STRUCTURE OF SKELETAL MUSCLES

EPIMYSIUM

The muscle is covered in a layer of connective muscle tissue known as the epimysium.

The epimysium protects the muscle from friction against other muscles and bones. It also continues at the end of the muscle to form (along with other connective tissues) the muscle tendon.

MUSCLE BUNDLES / FASCICULI

The skeletal muscles consist of muscle bundles called fasciculi.

PERIMYSIUM

The Fasciculi are surrounded by another connective tissue called the perimysium.

MUSCLE FIBRES

The muscle bundles are composed of huge elongated cells called muscle fibres. Each muscle bundle or contains anywhere between 10 and 100 muscle fibres, depending on the muscle in question. The muscle fibres are cylindrical, unbranched and with a diameter of 10- 100 um.

ENDOMYSIUM

Each Muscle fibre is covered in a fibrous connective tissue, known as endomysium which insulates each muscle fibre.

SARCOLEMMA

Beneath the endomysium and surrounding the muscle fibre is the sarcolemma which is the fibre's cell membrane.

SARCOPLASM

Beneath the sarcolemma is the sarcoplasm which is the cytoplasm, a gelatinous fluid which fills most cells. Sarcoplasm is a semi fluid matrix containing many nuclei and a large number of mitochondria. The nuclei are located near the periphery of each fibre.

PRODUCTION OF ENERGY

Sarcoplasm contains glycogen and fats for energy and also mitochondria which are cell's power houses, inside which the cell's energy is produced.

MYOFIBRILS

Each muscle fibre itself contains cylindrical organelles known as myofibrils, which are 1-2 μm in diameter. Each muscle fibre contains hundreds to thousands of myofibrils. These are bundles of actin and myosin proteins which run the length of the muscle fibre and are important in muscle contraction.

SARCOPLASMIC RETICULUM

Surrounding the myofibril there is a network of tubules and channels called the Sarcoplasmic reticulum in which calcium is stored which is important in muscle contraction.

TRANSVERSE TUBULES

Transverse Tubules pass inwards from the sarcolemma throughout the myofibril, through which nerve impulses travel.

The sarcolemma of muscle cell penetrates deep into the cell to form hollow elongated tube, the transverse tubule, T-tubule. The lumen of which is continuous with the extracellular fluid. The T-tubule and terminal portion of the adjacent envelope of sarcoplasmic reticulum form triads at regular intervals along the length of the fibril.

The nerve impulse is carried through the T-tubule to the adjacent sarcoplasmic reticulum.

'STRIPED' APPEARANCE

Each myofibril has alternate light and dark bands, which give the fibre its 'striped' appearance. It is because of this, that the skeletal muscles are also called striated or striped muscles.

SACROMERE

Each myofibril can be broken down into functional repeating segments called sacromeres. In each sacromere a series of dark and light bands are evident along the length of each myofibril.

A BAND (ANISOTROPIC)

The dark bands are A band (aniesotropic)

I BAND

The light bands are I-band (isotropic)

H-ZONE

Each A-band has a lighter strip in its mid section called H-zone (hele for bright)

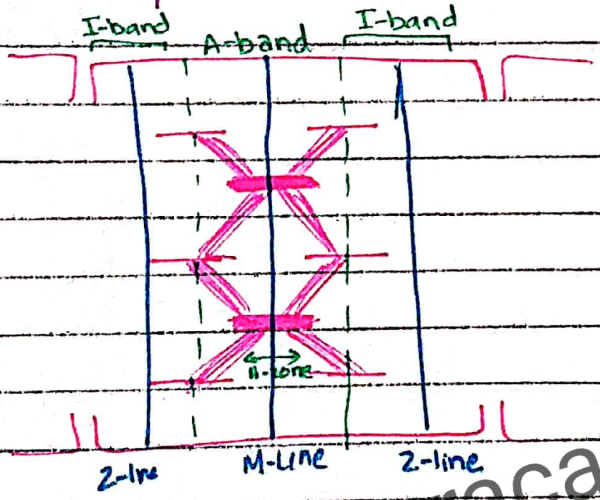
M-LINE

The H-zone is inturn bisected by M-line (medial line)

Z-LINE

The I-band have mid-line called Z-line (zwish meaning between)

A sacromere is the region of a myofibril between two successive Z-line. The sacromere is the functional unit of the contraction process in the muscles.



THICK MYOSIN FILAMENTS

Each myofilament is made up of central thick filament surrounded by thin filament, which are linked together by cross bridges.

The thick filament contains a protein, myosin

THIN ACTIN FILAMENT

Thin filament is composed of protein actin as its main component. Besides

it also has tropomyosin and troponin proteins.

MUSCLE CONTRACTION

The myosin and actin help in contraction of muscles.

CROSS BRIDGES

Thick filament has a tail terminating in two globular heads, which are also called a cross bridges and these links thin and thick filaments during contraction.