

4.3 Muscle and nervous tissue

Name: _____ Class: _____ Date: _____

Total: 24 marks

KEY WORDS sarcomere

Objective

Identify the three muscle types and read the sarcomere's banding as the contraction mechanism.

1 Key knowledge and worked examples

■ Fingerprints

Skeletal: striated, peripheral nuclei. Cardiac: striated, branched, intercalated discs.
Smooth: unstriated spindles.

■ Worked example: the bands

A-band (myosin) CONSTANT; I-band and H-zone narrow; filaments never shorten
✓ – the slide shows the sliding-filament model.

2 Practice

2.1 Which structure joins cardiac cells electrically and mechanically? [3]

2.2 In contraction, what happens to the A-band? [3]

2.3 Which cell type myelinates CNS axons? [3]

3 Exam-style questions

3.1 Identify each: (a) long parallel fibres, striated, nuclei at the periphery; (b) branched striated cells with dark cross-lines; (c) spindle cells, no striations, single central nuclei.

Name each tissue and its control (voluntary/involuntary). State one location for each. [8]

3.2 A nerve biopsy shows onion-bulb formations (fictional progressive weakness).

State what the onion bulbs are (concentric Schwann processes). Explain what they imply (repeated de/remyelination). State why a primary neuron disease would look different. [7]

Solutions

2.1

- Intercalated discs.

2.2

- Nothing – it stays constant (myosin's full length).

2.3

- Oligodendrocytes (CNS); Schwann cells peripherally.

3.1

- (a) Skeletal – voluntary; e.g. quadriceps.
- (b) Cardiac – involuntary; myocardium.
- (c) Smooth – involuntary; e.g. intestine.
- Consistent pairing of fingerprint with control and site.

3.2

- Concentric wraps of Schwann-cell processes around a thinly myelinated axon.
- Cycles of demyelination and remyelination have recurred.
- A neuron (axonal) disease would show fibre loss, not circumferential glial proliferation.