

Sports Soft Tissue Injury

by

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What is Soft Tissue?

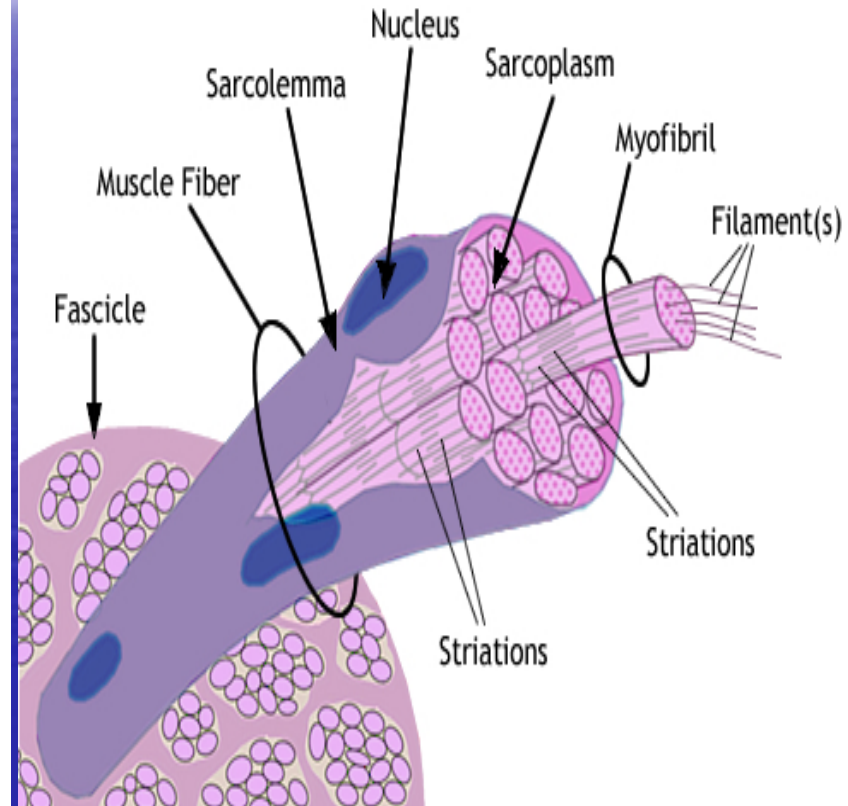
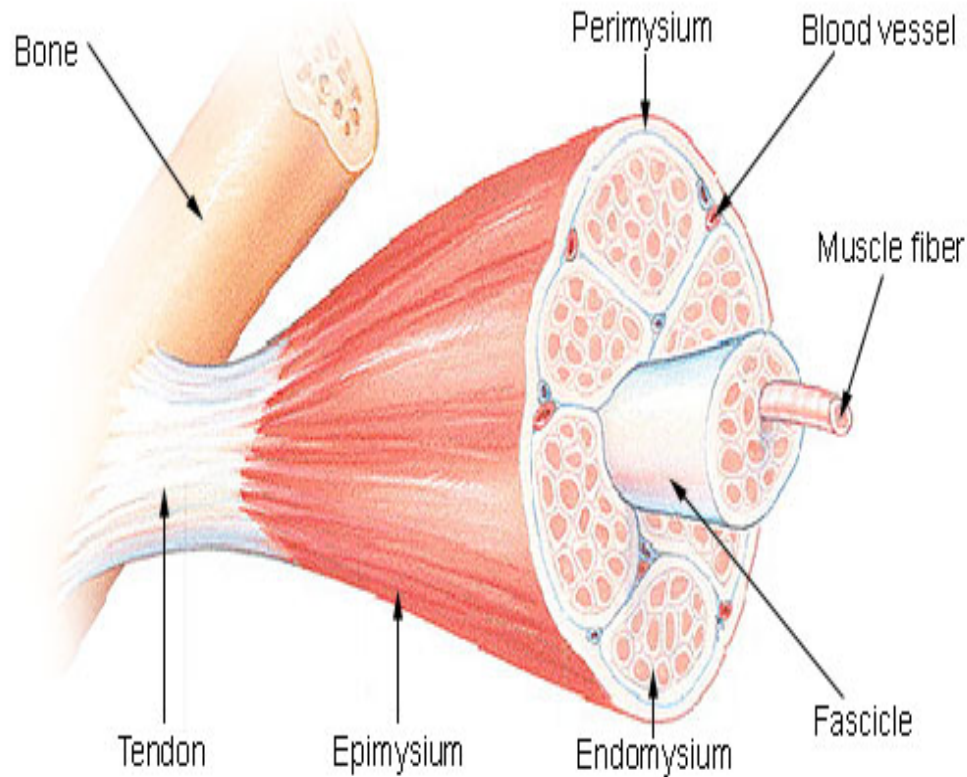
- Skin
- Ligaments – connects bones at joints
- Tendons – attaches muscle to bone
- Fascia – dense connective tissue
- Skeletal Muscle – usually attached to bone and moves parts of the skeleton
- So, tissue that has not hardened into bone and cartilage

What are the Type of Injuries?

- Sprain ligaments are commonly caused by indirect impact, overstretching (twisting)
- Muscle strains – pulling action, over stretching, rupture or direct trauma / overuse. Includes tendons
- Contusions (bruise) – direct blow
- Intramuscular hematoma is confined to the muscle compartment which fills up with blood. Is more painful and restrictive of ROM
- Intermuscular hematoma is when the blood escapes through the fascia and so becomes distributed, thus bruising will be evident

Skeletal Muscle

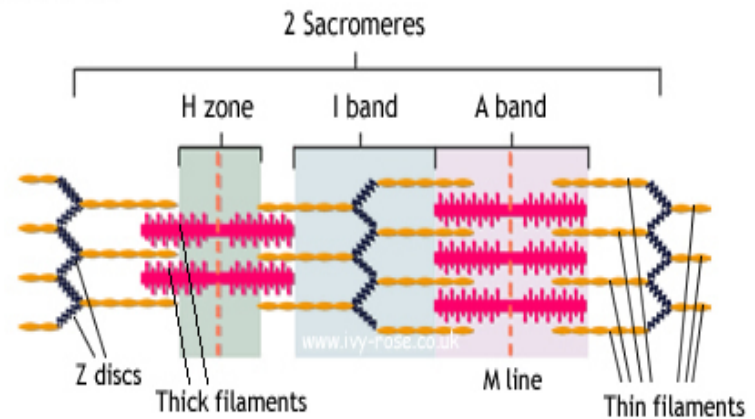
Structure of a Skeletal Muscle



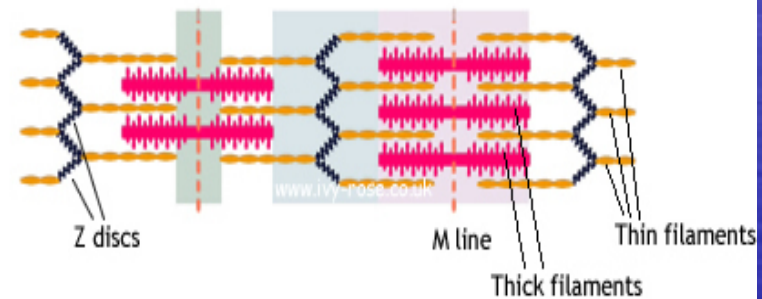
Sliding- Filament Theory

- Muscle cell 'fibre' includes myofibrils which consist of 2 types of protein called thick and thin filaments
- Thick filaments are formed with myosin protein, while thin filaments with actin protein. Both form the main contractile elements of muscle and as a unit is called a sarcomere
- The length of sarcomere is determined by the sliding nature of the thick and thin filaments which overlap

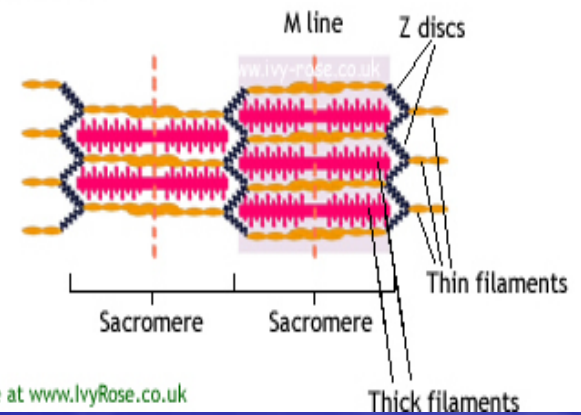
Relaxed Muscle :



Partially Contracted Muscle :



Fully Contracted Muscle :



Muscle

- Arranged to correlate with the power needed
- Grouped in orientation of their fibres – parallel / oblique or pinnate / spiral
- The agonist or prime mover (muscle) brings about movement
- At the same time the antagonist relaxes

Soft Tissue Healing from Injury

- Repairing damaged tissue
- Replaced by granulation tissue, which matures to form scar type tissue
- Phases overlap
- Bleeding / inflammatory / proliferation / remodelling phases

Bleeding Phase

- Bleeding time to stop will vary with the nature of both the injury and tissue
- Short lived 6 – 8 hours (acute stage)
- Reduces up to 24hrs
- Muscles will bleed longer than other structures i.e. ligaments

Inflammatory Phase

- Essential component of tissue repair
- Rapid onset - first few hours
- Quickly increases to maximum 2 – 3 days
- Gradually resolves over next few weeks
- Largely beneficial
- Over response can cause problems

Proliferation Phase

- Generation of the repair material
- Production of scar tissue (collagen material), needs to be laid down in an orientated way
- Rapid onset 24 – 48 hours
- Peaks 2 – 3 weeks / bulk scar tissue
- Final products several months
- Repair tissue is different. Fibres shorter, inelastic and different elasticity, increases risk of recurrence of rupture

Remodelling Phase

- Greatly overlooked phase
- Results in organised / functional scar tissue
- Starts as early as 2 weeks
- Continues for months to a year
- With maturity, the collagen becomes more orientated in line with local stress

Proliferation / Remodelling Phase – Important in Successful Healing

- Collagen fibres need to be orientated to provide tensile strength in the right direction
- Using normal stresses via movement, collagen can be laid down this way
- If not, collagen fibres are laid in haphazard and thus weakened pattern is caused
- With maturity, the collagen becomes even more orientated in line with stress

What Does This Mean for Treatment ?

- Excessive bleeding should be discouraged
- Inflammation is normal and essential, though when acute and continues, can cause problems.
A question re- NSAID'S use
- Early gradual mobilisation (active rest) orientates scar tissue in the line of stress, similar to normal tissue plus early movement helps breaks down adhesions
- Unhelpful adhesions / scar tissue will need direct intervention – Sports massage techniques
- Remodelling is helped by gradual return to full physical stress - rehabilitation programme

Overuse Syndrome / Sports

- Muscular system develops to the way it is used
- Individuals have unique pattern of imbalances
- Bundles of muscle fibres react fractionally in a different way, causing small areas to be under slightly greater pressure than surrounding areas
- A few fibres are damaged at microscopic level
- Causes secondary muscle tension to the surrounding tissue

OVERUSE SYNDROME BEGINS

Overuse Syndrome

- Same as normal tissue response of bleeding / inflammation and formation of scar tissue, yet at a microscopic level
- Secondary muscle micro-tension may cause soreness but no real pain and activity continues as inflammatory response is small
- Moderate activity is helpful at this stage yet further continuous stress prevents recovery
- Adjacent fibres work harder due to micro tissue damage, which is less contractual and stretchy
- More micro trauma / scar tissue occurs so less elasticity and the circle continues

Overuse Syndrome

You are full into overuse syndrome

- As small parts of muscle deteriorate, imbalance in the muscle and the group occurs
- 1 muscle problem then effects different muscle systems. May still be unnoticed !
- Tendon tension increases and may tear (acute)
- Biomechanical faults develop, causing more problems elsewhere in the musculoskeletal system

How to Treat / Stop Overuse Syndrome

- Effective and efficient training, includes correct biomechanics. Be prepared to adapt
- Have rest days (please), vary training
- Use soft tissue massage (STM) techniques to identify and treat problems before any symptoms are recognised
- STM to intervene in soft tissue problem i.e. adhesions / scar tissue

FIND THE CAUSE

Soft Tissue Injury Approach

- Facilitate / promote normal tissue repair
- Immobilization and early mobilization
- Enhance sequence of events
- Promote normality
- Appropriate therapy to influence the process in a positive way
- Intervene if needed i.e. adhesions / infection / overuse syndrome

References

Soft tissue issues

- Anderson, C., et al 2004*
- Fox, S and Pritchard, D., 2004
- Watson, T., 2006 *

Overuse syndrome

- Cash, M., 1996*
- Paine, T., 2007
- Sanderson, M., 2002

Sliding – filament theory

www.ivyrose.co.uk (Accessed April 2008)

Scar / collagen orientation in the lines of stress

- Forrest, L., 1983
- Hardy, M., 1989
- Norris, C., 2004*
- Watson, T., 2006*

NSAID'S

- Braund, R., 2006*
- Stovitz, S and Johnson R., 2003*
- Watson, T., 2006