elevated cholesterol levels (≥250 mg%/mL) and measure the cholesterol levels of their offspring within the 2-14 age range. Suppose we find that the mean cholesterol level in a group of 100 such children is 207.3 mg%/mL. Is this value sufficiently far from 175 mg%/mL for us to believe that the underlying mean cholesterol level in the population of all children selected in this way is greater than 175mg%/mL: **(6 points)**