

## FACTORS INFLUENCING MOBILITY OF A JOINT

### The temperature of the tissues and the efficiency of the warm-up

The warmer a muscle is the more efficiently it will operate reducing the risk of injury.

### The neural receptor system present in all muscles around joints called proprioception

Proprioception is the name given to the collective activity of specialized sensory nerve endings which monitor change within the body due to movement and muscular activity. Put simply, it is the unconscious information collecting and processing system that allows us to close our eyes, stretch out our arm and touch the end of our nose, because the brain is able to coordinate the movement of the limb accurately without needing to see it. Further, it is the system that allows coordination of muscle activity to permit smooth movement of a limb.

### The flexibility of muscles, tendons, ligaments and joint capsules

Muscles are the most flexible tissue stretching easily during movement. Tendons connect muscles to bone and have less flexibility and are frequently a point of injury. Ligaments are inelastic with a poor blood supply making healing following injury a slow process. The function of a ligament is to connect bone to bone stabilising a joint and preventing it dislocating. Lack of flexibility means these structures often rupture rather than stretching. When beginning a new exercise routine, the speed with which these various structures will improve in fitness is directly related to their blood supply and increasing the strength of a muscle too quickly can lead to problems with other joint structures.

### The configuration of articular surfaces

There are a number of different types of joint in the body each characterised by varying degrees of flexibility. Ball and socket joints such as the hip and shoulder are the most flexible. Other joints with varying degrees of movement are gliding or sliding, hinge, pivot, and condyle or saddle.

### Age

Age not only effects the healing process, generally taking longer the older we become, but it can also effect flexibility. In teenagers, bones can grow faster in length than the muscles that move them leading to 'growing pains'. For example Osgood Schlatters disease which can cause pain below the knee and

up the front of the thigh as well as restriction of movement, due to the femur growing more quickly than the quadriceps muscle. In later life restriction may be due to damage or degeneration of a joint such as osteo-arthritis.

### Sex

There are physiological differences between men and women, such as the shape of the pelvis, which can result in differences in flexibility.

### Exercise history

The physiological changes that take place in the body following regular exercise are too numerous to list here. Suffice to say with regular exercise comes greater flexibility and resistance to injury.

### Time of day

Generally the body is less flexible following rest and so we tend to be stiffer in the morning and freer as the day progresses.

### Pregnancy

During pregnancy the body produces a hormone called relaxin which significantly increases the flexibility of soft tissue. The function of this is to allow the pelvis to flex more during childbirth, but it has an effect on all joint structures in the body.

### Psychological factors

Psychological splinting often occurs following injury when fear of further injury or fear of pain restricts movement artificially reducing movement.

## SOFT TISSUE LIMITATIONS

(% of total resistance to movement)

- Muscle and fascia - 41% - these are the only factors that can be significantly affected by warm up and pre-event treatment. Fascia comprises some 30% of total muscle mass

- Tendons - 10%

- Ligaments - 47%

The flexibility of tendons and ligaments can not be significantly affected during the pre-event period.

### WHY WARM UP?

- Increase in muscle temperature
- Increased tissue elasticity allowing greater stretch before tearing
- Small increase in elasticity of tendons and ligaments
- Warms synovial fluid in joints
- Increase in blood supply- at rest 15-20% of blood total blood flow is through the muscles, but during warm up it rises to 70-75%.
- Initiation of aerobic energy cycle
- Improvement of coordination
- Psychological preparation
  - Significant reduction of risk of injury and enhancement of performance

### WHY COOL DOWN?

- Reduce muscle temperature
- Stretch muscles to prevent spasming
- Stretch muscles before they stiffen
- Reduce possibility of delayed onset muscle soreness
- Repay the oxygen debt
- Assist the removal of fatigue and waste products
- Psychological effects
- Significant reduction of risk of injury by removal of areas of tension
- Assists the recovery process