6.3 SKELETAL MUSCLE

Structure

- Sarcomere – unit of muscle
  - Z-line – boundary of sarcomere
- Actin (thin) and myosin (thick) protein filaments
  - I-band – length of actin filament
  - Lighter than the A-band
  - A-band – length of myosin filament
  - Darker due to overlap of filaments
  - H-zone – in the centre of the A-band
  - Myosin heads
- Muscle contains bundles of muscle fibres
  - Myofibrils consist of sarcomeres
  - Muscle fibres contain many myofibrils
  - Sarcoplasm around muscle fibres
  - Contains mitochondria and endoplasmic reticulum
  - Skeletal muscle is responsible for voluntary movement of the skeleton

Muscle fibres

- Fast twitch
  - Strong, fast contractions for a short period of time
  - Phosphocreatine to generate ATP rapidly
  - Glycogen
  - Thicker myosin filaments
  - E.g. bicep
- Slow twitch
  - Slow, sustained contractions
  - Calf and back muscles
  - Aerobic respiration
  - Store of myoglobin to provide oxygen
  - Mitochondria

Muscle contraction

- Motor unit = group of muscle fibres supplied by a single motor neurone
- Neuromuscular junction
- Action potential enters T-tubules
- Release of calcium ions into sarcoplasm
- Calcium binds to tropomyosin
- Uncovers actin binding sites
- Myosin heads bind to actin
- Cross-bridge formation
- Myosin heads pull on actin
- ADP released
- ATP molecule attaches to myosin head
- Myosin head detaches from actin
- ATPase hydrolyses ATP to ADP
- Releases energy
- Calcium ions activate ATPase
- Sliding filament mechanism
  - Actin slides past myosin
  - Myosin head returns to original position, cycle repeats
- Sarcomeres shorten

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