

**The answer keys for the self-assessment:**

- 1) Which of the following factors may play a role in the inter-individual differences that we see in drug response?**
- A) Age
  - B) Gender
  - C) Body mass
  - D) Physiological status/disease status
  - E) Environmental factors
  - F) Genetic factors
  - G) All of the above**
- 2) According to an article published in JAMA, approximately ..... cases of fatal adverse drug reaction occurs annually in the USA.**
- A) 1,000
  - B) 10,000
  - C) 100,000**
  - D) 1000,000
- 3) Many different classes of drugs are used in the treatment of hypertension. However many of these drugs do not work, or show a wide degree of variability in efficacy. The reasons are:**
- A) Hypertension is a polygenic disease
  - B) Environmental factors and modulators can result in variability in drug response.
  - C) Both statements are true.**
- 4) The coding region of the gene is located within**
- A) Exon**
  - B) Intron
- 5) Genetic variability affecting medications can be found in**
- A) Pharmacokinetics pathways
  - B) Pharmacodynamic pathways
  - C) Signal transduction pathways
  - D) All of the above**
- 6) Which of the following enzymes is not a phase I drug metabolism enzyme?**
- A) CYP2C9
  - B) CYP2D6
  - C) NAT-2**
  - D) CYP2C19

7) Which of the following enzymes is not a phase II drug metabolism enzyme?

- A) TMPT
- B) CYP2D6**
- C) NAT-2
- D) UGT1A1

8) Which of the following genotypes is a slow metabolizer for warfarin?

- A) CYP2C9 \*1/\*2
- B) CYP2C9 \*3/\*3**
- C) CYP2C9 \*1/\*1
- D) All of the above

9) Which of the following polymorphic enzymes play a major role in the metabolism of omeprazole?

- A) CYP2D6
- B) CYP2C9
- C) CYP2C19**
- D) TPMT

10) Which of the following polymorphic enzymes play a major role in the metabolism of tolbutamide?

- A) CYP2D6
- B) CYP2C9**
- C) CYP2C19
- D) TPMT

11) In peptic ulcer therapy, the cure rate is higher for patients who are ..... for omeprazole.

- A) slow metabolizers**
- B) normal metabolizers

12) The prevalence of CYP2C19\*2 and CYP2C19\*3 are higher in Asians than in Caucasians. Therefore at the present time, it seems that testing *CYP2C19* is more cost effective in the Asian population. This example highlights the importance of ethnicity in genetic population.

- A) True**
- B) False

13) The ratio of debrisoquine/4-hydroxydebrisoquine concentration (parent drug/metabolite ratio) is higher in plasma of the individuals who are ..... for CYP2D6.

- A) **slow metabolizer**
- B) rapid metabolizer
- C) ultra-rapid metabolizer

14) Ultra-rapid CYP2D6 metabolizers will require ..... for in order to demonstrate an effective therapy

- A) a reduced dose of nortriptyline
- B) **a substantially increased dose of nortriptyline**

15) Codeine does not work in individuals who

- A) are CYP2D6 ultra-rapid metabolizer
- B) **have zero or near zero CYP2D6 enzyme activity**

16) Which of the following polymorphic enzymes plays a major role in the metabolism of isonizid?

- A) TMPT
- B) CYP2D6
- C) **NAT-2**
- D) UGT1A1

17) Which of the following polymorphic enzymes plays a major role in the metabolism of 6-MP?

- A) **TMPT**
- B) CYP2D6
- C) NAT-2
- D) UGT1A1

18) G-6PD deficient patients are allergic to certain type of drugs such as anti-malarial drugs.

- A) **True**
- B) False

19) Many asthmatic patients respond poorly to beta-2 agonist drugs. One reason could be due to the genetic variability in the beta-2 receptor gene and receptor structure.

A) True

B) False

20) P-glycoprotein transporter is found in the

A) Gut

B) Brain

C) Kidney

D) Liver

E) Placenta

F) All of the above

21) Inactivating variations are reported in which of the following receptors which can be a source of genetic variability in drug response:

A) Androgen receptor

B) Estrogen receptor

C) Vitamin D receptor

D) Glucocorticoid receptor

E) All of the above

22) Which of the following methods may be used to reduce adverse drug effects?

A) Therapeutic drug monitoring

B) Surrogate markers such as liver function test and INR

C) Genetic testing

D) Functional tests such as debrisoquine test

E) All of the above

23) Ethical issues surrounding genetic testing include

A) Medico-legal issues

B) Insurance and costs

C) Public reactions including anxiety

D) Government responsibility

E) Scientist and medical professional responsibility

F) All of the above

24) Which of the following alleles is a normal allele version of CYP2D6 gene?

- A) CYP2D6\*1
- B) CYP2D6\*3
- C) CYP2D6\*5
- D) CYP2D6\*6

25) Which of the following alleles is a normal allele version for CYP2C9 gene?

- A) CYP2C9\*1
- B) CYP2C9\*2
- C) CYP2C9\*3
- D) CYP2C9\*4

26) Which of the following alleles is a normal allele version for CYP2C19 gene?

- A) CYP2C19\*1
- B) CYP2C19\*4
- C) CYP2C19\*3
- D) CYP2C19\*2

27) Which of the following alleles is a normal allele version for NAT2 gene?

- A) NAT2\*1
- B) NAT2\*2
- C) NAT2\*3
- D) NAT2\*4

28) Which of the following genotypes is a homozygote?

- A) CYP2C9\*1/\*2
- B) CYP2D6\*2/\*4
- C) NAT2\*1/\*4
- D) CYP2C19\*3/\*3

29) Which of the following genotypes is a heterozygote?

- A) CYP2C9\*2/\*2
- B) CYP2D6\*1/\*1
- C) NAT2\*4/\*4
- D) CYP2C19\*2/\*3

30) Haplotype is a number of SNPs or DNA variations on the same gene on the same chromosome.

- A) True
- B) False