10.5 Cardiovascular and respiratory pathology

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

KEY WORDS atherosclerosis • troponin

Objective

Read the plaque, the marker clock and the spirometry ratio.

1 Key knowledge and worked examples

■ Plaque to infarct

Injury → LDL → fatty streak → fibrolipid plaque → rupture → thrombosis → infarction ✓. Risk lives in the thin cap. Troponin: rises 3–4 h, stays ~7–10 days; CK-MB ~1–3 days.

■ Worked example: the ratio

FEV1 1.6 / FVC 4.0 = 0.40 < 0.70 → obstructive; FEV1 1.8 / FVC 2.0 = 0.90 with both low → restrictive ✓. Obstruction traps air; restriction shrinks both.

2 Practice

2.1 The earliest visible atherosclerotic lesion? [3]

2.2 Troponin timeline after infarction? [3]

2.3 Give the obstructive ratio threshold. [3]

3 Exam-style questions

3.1 A fictional chest-pain series: pain at 2 h (troponin normal), repeat at 6 h (troponin raised).

Explain the 2 h result (below the 3–4 h rise window) and the 6 h rise ✓. State which marker separates a SECOND event two days later (CK-MB, already fallen and rises again; troponin still elevated from the first) ✓. Give the infarct's necrosis pattern with reasoning (coagulative, solid organ) ✓. [8]

3.2 A fictional spirometry set: patient A FEV1 1.6 L, FVC 4.0 L; patient B FEV1 1.8 L, FVC 2.0 L.

Compute both ratios (0.40; 0.90) and classify (obstructive – air trapping; restrictive – both volumes shrunk) ✓. Explain the mechanism chain for emphysema's low ratio (alveolar walls destroyed, recoil falls, airways collapse on expiration) ✓. [7]

Solutions

2.1

- The fatty streak – foam cells in the intima ✓.

2.2

- Rises 3–4 h after injury, stays elevated ~7–10 days ✓.

2.3

- FEV1/FVC < 0.70 ✓.

3.1

- 2 h: before the 3–4 h rise window – a normal value does not exclude; repeat ✓.
- 6 h: troponin raised – myocyte death confirmed ✓.
- Second event at day 2: CK-MB (1–3 day curve) rises again while troponin still rides the first ✓.
- Pattern: coagulative – solid organ, slow proteolysis keeps outlines ✓.

3.2

- A: $1.6/4.0 = 0.40 \rightarrow$ obstructive ✓.
- B: $1.8/2.0 = 0.90$, both low $\rightarrow$ restrictive ✓.
- Emphysema: alveolar walls destroyed $\rightarrow$ elastic recoil falls $\rightarrow$ airways collapse on expiration $\rightarrow$ FEV1 collapses more than FVC ✓.