

## Appendix C

### Anticoagulation Test

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1. All of the following conditions can lead to circulatory stasis EXCEPT:
- a) Atrial fibrillation
  - b) Congestive heart failure
  - c) Hypervolemia
  - d) Venous obstruction

**Answer: C Hypovolemia, not Hypervolemia, can lead to circulatory stasis**

2. All of the following are hypercoaguable states EXCEPT:
- a) Anti-thrombin deficiency
  - b) Malignancy
  - c) Pregnancy
  - d) Varicose veins

**Answer: D Varicose veins are associated with circulatory stasis.**

3. Which of the following best describes warfarin's mechanism of action?
- a) Reduces platelet aggregation
  - b) Reduces the production of vitamin K
  - c) Reduces the conversion of vitamin K to the active form
  - d) Reduces vitamin K's action on clotting factors

**Answer: C Warfarin interferes with interconversion of oxidized vitamin K to the active form of vitamin K and as a result there is not enough active vitamin K to produce functioning clotting factors.**

4. All of the following are vitamin K dependent clotting factors:
- a) II, III, VII and X
  - b) II, VII, IX and X
  - c) II, VII, X and XIII
  - d) III, VIII, IX and X

**Answer: B Vitamin K clotting factors are II, VII, IX and X**

5. How long does it take warfarin to exert its full effect?

- a) 2-4 days
- b) 3-5 days
- c) 4-6 days
- d) 5-7 days

**Answer: D It takes warfarin 5-7 days to exert its full effect.**

6. Which of the following statements related to the International Normalized Ratio (INR) is CORRECT?

- a) It measures the time for a clot to form
- b) It is a mathematical correction that normalizes the Prothrombin Time (PT)
- c) Variance in the result is minimal from laboratory to laboratory
- d) Reagents used to determine the measurement are standard

**Answer: B INR is a mathematical correction that normalizes the Prothrombin Time (PT) by adjusting for the sensitivity of different thromboplastins. PT measures the time for a clot to form. There is often some variance in INR from laboratory to laboratory. Reagents used to determine the measurement vary.**

7. What is the recommended therapeutic INR range for a patient with a mechanical mitral valve?

- a) 1.5-2.5
- b) 2.0-3.0
- c) 2.5-3.5
- d) 3.5-4.5

**Answer: C 2.5 to 3-5**

8. What is the recommended therapeutic INR range for a patient with a proximal DVT?

- a) 1.5-2.5
- b) 2.0-3.0
- c) 2.5-3.5
- d) 3.5-4.5

**Answer: B 2.0-3.0**

9. Which of the following statements related to the use of vitamin K for reversal of supratherapeutic INRs is CORRECT?

- a) The effects of administration can take up to 24 hours to reverse the INR
- b) The goal is to reduce the INR to the normal range
- c) Subcutaneous administration of vitamin K is contraindicated
- d) Low doses can cause INR resistance

**Answer A: The goal is to reduce the INR to the therapeutic range. IM administration is contraindicated. High doses of vitamin K can cause INR resistance.**

10. All of the following are signs and symptoms of stroke EXCEPT:

- a) Dizziness
- b) Trouble speaking
- c) Weakness
- d) Vomiting

**Answer: D Vomiting is not a common sign of stroke.**

11. All of the following are factors that predispose a patient to hemorrhage on warfarin therapy EXCEPT:

- a) Controlled hypertension
- b) Concomitant use of antiplatelet agents
- c) Older than 65 years
- d) Peptic ulcer disease

**Answer: A Uncontrolled, not Controlled, hypertension is a factor that predisposes a patient to hemorrhage on warfarin therapy.**

12. All of the following medical conditions may impact warfarin's action resulting in an elevated INR except?

- a) Exacerbation of congestive heart failure
- b) Hypothyroidism
- c) Liver disease
- d) Fever

**Answer: B Hyperthyroidism, not Hypothyroidism, may cause an increase in warfarin's effect due to catabolism of clotting factors.**

13. When levofloxacin is added to warfarin therapy, the INR \_\_\_\_.
- a) Increases
  - b) Decreases
  - c) Does not change

**Answer: A Levofloxacin can increase the INR**

14. When ASA 325 mg is added to warfarin therapy, the INR \_\_\_\_.
- a) Increases
  - b) Decreases
  - c) Does not change

**Answer: C ASA does not alter the INR but enhances the patient's risk of bleeding**

15. When St. John's Wort is added to warfarin therapy, the INR \_\_\_\_.
- a) Increases
  - b) Decreases
  - c) Does not change

**Answer: B St. John's Wort decreases the INR by inducing the metabolism of CYP450**

16. John is a 60 years old and is taking warfarin for AF. His usual dose is 5 mg daily. His INR today is 5.5. He reports no unusual bruising or bleeding. He has no risk factors for bleeding. What action is most suitable for John?
- a) Hold warfarin for 1 to 2 days and resume at a lower dose
  - b) Hold warfarin and administer vitamin K 1-2.5 mg po
  - c) Hold warfarin and administer vitamin K 2-5mg po
  - d) Hold warfarin and advise to go to the Emergency Room

**Answer: A Since the patient does not have any risk factors for bleeding and has no bleeding complications, it is reasonable to hold warfarin for 1 to 2 days and resume at a lower dose.**

17. Marie takes warfarin 6 mg daily for a previous DVT. Her last 4 INRs are 2.3, 2.5, 2.5, 2.8 (last month). There have been no changes in diet, medications, lifestyle or exercise. Today the INR is 3.6. Based on the INR, which option is the most suitable recommendation?
- a) Decrease dose to 5 mg on T and Th and 6 mg on other days
  - b) Hold one dose, decrease dose to 5 mg on M, W, F and 6 mg on others
  - c) Hold one dose and reduce dose to 5 mg daily
  - d) Increase dose to 7 mg daily

**Answer: C Based the dosing algorithm it is reasonable to hold one dose and reduce the weekly dose by 10 to 15% (reduce to 5mg/day)**

18. Peter takes warfarin 2.5 mg daily for atrial fibrillation. His last 4 INRs done every 2 weeks are 2.1, 2.2, 2.0 and 2.1. There have been no changes in diet, medications, lifestyle or exercise. Today the INR is 1.7.

Based on the INR, which option is the most suitable recommendation?

- a) 5 mg today and increase dose to 3 mg daily
- b) Increase dose to 3 mg daily
- c) Increase dose to 3 mg on M, W, F and 2.5 mg on other days
- d) Decrease dose to 2 mg daily

**Answer: B Based on the dosing algorithm it is reasonable to increase the weekly dose by 5 to 15% (3mg/day)**

19. Elizabeth is concerned about her diet since reading product information on warfarin. Which of the following statements are **CORRECT** related to diet recommendations for patient taking warfarin.

- a) Try to eliminate green leafy, vegetables from your diet.
- b) The addition of more green leafy, vegetables to your diet may increase your INR.
- c) Warfarin should not be taken at the same time as a meal with green leafy vegetables
- d) None of the above

**Answer: D When taking warfarin, the intake of green leafy vegetable should be consistent.**

20. Marty has been on warfarin 7 mg daily for atrial fibrillation. He just returned from vacation and his INR today is 3.6. In your discussion with Marty you discover the following:

- \* Marty continued to take his warfarin daily but changed his dose to the morning.
- \* His diet changed while on vacation. He usually eats a large quantity of fruits and vegetables but on vacation he primarily ate meat, potatoes and fish.
- \* He drank more alcohol; approximately 4 beer per day compared to his usual 2 beers per week.
- + He was more active; hiking and snorkeling.

Which factor most likely contributed most to Marty's INR changes:

- a) Dose of warfarin
- b) Diet
- c) Alcohol intake
- d) b and c, decrease in vitamin K content of food and changes in alcohol intake.

**Answer: C** Marty's alcohol intake most likely contributed to his INR changes since while chronic use of alcohol increases metabolism of warfarin, acute (binge) alcohol consumption, as in the case of Marty, can reduce warfarin metabolism.