注意：請依題號順序作答，並請寫在答案卷。

一、選擇題 (20%)

1. Ms. Chang, a 34-year-old racing pigeon breeder, has fever and headache for 20 days. Physical findings and laboratory examinations suggest that she has meningitis with *Cryptococcus* infection. About her anti-fungal treatment, which of the following is **NOT CORRECT**? (3 %)
   (A) Very little amount of Amphotericin B is distributed to cerebrospinal fluid if it is given intravenously. Intrathecal infusion may be required if Amphotericin B is indicated for this patient.
   (B) Fluconazole is both the substrate and inhibitor of CYP3A4.
   (C) Flucytosine can be used with Amphotericin B or Fluconazole to treat Ms. Chang's meningitis if she also has human immunodeficiency virus (HIV) infection.
   (D) Fluconazole suppresses fungal 14-α-sterol demethylase.
   (E) Amphotericin B targets fungal cytosine permease & cytosine deaminase.

2. About anti-viral drugs, which of the following is **NOT CORRECT**? (3 %)
   (A) Oseltamivir inhibits neuraminidases of influenza A and B, blocking viral budding and release.
   (B) Lamivudine inhibits the RNA-dependent DNA polymerase of both cytomegalovirus (CMV) and human papillomavirus (HPV).
   (C) Ritonavir inhibits both HIV aspartyl protease and human CYP3A4.
   (D) Acyclovir targets thymidine kinase & DNA polymerase of herpesvirus.
   (E) Sofosbuvir inhibits the NS5B RNA polymerase of hepatitis C virus (HCV).

3. Mr. Wang, a 56-year-old businessman, has suffered from hunger pain for a year. Serial examinations conclude the diagnosis of duodenal ulcer, with the infection of *Helicobacter pylori*. Which of the following is **NOT CORRECT** about his treatment? (3 %)
   (A) Omeprazole irreversibly inhibits acid secretion of gastric parietal cells by covalently bonding to their H^+, K^+ -ATPases.
   (B) Famotidine reversibly competes with histamine for H_2 receptors.
   (C) Cimetidine may interfere with the effects of testosterone and the metabolism of estradiol to cause gynecomastia and impotence.
   (D) Misoprostol antagonizes the effects of prostaglandin, so its gastric protection effect will be further improved by the concomitant use of non-steroid anti-inflammatory drugs (NSAIDs).
   (E) To prevent the recurrence of duodenal ulcer in the future, Mr. Wang should receive *Helicobacter pylori* eradication using amoxicillin, clarithromycin and a proton-pump inhibitor for two weeks.

4. About drugs for gastroenterological and hepatobiliary disorders, which of the following in **NOT CORRECT**? (3 %)
   (A) Cisapride inhibits serotonin 5-HT_4 receptors to decrease intestinal motility. It also shortens QT interval to prevent fatal ventricular arrhythmia.
   (B) Metoclopramide inhibits dopamine D_2 receptors to increase gastrointestinal motility. It may also induce extrapyramidal symptoms.
   (C) Anticholinergic agents reduce intestinal spasm and motility, so it relieves abdominal cramping pain.

見背面

(D) Ursodiol changes the composition of bile-acid pool to resolve gall stones. It is also used in cholestatic liver disease for hepatocyte protection and immune modulation.

(E) The standard initial treatment for inflammatory bowel diseases include mesalamine (5-aminosalicylic acid)-containing regimens.

5. Mr. Chen, a 65-year-old man, has suffered from intermittent cough with hemoptysis for 4 months. Chest x-ray and sputum examination reveal the infection of *Mycobacterium tuberculosis*. About his anti-tuberculosis drugs, which of the following is **NOT CORRECT**? (3 %)

(A) Isoniazid may cause peripheral neuritis, which can be prevented by pyridoxine.

(B) Rifampin targets bacterial DNA-dependent RNA polymerase.

(C) Ethambutol is mainly metabolized in liver, so it may cause hyperuricemia if Mr. Chen has hepatic failure.

(D) Isoniazid is activated by mycobacterial catalase-peroxidase (KatG) and metabolized by human N-acetyltransferase type 2 (NAT2).

(E) In most cases, Mr. Chen needs to receive the combination of anti-tuberculosis drugs for 6 months or more.

6. About sedatives and anxiolytics, which of the following is **NOT CORRECT**? (3 %)

(A) Zolpidem, Phenobarbital and Alprazolam all facilitate the opening of the $GABA_A$ receptor, which is a Cl^- channel.

(B) Flumazenil is a neutral antagonist of $GABA_A$ receptors, so it reverses the effect of phenobarbital and picrotoxin.

(C) Once absorbed after oral intake, Diazepam is rapidly re-distributed to adipose tissue. That explains why Diazepam has some residual effect after the intended sedative or hypnotic effect is gone.

(D) Unlike benzodiazepines, barbiturates intoxication may cause renal failure.

(E) When Venlafaxine is prescribed for the general anxiety disorder, it takes several weeks to be effective.

7. Which of the following is **NOT CORRECT**? (2%)

(A) Buspirone acts as a 5-$HT1_A$ agonist and D_2 antagonist.

(B) Ondansetron acts as a 5-HT_3 receptor antagonist.

(C) Aprepitant acts as an NK_1 receptor antagonist.

(D) Ramelteon acts as an orexin receptor antagonist.

二、請簡述下列藥物的適應症及作用機轉 (10%)

1. Spironolactone (2%)
2. Tiotropium (2%)
3. Formoterol (2%)
4. Adalimumab (2%)
5. Colchicine (2%)

接次頁

國立臺灣大學 105 學年度碩士班招生考試試題

三、問答題 (70%)

1. 中樞神經系統中，glutamate 及 GABA 分別是最重要的興奮性及抑制性 neurotransmitter，試述此二種 neurotransmitter 的作用機轉。(5%)

2. 試述 Aspirin 為何不適用於痛風病人之消炎止痛? (5%)

3. 請敘述以下藥物作用的藥理機轉。(20%)
   (1) Digoxin 治療心衰竭的作用機制 (4%)
   (2) Angiotensin converting enzyme inhibitor (ACEI) (4%)
   (3) Sulfonylurea 治療糖尿病的機制 (4%)
   (4) Statin 治療高膽固醇血症的作用機轉 (4%)
   (5) Salbutamol (支氣管擴張劑)治療氣喘的作用機轉 (4%)

4. 幹細胞被運用在「再生醫學」上已有許多的臨床試驗正在進行，請比較幹細胞療法與藥物治療的優缺點。(3 %)

5. 有一病患因細菌感染，醫生原本開出 sulfamethoxazole 加以治療，但得知病患為 Glucose-6-phosphate dehydrogenase deficiency，所以改以替代藥物治療，試闡述其原因。(4%)

6. 美國 FDA 規定所有穀類食品必須添加葉酸，防止缺乏而引起貧血，但自 1998 年起，規定上述穀類食品葉酸之添加量上限值為 1 mg。試闡述其理由。(5%)

7. 有一小鎮阿嬤，平日就有服用 Warfarin 以預防血栓，但近日衛生所健康檢查，發現阿嬤有高血脂的狀況，其中總中膽固醇 (TC) : 280 mg/dl，三酸甘油脂 (TG) : 150 mg/dl，於是醫師就先幫阿嬤開了 Sinty® (Simvastatin) 膜衣錠加以治療，處方簽在藥局領藥時，藥師發現阿嬤平日就有服用 Warfarin，於是建議醫師改用 Mevalotin®（Pravastatin）取代 Sinty®。請問為什麼需要這樣做? 並請敘述相關藥物作用機轉? (8 %)

8. The development of anticancer drugs derives from chemotherapy, molecular-targeted therapy to immunotherapy. For chemotherapeutic drugs, please indicate the action mechanism, therapeutic use and side effect of cyclophosphamide and doxorubicin. For molecular-targeted therapy, please elaborate the role of EGFR pathway and related drugs for cancer therapeutics. (20%)

試題隨卷繳回