11.6 CNS drugs and analgesia

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

KEY WORDS tolerance • dependence

Objective

Match drug to site; explain tolerance and dependence.

1 Key knowledge and worked examples

■ **Sites**

NSAID at peripheral COX (gastric, renal cost); opioid at μ (respiratory depression, constipation); benzodiazepine GABA-A PAM; SSRI reuptake blocked, effect in weeks ✓.

■ **Worked example: adaptation**

Tolerance = down-regulation (same concentration, less effect); dependence = withdrawal unmasks the adapted state ✓. WHO ladder 1986/1996 named as the classic framework.

2 Practice

2.1 Which opioid effect barely tolerises? [3]

2.2 Why do SSRIs take weeks despite immediate reuptake blockade? [3]

2.3 Name the enzyme NSAIDs block and its two isoforms. [3]

3 Exam-style questions

3.1 Three fictional pains: prostaglandin-mediated inflammation; severe post-operative pain; neuropathic burning.

Match each to its first-line mechanism site (peripheral COX; μ receptor; neuronal excitability agents) with one cost named for the first two (gastric; respiratory) ✓. Explain why combinations from different sites add ✓. [8]

3.2 A fictional patient on long-term benzodiazepines stops abruptly.

Explain what tolerance was (receptor adaptation: same dose, less effect), what dependence is (the adapted state uncovered by withdrawal), and why the course is kept short by design ✓. Contrast the paracetamol overdose mechanism (glutathione saturated; metabolite binds liver protein – MED10) as a dose-related toxicity instead ✓. [7]

Solutions

2.1

- Constipation – the μ effect that hardly tolerises ✓.

2.2

- Clinical effect needs receptor adaptation, not just the block ✓.

2.3

- Cyclo-oxygenase: COX-1 (housekeeping) and COX-2 (inflammatory) ✓.

3.1

- Inflammation: NSAID at peripheral COX – gastric cost ✓.
- Post-operative: opioid at μ – respiratory price ✓.
- Neuropathic: agents on neuronal excitability – neither site alone ✓.
- Different sites → additive without overlapping toxicity ✓.

3.2

- Tolerance: down-regulation – same concentration does less ✓.
- Dependence: withdrawal unmasks the adapted state ✓.
- Short courses by design limit the adaptation ✓.
- Paracetamol: dose-related – glutathione saturated, liver protein bound (MED10 necrosis) ✓.

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