McKenzie Extremity Talk

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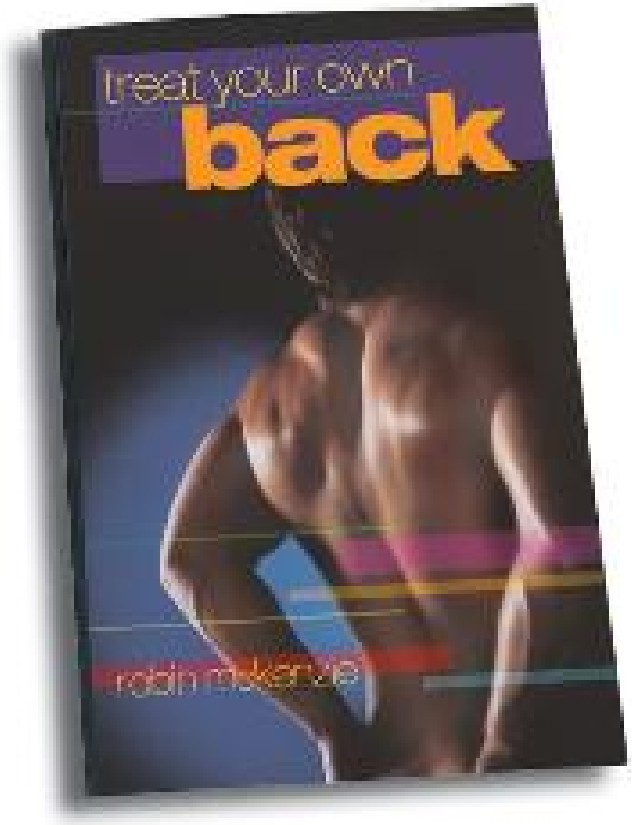
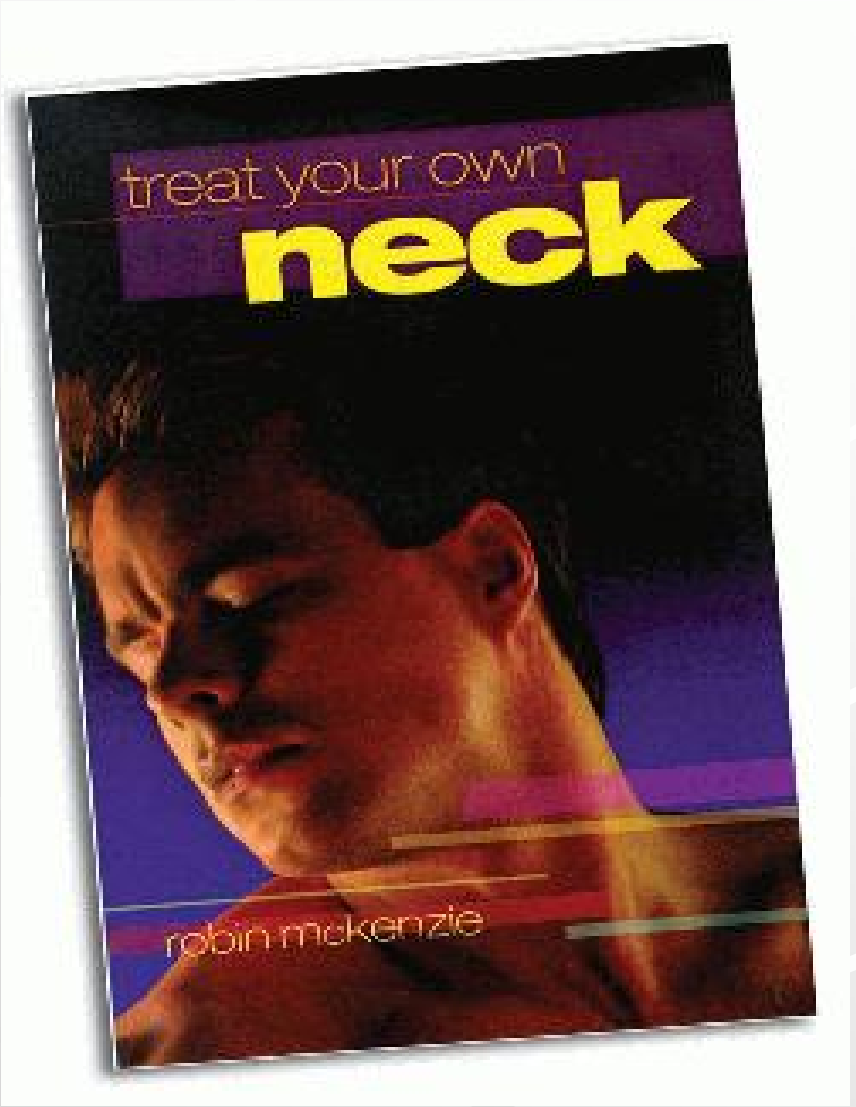
Robin McKenzie

- New Zealand Physical Therapist
- Robin McKenzie was made an Officer of the Most Excellent Order of the British Empire in 1990 and appointed by Her Majesty the Queen in 1999 as a Companion of the New Zealand Order of Merit, both honours in recognition for his services to physiotherapy.
- McKenzie method in treating spines
- McKenzie latest book is on the extremities
- This is a movement based exam and treatment

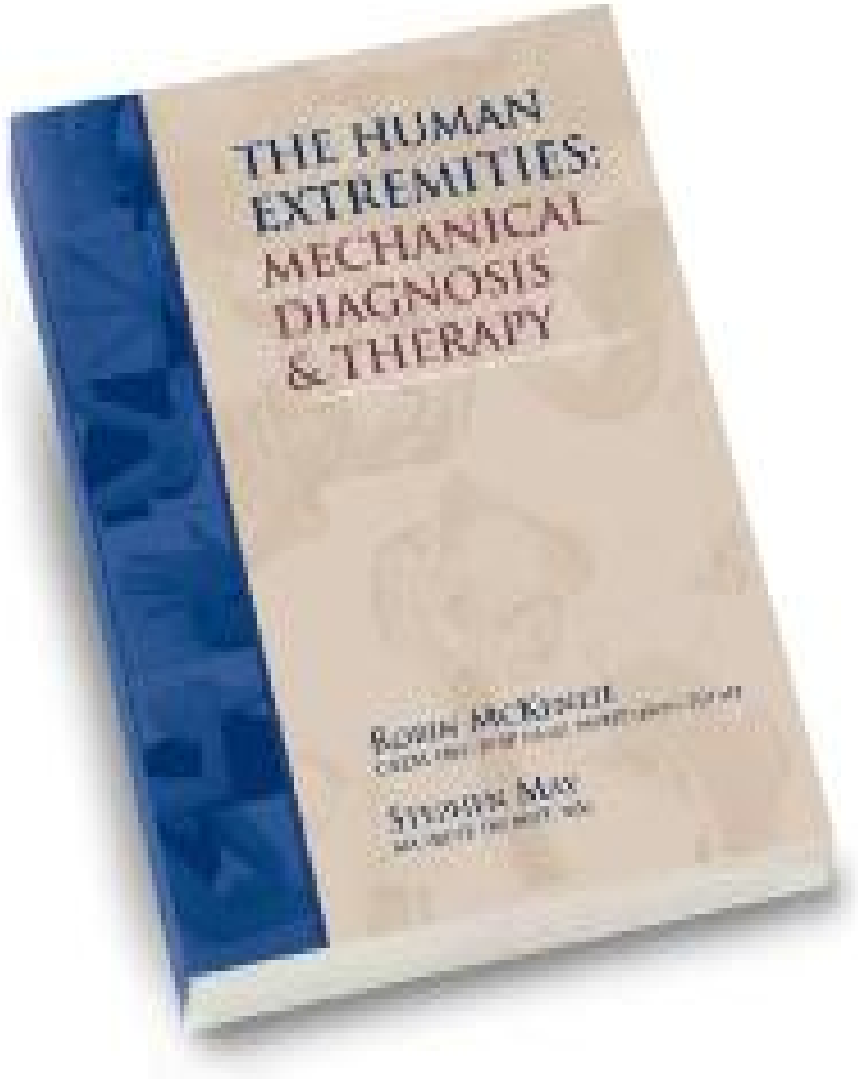
McKenzie Self Help Books





Extremity Book

- Published recently
- Concepts applied to treatment of extremity problems
- Good to read
- Simple to understand
- Effective Treatment



McKenzie System

- Based on repeated motions
- Based on end range loading of tissue
- Based on appropriate/ progressive loading of tissue
- Based on good history taking
- Based on good observations
- Is logical if you understand basis concepts and concepts of tissue healing
- **Is a movement based system – is a mechanical based system**
- Is involved in treating movement based problems
  - Sprained ankles ; painful shoulders ; knee pain and dysfunctions ; can be used for acute or chronic problems
  - Used world wide
  - Has changed my practice a lot

Mechanical Pain

- Mechanical Pain
  - Intermittent
  - Due to abnormal tissue load or stress
  - Due to tissue deformation
  - May be derangement
  - May be dysfunction
  - May be postural
  - Treated by movement or postural changes
- Chemical Pain
  - Constant
  - Due to inflammatory or infectious process
  - Treated by inflammatory techniques or drugs

Postural Syndrome

- Mechanical Deformation of normal soft tissues or vascular insufficiency arising from prolonged positional or postural stresses affecting any articular or contractile structures resulting in pain.

- Due to positional stress = prolonged stress
  - Carpal Tunnel syndrome
  - Some sports like archery or shooting where postures have to be sustained
  - Basketball players who sit on an unsupported seat – especially tall players
  - Women volleyball players who are tall and have poor posture – forward shoulder position and do not look like derangements of contractile tissue dysfunction

Derangement Syndrome

- Internal dislocation of articular tissue, of whatever origin, that causes a disturbance in the normal resting position of the affected joint surfaces.
- This deforms the capsule and periarticular supportive ligaments resulting in pain, which will remain until such time as the displacement is reduced or adaptive changes have remodelled the displaced tissues.
- Internal dislocation of articular tissues. Internal dislocation of articular tissue obstructs movement attempted towards the direction of displacement.
- Common in sports medicine
  - Ankle pain – chronic or acute ankle sprains
  - Knee pain – internal derangements that are not unstable
  - Shoulder pain – overhead throwers
  - Elbow pain – tennis or golfers elbow
  - Spine problems – lots of athletes

Dysfunction Syndrome

- Normal mechanical deformation of structurally impaired soft tissues that results in pain. This abnormal tissue may be the product of previous trauma, or inflammatory or degenerative processes. These events cause contraction, scarring, adherence or adaptive shortening. Pain is felt when the abnormal tissue is loaded. Dysfunctions may be located in articular or contractile tissue
- Usually long standing
- Has no directional preference
- Is mostly at end range if articular
- Is mid range or target zone if contractile
- Needs to be remodelled
- Needs to hurt for short term
- May use 10 minute rule
- Will take time
- Articular dysfunctions – ACL without full extension of the knee ; OA knees
- Contractile dysfunctions – jumper’s knee ; Achilles' tendinosis

What is a derangement ?

McKenzie doesn't know for sure

- Disc model in spine
- Meniscus model in knee
- ? Model in the shoulder

I don't know

Probably intra articular

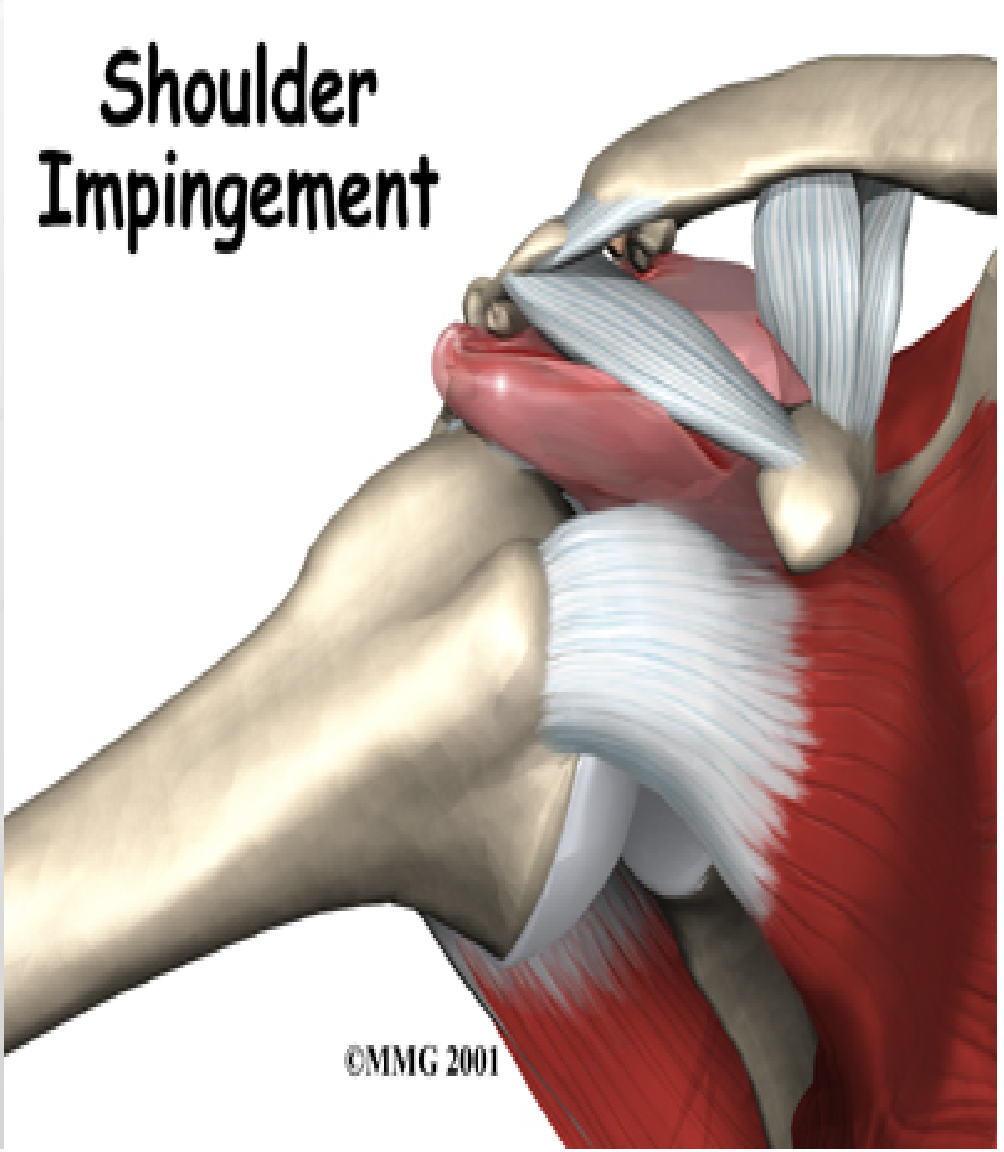
It will be better or worse quickly

It will have a directional preference

- One movement or maybe two will be therapeutic
- One movement or two will be aggravating and will make condition worse

Shoulder Impingement

- Might be a derangement
- Might be a contractile dysfunction
- MIGHT BE BOTH!!
- If derangement – it will have a directional preference and will change quickly – you are always looking for derangement
- If dysfunction- it will need to have tissue remodeling and will take a longer time – you will need to remodel tissue in the target zone



This may be derangement ?

- Old diagram from Dr. Cailliet's book
- Humeral head centering?
- Maybe this is why there is a movement derangement?
- Maybe this is what we are doing when we do repeated movements with the proper directional preference?

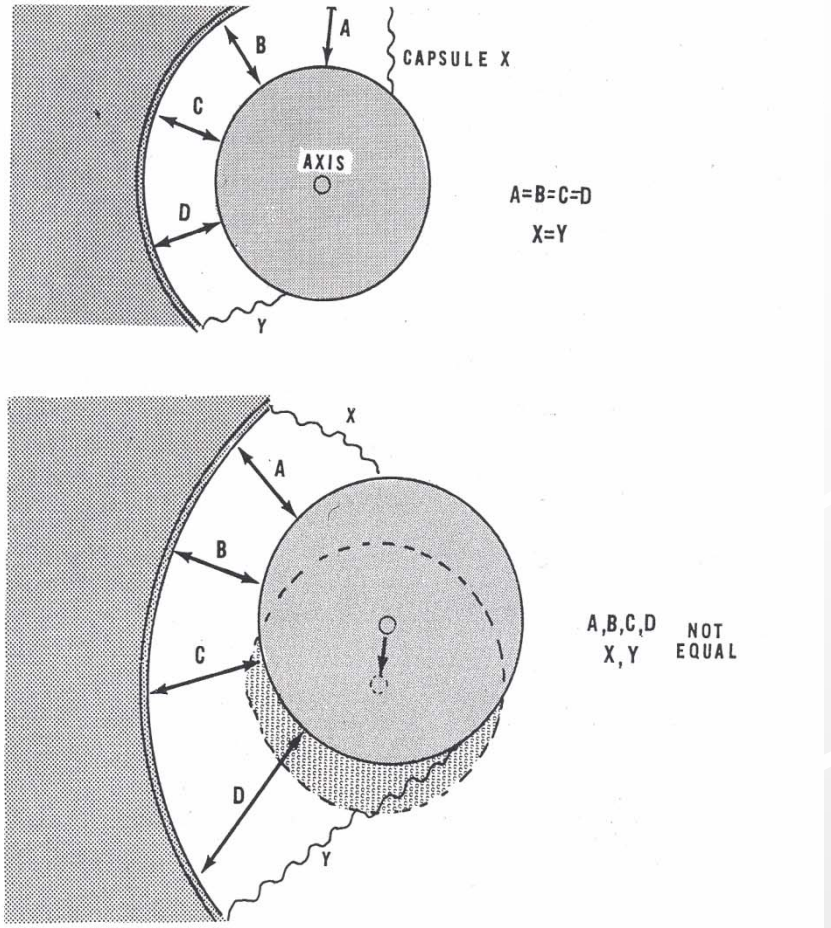


FIGURE 120. Congruous and incongruous joints. *Above*, Congruous joint with parallel surfaces of the socket and the articulating head. The axis of rotation is central and the head rotates about this axis. The capsule has general flexibility and muscle action is equal about the axis merely moving the head about the axis. The symmetric surfaces with the head deep seated gives the joint stability.

Below, The incongruous joints have asymmetric surfaces with the capsule concavity much broader than the convex head. Joint space differs throughout the articulation. The axis of rotation varies with the position of the head. Muscular action must fix the head and imitate the gliding motion. The capsule must permit this type of motion.

Directional Preference

- Used to describe the phenomenon of preference for movement in one direction, which is characteristic of the derangement syndrome.
- It describes the situation when movements in one direction will improve pain the limitation of range, whereas movements in the opposite direction cause signs and symptoms to worsen.

Use of Repeated Movements for Evaluation/Diagnosis

- No pain during repeated movements = **postural syndrome**
- Pain produced only at limited end range - no worse after = **Dysfunction - peri-articular** - **Articular dysfunction**
- Pain produced only by resisted tests - no worse after - **Dysfunction (contractile tissue) - Contractile Dysfunction**
- Increasing symptoms in one direction -decreasing symptoms in the other - **derangement**
- All directions cause lasting increase in pain in sub-acute condition - **chemical pain**
- Persistent pain in which initial active therapy causes some temporary aggravation of symptoms - **chronic state**

Matching Treatment to Condition

Stages of healing

- Injury and inflammation
  - Protect from further damage
  - Prevent excessive inflammatory exudate
  - Reduce Swelling
- Repair and Healing
  - Gentle natural tension and loading
  - Progressive return to normal loads and tension

- Remodelling
  - Prevent contractures
  - Normal loading and tension to increase strength and flexibility

Tissue Status

- Trauma /Inflammatory = rest
- Posture syndrome = education
- Articular dysfunction = remodel at end range
- Contractile dysfunction = remodel through range (Target Zone)
- Articular Derangement = Reduce
- Chronic Pain = Recondition and Desensitize
- Healing = restorative exercises

Directional Preference for shoulder

- If the exam reveals the following
  - Positive overhead Neer's test
  - Pain on active shoulder elevation at end range
  - Painful arc in abduction
  - Pain on resisted shoulder abduction with either the full can or empty can position
- The directional preference may be a combination move
  - Hand behind back
  - Internal rotation
  - Extension
  - Adduction
  - Downward scapular rotation

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For assisted-flexion the patient should be shown how to clasp hands together and, keeping the elbows straight, lift the arms as high as possible over the head. As with all the exercises, the patient is encouraged to take the movement as far as possible and to try to increase the range over time. The limit of movement will be due to a mixture of pain and stiffness.

Assisted-extension may need work prior to medial rotation. For extension, clasp hands together behind the back and lift backwards; caution against leaning forward. If they are unable to link hands behind their back, they may use a stick to do so.

For internal rotation the patient should be instructed to place the hand of the affected arm behind the buttock. If the patient can reach even further, perhaps across to the buttock on the other side, they should be encouraged to do so. After reaching as far as possible the hand should be allowed to return to the side and rest briefly. The movement should be repeated, and with each repetition the hand should move across behind the buttocks and attempt to slide higher up the back. By using the healthy limb to assist with the movement a better range of movement can be obtained. If clasping hands together is initially difficult, a towel can be used to achieve this.

Directional Preference for Knee Derangement

- Knee pain
  - With squat test
  - With stairs
  - Over medial joint
  - With running or walking
  - With jumping
- Directional preference may be extension with overpressure
  - Overpressure may be done actively or passively
  - Should be done so patient feels it but doesn't get worse with repetition
  - Baseline test should be better – squat test or stair test

Shelbourne Article

ORIGINAL RESEARCH

DECONDITIONED KNEE: THE EFFECTIVENESS OF A REHABILITATION PROGRAM THAT RESTORES NORMAL KNEE MOTION TO IMPROVE SYMPTOMS AND FUNCTION

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Angela Biggs, PT, MS*
Tinker Gray, MA, ELS*

ABSTRACT

Background. Knee pain can cause a deconditioned knee. Deconditioned is defined as causing one to lose physical fitness. Therefore, a deconditioned knee is defined as a painful syndrome caused by anatomical or functional abnormalities that result in a knee flexion contracture (functional loss of knee extension), decreased strength, and decreased function. To date, no published studies exist examining treatment for a deconditioned knee.

Objective. To determine the effectiveness of a rehabilitation program focused on increasing range of motion for patients with a deconditioned knee.

Methods. Fifty patients (mean age 53.2 years) enrolled in the study. Objective evaluation included radiographs, knee range of motion, and isokinetic strength testing. The International Knee Documentation Committee (IKDC) subjective questionnaire was used to measure symptoms and function. Patients were given a rehabilitation program to increase knee extension (including hyperextension) and flexion equal to the normal knee, after which patients were instructed in leg strengthening exercises.

Results. Knee extension significantly improved from a mean deficit of 10° to 3° and knee flexion significantly improved from a mean deficit of 19° to 9°. The IKDC survey scores significantly improved from a mean of 34.5 points to 70.5 points 1 year after beginning treatment. The IKDC subjective pain frequency and severity scores were significantly improved.

Conclusions. A rehabilitation program that improves knee range of motion can relieve pain and improve function for patients with a deconditioned knee.

Key Words. knee pain, flexion contracture, range of motion

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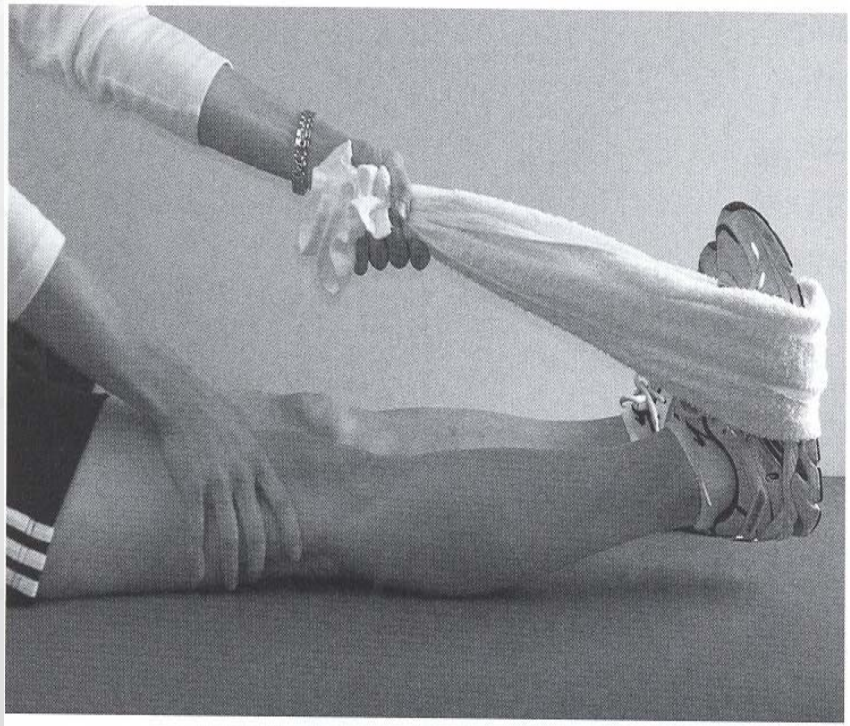

Figure 2: Towel Stretch: The towel stretch exercise is performed to increase knee extension. A towel is placed around the ball of the foot and the opposite hand holds down the distal part of the thigh. The patient pulls the towel up bringing the knee into hyperextension.

Inflammation – Stage 1

- Response to tissue damage or injury
- Host of inflammatory cells with specialist function are released and attracted to the damaged area
- Cardinal signs of inflammation are redness, pain, swelling, and lack of function (Evans, 1980) –these are a result of the inflammatory exudate
- Swelling, heat, and redness are products of the vascular activity.
- **Pain is a result of the presence of noxious inflammatory chemicals and heightened chemical sensitivity**
- Another sign of inflammation is heightened mechanical sensitivity
- This stage of recovery under optimal conditions should last less than 5 days, with a gradual reduction of inflammatory cells thereafter and non present at the end of the third week (Enwemeka, 1989)
- **Ice, if applied in the first few days following the injury, can reduce pain and oedema.**
- Ice is of little value after the fifth day as the inflammatory cells are replaced by fibroblasts.

Tissue Repair – Stage 2

- The Fibroplastic or repair stage commences as the acute inflammatory stage subsides and lasts about 3 weeks (Enwemeka, 1989)
- It is during this phase that the collagen and glycosaminoglycans that will replace the dead and damaged tissue are laid down.
- The cellular activity is stimulated by the physical stresses to the tissue.
- With inactivity, collagen turnover occurs and new collagen is made, but it is not oriented to stress lines
- At the end of this phase fibrous repair should be established and collagen mass is maximal, **but the tensile strength of the new tissue is only 15% of normal** (Hardy, 1989)
- **Gentle Tension applied early in the healing process will promote greater tensile strength in the long term.**
- From the first week a progressive increase in movement should be encouraged so that full range is possible by the 3rd or 4th week**. It is within this period that that appropriate education and movement provides the optimal climate for an uncomplicated repair.**

Tissue Repair – Stage 2 (cont.)

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Tissue Remodeling – Stage 3

- Wound repair is only optimal if remodeling of the scar tissue occurs
- This involves increasing strength and flexibility of the scar tissue through progressively increased normal usage and specific loading.
- **Remodelling is the process of turning weak, immature and disorganized scar tissue into a functional structure able to perform normal tasks.**
- The repair is unlikely to achieve the strength of the original tissue, but progressive loading and mechanical stimulation enhances the tensile strength and improves the quality of the repair.
- T**his occurs over several months after the original injury**.
- Newly synthesized collagen will tend to contract after three weeks; this naturally occurring shrinkage is said to continue for at least 6 months, if not forever (Evans, 1980). Thus recently formed scar tissue will commence shortening unless it is repeatedly stretched. The stretching process should be commenced in the early stages following injury and continued to well after full recovery so no soft tissue shortenings is likely to develop.

Tissue Remodelling – Stage 3 (cont.)

- **Low – load regular application of stress will also help to increase the tensile strength of the repair tissue (Hardy, 1989).**
- Failure to perform the appropriate tissue loading will leave the repair process complete, but the remodeling stage incomplete: the individual may still be bothered by pain and limited function and the tissue will remain weak and prone to re-injury.
- The nerves, which infiltrated the tissue during repair, can now be sources of pain each time the scar is stretched or loaded. This is a cause of persistent pain in many patients.
- The regular application of intermittent stress or loading to bone and normal soft tissue enhances structural integrity through the process of remodeling. During the healing process loading for prolonged periods must be avoided as this may disrupt the repair process.
- **Prolonged stress damages, intermittent stress strengthens.**
- The proper rehabilitation of tissue damage involves progressive, incremental loading and activity in order to restore the structure to full function and to restore the patient's confidence to use it. This is the essential management strategy during the repair and remodelling stages

Summary

- No injury can be made to heal faster than its natural rate but healing can be prolonged by inappropriate therapy and activity
- Whenever there has been tissue damage, the processes of inflammation, tissue repair, and remodelling have to occur to allow full restoration of normal function.
- ***“ Failure of any of these processes may result in inadequate or ineffectual repair leading to chronic pathological changes in the tissue or to repeated structural failure”*** (Barlow and Willoughby, 1992)
- These processes are essentially the same in tendons, muscles, ligaments, and all soft tissues; however intrinsic factors may be more likely to impair the recovery process in **tendon injuries**, especially if the onset is through overuse rather than trauma (Barlow and Willoughby 1992).

Summary (cont.)

- Early progressive active rehabilitation is essential to optimise repair and function. No passive modality used within physiotherapy has yet been shown to reduce the time for the completion of natural healing.
- We can avoid delay to the healing process and ensure that the climate for repair is favourable (Evans 1980)
- **Strenuous mechanical therapy applied when the pain from the injury is essentially chemical will delay recovery.**
- **The integrity of the repair must be established before more vigorous procedures are applied.**
- **However, of equal importance is the use of progressive, controlled, programme of loading the tissues at the appropriate time during the repair process in order to promote a fully functional structure which the patient is confident to use.**

* Taken from The Human Extremities Mechanical Diagnosis &Therapy by Robin McKenzie and Stephen May, Spinal Publications, New Zealand, Ltd., 2000, pp. 22-24.