

# 國立成功大學

## 113學年度碩士班招生考試試題

編 號：295

系 所：醫學檢驗生物技術學系

科 目：檢驗醫學

日 期：0202

節 次：第 1 節

備 註：不可使用計算機

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

一、單選題 (3 points/each)

1. Which of the following methods may exhibit antigen excess effect?
  - A. reflectance spectrometry
  - B. turbidimetry
  - C. mass spectrometry
  - D. atomic absorption spectrometry
2. Which would not affect the motility of ions in electrophoresis?
  - A. activity of the molecule
  - B. net charge of the molecule
  - C. support medium properties
  - D. strength of the electrical field
3. When observing RBC morphology under the microscope, there are about 30% of the cells exhibiting varying sizes, known as:
  - A. anisocytosis
  - B. schistocytosis
  - C. polychromatic
  - D. poikilocytosis
4. Which antibiotic can be used to break the cell membrane?
  - A. clindamycin
  - B. erythromycin
  - C. daptomycin
  - D. clarithromycin
5. Which type of bacteria can be grown in BCYE agar, but not in blood agar?
  - A. *Legionella spp.*
  - B. *Brucella spp.*
  - C. *Salmonella spp.*
  - D. *Streptococcus spp.*
6. Which is based on the principle of hybridization in single nucleotide polymorphism analysis?
  - A. Dideoxy DNA fingerprinting
  - B. single-strand DNA truncation assay
  - C. SNP DNA microarray analysis
  - D. PCR-RFLP
7. The enzyme catalyzing peptide bond formation is located in
  - A. tRNA
  - B. ER
  - C. small ribosomal subunit

- D. large ribosomal subunit
8. Which antibody is not used for the diagnosis of type I diabetes?
- A. Insulin autoantibody
  - B. glutamic acid decarboxylase (GAD) autoantibody
  - C. Glyceraldehyde 3-phosphate dehydrogenase (GAPDH) autoantibody
  - D. Islet antigen-2 (IA-2) autoantibody
9. Which kind of immune cell is HLA-A restricted?
- A. regulatory T cell
  - B. cytotoxic T cell
  - C. helper T cell
  - D. NK cell
10. Abnormal increases of immunoglobulin happened in the patient with:
- A. ovarian cancer
  - B. multiple myeloma
  - C. non-small cell lung carcinoma
  - D. cholangiocarcinoma
11. A 15-year-old male with diabetes mellitus presented to the emergency room with abdominal pain. Routine chemistry investigations were performed on a plasma sample with the following results:
- Na: 125 mmol/L (133-143)
  - K: 5.3 mmol/L (3.4-5.1)
  - Cl: 99 mmol/L (98-110)
  - Glucose: 650 mg/dL (65-97)
- You expect that the patient would have:
- A. isosmotic hyponatremia
  - B. hyperosmotic hyponatremia
  - C. hypoosmotic hyponatremia
  - D. severe dehydration
12. \_\_\_\_\_ deficiency leads to microcytic hypochromic anemia.
- A. folic acid
  - B. copper
  - C. zinc
  - D. iron
13. Hb C disease is caused by what mutation in the sixth amino acid in  $\beta$ -globulin?
- A. thymine to adenine
  - B. guanine to cytosine
  - C. valine to lysine
  - D. glutamic acid to lysine

14. A 60-year-old male, recipient of a kidney allograft, is four months out from his transplant. He is on immunosuppressive medication and his kidney function is routinely monitored. In the last few weeks his serum creatinine levels have slowly been rising. He is otherwise asymptomatic. His nephrologist is concerned about the possibility of BK virus (BKV)-associated nephropathy and a plasma specimen is collected for testing for the presence of BKV. The hospital's laboratory uses a nucleic acid assay targeting the gene encoding the large T-antigen (lower limit of detection: 500 viral copies/ml) for detection and quantitation of BKV DNA. The test result comes back as "BKV DNA not detected". The patient's physician still strongly suspects BKV associated nephropathy and requests the specimen to be retested by a reference laboratory. The reference laboratory uses an assay that targets the VP2 gene and the lower limit of detection of their assay is also 500 viral copies/ml. The result comes back as positive for BKV with a viral load of 15,500 copies/ml. What is the most likely possible explanation of the discrepancy between the results generated by the two laboratories, assuming the discrepancy is not a result of pre-analytic variables (specimen mismatch etc.)?
- A. The large T-antigen is more sensitive than VP2 gene target for detection and quantitation of BKV DNA; the second test result likely represents a false positive. No change in immunosuppressive therapy is necessary.
- B. The VP2 is more sensitive than the large T-antigen gene target for detection and quantitation of BKV DNA; hence the first result is likely a false negative. A persistently elevated BKV DNA might prompt a decrease in the patient's immunosuppressive regimen.
- C. The VP2 gene is more sensitive than the large T-antigen gene target for detection and quantitation of BKV DNA, hence the first result is likely a false negative. The viral load is, however, too low to consider a decrease in immunosuppression.
- D. None of the above.
15. A 25 year old woman in her first trimester of pregnancy presents for a checkup with her obstetrician. Three weeks ago she returned from a vacation to Puerto Rico. A few days before leaving Puerto Rico she developed an acute febrile illness, accompanied with muscle aches, rash and joint pain. Her doctor suspects possible Zika virus infection and orders a Zika IgM Antibody Capture Enzyme-Linked Immunosorbent Assay (Zika MAC-ELISA) test on the patient's serum. The test results come back two days later as being equivocal for the presence of Zika virus antibodies. Further testing is performed by rRT-PCR (real-time reverse transcription-polymerase chain reaction) for the presence of Zika virus RNA on serum and urine samples. The result is negative.
- Which of the following scenarios appear to be most plausible and what might be the next step?
- A. The patient may still have Zika virus infection; plaque reduction neutralization test (PRNT) should be performed to confirm the presence of anti-Zika antibodies.
- B. Testing for Dengue virus and Chikungunya virus might be indicated.
- C. Amniocentesis should be done and rRT-PCR for Zika virus should be performed on the amniotic fluid specimen urgently.
- D. A+B

16. A 60 year-old man from Florida with a history of leukemia refractory to chemotherapy presented to his oncologist for pre-stem cell transplant evaluation. His clinical presentation was notable for fatigue, weakness and low grade fever. Upon evaluation, significant hemolytic anemia was noted which precluded moving forward with a bone marrow transplantation. His CBC was notable for low red blood cells, hemoglobin, hematocrit and platelets and a manual differential showed a normal absolute neutrophil count but lymphocytopenia. Work-up for non-infectious causes of his persistent anemia including the underlying cancer, drug toxicities or the presence of autoantibodies were all negative.

Which of the following pathogen is most likely responsible for this patient presentation?

- A. Babesia microti
- B. Bocavirus
- C. Parvovirus B19
- D. Cytomegalovirus

17. 狹心症發作時, 心電圖最常出現的變化為?

- A. ST 節段水平下降
- B. T 波變為雙向
- C. 出現不正常的 Q 波
- D. QRS 波變高

18. 血液的緩衝系統, 按其重要性排列順序為?

- A. 蛋白質 > 磷酸鹽 > 碳酸-重碳酸鹽
- B. 碳酸-重碳酸鹽 > 蛋白質 > 磷酸鹽
- C. 蛋白質 > 碳酸-重碳酸鹽 > 磷酸鹽
- D. 磷酸鹽 > 蛋白質 > 碳酸-重碳酸鹽

19. 血液氣體分析中之氧氣飽和度(SO<sub>2</sub>)是指下列何者?

- A. 血漿中溶解的氧氣之飽和程度
- B. 血紅素與氧離子之飽和程度
- C. 血紅素攜帶氧氣之飽和程度
- D. 血漿中氧離子之飽和程度

20. 下列何者不是評估人體內鐵含量的指標?

- A. 血清運鐵蛋白量 serum transferrin
- B. 總鐵結合力 Total iron binding capacity
- C. 儲鐵蛋白量 ferritin
- D. 游離鐵含量 free iron

21. 帶有 Heinz bodies 之紅血球主要依賴下列哪個器官清除?
- A. Liver
  - B. Kidney
  - C. Spleen
  - D. Pancreas
22. Erythropoietin 最主要由下列何者製造?
- A. Kidney tubular cells
  - B. Kidney peritubular interstitial cells
  - C. Liver hepatocyte
  - D. Liver Kupffer cell
23. 下列何者不是造成 lymphocytosis 的原因?
- A. Herpes simplex virus infection
  - B. Hypersplenism
  - C. Syphilis
  - D. Septic shock
24. 目前以化學治療瀰漫性大細胞 B 細胞淋巴瘤(diffuse large B-cell lymphoma)最常併用下列哪一種單株抗體?
- A. Anti-CD19
  - B. Anti-CD20
  - C. Anti-CD22
  - D. Anti-CD33
25. 下列何者症狀是 Respiratory Syncytial Viruses 引起小小孩住院的原因?
- A. 腦炎
  - B. 支氣管炎
  - C. 腹瀉
  - D. 手足口症
26. 有關流式細胞儀螢光補償(color compensation)之敘述，下列何者最適當?
- A. 使用適當的濾鏡可以降低螢光光譜重疊訊號干擾
  - B. 可用於調校檢體自發之干擾螢光
  - C. 若螢光之吸收光譜重疊，則不須執行光補償調整
  - D. 同時使用之螢光愈多，光補償的影響愈不顯著

27. 下列何種抗體可用來確認不是施打 SARS-CoV-2 病毒疫苗所產生?

- A. Anti-nucleocapsid protein
- B. Anti-spike protein
- C. Anti-receptor binding domains
- D. Anti-glycoprotein

28. 下列有關登革病毒的敘述，何者錯誤?

- A. 單股負股 RNA 病毒
- B. 屬黃病毒科
- C. 可分為 4 種血清型
- D. 再次感染不同型別登革病毒，可能發生症狀較嚴重的登革熱重症

29. 下列有關於登革出血熱的實驗室檢查，何者錯誤?

- A. 發病後第 3 天後白血球明顯下降，約在第 5 天降至谷底
- B. 血小板下降至小於 10 萬/uL
- C. 肝指數 GOT 和 GPT 輕中度上升
- D. 凝血原酶時間檢測大多延長

30. 下列不是登革病毒檢驗檢測之檢體?

- A. 血清
- B. 血漿
- C. Buffy coat
- D. Throat swab

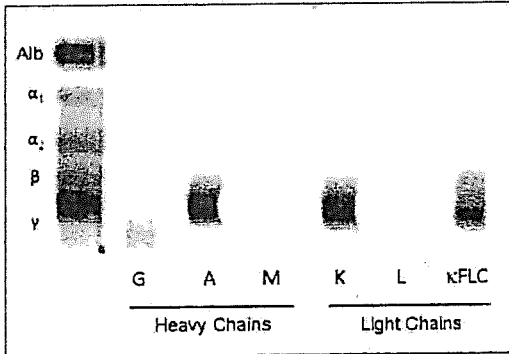
## 二、問答題

1. The laboratory received a blood sample from a nurse in the outpatient department. The sample was centrifuged immediately, and the serum was tested within 10 minutes after arrival. The following results were obtained:

Analyte	Result	Reference interval
K	10.7 mmol/L	3.7-5.4
P	0.8 mmol/L	0.65-1.30
Glucose	32 mg/dL	60-99 mg/dL

- (a) If you are the laboratory technician, how do you interpret the result? And describe the possible reason (4 points).
- (b) What will you do to confirm your thought from the above interpretation? (3 points)

2. An 80-year-old male with multiple myeloma visited the clinic. His serum immunofixation (IF) results at diagnosis are shown below (3 points).



G, IgG; A, IgA; M, IgM; K, Kappa; L, Lamda;  
FLC, free light chains.

What is your interpretation for the result at diagnosis?