11.4 Cardiovascular and renal drugs

Name: _____ Class: _____ Date: _____ **Total: 24 marks**

KEY WORDS diuretic • anticoagulant

Objective

Mechanisms to pressures; sites to electrolytes; monitors to anticoagulants.

1 Key knowledge and worked examples

■ Steps and sites

Antihypertensives: volume (diuretics), ACE inhibitors (bradykinin cough), ARBs, CCBs, $\beta 1$ blockers ✓. Diuretic sites: loop (Na^+-K^+-$2Cl^-$, ~25 % Na^+), thiazide (distal), K-sparing (collecting duct) ✓.

■ Worked example: monitors

Heparin immediate → aPTT; warfarin blocks NEW factor carboxylation → INR after days of factor decay ✓; DOACs: one factor, predictable.

2 Practice

2.1 Which antihypertensive class causes a dry bradykinin cough? [3]

2.2 Which nephron segment does the thiazide act on? [3]

2.3 Which test monitors warfarin? [3]

3 Exam-style questions

3.1 Three illustrative diuretics at their sites: loop, thiazide, K-sparing.

For each, state the transport target and rank the Na^+ effect (loop ~25 % > thiazide > K-sparing) ✓. Predict the electrolyte fingerprint of the loop agent (K^+ loss, Ca^{2+} loss via downstream flow) versus the K-sparing agent (K^+ retained) ✓. [8]

3.2 A fictional patient on warfarin starts an illustrative course of an enzyme-inhibiting antibiotic; a second starts an enzyme inducer.

Predict each INR direction (inhibitor → INR rises; inducer → INR falls) with the kinetic reason (substrate cleared slower vs faster) ✓. Explain why warfarin's onset lags days regardless (stored factors must decay; it blocks carboxylation of NEW factors) ✓. [7]

Solutions

2.1

- ACE inhibitors – bradykinin not degraded ✓.

2.2

- The distal convoluted tubule (Na^+-Cl^-) ✓.

2.3

- The INR (prothrombin effect, not dose) ✓.

3.1

- Loop: Na^+-K^+-$2Cl^-$ in the thick ascending limb, ~25 % of Na^+ – strongest ✓.
- Thiazide: Na^+-Cl^- distal – gentler ✓.
- K-sparing: collecting duct – mildest ✓.
- Loop fingerprint: K^+ and Ca^{2+} lost with the flow ✓.
- K-sparing: K^+ retained ✓.

3.2

- Inhibitor: warfarin cleared slower → INR rises ✓.
- Inducer: faster clearance → INR falls ✓.
- Onset lag: existing factors circulate until they decay – warfarin blocks only NEW synthesis ✓.
- Monitoring interval follows interaction risk ✓.