

PREVENTION AND MANAGEMENT OF SPORTS TRAUMA

Master of Physical Education (M.P.Ed.)
Course Material for Students circulation

Edited by

Dr. K. Jothi Dayanandan
Associate Professor



Y.M.C.A. COLLEGE OF PHYSICAL EDUCATION

A Project of the National Council of YMCAs of India

No.497, Anna Salai, Nandanam, Chennai 600035.

Ct. No. 044-24344816; Email: ymcanandanam1920@gmail.com

MCC 401 PREVENTION AND MANAGEMENT OF SPORTS TRAUMA

Unit I – Introduction

Meaning, definition and importance of Sports Medicine, Definition and Principles of therapeutic exercises. Coordination exercise, Balance training exercise, Strengthening exercise, Mobilization exercise, Gait training, Gym ball exercise Injuries: acute, sub-acute, chronic. Advantages and Disadvantages of PRICE and SAID principle. Definition and objectives of corrective physical Education. Posture and body mechanics, Standards of Standing Posture. Value of good posture, Drawbacks and causes of bad posture. Posture test Examination of the spine.

Unit II - Posture, Spine Injuries and Corrective Exercise

Normal curve of the spine and its utility, Deviations in posture: Kyphosis, lordosis, flatback, Scoliosis, round shoulders, Knock Knee, Bow leg, Flat foot. Management including exercises. Head, Neck and Spine injuries: Flexion, Compression, Hyper extension, Rotation injuries. Spinal range of motion. Free hand exercises, stretching and strengthening exercise for head neck, spine. Supporting and aiding techniques and equipment for Head, Neck and Spine injuries.

Unit III - Rehabilitation Exercises and Basic Rehabilitation

Basic Rehabilitation: Strapping/ Tapping: Definition, Principles Precautions, Contraindications. Proprioceptive neuromuscular facilitation: Definition hold, relax, repeated contractions. Show reversal technique exercises. Isotonic, Isokinetic, isometric stretching. Definition. Types of stretching, Advantages, dangers of stretching, Manual muscle grading. Passive, Active, Assisted, Resisted exercise for Rehabilitation, Stretching, PNF techniques and principles.

Unit IV - Massage

Brief history of Massage as an aid for relaxation Points to be considered in giving massage Physiological, Chemical, Psychological effects of massage Indication/ Contraindication of Massage Classification of the manipulation used massage and their specific uses in the human body Stroking manipulation: Effleurage Pressure manipulation: Petri sage Kneading (Finger, Kneading, Circular) ironing Skin Rolling Percussion manipulation: Tapotement, Hacking, Clapping, Beating, Pounding, Slapping, Cupping, Poking, Shaking Manipulation, Deep massage.

Unit V – Sports Injuries Care, Treatment and Support

Principles pertaining to the prevention of Sports injuries care and treatment of exposed and unexposed injuries in sports Principles of apply cold and heat, infrared rays Ultrasonic, Therapy Short wave diathermy therapy. Principles and techniques of Strapping. And Bandages. Upper Limb and Thorax Injuries: Shoulder: Sprain, Strain, Dislocation, and Strapping. Elbow: Sprain, Strain, Strapping. Wrist and Fingers: Sprain Strain, Strapping. Breathing exercises, Relaxation techniques Fracture at cranium, shoulder, hip knee, ankle Lower Limb and Abdomen Injuries: Hip: Adductor strain, Dislocation, Strapping. Knee: Sprain, Strain, Strapping. Ankle: Sprain, Strain, Strapping. Abdomen: Abdominal wall, Contusion, Abdominal muscle strain. Free exercises Stretching and strengthening exercise for Hip, knee, ankle and Foot.

REFERENCES:

1. Doherty.J.Meno.Wetb, ModerD (2000) Track and Field, Englewood Cliffs, Prentice Hall Inc.
2. Lace, M. V. (1951) Massage and Medical Gymnastics, London: J and A Churchill Ltd.

3. M Cooy and Young (1954) Tests and Measurement, NewYork: Apple ton Century.
4. Naro, C.L.(1967) Manual of Massage and, Movement, London: Febra and Febra Ltd.
5. Rathbome,J (1965) Corrective Physical Education, London: W.B.Saunders and Co.
6. Stafford and Kelly, (1968) Preventive and Corrective Physical Education, NewYork.
7. Christopher M. Norris. (1993). Sports Injures Diagnosis and Management for Physiotherapists East Kilbride: Thomson Litho Ltd.
8. James,A. Gouldand George J.Davies.(1985). Physical Physical Therapy Toronto: C.V. Mosby Company.
9. Morris B. Million (1984) Sports Injuries and Athletic Problem. New Delhi: Surjeet Publication.
10. Pande.(1998) Sports Medicine New delhi: KhelShitya Kendra
11. The Encyclopedia of Sports Medicine. (1998). The Olympic Book of Sports Medicine,
12. Australia: Tittel Black well Scientific publications - Practical: Anthropometric Measurements,

UNIT I - INTRODUCTION

PRINCIPLES OF INJURY PREVENTION

The sports medicine professional is concerned with the wellbeing of the athlete and generally assumes the responsibility for overseeing the total health care for the athlete. Participation in sports places the athlete in a situation in which injury is likely to occur. Fortunately, most injuries are not serious and lend themselves to rapid rehabilitation, but the sports medicine professional must be capable of dealing with any type of trauma or catastrophic injury.

A. Physical Conditioning Physical conditioning is a key principle of injury prevention.

- Appropriate conditioning programmes decrease the risk of injury, decrease the severity of an injury should it occur, and can help prevent re-injury.
 - Maximising the chance for safe athletic performance requires adequate muscular strength and balance, power, endurance, neuromuscular coordination, joint flexibility, cardiovascular endurance, and good body composition for sport.
 - Improving specific components of fitness and conditioning reduces the risk of injuries. For example, strengthening the muscles of a joint helps reduce injuries to the area; regular exercise can significantly increase the strength of the ligaments surrounding the knee and prevent knee injuries; development provides increased strength that helps to stabilise joints; and improved movement skill is important in avoiding injury.
1. **Strength** To improve muscle strength, stress must be progressive and gradually challenged or placed under additional loading. A conditioning programme's effects are specific to the type of stress applied. The SAID principle (Specific Adaptation to Imposed Demands) state that as the body is placed under stress of varying intensities and durations, it attempts to overcome the stress by adapting specifically to the imposed demands.
 2. **Balance** Proprioceptive or kinesthetic sense through balance training enhances motor control, which is needed to decrease the risk of injury or re-injury during practice or competition. When injury to a joint or musculo-tendinous structure occurs, somato-sensory information is altered, adversely affecting motor control. Hence, rehabilitation should emphasise restoring the athlete's balance strategies. This will also decrease the risk of recurrent injury. The balance training tasks must be specific to the type of balance strategies required by the athlete's event.
 3. **Flexibility** Efficient performance requires a full range of motion, and adequate joint flexibility also decreases an athlete's susceptibility to injury. The warm-up period before practice or competition increases the body's tissue temperature prior to subjecting the musculo-tendinous structures to repeated stretch and contraction. Connective tissue has visco-elastic properties, which allow elongation of the tissue.
 4. **Endurance** Cardiovascular endurance is also a factor in injury prevention. The cardiovascular and respiratory systems must be adequately conditioned to delay the onset of fatigue. A fatigued athlete becomes vulnerable to injury when the nervous and muscular systems are unable to respond adequately to an injury-producing situation.

B. Appropriate Training Methods Ensuring proper, efficient mechanics requires practice and effective coaching, including a systematic series of specific, repetitive, and progressive exercises and drills. Faulty mechanics must be corrected and good fundamentals ingrained.

Exercises should include strength, relaxation, and flexibility specifically geared to the demands made on the body.

- C. **Rest and Recovery** Adequate sleep is important for general good mental and physical health, and becomes critical for recovery after intensive workouts. Chronic overexertion and fatigue can make the athlete susceptible to injury
- D. **Muscle Soreness** Muscular over-exertion may present as muscle soreness, muscle stiffness, and muscle spasm. According to the tissue damage hypothesis, micro-tears occur and pain/soreness results from the nerve-endings being stimulated by muscle tissue swelling. Proper massage may aid in reducing tissue oedema and decreasing accompanying muscle spasm. Ice applications or other forms of cryotherapy, and pool training, may facilitate the body's healing response. Appropriate rest will allow microscopic damage of the tissue to heal.
- E. **Appropriate Equipment** Shoes are the most critical piece of a track and field athlete's equipment and should be individually and carefully selected. Proper fitting shoes can mean the difference between a low and a high risk of injury for a track and field competitor.
- F. **Psychological Factors** Athletes need to be psychologically prepared for practices and competition in order to reduce the risk of injury. Research has demonstrated a positive relationship between stressful life situations, especially those with high negative stress, and injury occurrence. In understanding the stress-injury relationship
- G. **Training in Extreme Conditions** Athletes and coaches should take into account the temperature and humidity during training, and the need to acclimate after travel to a different, extreme climate or altitude. Extreme heat and humidity, cold, and altitude can adversely affect performance in many athletic events

How can I prevent a sports injury?

The following are some basic steps to prevent a sports injury:

- Develop a fitness plan that includes cardiovascular exercise, strength training, and flexibility. This will help decrease your chance of injury.
- Alternate exercising different muscle groups and exercise every other day.
- Cool down properly after exercise or sports. It should take 2 times as long as your warm-ups.
- Stay hydrated. Drink water to prevent dehydration, heat exhaustion, and heatstroke.
- Stretching exercises can improve the ability of muscles to contract and perform, reducing the risk of injury. Each stretch should start slowly until you reach a point of muscle tension. Stretching should not be painful. Aim to hold each stretch for up to 20 seconds.
- Use the right equipment or gear and wear shoes that provide support and that may correct certain foot problems that can lead to injury.
- Learn the right techniques to play your sport.
- Rest when tired, Avoid exercise when you are tired or in pain.
- Always take your time during strength training and go through the full range of motion with each repetition.
- If you do sustain a sports injury, make sure you participate in adequate rehabilitation before resuming strenuous activity.

Athletic taping/Strapping

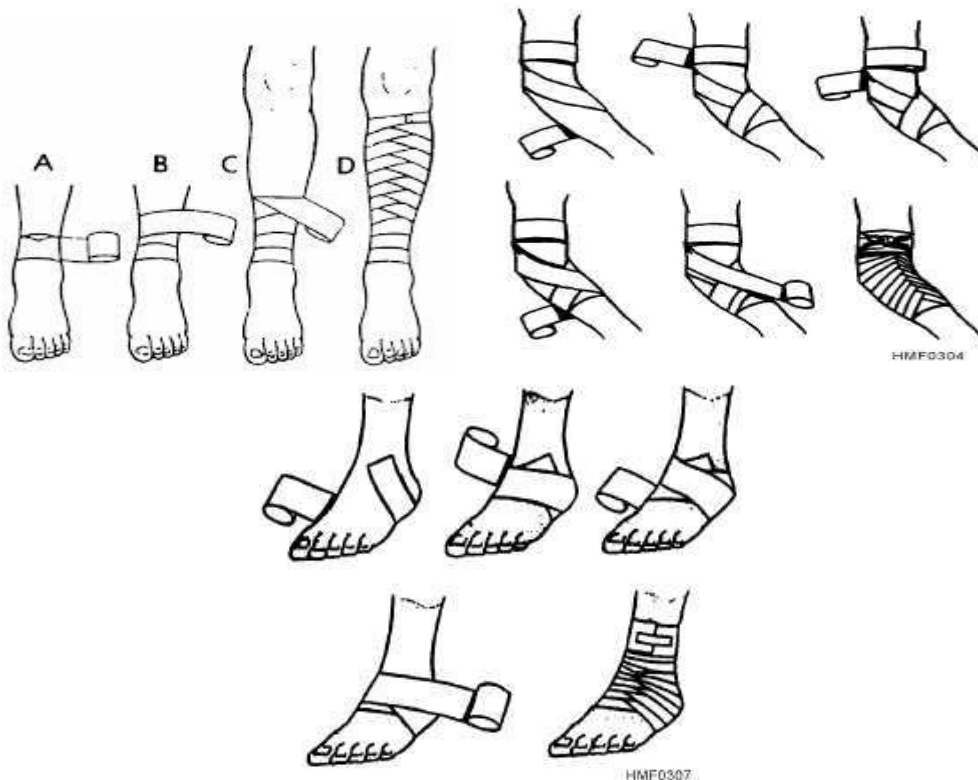
Introduction:

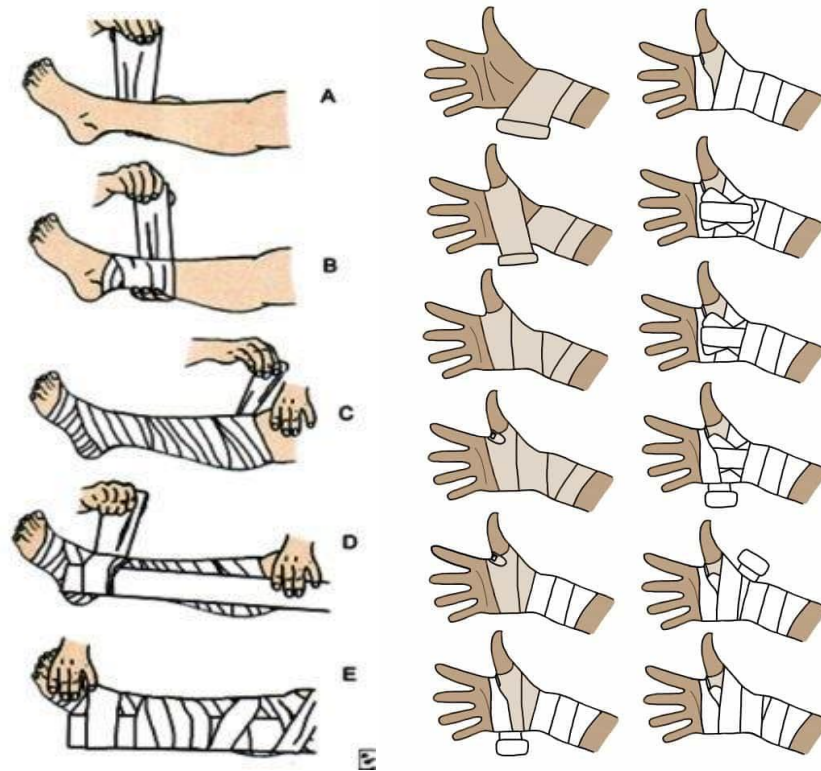
- The Term 'Therapeutic' as relating to the healing of a disease or having a good effect on the body or mind. Taping technique

- that utilize an adhesive tape as a component of management of patients with musculoskeletal condition.
- The Taping are used for soft tissue injury and joint support and protection and controlling pain, swelling in the acute as well as chronic stage also.
- Tape provides support to injured Muscle, Ligament, Weak Joint And other Structural Body Parts, Avoid Further Damage During Day To Day Activity.
- Taping Also Fascilitate Muscle Activity By Providing Fascilitatory Taping And Helps in Reducing Muscle Strain and rehabilitation.
- Taping Inhibitory Technique Used to reduce Muscle Activity to avoid injury, Reduce pain, swelling , spasm of that particular Muscle.
- Tape is strong, supportive and Lightweight and temporary Support. it adjust to the body part and elastic property of tape allow movement with support as compared to other.

Taping technique benefits:

- To Protect from further injury in day to day activity by proving support to ligaments, Muscle, Tendon and joint
- To Limit Unwanted Joint Movement.
- To allow healing Process by Proving Support and Reduce Activity.
- Reduce Pain, Spasm and Swelling by Breaking the Pain – spasm- Swelling Cycle.
- To Protect and Support the injured structure in a functional position during the exercise, Strengthening and proprioceptive programme.
- Tape can work even after it is removed. This carry over effect occurs because receptors in the skin, Joints and soft tissue remain activated. This will improve movement, body awareness, balance and flexibility of the affected part.
- To Correct Deformity by reducing activity And Facilitate Opposite Directional Movement.





Goals of Taping:

- Prophylactic: In order to prevent injuries from happening.
- Rehabilitative: to the treatment of injured musculoskeletal Body Parts by Restricting Movements during Healing Process.
- Functional: to help the person/athlete maintain day to day activity/functional mobility while still recovering from the injury.
- Corrective: To Reduce Deformity By Reducing Movement And Facilitating Opposite Directional Movement.

Side Effects of Taping Technique:

- **Skin Allergies:** Some people are allergic to tape or the glue used on the tape. If the patient feels itchy or skin becomes red and inflamed, removed, remove the tape immediately as the patient may be having a skin reaction.
- **Skin chafing (irritation):** Results when a taped area rubs against skin. It often occurs on the thighs or between toes. To prevent chafing, apply a reasonable amount of skin lubricant to the body part and the tape.
- **Blisters & Lacerations:** Improper application or removal of tape (ripping off tape) can cause blisters or small skin cuts.
 - Athletic taping is a temporary technique or an adjunct mechanism adopted as a measure of post-injury rehabilitation. It is mainly used as a preventive measure by athletes to protect an existing injury.
 - The goals of the taping in sports are to restrict motion of injured joint(s), compress soft tissues to prevent swelling, support to the anatomical structure involved in the injury, serve as a splint or to secure a splint, secure the dressing and/or bandages, protect the injured part from re-injury and to protect the injured part while the healing process is under progress. Therefore, the taping is mainly procured as one of the means of rehabilitation and prophylaxis in cases of support and stability, immediate first aid,

securing a pad or brace, preventing injury, restricting the angle of pull and psychological assistance

- Athletic Taping has been in the fore-front for a long time. It plays an important role in coping up with post injury conditions of an athlete and also performing in the field even before completing the rehabilitative recovery from injury. Literatures suggest that taping serves as a measure of “post-injury rehabilitation” and yet there have still been others who point out on the disadvantages of taping in reducing performance and skill
- Although it is such a common technique, yet complete guide to the principles and techniques involved in taping, its advantages, types, disadvantages, etc. are rare to be found. This article nonetheless serves the purpose of providing a suitable guide about the basics of Athletic Taping.
- The McConnell method of patellar taping has been a popular practice among athletic trainers and other health care professionals when treating patients with PFPS. However, the clinical evidence for the success of this intervention is still unclear. An insufficient number of randomized controlled trials, inconsistency of tape application techniques, and variance in measurement of specific outcome variables limit the strength of clinical efficacy and evidence.

Principles of taping: Athletic taping is based on certain criteria or set rules, regulations and guidelines which form the major “principles” based on which the experts carry out the process of taping on the injured part of the sports person. General principle also includes few criteria which practitioners should consider – skin preparation, functional position of the body part to be taped, body mechanics of the practitioner, tape application and removal of the tape post activity. Skin preparations that should be carried out before taping includes removal of hair, cleaning of skin, addressing of any lesions with necessary consultation, using adherents and lubricants, and er wraps, under pads, etc.

The major principles which are to be followed are

- Placing the athlete in an appropriate position.
- Appropriate selection of a comfortable table height and position that is appropriate for the health care provider to minimize strain and fatigue.

Type and width of the tape.

- Application of tape:
 - To a dry and clean area and at body temperature.
 - Immediately after cryotherapy or hydrotherapy is to be prevented.

Taping should be:

- Prevented at the site of perspiration.
- Applied directly on skin or on under-wrap.
- Done on skin with the tape adherent to prevent slippage.
- Areas subjected to friction blisters should be covered with protective pads or under-wraps.

While applying tape, the following should be kept in mind:

- It should be firm, yet smooth and wrinkle free

- There should not be impairment of normal circulation, normal movement of muscles and tendons present underneath the tape.
- Avoid pressure on bony prominences.
- Any tingling, numbness, decreased tactile sensations or impaired distal venous return should be monitored and taken care of immediately, if noted.
 - The tape is to be broken or torn in an extended or stretched fashion to avoid folded edges
 - Removal of tape should be done following the proper methods by using tape cutters and specially designed scissors
 - The skin has to be cleaned adequately of the tape residue
 - Any blisters or skin abrasions, if noted, should be taken care of immediately.

Types of tape used in sports persons: A tape should be chosen properly so as to be able to strap the given body part properly. It should be of the proper size. Tape is graded on the basis of the following characteristics

- Number of vertical (warp) and horizontal (woof) threads per square inch.
- Tensile strength.
- Composition.
- Bleached or unbleached cotton.
- Cotton plus synthetic fibre.
- All synthetic fibre.
- Adhesive mass (stickiness).

The thread count varies between 120 and 150 per sq. inch. Higher thread count implies higher tensile strength, overall higher quality, better adhesive, easier to unwind, long lasting and costlier. Tensile strength increases on folding edge of the tape whereas bleaching and colouring lowers it. Common taping techniques Taping can be done in various regions of the body as and when required.

Contraindication of Taping:

- Open wounds
- Allergy to Taping Materials.
- Active Infection
- Hyper Sensitive Skin History Condition e.g. eczema, dermatitis, psoriasis
- Irritation of area of skin to be tapping done earlier.
- Circulation compromised in area
- Sensation compromised in area.
- Indications

The Taping are used for soft tissue injury and joint support and protection and controlling pain, swelling in the acute as well as chronic stage also.

Tape provides support to injured Muscle, Ligament, Weak Joint And other Structural Body Parts, Avoid Further Damage during Day to Day Activity.

Taping Also Facilitate Muscle Activity by Providing Fascilitatory Taping and Helps in Reducing Muscle Strain and rehabilitation.

Taping Inhibitory Technique Used to reduce Muscle Activity to avoid injury, reduce pain, swelling, spasm of that particular Muscle.

Tape is strong, supportive and Lightweight and temporary Support. it adjust to the body part and elastic property of tape allow movement with support as compared to other.

Taping technique benefits:

- To Protect from further injury in day to day activity by proving support to ligaments, Muscle, Tendon and joint.
- O Limit Unwanted Joint Movement.
- To allow healing Process by Proving Support and Reduce Activity.
- Reduce Pain, Spasm and Swelling by Breaking the Pain – spasm- Swelling Cycle.
- To Protect and Support the injured structure in a functional position during the exercise, Strengthening and proprioceptive programme.
- Tape can work even after it is removed. This carry over effect occurs because receptors in the skin, Joints and soft tissue remain activated. This will improve movement, body awareness, balance and flexibility of the affected part.
- To Correct Deformity by reducing activity And Facilitate Opposite Directional Movement.

Goals of Taping:

- Prophylactic: In order to prevent injuries from happening.
- Rehabilitative: to the treatment of injured musculoskeletal Body Parts by Restricting Movements during Healing Process.
- Functional: to help the person/athlete maintain day to day activity/functional mobility while still recovering from the injury.
- Corrective: To Reduce Deformity By Reducing Movement And Facilitating Opposite Directional Movement.

Side Effects of Taping Technique:

- **Skin Allergies:** Some people are allergic to tape or the glue used on the tape. If the patient feels itchy or skin becomes red and inflamed, removed, remove the tape immediately as the patient may be having a skin reaction.
- **Skin Chafing (irritation) :** Results when a taped area rubs against skin. it often occurs on the thighs or between toes. To prevent chafing , apply a reasonable amount of skin lubricant to the body part and the tape.
- **Blisters &Lacerations:** Improper application or removal of tape (ripping off tape) can cause blisters or small skin cuts.

Type of Tapes:

- **Micro Pore/Paper Tape:** A latex-free, hypoallergenic paper tape that is gentle to the skin yet adheres well and leaves minimal adhesive residue upon removal. It is an economical, general purpose, breathable tape, available in white or tan. Micro Pore tape is excellent for repeated applications on sensitive skin, fragile skin and elderly patients. It is available in a dispenser pack for easy tear and convenience.
- **Underwrap Tape:** Under wrap/Pre wrap is a thin foam based material used to reduce friction between the skin and the tape surfaces. It helps to protect the skin & help eliminate skin irritation, but decreases the efficiency of the tape. It is Skin friendly and hypo-allergenic, thus ideal for all sports.

- **Rigid Athletic Tape (Non-Elastic):** Mainly Useful in Joint Injuries, Such as sprains, or conditions that need rest, support and immobilization to facilitate healing of tissues. eg. Muscle Pull, Strain, Sprain, Ligament Laxity, Subluxation Of Weak Joint. They include regular white cloth athletic tapes and brown tapes. The white athletic tapes are commonly used for Preventive Measure purposes whereas the stronger brown tapes are designed for specific taping techniques, like joint realignment, deformity corrective measures etc.
- **Elastic Tape :** The Elastic adhesive tapes have a Property of elasticity same have in muscle that permit some flexibility and movement, so that muscle can contract and relax while still being supported. The thicker version of elastic tape is suitable when strong support and compression is required for injury protection.
- **Self-Adhesive (Cohesive) tape:** This tape contains a cohesive material that sticks only to itself. It are excellent as a bandage for acute injuries e.g. ankle sprain, it provides compression to reduce swelling. Since it sticks to itself and not the skin, skin reaction not usually seen.

Care Taken During Application of Tape:

- Use the correct type, width and amount of tape for the application.
- Apply tape to skin which is at room temperature.
- Begin with anchors.
- Overlap successive strips by half to prevent slippage and gapping.
- Apply each strip with a particular purpose in mind.
- Apply tape smoothly and firmly.
- Flow with the shape of the limb.
- Avoid pressure points, wrinkles and creases to prevent blisters/lacerations.
- Apply strips of tape in a sequential order.
- Explain the function of the tape to patient and how it should feel.
- On completion check if the patient is comfortable.

Post-Taping assessment Care:

Check for patient comfort, as well as signs of impaired circulation.

- Numbness
- Tingling
- Dislocation
- Loss of Pulse
- Loss of Function

How to Remove Tape?

“ Never rip tape off directly. “

- Remove the tape carefully by peeling it back on itself, and pushing the skin away from the tape.
- Pull the tape carefully along the axis of the limb.
- Check the skin for damage and apply lotion to restore skin moisture.
- Tape should not be left on for more than 24 hrs, unless using hypo-allergenic tape which may be left on longer.
- Leaving tape on for too long a period may lead to skin breakdown.

RIGID TAPING APPLICATION:

PFPS Taping: When the patella does not track properly in the trochlear groove, it can lead to patello-femoral pain and dysfunction.

KINESIOLOGICAL TAPING:

- It is a time tested therapeutic taping method which makes use of a uniquely designed elastic tape that enhances muscular, joint and circulatory function.
- The kinesiological tape is a cotton based cloth tape with acrylic glue that allows for ventilation, good adhesion with minimal negative skin reactions.
- This highly specific tape has been used worldwide, in many settings, from chiropractic offices to athletic training rooms, physiotherapy clinic and athletic fields.
- It can be applied 24hrs a day, for 3-5 days.

Fundamental Basic:

- Kinesiological taping is based on the science of kinesiology, with a belief that the body's muscles are responsible for movements of and in the body as well as being in control of other elements, such as circulation of the blood and body temperature.
- As result of this, when muscles fail or are impaired, other parts of the body are necessarily affected, thus putting their function at risk.
- The principle of kinesiology is to treat the muscles to help the body heal itself naturally.

Unique qualities of the tape:

- Kinesiological tape is 100% cotton, hypoallergenic, latex free, non-restrictive elastic adhesive tape designed to have the same amount of stretch as human skin.
- This tape mimics skin - it is the approximate thickness of the epidermis, and when properly applied, the body will not perceive its weight.
- There is no latex, and the adhesive is 100% acrylic. It is activated by body heat and will become more adherent, the longer it is worn.
- In the manufacturing process, the adhesive is applied to the fibres of the tape in a wave-like pattern to mimic the qualities of fingerprints on the fingerprint. This wave pattern lifts the epidermis and also allows for moisture to escape.

Skin Preparation:

- Skin preparation is important to the application process, since the tape works via the skin.
- The skin should be clean and free of any oil/cosmetics'.
- Hair may also need to be clipped or shaved since the application works by skin to tape contact.

Basic of Application:

- The Practitioner has to be thorough with anatomy in order to practise Kinesiological taping.
- The practitioner must "unlearn" traditional tape application methods, as the techniques used to apply Kinesiological tape are different from traditional tapes. The tape has a paper backing which can be torn, folded back, and removed in different ways, depending on the desired application.

- The tape can be worn for three to five days, and be worn during athletic events as seen in the recent Olympics. The tape comes in several sizes; the most commonly used size is the 2inch width.
- The tape itself can stretch (only longitudinally) approximately 40-60% of its resting length. The tension may be altered when applying to the skin, depending on the desired effect and the technique being used.

How to Apply Kinesiological tape?

- Measure and cut the tape into the size and shape required.
- Round off the corners at the end of the tape to prevent it from lifting/peeling.
- Remove the paper backing and apply.
- Rub- to activate the adhesive.

Anchors:

Never stretch ends of the tape and leave between 2 & 3 cm of tape at each end that will remain unstretched, serving as the anchors.

Pre-stretch:

- Before the kinesiological tape is applied to the injured area, guide and place the soft tissues into a naturally stretched position :
- This allows for wrinkling or recoil, so the kinesiological tape will create convolutions on the skin, which aid in normal blood and lymphatic flow.
- Applying in a stretched position also allows full range of motion for the patient.

Mechanism of Action:

Potential skin lifting effects of kinesiological tape :

- Creates convolutions.
- Sub-dermal vacuum.
- Tissue decompression.
- Promoting fluid flow.

Recoil effect: when tape is applied at or below 50% of available tension, the tape will recoil or pull back toward the anchor, thus potentially shortening or lengthening the tissues.

Conditions, it can be used for? AC joint dysfunction, bicipital tendinitis, tennis elbow, carpal tunnel syndrome, de Quervain's Syndrome, Ankle sprain etc.

Preventive / Curative Effects:

- The taping technique can be preventative by supporting ligament, muscles and stabilizing soft tissues or rehabilitative to allow athletes to continue training and completing as injuries heal.
- The tape may be used with differing degrees of stretch depending on the desired effect of the taping e.g. preventive, supportive or curative.

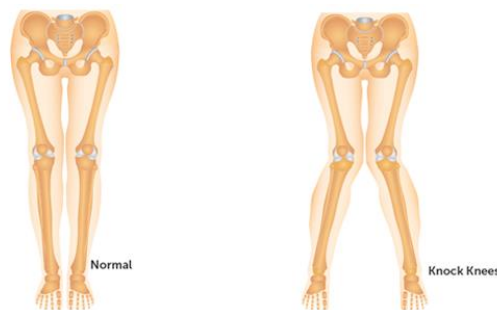
UNIT II - POSTURE, SPINE INJURIES AND CORRECTIVE EXERCISE

POSTURAL DEFORMITIES

- Flat foot: the arch of the foot is collapsed or lowered
- Kyphosis: the upper back is excessively curved
- Knock knee: the knees are close together and the lower legs are apart
- Bow legs: the knees are apart and the lower legs are close together
- Scoliosis: the spine is curved sideways

Postural deformities Posture is the position of an individual's body while standing, sitting, walking, sleeping etc. There is no conform rigid standard of body positions. Deformity is the malformation of any component or body part or joint of the body. There are various postural deformities like knock knees, Bow legs, Flat foot, Scoliosis, Lordosis and Kyphosis. Following are the common postural deformities.

1. Knock Knees knock knees images Knock knees meaning -



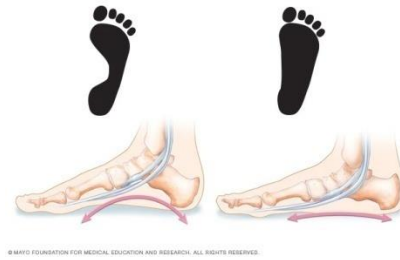
Knock knees or Genu Velgum is a postural deformity in which the legs are bent inward and knees strike each other while walking or running. Between birth and 18 months, an outward-turning alignment from hip to knee to ankle is normal. Between about 18 and 24 months, this alignment normally becomes neutral. When the child is between 2 and 5 years old, an inward-turning alignment is normal. The alignment returns to neutral as the child grows.

Knock knees causes:

1. Rickets.
2. Obesity during childhood.
3. Muscular or ligaments weakness at early age.
4. Fractures and injuries involving the knee joint.
5. Lack of Balanced diet.
6. Flat foot. Precautions of Knock knees.
7. Balanced diet should be taken.
8. Babies should not be forced to walk at very early age.
9. Perform proper exercises.

Knock knees exercise and Knock knees Remedies: keep a pillow between the knees and stand erect for some time. Use cod liver oil. Horse riding. Use walking callipers

2. Flat Foot Flat foot meaning



Flat foot is a postural deformity in which the inner curve of foot has bulge more than normal. In this default of feet person gives complete print of his foot sole over the plane surface.

Flat foot Causes:

1. Weak muscles.
2. Obesity.
3. Using improper shoes.
4. Carrying heavy weight for a long period.
5. Standing for a long time.

Precautions of Flat foot:

1. Always wear the shoes of proper shape and size.
2. Obesity should be avoided.
3. High heeled shoes should be avoided.
4. Don't carry heavy weight for a long period.
5. Babies should not be forced to walk at very early age.

Flat foot Remedies and Flat foot exercises:

1. Walk on heels.
2. Lose weight.
3. Skip on rope.
4. Perform stretching exercises.
5. Use good quality shoes.
6. Walk bare footed over the sand.
7. Run fast bare footed over clean surface

3. Round Shoulder



Round shoulders meaning - Round Shoulders or arm around shoulder is a postural deformity in which the shoulders become round and sometimes they seem to be bent forward. If you are

looking for how to fix rounded shoulders, you are at right place. Fix your rounded shoulders without any surgery. See round shoulder exercise given below for treatment of rounded shoulders.

Round shoulder Causes:

1. Due to heredity.
2. By wearing very tight clothes.
3. By sitting on improper furniture.
4. By walking, sitting in bent position.
5. Lack of proper exercise.

Precautions of Round shoulder:

1. Never sit, stand or walk in bent position.
2. Use loose fitting clothes.
3. Always use proper furniture to sit.

Exercises for Rounded shoulders and Round shoulder Remedies:

1. Keep your tips of fingers on your shoulders and encircle your elbows clockwise and anticlockwise direction for same number of times.
2. Hold the horizontal bar for some time.
3. Yoga for rounded shoulders - Perform Chakra asana and Dhanur asana regularly.
4. Lordosis

Kyphosis Kyphosis: Kyphosis is a forward rounding of upper back. Some rounding is normal but the term "Kyphosis" usually refers to an exaggerated rounding, more than 50 degrees. This deformity is also called round back or hunch back. It also leads to kyphosis cervical pain.

Kyphosis Causes:

1. Malnutrition.
2. Carrying heavy loads.
3. Improper furniture.
4. Weak muscles.
5. Bending while walking.
6. Wearing shapeless and tight cloths.
7. Due to heredity.

Precautions of Kyphosis:

1. Adopt correct posture.
2. Wear loose clothes.
3. Use suitable furniture.

Kyphosis Treatment and Kyphosis exercises:

1. Always keeps a pillow under your back while sleeping.
2. Bend your head backward in standing position.
3. Perform swimming.
4. Perform dhanur asana, Chakra asana regularly.

Bow Legs Bow legs meaning - It is a postural deformity. It is opposite to knock-knees. In this deformity knees are widely apart. There remains a wide gap between knees when a bow legged person keeps his feet together. It occurs during childhood. Bow legs for babies are common. Sometimes parents get afraid about their bow legs baby. But as they grow their legs starts to come in proper shape. If there are bow legs in toddlers, then it is due to lack of nutrition.

Bow legs Causes:

1. Rickets.
2. Deficiency of vitamin D and calcium.
3. Improper way of walking.
4. Obesity.
5. Using defaulted footwear.
6. Forcing babies to walk at early stage.

Precautions of Bow legs:

1. Don't carry heavy weight in childhood.
2. Babies should not be forced to walk at very early age.
3. Balanced diet should be taken.
4. Always walk properly.
5. Use good quality shoes.

Bow legs Remedies and bow legs exercises:

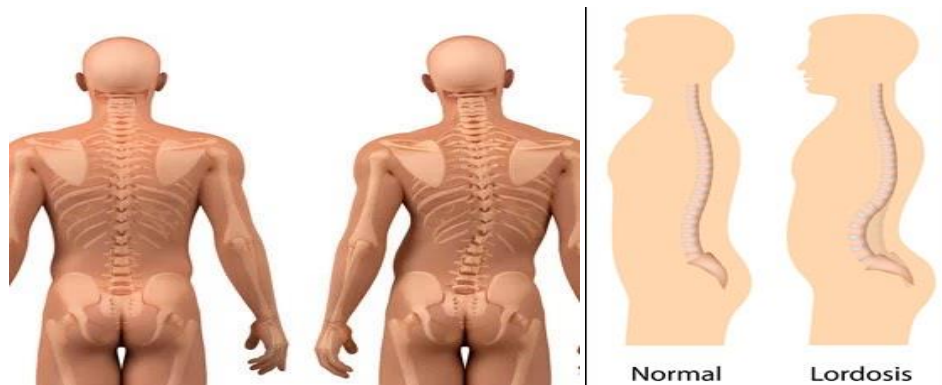
1. Vitamin 'D' and calcium should be taken in required amount.
2. Walk on inner edge of the feet.
3. Walk by bending the toes inward.
4. Perform Garud asana regularly.
5. Scoliosis

Causes of abnormal posturing: Abnormal posturing most often results from damage to the brain or spinal cord. The type of posturing you experience will depend on the specific area of the brain or spinal cord that was affected.

Damage to the central nervous system may occur due to Trusted Source:

- fluid build-up in the skull
- swelling of the brain
- a direct blow to the head
- a blood clot or stroke
- a brain tumor
- high blood pressure in the brain as a result of malaria
- meningitis, which is an inflammatory condition caused by a virus or bacterial infection
- Reye's syndrome, which is a serious condition that causes sudden swelling in the liver and brain, particularly in children
- There are numerous possible causes of abnormal posturing. Many of these underlying causes are very serious.

- It's critical to call 911 or to go to the nearest emergency room right away if you or someone you know is displaying abnormal posturing. Failure to seek medical treatment could result in permanent brain damage and life-threatening complications.



Diagnosing abnormal posturing

Once your doctor takes your medical history, they'll likely conduct a complete physical examination. Determining the exact cause of abnormal posturing can take time and numerous tests. Here are some common tests:

- An electroencephalogram lets your doctor measure the electrical activity in your brain and identify potential problems associated with this activity.
- A cerebral angiography involves the use of a contrast dye to determine how blood is flowing through your brain.
- MRI and CT scans produce detailed images of the brain to show swelling and inflammation inside of the brain
- Intracranial pressure monitoring lets your doctor assess the amount of pressure inside of your skull.

You'll need to stay in the intensive care unit until the cause of abnormal posturing is determined and stabilized.

Preventing abnormal posturing

Abnormal posturing is a symptom of an injury, disease, or illness. Ignoring symptoms may cause the underlying condition to get worse. Prevention lies in getting timely treatment.

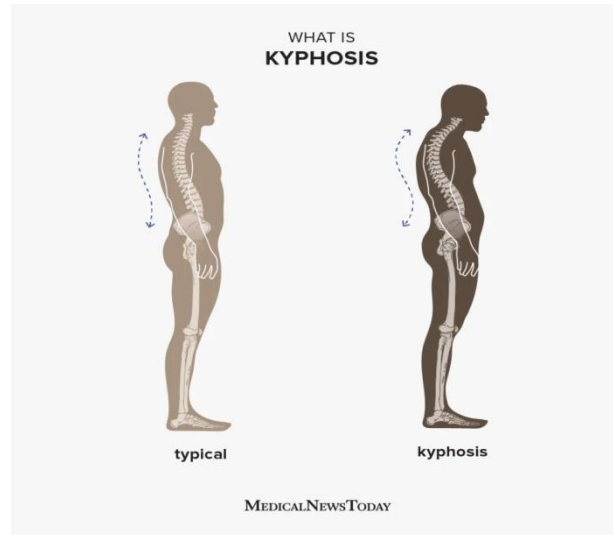
You should also take steps to prevent blood clots from forming and potentially causing a stroke, which could lead to abnormal posturing. These steps include:

- controlling blood pressure
- controlling blood sugar levels
- controlling cholesterol levels
- quitting or cutting back on smoking if you smoke
- exercising at least three times per week

Talk with your doctor about additional ways you can lower your risk for abnormal posturing.

Kyphosis refers to an excessive forward curvature in the upper back. Posture, age, and spinal features can cause it. It can lead to back pain and other problems and may need treatment.

Symptoms of kyphosis



The primary sign of kyphosis is a visible forward curve in the upper part of the spine. It causes the upper back to appear curved over, with the shoulders rounded forward.

In mild cases, the excess spinal curve is not very noticeable. In other instances, a person may look as if they are bending forwards.

Kyphosis often occurs without any other symptoms. However, other symptoms can include:

- back pain
- stiffness in the upper back
- a rounded back
- tight hamstrings

Doctors find vertebral fractures in around 40% Trusted Source of people with hyperkyphosis. Each vertebral compression fracture may increase the kyphosis angle by 3.8 degrees.

Types and causes of kyphosis: The spine is made up of bones known as vertebrae that stack on top of each other. This structure allows the spine to be supportive and flexible. It also means the spine is vulnerable to damage.

There are several types of kyphosis. The factors that contribute to kyphosis vary depending on the type someone has.

- **Postural kyphosis:** This is the most common form of kyphosis. It often starts in adolescence, when the muscles surrounding the spine develop differently due to a postural imbalance, such as slouching. Slouching increases the forward curvature, stretching the extensor muscles and posterior ligaments of the spine, which weaken over time. This can also occur in older adults, due to decreased muscle strength.
- **Scheuermann's kyphosis:** This also tends to develop during adolescence. However, it can become more severe than postural kyphosis. Doctors do not know what causes this form of kyphosis.
- **Age-related kyphosis:** This type of kyphosis causes a curve in the spine that progressively gets worse in older age, often as a result of conditions that affect the bones in the spine. A common example is osteoporosis, which causes the bones to lose density and become weaker.

- **Congenital kyphosis:** This occurs when the spine does not develop properly before birth, causing kyphosis at birth. It can rapidly worsen with age.

Who gets kyphosis?

Doctors do not fully understand why some people develop kyphosis while others do not. However, postural kyphosis is more common Trusted Source in:

- adolescents
- people over the age of 40
- females

Age-related kyphosis affects older adults, especially those with osteoporosis. Older females are more likely Trusted Source to develop osteoporosis after menopause, as low levels of estrogen make the condition more likely.

Complications from kyphosis

Complications with kyphosis can occur in more severe cases. These include Trusted:

- an irreversible curvature in the back
- persistent back pain
- respiratory complications
- heart problems
- limited quality of life

Kyphosis can also compress or pinch the spinal cord, causing problems with the nerves that supply the legs and lower body. This can lead to:

- weakness or numbness in the arms and legs
- loss of bladder control
- problems with balance

If these symptoms occur in someone with a spinal curve, they must seek immediate medical attention. A doctor may recommend surgery to relieve the spinal compression.

If an individual has surgery to treat kyphosis, there are risks of complications, including postoperative infections and bleeding around the surgical site.

Exercises for kyphosis: A physiotherapist can recommend exercises and stretches to strengthen the back and abdominal muscles, such as:

Knee rolls

1. Lie on the floor with the knees bent and feet flat on the floor.
2. Move the knees slowly to one side until the back feels tense.
3. Repeat at least five times on each side.

Pelvic tilting

1. Lie on the floor with the knees bent and feet flat on the floor.
2. Slowly arch the back, keeping the buttocks and upper back flat on the ground.
3. Hold the arch for a few seconds before returning to a fully flat position.
4. Repeat at least five times.
5. Knees to chest
 1. Lying in the same position as the previous two exercises, bring one knee up towards the chest.
 2. Clasp the hands around the knee and gently pull the knee closer to the chest.
 3. Hold this position for a few seconds, then release.

4. Repeat at least five times on each leg.

Prevention of kyphosis

It is not always possible to prevent kyphosis. However, people may be able to reduce the chances of postural kyphosis by maintaining good posture and back health. This may involve:

- exercising regularly to keep the back and core muscles strong
- avoiding slouching
- making sure workspaces and desks are set up ergonomically
- using chairs that support a healthy sitting position
- getting enough calcium and vitamin D to maintain bone strength
- stopping smoking, as this raises the risk Trusted Source for broken bones
- reduce or avoid alcohol consumption

How to maintain healthy posture while sitting

If someone spends a lot of time sitting, it is important to practice a healthy sitting position. To do this:

1. Position the chair so that when sat down, both feet can rest on the floor. The knees should be at a 90 degree angle. If the chair is too tall, or a person is using a desk that is too tall, use a foot rest.
2. Relax the shoulders so they are neither rounded, nor pulled back. Rest the arms on arm rests so they sit at a 90-120 degree angle, and are close to the body.
3. If using a desk or other surface, make sure it is at the same height as the arms.
4. Use a chair that supports the curve of the lower back, or if the chair does not have this support, add some using a cushion or back rest.

Remember to take frequent breaks to stretch.

How to maintain healthy posture while standing

To maintain good posture while standing, try:

- placing the feet shoulder-width apart
- putting most of the weight onto the balls of the feet
- standing straight and tall
- keeping the head level
- relaxing the shoulders down and back

Cervical kyphosis

Cervical kyphosis is a rare issue that affects the cervical spine, which is at the top of the backbone. It causes the neck to curve forwards, which can lead to significant problems.

Individuals with cervical kyphosis may experience neck pain. Because the condition compresses the spinal cord, they may also have sensory and motor problems. The causes of cervical kyphosis include:

- developmental problems with the spine
- osteoporosis
- cancer
- muscular dystrophy
- neurofibromatosis
- Paget's disease
- injury to the cervical spine
- infection

- multilevel spondylosis
- rheumatoid arthritis

What causes a hump on the back of the neck?

A hump on the back of the neck can have various causes, so a doctor may use several diagnostic tools, including X-ray and physical examinations, to investigate it.

SCOLIOSIS

Meaning: A condition characterised by sideways curvature of the spine or back bone, often noted during growth spurt just before a child attains puberty.

Scoliosis in some cases may be mild, but in a few it can be degenerative, becoming worse as they grow old. Some of the commonly noted symptoms include:

- Uneven hips, waist, or shoulders
- Back pain
- Leaning while standing
- One shoulder blade appears more prominent than the other

Causes

- The causes include:
- Cerebral palsy
- Muscular dystrophy
- Birth defects that affect the development of back bone
- Infections or injuries to the spine
- Tumors developing in or closer to the spine
- Tumours developing in or closer to the spine
- Genetic disorders such as Marfan syndrome, Down's syndrome
- One leg being longer than the other
- Muscle spasms
- Inflammations such as appendicitis
- The risk factors include:
- Family history
- Gender - girls are more prone to develop scoliosis
- Age- usually occurs just before the puberty

Complications

If untreated for a prolonged period it may lead to

- Severe spinal curvature reduces the chest space, making it difficult for the lungs and heart to work normally
- Increased distance between ribs on each side of the chest.
- Rotation or twisting of the spine
- Chronic back pain, particularly in people who had scoliosis during childhood

UNIT III - REHABILITATION EXERCISES AND BASIC REHABILITATION

What is sports injuries and rehabilitation? Sports rehabilitation is a type of physical therapy that treats people of all ages who have musculoskeletal system pain, injury, or illness. With the use of exercise, movement, and therapeutic interventions, sports rehabilitation helps maintain health and fitness and helps you recover from injury and reduce pain.

What is Sports injury rehabilitation? Sports injury rehabilitation or 'rehab' is a structured programme designed by physiotherapists for people who have sustained a sporting injury. Depending on the type of injury you have sustained, your programme will include a number of parts which may include strengthening exercises, mobilising, pain relief techniques and functional skills. At Physio.co.uk, we aim to maximise recovery by tailoring the rehabilitation to your individual goals and monitoring your progress.

What are the benefits of sports injury rehab? Our specialist musculoskeletal physiotherapists will work with you to provide a thorough rehabilitation programme which will encourage a number of benefits including:

- Restoring full function as soon as possible
- A faster recovery and return to sport
- Strengthening weakened muscle groups
- Reducing any pain and inflammation from your injury
- Maintaining cardiovascular fitness whilst you are out of sport
- Minimising the risk of future injuries
- Improving your flexibility and coordination
- Advice on correct footwear and equipment trough out.

What are the 5 stages of rehabilitation in sport?

Don't Forget the Rehab

Phase 1 - Control Pain and Swelling.

Phase 2 - Improve Range of Motion and/or Flexibility.

Phase 3 - Improve Strength & Begin Proprioception/Balance Training.

Phase 4 - Proprioception/Balance Training & Sport-Specific Training.

Phase 5 - Gradual Return to Full Activity.

Sports Injury Rehabilitation Stages

After initially sustaining a sports injury, it can be easy to want to rush through the recovery process and return to the game. However, taking the time to go through each stage of rehabilitation will help ensure you make a full recovery. At MOTION, our team knows which stage of recovery an athlete should attain and when they'll be ready to move on to the next. By choosing our staff to administer your physical therapy, you'll be able to return to your sport with no risk of future injury.

1. Pain and Swelling Reduction With most injuries, the first two symptoms a person experiences are pain and swelling. As a result, these will be the first challenges targeted during physical therapy. Before you can complete any of the more involved aspects of physical therapy, you can expect a rotation of ice, heat, and sometimes even massage therapy on the injured area. Once the pain and swelling have diminished, the next stage of rehabilitation can begin.

2. Improve Joint Mobility and Range of Motion Now that you have less swelling, you can begin physical activity. Due to the nature of your injury or a prolonged period of immobility, your joints and muscles may be stiff. This can make moving very difficult and sometimes even painful. To help limit the time spent with stiff joints and the potential for long-term damage, your physical therapist will start you with range of motion exercises as soon as your body is ready to handle them.

3. Regain Your Strength and Endurance

After restoring your range of motion, the next step will be regaining your strength. Our team at MOTION will teach you a variety of strength and endurance exercises that will push you to your limits without causing additional harm. By making sure you regain your levels of strength, you'll be able to reduce the risk of re-occurring injuries while moving closer towards your peak athletic ability.

4. Increase Coordination Skills

Proper body coordination is the key to being a successful athlete. In the second to last stage of rehabilitation, you will need to "re-teach" the injured area how to work in tandem with the rest of your body. Our physical therapist will assess how far you've come and consider what motions are used in your specific sport when coming up with a coordination regimen. Once your coordination has reached a healthy level, you'll be able to move on to the final stage of physical therapy.

5. Recovering Sports-Specific Movements

For the final stage of rehabilitation, our physical therapist will have you perform exercises that mimic the specific motions you'd utilize when competing in your sport. You won't be able to return to action until you're able to perform all the motions you could before the injury took place. After they've completed this stage, our patients should feel confident that they can begin to compete without fear of injury.

What to Expect?

Your initial visit will feature an in-depth consultation interview and physical assessment. The physical assessment of the patient will conclude an appropriate diagnosis of the injury, factors predisposing the injury, and other health disorders that could be related. At MOTION, our physical therapists use clinical reasoning to create a tailored recovery plan to help you return to the highest level of function and physical activity. Sports rehabilitation will combine advice, education, and rehab into all the features of your daily life.

Road to Recovery

It is important to start treatment and rehabilitation soon after an injury happens and continue using therapeutic interventions to speed up recovery. At MOTION, our team of highly specialized physicians and therapists will work with you to create the best treatment plan targeting your

specific needs to help you recover and return to your prior activity level before the injury. Your treatment plan for rehabilitation will focus on getting you back to the same—if not better — functional capacity. We'll incorporate therapeutic interventions and exercises into the treatment and monitor and modify areas as needed.

Forms of treatment include but are not limited to:

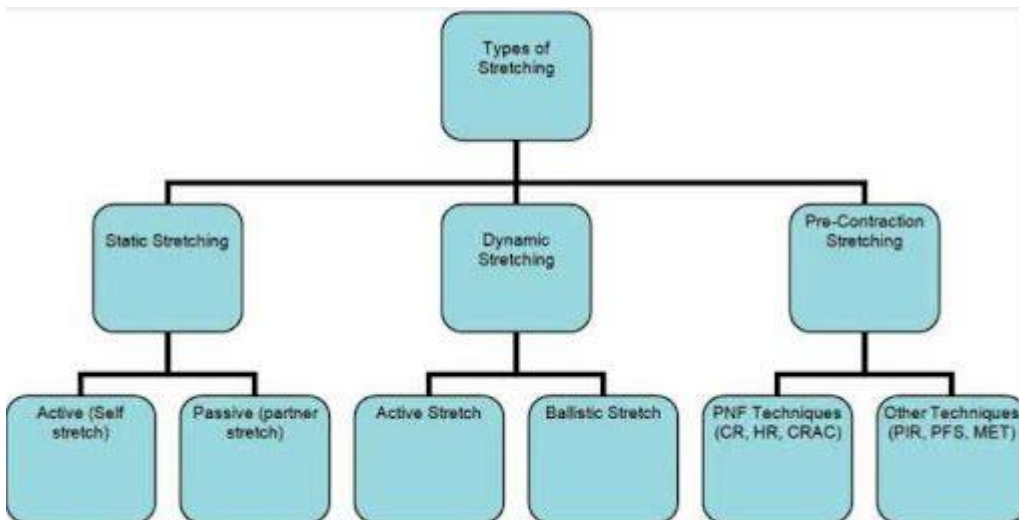
- Exercise rehabilitation
- Graded activity
- Manual therapy
- Workplace assessment and modification
- Massage
- Taping
- Bracing
- Electrotherapy

Benefits of Physical Therapy

There are few things more infuriating to an athlete than dealing with an injury. While you may think your season is now over, this doesn't need to be the case. By allowing our specialists at MOTION to perform your physical therapy, you'll be able to achieve the following benefits:

- Avoid the need for surgery
- Mitigate the risk of re-injury
- Increase athletic performance

Types of stretching



The benefits of stretching

All human movement depends on the range of motion of our joints. This is the ability of your limbs to go through their complete spectrum of movements. The range of your joints is mostly determined by two parts of your anatomy: your joints and your muscles

Joints and muscles can become less flexible and reduce your ability to move the way you want to for many reasons. Bad posture or injuries can cause your muscles to become shorter due to spasms

or contractions, limiting your range of motion. This can create a muscle imbalance that causes you discomfort.

Increase your range of motion

Decrease muscle stiffness after exercise

Potentially prevent injuries

Any kind of stretching before exercise can be beneficial. You should customize the type of stretching you choose and your exact routine to your fitness level and the activities you plan to do (Behm, 2016).

Different types of stretching

Just as there are different types of athletic activities, there are different types of stretching. Stretches can be either static (involving no motion) or dynamic (incorporating movement into the stretch).

1. Static stretching This is the most common type of stretching—you probably practiced this in gym class at some point. Static stretching is where you hold a specific position with a muscle tensed to the point of a stretching sensation. It is often repeated several times in succession. Static stretching is good for cooling down after a workout to reduce muscle fatigue and soreness. With your healthcare provider’s supervision, relaxed, static stretching can also help relieve spasms in muscles that are healing after an injury.

A typical example of a static stretch is when you bend over and touch your toes.

2. Active stretching Active stretching is a type of dynamic stretching that involves moving a limb through its full range of motion, but not past that. The exercise is repeated several times (Page, 2012).

Active stretches take you gently to the limits of your range of motion with no bouncing or jerking movement. They can be helpful as a warm-up for an aerobic workout.

You can try actively stretching your hamstrings by lying on your back on the floor and lifting your leg straight into the air until you feel your hamstring stretch, then repeating this motion.

3. PNF stretching Proprioceptive neuromuscular facilitation or PNF stretching is a technique that incorporates both static stretches and isometric contractions (contracting a particular muscle without moving it). It's generally considered highly effective, although there aren't many studies looking at the results (Behm, 2016).

PNF stretching may be very effective for increasing flexibility and range of motion, but it isn't appropriate for everyone. Many of the PNF techniques require a partner to do them safely. There is also a high potential for muscle or joint injury if the stretches are done incorrectly (Behm, 2016).

The most straightforward PNF stretch is the hold-relax. This is where you stretch the target muscle group and hold it for a few seconds. Then you contract that same stretched muscle without moving it. Hold the stretch and the contraction for 10–15 seconds, then relax your muscle. When you repeat the sequence, you should be able to stretch further than before.

4. Ballistic stretching Ballistic stretching is a dynamic technique where you extend your joint as far as you can to lengthen the targeted muscle. Then, instead of stopping there as you would with a

regular stretch, you add in a “bouncing” or a “pulsing” motion while in the stretched position. The momentum of your body pushes your joint to go further than it normally would (Konrad, 2014).

An example is the ballistic hamstring stretch. In this exercise, you fold forward from a standing position and try to touch your toes. When you are as close as you can get, begin to pulse up and down to see if you can get closer to your toes.

While once a common advanced stretching technique, sports medicine specialists typically no longer recommend ballistic stretching due to the increased risk of injury.

The type of stretching While researchers have long known about the benefits of stretching, there is still some controversy about the best form of stretching for each individual to help them meet their exercise goals. Static, ballistic, and PNF stretching exercises have all been shown to increase range of motion and decrease muscle stiffness. When comparing the different types, researchers in one study didn't find any meaningful difference in the results experienced by participants with these different stretching styles (Konrad, 2017).

They concluded that a single stretching exercise of any type was an appropriate tool to increase flexibility and decrease muscle stiffness. They recommended performing your chosen stretch four times for 30 seconds each time (Konrad, 2017).

In general, dynamic stretches are recommended over static stretching when used for warming up before physical activity. This is because evidence suggests that dynamic stretching might positively affect your immediate physical performance (O'Sullivan, 2009).

When to stretch? Just like the type of stretching, researchers also don't agree on when you should stretch to see the best benefits.

Typical recommendations are to perform dynamic stretches (such as active stretching or PNF stretching) before an activity to get your muscles warmed up and ready to exercise. Static stretches may be better suited for the cool-down period after a workout when they can help loosen your muscles up (O'Sullivan, 2009).

It's important to remember that stretching alone will not prevent all injuries from activities. Some people may develop a false sense of security and engage in activity beyond their fitness level, resulting in serious injury (da Costa, 2008). Be honest with yourself about your fitness level, and don't push yourself into pain or beyond what you can handle.

Doing stretches with bad form can also cause injuries or aggravate existing injuries. If you have any injuries, you should talk with a physical therapist or exercise professional about developing a stretching routine that won't cause you further problems (da Costa, 2008).

UNIT- IV MESSAGE

INTRODUCTION

Many types of massage can be used to treat injuries. The most common types of massage used for injury include remedial massage, Swedish massage, deep tissue massage and sports massage. Massage can assist after injury by helping pain, tight muscles and the breakdown of scar tissue. Begin with gentle stroking motions. If touching the affected area causes pain, apply light pressure using only the tips of your fingers. Massage the entire area surrounding the strain to improve circulation; focus on tender spots for longer periods of time. Massage helps by after injury by speeding up the healing of damaged tissues, decreases tension and breaks down scar tissue. Massage helps recovery after injury by stimulating the healing process. Massage encourages circulatory movement and helps more oxygen and nutrients transport into tissues.

History of Massage Therapy

The Ancient World

The first mention of codified massage therapy being used was in a Chinese text, published in 2700 BCE, known as “The Yellow Emperor’s Classic Book of Internal Medicine.” This book focuses on using massage therapy to change the flows of Qi energy flowing through the body, realigning it so that the flow of positive energy would help overcome medical conditions.

Eventually, these Chinese traditions would make their way to Japan where they would form the basis of the *anma* style of massage that would eventually develop into modern *shiatsu* massage.

This same approach to massage therapy can also be found in Egyptian art and Greek writings that first appeared in around 2500 BCE. Egyptian massage therapy, as written down and evolved by both the Greek and Romans, bears a striking similarity to the modern practice of reflexology.

In 1500 BCE, Hindus practicing Ayurvedic medicine, which translates from Sanskrit as “life health,” first wrote down their message therapy traditions based on holistic medicine, combining meditation, relaxation, and aromatherapy. Ayurvedic medicine still has a strong following in Hindu countries and the British occupation of India resulted in that traditional making its way back to the west.

Western Traditions

The Roman medical tradition, pioneered by the physical Galen who was often known as the “Father of Medicine,” included massage alongside exercise, a healthy diet and rest. While Galen’s system did operate on the comparatively primitive system of Humorism, it did include a tradition of massage passed down from the Ancient Egyptians.

In the early 1800s, the Swedish doctor, gymnast, and educator Per Henrik Ling applied his experience of the human body into a series of massage techniques that he called “Swedish Movement System.”

Ling combined his education of physiology and gymnastics with pre-existing massage tradition found in Sweden, Denmark, and Norway to create the basis of what would become moderns Swedish Massage.

Modern Massage: In the first half of the 20th century, message tended to be relegated to a luxury, a simple form of relaxation without any other benefits. Slowly, that reputation is being

rehabilitated, with the medical world coming round to the idea that massage therapy can be an important part of a healthy lifestyle and assist in the treatment of certain illnesses and conditions.

Effects of massage: Massage facilitates the energy flow throughout the body and reduces discomfort. It has various other therapeutic effects like:

- Decreases pain.
- Increases movement.
- Eases muscle tension.
- Improves blood flow.
- Improves functionality.
- Promotes relaxation.
- Relieves stress.

Physiological Benefits of Massage Therapy

- Reduces Pain and Inflammation
- Promotes Relaxation
- Aids In Digestion
- Stimulates The Circulatory System.
- It Boosts Immunity.
- Helps Regulate The Respiratory System.
- Maintains Bone Health.
- Aids in Skin Regeneration.

Psychological effect of massage

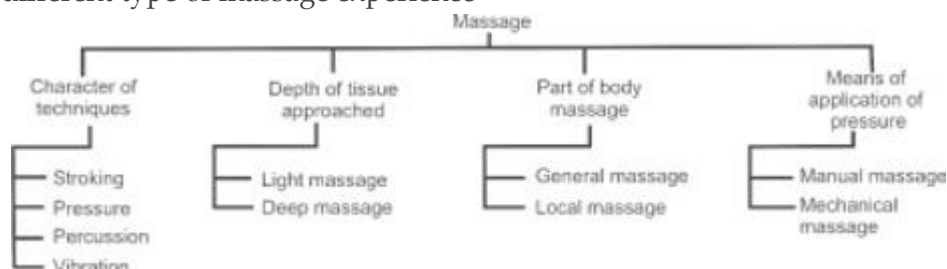
It has been reported that sport massage therapy psychologically reduces stress levels, decreases nervous system tension and anxiety, as well as improves concentration during and after performances.

Chemical effects of massage

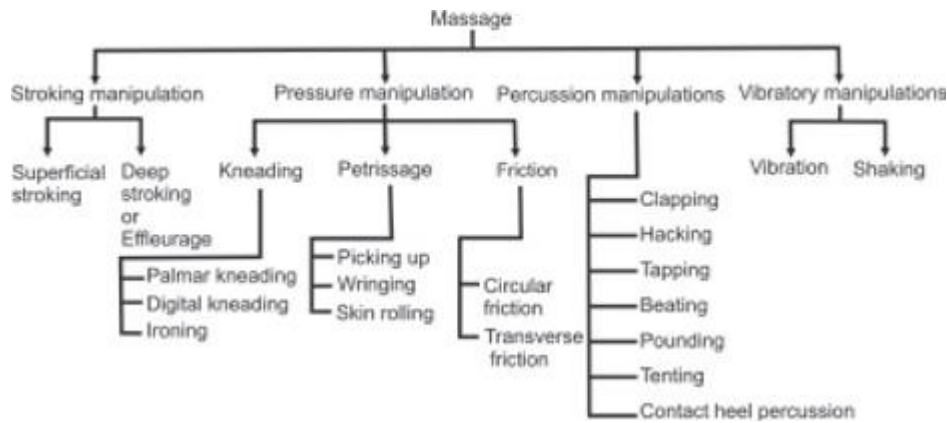
The immediate benefits of massage is a feeling of deep relaxation and calm. This occurs because massage prompts the release of endorphins – the brain chemicals (neurotransmitters) that produce feelings of wellbeing.

Levels of stress hormones, such as adrenalin, cortisol and norepinephrine, are also reduced.

Increased endorphins, serotonin and dopamine hormones is a common benefit gained through massage. Endorphins, serotonin and dopamine are positive hormones that circulate around the body. Endorphins, serotonin and dopamine can give a person a sense of well-being and reduce anxiety. What are the 5 basic massage techniques? The five basic massage movements are effleurage, petrissage, tapotement, friction, and vibration. Each of these movements is designed to provide a different type of massage experience



PREVENTION AND MANAGEMENT OF SPORTS TRAUMA



1. **Petrissage Massage** is a kneading of the muscles, skin and tissues to loosen muscles and increase blood flow to the massaged area. This comes from the French word, *petrir*, meaning “to knead.” Not surprisingly, therapists refer to this as the kneading stroke. Petrissage involves the pressing, rolling and kneading of muscles, skin and tissues. Movements should be slow and repetitive with pressure, in order to loosen tight muscles and increase blood flow to the massaged area. Results are often improved when muscles are already relaxed before the petrissage massage, so for even better results, try a lighter effleurage massage first.

2. **Friction Massage** uses the ball of the thumb or a pointed object in small, circular movements to penetrate deep tissues and muscles. Friction massage relies on the rubbing of a top layer of tissues against deeper muscle or bone. Friction massage is typically done using the ball of the thumb or a pointed object. It is a deep pressure massage done in small circular movements to penetrate deep tissues. The technique involves pressing on the tissue and rubbing it back and forth over the underlying muscle. This helps loosen knots in muscles, increases blood flow and relieves pain. A common example is massaging the muscles on either side of the spine. This deep tissue massage is good for relieving very tired or sore muscles. As a result, it is often used with athletes after a competition. Do not use this technique over the kidneys or the back of the knee. If you have questions, always consult a physician before using.

3. **Tapotement Massage** is the rapid, percussive tapping, slapping and cupping of the massage area to work and strengthen deep-tissue muscles. This comes from the French word, *tapoter*, meaning “to tap or drum.” Therapists refer to this as the percussion stroke. Tapotement is the rapid, percussive tapping, slapping and cupping of the massaged area. It is used to more aggressively work and strengthen deep-tissue muscles. It increases local blood circulation and can even help tone muscle areas. Tapotement is often used to warm-up athletes before an event. Because of the tapping nature, don’t use this technique over bony areas or sensitive muscles. Do not use over the kidneys, the spine or the back of the knee. If you have questions, always consult a physician before using.

4. **Effleurage Massage** is done with soothing, often circular strokes over the skin to relax and warm up muscles. This comes from the French word, *effleuer*, meaning “to touch lightly.” In a massage session, this is typically the opening massage technique to relax and warm up the muscles. Therapists refer to it as the gliding stroke. Effleurage is done with soothing, often circular strokes over the skin. To improve the experience, try varying the rhythm or speed of the massager. Slow strokes are relaxing; faster strokes are more stimulating. You can also try

different pressures. Light pressure stimulates the skin; stronger pressure improves circulation. A combination of light and more intense pressure creates a soothing, pain-relieving massage.

The Four Principles of Massage are:

1. Superficial, deep, superficial
2. General, specific, general
3. Proximal, distal, proximal
4. Peripheral, central, peripheral

The following are the **other principles of Therapeutic massage:**

Depth of pressure:

Depth of pressure is the amount of force applied to the tissue by stroking. The depth of the pressure should be increased gradually and with great care, and also watch for signs of discomfort.

Speed of the stroke:

Speed of the stroke is how fast or slow stroking is performed. Depending on the desired response any stroke may be applied slowly and quickly.

Rhythm:

Rhythm is the regularity or constancy with which the stroke is applied. Rhythm can be slow or fast, depending on the condition being treated.

Duration:

Duration is the length of time each stroke lasts during its application or the length of time the stroke remains on any given body part.

Direction:

Direction is the path of the stroke, it is always towards the heart.

Frequency:

Frequency is the number of times each stroke is performed.

INDICATION OF MASSAGE

Massage can be given as an adjunct treatment for many medical conditions. Given below is a list of various conditions which can be treated by massage or in conjunction:

- Neck, shoulder, elbows, back, or knees pain,
- Tendinitis,
- Nerve injuries,
- Muscle tension,
- Myofascial Pain Syndrome,
- Rotator Cuff Syndrome,
- Sciatica,
- Tennis Elbow,
- Frozen Shoulder,
- Osteoarthritis,
- Rheumatoid Arthritis,
- Muscle sprains and strains,
- Sports injuries,
- Carpal Tunnel syndrome,
- Fibromyalgia,

- Poor circulation.

CONTRAINDICATION OF MASSAGE

Conditions for which massage may interact negatively and might prove to be harmful.

These conditions are:

- Contagious diseases
- Vomiting
- Diarrhea
- Fever
- Severe pain
- Kidney disease
- Thrombosis.

ELECTROTHERAPY

INFRARED

Infrared (IR) or thermal radiation is a band of energy in the complete electromagnetic spectrum. IR are the radiations of longer wavelength than the red end of the visible spectrum and extend to the microwave region, i.e., from 760 nm to 1 mm.[1] IR radiation is generated by Sun. Many ancient therapies have utilized sunlight for wound healing and pain relief. When Sun rays reach the ground, they get absorbed by gases or water molecules in the atmosphere. The human body is made of 70% water, so it can potentially accumulate a large amount of energy that could modulate biological processes by strong resonant absorption of IR radiation from sunlight mediated by water molecules

Any heated body emits infra-red. Any material with temperature above absolute zero emits IR. IR radiations are produced in all matter by molecular vibration; the molecular movement causes infrared emission of different wavelengths and frequencies[1]. The frequencies at which maximum radiations are emitted are proportional to the temperature which means the higher the temperature, the higher the frequency and so shorter the wavelength



Physiological Benefits

Infrared radiations cause

- local cutaneous vasodilation due to the release of chemical vasodilator (histamine) as well as possible effect on the blood vessels, occurs after 1-2 minutes.
- evident erythema. The rate and intensity of erythema depends on rate and degree of heating.

- reflex dilation of other cutaneous vessels occurs to maintain normal heat balance.
- prolonged heating leads to sweating and eventually to cooling.

THERAPEUTIC EFFECT

- pain relief
- decreases muscle spasm
- increases the sensory nerve conduction velocity, increase in endorphins influencing the pain gate mechanism
- acceleration of healing and tissue repair- pressure sores
- used prior to electrical stimulation/testing or biofeedback to make the skin a better conductor

INDICATIONS

- Osteoarthritis
- Rheumatoid arthritis
- Ankylosing spondylitis
- Capsulitis
- Psoriasis
- Joint stiffness
- Odema
- Pain
- Muscle spasm

CONTRAINDICATIONS

- Impaired cutaneous thermal sensations
- Defective arterial cutaneous circulation
- Dermatitis or eczema
- Tumors
- Skin damage due to ionizing radiation
- Tuberculosis
- Photosensitivity
- Hyperesthesia
- Mental retardation
- Metal implant
- Fever

PARAFFIN WAX THERAPY: Paraffin Wax bath is a form of deep heating therapy which mainly use paraffin oil and wax to promote pain relief to hand, feet, sore joints and muscles. The actual temperature of paraffin wax is 42-52°C whereas its melting point is 51-54.4°C. The melted wax should not be poured directly on the body tissue as it may lead to thermal injuries. In order to avoid this, melting point of wax is usually lowered by adding an impurity in the form of paraffin oil.

The heat transfer during paraffin wax bath therapy occurs through conduction from the layer of solid paraffin wax into the skin. When the warm paraffin wax are applied to the skin, it causes the

blood vessels to get expand by improving the circulation, promote healing and removing toxins out of the skin.

Paraffin wax bath unit

- Parts of paraffin wax bath (PWB) includes container, mains, thermostat, thermostat pilot lamp, cap and casters.
- The container of paraffin wax bath (PWB) is usually made up of steel.
- The ratio of paraffin wax and mineral oil is 6:1 or 7:1
- The composition of the solid wax : liquid paraffin : petroleum jelly is 2:1:1

Patient preparation

- Explain the procedure to the patient prior applying paraffin wax bath (PWB).
- Expose the body part to be treated.
- Remove jewelry or metal if any.
- Check for the sensation of the patient.
- Check for the contraindications if any.
- Thoroughly inspect the body part to be treated.
- Ensure comfortable position of the patient.
- Check the temperature selected on thermostat before treatment.
- Check the temperature of the bath.
- Select convenient or appropriate method of application.
- Inspect the body part after the treatment.

Technique

There are various methods used for the application of paraffin wax such as-

- Dip method
- Immersion method
- Brush method
- Bandage method
- Pouring method

Dip Method: In this method, the therapist will instruct the patient to dip his/her extremity to be treated in the paraffin wax bath (PWB). Remove the extremity once the paraffin solidifies or becomes thick which covers the skin. Dipping should be done for 8-12 times until a thick coat is formed. Once thick coating of wax is formed the treated area should be wrapped 1st in a plastic and then wrapped with a towel. This method of paraffin wax bath (PWB) promotes mild heating. The treatment duration should be 10-15 minutes.

Immersion Method: In this method, the therapist will instruct the patient to dip his/her extremity for 3-4 times in the paraffin wax bath (PWB) until a thin coat is formed and then left immersed in paraffin for 20-30 minutes. This method of paraffin wax bath (PWB) promotes vigorous heating to the affected extremity.

Brush Method: In this method, the therapist will apply 8-10 coats of wax on the affected body part with the help of paint brush using even and rapid strokes. Once thick coating of wax is formed the treated area should be wrapped 1st in a plastic and then wrapped with a towel for 10-20 minutes. This method of paraffin wax bath (PWB) is more commonly used.

Bandage Method: A towel or a bandage of suitable size will be immersed in paraffin wax and then wrapped around the body part to be treated. Additional wax then can be poured or brushed over the bandage. This method can be commonly used for treating proximal parts of the body.

Pour Method: In this method, the therapist will be using a mug or utensil to directly pour a wax on the part to be treated. Wax should be poured 7 to 10 times to create a thick coat, then covered with a plastic cover and wrapped around with a towel. Treatment duration includes 10-15 minutes. This method will be commonly used for knee and elbow.

Indication

1. Osteoarthritis
2. Rheumatoid arthritis
3. Tenosynovitis
4. Joint stiffness
5. Leprosy
6. Scleroderma
7. Dupuytren's contracture
8. Sudeck's atrophy
9. Soft tissue contractures

Contraindication

1. Open wounds
2. Infective conditions
3. Allergic rashes
4. Deep vein thrombosis
5. Impaired sensations
6. Acute dermatitis

Clinical Effects of Paraffin Wax Bath

- Relieving musculoskeletal pain
- Reducing stiffness
- Increase in local temperature
- Increase sweating
- Increase in local circulation

Precautions

- Temperature of the paraffin wax should be checked prior applying.
- The skin must be dry, as water droplets may result in burns.

Short Wave Diathermy

Pulsed short wave diathermy is a form of electrotherapy, similar to Ultrasound. It uses electromagnetic energy to heat the underlying tissues. High frequency, short wave, alternating electrical currents pass into the muscles, tendons, ligaments, etc.

As the current alternates between positive and negative, this causes structures within the muscle to rotate in reaction. This friction from repeated movement causes an increase in temperature.

This works in a similar way to ultrasound, however, diathermy can be used to heat a larger area and also heats the deep muscles more effectively. On the downside, diathermy units are expensive and can only be used by one person at a time.

Short Wave Diathermy uses

- Muscle strains.
- Ligament sprains.
- Tendinopathies (e.g. Achilles)
- Back or joint pain.

The Contraindications

Short Wave Diathermy should not be used in the following circumstances:

- Over metal implants such as pins and plates.
- On the chest of patients with pacemakers.
- Over the abdomen or back of a pregnant woman.
- When infection is present.
- Over open wounds.
- Over cancerous tissue.

TENS



Transcutaneous electrical nerve stimulation (TENS) is a method of providing pain relief. As the name suggests, it involves the application of electrical current to the affected area. This is achieved via a number of electrodes that can be fixed on the skin.

TENS relieves pain mainly by stimulating the pain gate mechanism. Electrical signals from the machine block the body's natural pain signals.

Ultrasound Therapy

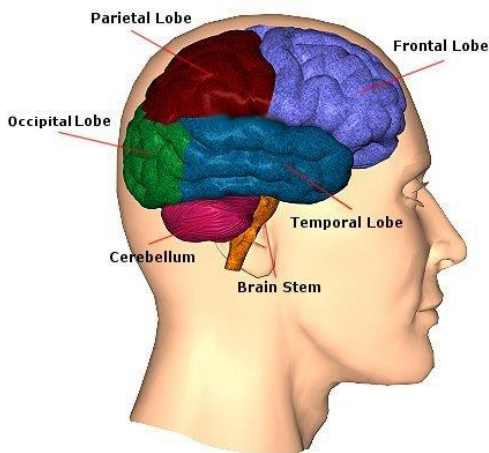


Ultrasound has been used as an electrotherapy treatment modality by therapists over the last 50 years. It transmits high-frequency sound waves into tissues. It has a number of benefits and effects including heat and micro-massage effects.

However, the effectiveness of therapeutic ultrasound is controversial. To date, there is still very little evidence to explain how ultrasound causes a therapeutic effect in injured tissue. Nevertheless, practitioners worldwide continue to use this treatment modality relying on personal experience rather than scientific evidence.

UNIT V - SPORTS INJURIES CARE, TREATMENT AND SUPPORT

Head Injuries



Symptoms

- Bleeding from wound, ears, nose, or around eyes
- Bruising behind the ears or under the eyes
- Changes in pupils (sizes unequal, not reactive to light)
- Drainage of clear or bloody fluid from ears or nose
- Confusion
- Convulsions
- Difficulties with balance
- Drowsiness
- Headache
- Loss of consciousness
- Nausea/Vomiting
- Restlessness, irritability
- Slurred speech
- Stiff neck
- Swelling
- Visual disturbances

Indications of a head injury:

Injuries to Lower Limb

The following is a list of common sporting conditions and injuries. The severity of each condition may lead to different treatment protocols and certainly varying levels of intervention. As treatment therefore is quite subjective we have merely provided a list of commonly used modalities. Further tips may appear under Treatment goals, advice and after care for each injury. Conservative treatment of sports injuries often includes:

- Rest.
- Ice.
- Anti-inflammatory medications.
- Stretching.
- Sports massage.
- Ultrasound.
- Strengthening exercises, especially eccentric.

Hip and Thigh Injuries (Category I)

Hip Joint-Sprains

Structures affected

- Sprains are categorised into 1st, 2nd and 3rd degree dependent upon the severity of the tear and the percentage of fibres that have torn.
- Any of the ligaments of the hip joint can be damaged Ilio-femoral, ischio-femoral, pubo-femor alignments
- Complete rupture will result in the hip being dislocated, this can be very serious and should not be attempted to be relocated by anyone who is not medical trained

Signs and Symptoms

- Obvious deformity of third degree tear Pain with passive movement of the joint Instability of the joint
- Poor ROM
- Inflammation
- Discoloration
- Weak

Biomechanics of injury

- Excessive rotation
- Excessive abduction
- Rotation of the core while the feet are fixed

Assessments

- Passive extension and external rotation will test the ilio-femoral and ischio-femoral ligaments
- Passive abduction will test the pubo-femoral ligament

Treatment Goals, Advice and Aftercare

- Ice application to reduce pain and inflammation
- Be cautious when icing the groin area (testicles)
- Fluid drainage may be needed to reduce oedema
- Mobilisation following any adaptive shortening Restore ROM
- Restore any lost strength
- Tensile loading Concentrate on proprioceptive exercises

Adductor strain

Structures affected

- Muscles strains normally occur at the MTJ but can also occur in the muscle belly
- Graded 1st, 2nd and 3rd degree according to severity and the number of fibers left intact Adductor Magnus, longus, brevis, gracilis and Sartorius

Signs and Symptoms

- Sudden pain felt around the groin during activity
- Localised pain on palpation
- Possible discolorations

- A palpable dip may be felt in the muscle if there is a complete rupture
- Pain at end ROM
- Pain with active and resisted muscle actions

Biomechanics of injury

- Most likely to occur during eccentric muscle action
- High impact or unexpected force is usually associated with muscle strains
- Muscle imbalance between agonist and antagonist pairs will make the athlete more susceptible to muscle tears
- Also very common with rugby and football when a player slips over stretching the adductor muscles

Assessments

- Passive abduction will cause pain at end ROM
- Active and resisted adduction will be weak and painful

Treatment Goals, Advice and after care

- P.R.I.C.E. during the acute phase
- Tensile loading is important after the acute phase of injury
- Isometric followed by dynamic and the resisted contractions
- Restoring length
- Restoring strength
- Insuring that proprioception has also been restored
- If 3rd degree sometimes surgery is necessary

The Knee Injuries (Category II)

Osgood Schlatter's Syndrome

- Structures affected
- Tibial tuberosity (insertion point of the quadriceps tendon)
- Signs and Symptoms
- Inflammation of the bony prominence (tibial tuberosity), this will appear more projecting than the unaffected side - bony growth over long period of suffering the syndrome
- Localised pain on palpation
- Pain when contracting isometric/isotonic against resistance
- Pain worsens after activity

Biomechanics of injury

- Following a rapid growth period
- More common in boys aged 10-15
- High levels of activity
- The tendon repeatedly pulling at the patella bone

Assessments

- Contracting the quads at their shortest length (with the knee straight will cause pain)
- The appearance of the bony lump and other symptoms mentioned above
- Noticeable increase in activity for the individual (overload)

Treatment Goals, Advice and Aftercare

- RICE
- Reduce high impact activity - try to replace with swimming to maintain cardiovascular fitness
- Ice massage to the painful area
- Use massage to relieve tension in quadriceps muscles and tendon
- Developmental stretching of the quadriceps once pain and inflammation had reduced

Meniscal tears

Structures affected

- The medial or lateral meniscus
- The meniscus sit between the femoral condyles and tibial plateau
- The medial meniscus is more like to be injured and is the larger of the two

Signs and Symptoms

- Clicking, locking and intermittent pain are classic signs of meniscal damage
- Pain described as inside the knee or to either the lateral or medial side Swelling
- Poor ROM when flexing the knee
- Pain on weight bearing

Biomechanics of injury

- Degeneration of the meniscus
- Twisting with the foot fixed
- Direct impact

Assessments

Client lying prone, pressure applied to the foot with the knee flexed to 90°, rotating the foot Medially and laterally (Appley's Test). Positive test will produce pain and or clicking

Treatment Goals, Advice and Aftercare

- Apply ice
- Start to mobilise the leg as soon as possible to help with reducing swelling (CPM)
- Massage muscles surrounding the knee to relax any hypertonic
- Restore ROM
- Restore strength particularly in the quadriceps Proprioceptive exercises
- Surgery - knee arthroscopy may be necessary if the damage is extensive

Ligament sprains-MCL,LCL,PCL,ACL

Structures affected

MCL - medial joint line

LCL - lateral joint line (attaching on the head of fibula)

PCL - medial femoral condyle to the posterior edge of the tibia

MCL - notch of the distal femur and lateral femoral condyle to the tibial plateau

Signs and Symptoms

- Swelling (amount varies according to severity and ligament)
- Discolouration

- Localised pain on palpation for MCL and LCL
- Pain on weight bearing particularly when bending the knee

Biomechanics of injury

- MCL - often associated with twisting with the foot planted or impact from the lateral side of the knee forcing the knee into an increased valgus angle
- LCL - impact to the medial side of the knee forcing the knee into an increased varus angle
- PCL - not often injured, possible with impact to the front of the tibia when the knee is
- flexed
- MCL - again associated with twisting to change direction, or a backwards fall
- Assessments
- MCL - valgus stress test LCL - varus stress test
- PCL - posterior draw test ACL - anterior draw test

Treatment Goals, Advice and Aftercare

- Apply ice
- Dependent upon severity of injury surgery may be required, particularly with ACL/PCL rupture
- Period of immobilization likely
- Restore ROM
- Restore strength Proprioceptive exercises
- Strapping and taping of the knee on return to sport

Runners Knee-ITB Friction Syndrome

Structures affected

Iliotibial band on the lateral thigh

Signs and Symptoms

- Lateral knee pain
- Pain when flexing and extending the knee
- Pain worsens with running
- Weak hip abduction
- Pain on palpation of the ITB

Biomechanics of injury

Overuse injury most common in long distance runners

Assessments

- Ober's test
- Observation during the Thomas and Kendall test
- Palpation of tightness

Treatment Goals, Advice and Aftercare

- Ice the lateral knee to ease pain
- Assess biomechanics when running
- Reduce frequency and duration spent running
- Release the ITB
- NMTs applied to any excessively tight areas
- Gradually increase running

- Advise on ITB stretches

Thigh strains-Rectus Femoris

Structures affected

- Rectus Femoris muscle located in the middle of the anterior thigh
- Muscle strains most commonly occur at the musculo-tendinous junctions (MTJ), but can occur in the muscle belly
- Graded 1st, 2nd and 3rd degree according to severity

Signs and Symptoms

- Pain when actively extending the knee or flexing the hip
- Pain with weight bearing
- Localised pain on palpation
- Pain at end ROM
- If complete rupture the muscle may recoil and a palpable dip may be felt in the muscle
- Possible discoloration

Biomechanics of injury

Muscle strains often occur with eccentric muscle action

Assessments

Pain with active and resisted knee extension and hip flexion

Treatment Goals, Advice and Aftercare

- P.R.I.C.E. during the acute phase
- Tensile loading is important after the acute phase of injury
- Isometric followed by dynamic and the resisted contractions
- Restoring length
- Restoring strength
- Insuring that proprioception has also been restored
- If 3rd degree sometimes surgery is necessary

Haematomas

Structures affected

Often occurring to the rectus femoris

Signs and Symptoms

Swelling

Tenderness

Discolouration

Restricted ROM due to pain

Biomechanics of injury

Direct impact to the muscle compresses the muscle against the bone

Assessments

- Symptoms above are present
- Determine between inter and intramuscular
- Intramuscular will need to be monitored more carefully, as myositis ossificans can occur (see below)

Treatment Goals, Advice and Aftercare

- Apply ice
- Massage around and above the injury
- Active muscle pump – get the client to actively contract the affected muscle
- Restore ROM
- Restore strength

Achilles Tendonitis

Structures affected

Achilles tendon usually 2-3cm above insertion

Signs and Symptoms

- Localised tenderness
- Stiffness
- Sometimes a 'creaking' sensation

Caused by

- Overuse
- Possible lack of flexibility to gastrocnemius and soleus
- Poor footwear and lack of shock absorption to heel
- Musculoskeletal Imbalances

Checks

- Check history – usually slow onset
- Palpate for localised tenderness
- Pain on stretching or contracting calf muscles
- Footwear

Treatment Goals, Advice and Aftercare

- Reduce or stop activities causing the problem
- Massage calf muscles to reduce tension and alleviate stress to Achilles
- Apply ice to reduce inflammation; especially post-exercise
- Restore flexibility to calf muscles

Inversion and Eversion Sprains

Structures affected

ATFL – just anterior to the lateral malleolus
CFL – directly inferior to the lateral malleolus

Deltoid – inferior aspect of the medial malleolus

Sprains are categorised into 1st, 2nd and 3rd degree dependent upon the severity of the tear and the percentage of fibres that have torn.

Signs and Symptoms for all ligaments

- Localised pain on palpation
- Pain on weight bearing
- Inflammation and discolouration
- Poor stability
- Feeling very weak

Caused by

All movements are forced and usually occur from impact or rolling over on the ankle
ATFL – excessive inversion and plantar-flexion of the ankle

CFL – excessive inversion of the ankle

Deltoid – excessive eversion of the ankle

Checks

ATFL – passive inversion and plantar flexion of the ankle
CFL – passive inversion of the ankle

Deltoid – passive eversion of the ankle

Treatment Goals, Advice and Aftercare

- Ice application to reduce pain and inflammation
- Fluid drainage may be needed to reduce oedema
- Mobilisation following any adaptive shortening
- Restore ROM and strength
- Tensile loading of the damaged legs
- Concentrate on proprioceptive exercise
- Strapping and taping if necessary

Plantar Fasciitis

Structures affected

- Plantar Fascia Sole of the foot
- Particularly felt around the heel of the foot

Signs and Symptoms

- Heel pain often on the medial aspect (origin of fascia)
- Pain worse in the morning and often easing with movement, as the fascia warms up If no treatment, pain can worsen with increased activity as the fascia will tighten
- Pain on the outside of the foot due to overcompensation

Caused by

- Overuse injury
- The plantar fascia is placed under constant stress, normally from running. Normal pronators who are supinating
- People who excessively pronate will suffer greater strain on the fascia
- Tight calf muscles can cause plantar fasciitis, by increasing pronation of the foot Poor footwear (limited medial arch support)

Checks

- Pain on palpation of the arch and antero-medial aspect of the heel
- Pain when stretching the fascia (flexing the toes and dorsi-flexing the ankle)
- Over pronation
- Footwear
- Calf muscle length

Treatment Goals, Advice and Aftercare

- Reduce inflammation and tenderness with ice application Taping – while doing physical activity
- Using a medial arch support in the shoes if over pronating Stretching the plantar fascia
- Stretching the calf muscles if they are short
- Strengthening the plantar fascia, i.e. using the toes to gather a towel Sports massage to the foot and calf muscles
- Gait analysis if symptoms persist

Metatarsal Stress Fracture (also known as March Fracture)

Structures affected

Most commonly the second metatarsal, although may affect other metatarsals

The metatarsal bones are between the toes and the tarsal bones in the foot

Signs and Symptoms

- For overuse - general slow onset of discomfort/pain
- Pain on increased weight bearing activities
- Localised pain on palpation and percussion
- Some swelling and discolouration

Biomechanics of injury

- Most commonly an overuse injury Or a sudden onset from impact such as from a studded boot.
- Repeatedly putting high loads of force through the foot, i.e. gymnasts and military – hence the term ‘march’ fracture.
- Over-pronation or over-supination can contribute to stress fractures in the foot

Assessments

- Percussion test to the end of the toe in line with the affected metatarsal, positive test will cause pain
- An x-ray will almost certainly never show the stress fracture in its early stages, although it
- will show as a white ‘halo’ after a few weeks

Treatment Goals, Advice and Aftercare

- Rest for 4-6 weeks or until pain has subsided
- Gait analysis to see if foot biomechanics contributed to the stress fracture, refer on if orthotics are necessary
- Stretching any muscles that have shortened
- Assess footwear
- Proprioception exercises

Anterior Compartment Syndrome

Structures affected

- Antero-lateral muscle compartment of the lower leg
- Can be acute or chronic

Signs and Symptoms

- Acute injury can be from a high impact to the front of the leg
- Chronic anterior compartment syndrome can develop from the fascia being too tight following the hypertrophic effect of training
- Chronic – onset of pain and increasing when running or performing physical activity
- Swelling and a ‘glassy’ appearance
- May be pain on resisted dorsi flexion
- May be pain when plantar flexing the foot

Biomechanics of injury

- Acute impact to the leg can cause swelling and/or bleeding within the compartment
- Overuse can cause tight fascia in the compartment, gradually decreasing the nutrient supply
- due to pressure and therefore increasing during activity.

Assessments

- Check for all signs and symptoms above
- Treatment Goals, Advice and Aftercare
- If chronic and seemingly very swollen and painful – connective tissue massage
- A fascia release (surgical procedure) may be necessary if symptoms persist or worsen
- If acute, ice massage to try to reduce pain and swelling. Monitor signs and symptoms and refer to hospital if they increase, indicating bleeding may be continuing.
- Stretch the anterior compartment
- Compression bandages are contra-indicated as they will increase pressure and further impede circulation.

Muscle Strains

- Structures affected
- Muscle strains or tears often occur at the musculo tendinous junctions, but can occur in the muscle belly.
- The musculo tendinous junction (MTJ) is the portion of the muscle which is susceptible to the highest loading throughout the muscle
- Muscle tears are more likely to occur during eccentric muscle action
- Are graded 1st, 2nd and 3rd degree dependent upon severity (percentage of muscle fibres torn)

Signs and Symptoms

- Pain in active movements of the muscle
- involved Pain on palpation
- Possible discoloration
- If a complete tear has occurred the muscle may recoil to its origin and insertion and be visible as small balls

Biomechanics of injury

- Muscle strains more commonly occur during eccentric muscle action
- This is more like if there is a muscle imbalance between agonist and antagonist pair
- A high velocity action or unexpected force is normally associated with muscle strains

Assessments

- Active movements will be painful
- Resisted movements will show decreased strength in the muscle and be painful
- There will be pain on palpation

Treatment Goals, Advice and Aftercare

- P.R.I.C.E. during the acute phase
- Tensile loading is important after the acute phase of injury
- Isometric followed by dynamic and the resisted contractions
- Restoring length
- Restoring strength
- Insuring that proprioception has also been restored

Periosostitis (tibia - shin splints)

Structures affected

Anteromedial aspect of tibia

Lower half of the tibia

Signs and Symptoms

- Pain and inflammation on the lower half of the leg
- Pain worse at beginning of activity and easing with time throughout training
- Pain returns shortly after activity
- Some palpable lumps at the medial portion of the tibia

Biomechanics of injury

- Overuse injury
- Poor biomechanics when running (foot or knee)
- Poor footwear
- Change in surface or training intensity
- Muscle imbalances

Assessments

- Palpate between the anterior ridge of the tibia and the anterior compartment - small bumps may be felt and cause local tenderness
- May be painful to dorsiflex and invert the foot against resistance

Treatment Goals, Advice and Aftercare

- Rest and ice until inflammation and pain goes
- Adjust footwear, biomechanics or training surface
- Ensure that ROM at the ankle is ok
- Increase activity gradually rather than returning to full training

Injuries to Upper Limb

The following is a list of common sporting conditions and injuries. The severity of each condition may lead to different treatment protocols and certainly varying levels of intervention. As treatment therefore is quite subjective we have merely provided a list of commonly used modalities.

Conservative treatment of sports injuries often includes:

- Rest.
- Ice.
- Anti-inflammatory medications.
- Stretching.
- Sports massage.
- Ultrasound.
- Strengthening exercises, especially eccentric.

Shoulder Acromio-Clavicular Joint Sprain

Structures affected

- The acromio-clavicular (AC) joint
- This joint is formed by the acromion and the distal end of the clavicle, the acromio-clavicular ligament joins the two bones together to form the joint
- Graded as 1st, 2nd and 3rd class, as with all sprains

Signs and Symptoms

- Localised pain on palpation
- A palpable and/or visible separation between the two bones Swelling
- Pain when abducting the arm, and placing the hand on opposite shoulder

Biomechanics of injury

- Falling on an outstretched
- Direct impact to the clavicle (tackle)
- Direct impact to the lateral aspect of the arm, compressing the clavicle

Assessments

- Scarf test – asking the client to take the hand of the injured limb and wrap it around the opposite shoulder (like a scarf).
- A positive test would show inability to complete the movement and/or pain X-ray to determine severity of sprain

Treatment Goals, Advice and Aftercare

- Ice the site of injury to reduce pain and inflammation
- Immobilise the arm, can be done using a sling
- Once pain subsides, begin to restore ROM
- Restore strength
- Grade 3 tears/disruptions will often require surgery

Signs and Symptoms

- Sudden pain felt around the shoulder during activity
- Localised pain on palpation
- Possible discoloration
- A palpable dip may be felt in the muscle if there is a complete rupture
- Pain attend ROM

Biomechanics of injury

- Most likely to occur during eccentric muscle action
- High impact or unexpected force is usually associated with muscle strains
- Muscle imbalance between agonist and antagonist pairs will make the athlete more susceptible to muscle tears

Assessments

Supraspinatus – pain/weakness when resisting abduction

Infraspinatus and Teres Minor – pain/weakness when resisting external rotation

Subscapularis – pain/weakness when resisting internal rotation

Treatment Goals, Advice and Aftercare

- P.R.I.C.E. during the acute phase
- Tensile loading is important after the acute phase of injury
- Isometric followed by dynamic and the resisted contractions

- Restoring length
- Restoring strength
- Insuring that proprioception has also been restored
- If 3rd degree sometimes surgery is necessary

Sub-acromial Bursitis

Structures affected

- The bursa which sits under the supraspinatus tendon
- This is located on the superior aspect of the greater tubercle of the humerus

Signs and Symptoms

- This will produce similar symptoms to supraspinatus tendonitis
- Pain will be less on resisted abduction than with tendonitis
- Pain will be similar to tendonitis with palpation
- Tightness in the supraspinatus muscle
- Pain felt in the shoulder during throwing on release of the ball
- Inflammation in the area
- Pain on the superior aspect of the shoulder

Biomechanics of injury

- Overuse injury
- The bursa becomes inflamed, often along with the tendon
- Sometimes related to change in technique or weight of object being lifted/ thrown

Assessments

- Assess ROM of the shoulder, particularly abduction
- Pain on palpation
- Tightness of the supraspinatus
- Resisted arm abduction

Treatment Goals, Advice and Aftercare

- Apply ice to the area to reduce inflammation and pain
- Rest until pain and inflammation subside
- Begin to restore ROM of the shoulder, particularly abduction past 60° Restore strength in the rotator cuff muscles
- Assess technique
- Reduce weight being lifted/ thrown if this was suspected to be a cause of the problem

Frozen Shoulder

Structures affected

- Also known as adhesive capsulitis
- Affects the whole shoulder capsule
- Often only effects one side
- Condition is unique to the shoulder
- The fluid within the joint capsule become 'sticky' making the joint hard to move

Signs and Symptoms

- Recent surgery or immobilization
- Slow onset of shoulder pain and stiffness Pain worsening at night
- worsening when pressure is placed upon the effected side Decreased ROM

- Not being able to complete everyday tasks such as putting a coat on
- Muscle atrophy from lack of movement

Biomechanics of injury

- Often occurs in the older population, more commonly in women
- Can be as result of trauma or surgery to the joint
- Immobility after an injury can lead to the onset of this condition
- Can also spontaneously happen, with no known cause
- The fluid in the capsule becomes inflamed leading to scar tissue formation within the capsule, allowing less free movement within the joint

Assessments

- Assess ROM in all movements
- Gain a full history to include any past injury to that shoulder or arm

Treatment Goals, Advice and Aftercare

- Be aware that this condition will take it's time to disappear!
- Starting with gentle continuous passive movements of the shoulder
- Massage to the area, where pain permits
- Passively take the joint to each end ROM (all 14 movements), then restore some mobility
- Get the client to actively take the joint to end ROM
- Begin stretching to restore ROM
- Restore strength to atrophied muscles
- Not all clients will react to above treatment and may require surgery, however this is a last resort

GH Instability

Structures affected

- The gleno-humeral joint (head of the humerus and glenoidfossa)
- Muscles surrounding the shoulder joint, particularly the rotator cuff muscles (supraspinatus, infraspinatus, teresminor and sub-scapularis)

Signs and Symptoms

- Complain to discomfort around the joint
- Laxity in the joint during sport and everyday tasks (i.e. throwing a ball or just carrying shopping bags)
- History of dislocation

Biomechanics of injury

- Trauma driving the humerus away from the fossa (either dislocation or subluxation)
- Ligament laxity within the joint
- Muscle weakness, particularly the rotator cuff muscles Hyper mobility, meaning heath letehaslaxity in all joints

Assessments

- Draw tests
- Test for muscle weakness using resisted/strength tests

Treatment Goals, Advice and Aftercare

- Exploratory arthroscopy may be used to determine cause of laxity if not already known
- Some may require surgery to tighten ligaments
- For muscle weakness, strength train the weak muscles using timing, reps and sets

appropriate to train hypertrophy

The Elbow Golfers Elbow

Structures affected

- The medial epicondyle, origin for the flexor and pronator muscles of the wrist

Signs and Symptoms

- Gradual onset of pain on the lateral side of the elbow
- Pain when flexing or pronating the wrist actively or against resistance

Biomechanics of injury

- Repetitive strain placed upon the flexor and pronator muscles
- Activities such as golf, forehand tennis and baseball players all commonly suffer this injury
- Not as common as lateral epicondylitis

Assessments

- Palpation of the medial epicondyle will cause pain
- Resisted flexion and pronation may be weak and will cause pain Passive extension and supination will be painful at end ROM

Treatment Goals, Advice and Aftercare

- Ice the area to reduce inflammation
- Rest until pain subsides
- Restore ROM Restore strength
- Introduce throwing activities and any equipment
- Assess technique and use of equipment

Tennis Elbow

Structures affected

- The lateral epicondyle, common origin for the extensor and supinator muscles

Signs and Symptoms

- Gradual onset of pain on the lateral side of the elbow
- Pain when extending or supinating the wrist actively or against resistance

Biomechanics of injury

- Most common in tennis (also known as Tennis elbow)
- Common causes in tennis include excessive use of backhand, change in or poor grip size and string tension, technique and overuse
- Stresses places upon the supinators and flexors of the wrist
- Poor strength

Assessments

- Palpation of the lateral epicondyle will cause pain
- Resisted extension and supination may be weak and will cause pain Passive flexion and pronation will be painful at end ROM

Treatment Goals, Advice and Aftercare

- Ice the area to reduce inflammation Rest until pain subsides
- Restore ROM Restore strength
- Introduce throwing activities/racket
- Assess technique and use of equipment/equipment change

Bursitis

Structures affected

- Inflammation of the bursa which lays over the olecranon process

Signs and Symptoms

- Often painless in the early stages
 - Warm to touch and appear as a large lump on the posterior side of the elbow
 - The bursa becomes very painful as the injury worsens (described as a 'burning' pain)
- Limited flexion of the elbow

Biomechanics of injury

- Direct impact to the olecranon process and the bursa causing the bursa to bleed and become inflamed
- Constantly leaning on the elbow (also known as students elbow!)

Assessments

- Palpation of the bursa over the elbow will cause pain
- Redness may appear on the skin and will feel warm to touch Assess ROM of the elbow, flexion may be limited

Treatment Goals, Advice and Aftercare

- Apply ice to the area to reduce inflammation and pain Rest until pain and inflammation subside
- Begin to restore ROM of the elbow, focusing on flexion in particular
- Restore strength of all muscles affected due to rest (check in comparison to unaffected arm)

Dislocation

Structures affected

- Humeroulna dislocation
- Radioulna dislocation

Signs and Symptoms

- Sudden pain felt on impact Inflammation Discolouration
- Pain with pronation and supination Localised tenderness on palpation
- Obvious deformity Unable/unwilling to move the arm

Biomechanics of injury

- Humeroulna dislocation occurs when the radius and ulna displace posteriorly to the humerus often occurring from hyperextension
- Radioulna dislocation is the tearing of the annular ligament and interosseus membrane, can occur from direct impact to the lateral elbow

Assessments

If signs and symptoms are present send for x-ray to confirm

Treatment Goals, Advice and Aftercare

- The limb will be relocated if necessary with or without surgery Limb will be immobilized
- Following immobilisation begin continuous passive movements
- Restore ROM
- Restore strength

The Forearm and Wrist Tenosynovitis

Structures affected

- Tenosynovitis of the abductor pollicis longus and extensor pollicis brevis tendons Lateral side of the thumb
- Tendon and the synovial sheath become inflamed

Signs and Symptoms

- Localised tenderness on palpation Pain worsened by ulna deviation Inflammation
- Poor ROM with ulna deviation

Biomechanics of Injury

- Overuse injury (now often known as texters thumb)
- Repetitive gripping combined with ulna deviation Inflammation of the tendons

Assessments

- Pain when closing the fist and deviating the hand towards the ulna (Finkelstein Test)
- Pain with resisted abduction and extension

Treatment Goals, Advice and Aftercare

- Ice the area to reduce inflammation
- Reduce action which caused problem in the first instance Passively begin to reintroduce motion
- Restore ROM
- Restore strength

Carpal Tunnel Syndrome

Structures affected

- Compression of the median nerve in the carpal tunnel
- Most commonly affects older adults

Signs and Symptoms for all ligaments

- Change in sensation in the hand a fingers
- Localised pain with palpation over the anterior aspect of the wrist
- Flexion of the fingers may become weak
- Adduction and abduction of the thumb may become weak and painful
- Holding the wrist in a flexed position will increase the pain

Biomechanics of Injury

- Overuse in sport and with action such as typing on a computer Bony abnormality
- Excess fluid retention
- Can be associated with fractures and dislocations where fragments of bone are displaced

Assessments

- Fully flex the wrists and place the posterior surface of the hands together with the fingers pointing to the floor
- Numbness or tingling in the digits is a positive sign
- Wrist pain in this position is normal

Treatment Goals, Advice and Aftercare

- Apply ice to the area to reduce inflammation Rest (often with immobilisation)
- Continuous passive motion to reintroduce movement Restore ROM
- Restore strength
- Reduce activity which caused injury in the first instance

Fractures

Structures affected

- Fracture of the distal radius and ulna, displacing the distal ends of the bone Metacarpal fractures
- Carpal bone fractures Fracture of the phalanges
- Beware of fractured scaphoid (seek medical care immediately)

Signs and Symptoms

- Sudden pain felt on impact Inflammation Discoloration
- Pain with movement
- Localised tenderness on palpation Obvious deformity
- Unable/unwilling to move the fingers or hand

Biomechanics of injury

- Fractures of the wrist often are consistent with falling with an open palm
- Scaphoid fracture due to impact of the against the radius from direct impact, often a fall or punch (common in boxers)

Assessments

- If symptoms are present send for x-ray to confirm
- For metacarpal and phalangeal fracture, apply a percussion test to end of the finger in line with the metacarpal. This is applied by flicking the end of the finger, with force towards the clients hand, positive test will cause pain

Treatment Goals, Advice and Aftercare

- Scaphoid fractures should be treated as soon as possible, due to the vascular supply, ensuring the bone has not completely broken can be crucial to healing
- Limb will be immobilized
- Following immobilization begin continuous passive movements
- Restore ROM
- Restore strength
- Gradual return to sport/weight

You may pay particular attention to a full understanding of the relationship between damage, mechanics and which tests cause discomfort or pain – and in which range.

Ergogenic Aids - Performance Enhancing Drugs - Supplements

Information, descriptions and research about ergogenic aids in sports, including supplements and performance enhancing drugs, and practices including steroids, designer drugs, THG, blood doping and why many are now banned by international sport federations.

PERFORMANCE ENHANCING DRUGS IN SPORTS

Performance enhancing drugs consist of a variety of substances, including medications, procedures and even devices that are intended to improve athletic sports performance. Some of these substances are naturally occurring, easily available and completely legal while others are manufactured, illegal, or banned by many sporting organizations. Many athletes, coaches, politicians and fans feel the use of certain substances is unethical in sports.

Determining which substances are regulated, however, is an area of constant debate. Many performance enhancing substances classified as supplements are widely marketed as "health aids" yet have limited research on their safety or effectiveness. Being classified as a supplement means

the contents of the product and the claims on the label have not been evaluated. Food and Drug Administration and may not have any scientific basis.

In general, performance enhancing substances (ergogenic aids) can be categorized into the following areas.

I. Sports Supplements - Vitamins - Minerals

Sports Supplements and Athletic Performance

- **Athletes often look for alternative nutrition to perform at their best. But what are they and how to do work?**
- Protein Supplements: Protein is a necessary nutrient that everyone needs to function properly. Both athletes and sedentary individuals need to get adequate protein.
- Glucosamine: Glucosamine has been used to treat osteoarthritis and helps stimulates cartilage. But does it help athletic performance?
- Ribose: There is clear evidence that shows an athletic performance benefit from ribose supplements.
- Creatine: For some athletes, creatine supplementation improves repeated bouts of high-intensity exercise, such as sprinting, weight lifting or power sports.
- Glutamine: Glutamine (L- Glutamine) is a classified as a nutritional supplement and is not regulated or banned by most sports organization.
- B-Vitamins: Vitamins are essential for the body to function properly, but there may be a link between the B-vitamins (thiamine, riboflavin, vitamin B-6, B-12 and folate) and performance in high-level athletes.
- How to Evaluate Supplement Health Claims? It's difficult to wade through the research regarding health or performance benefits of many nutritional supplements. These tips will help you make an informed decision about what actually works.

Banned or Regulated Performance Enhancing Drugs (Ergogenic Aids)

I- Erythropoietin (EPO)

Erythropoietin (EPO) is a naturally-occurring hormone, produced by the kidneys, that stimulates the production of red blood cells. This hormone can also be manufactured and injected. Most recently EPO has been linked to the professional cycling world. Although EPO is on the banned substance list, some claim cyclists continue to use it to boost performance.

II- Ephedrine

Ephedrine is classified as a supplement, and is freely available, but is on the banned list of many sports organizations. Research hasn't found any improvement in strength, endurance, reaction time, anaerobic capacity, or recovery time with ephedrine supplements, but there are serious side effects athletes should be wary of.

III- Caffeine

Caffeine is a naturally occurring substance that has been used by endurance athletes for years as a way to stay alert and improve endurance. While generally not harmful, it does have side effects, and is banned (in high doses) by many sports organizations.

IV- Anabolic Steroids

Anabolic steroids (anabolic-androgenic steroids), are synthetic versions of the male hormone testosterone. Non-medical use of anabolic steroids is illegal and banned by most major sports organizations. Still, some athletes continue to use them illegally in an attempt

to improve sports performance, despite evidence that using them this way can cause many serious health problems. The manufactured version of **DHEA (Dehydroepiandrosterone)** as well as the designer steroids, **Androstenedione (Andro)** and **Tetrahydrogestrinone (THG)** are all precursors to hormones, such as testosterone, and work in a similar manner to anabolic-androgenic steroids. These are all banned substances by nearly all sports organizations.

- V- **Amphetamines:** Amphetamines are central nervous system stimulant drugs that increase alertness and self-confidence, improve concentration, decrease appetite and create a feeling of increased energy. Amphetamines such as Benzedrine, Adderall, and Dexedrine have a high potential for addiction and are on the banned substance list of most, if not all, sports organizations.

Steroids - Anabolic - Androgenic Steroids in Sports

Drugs commonly referred to as steroids can be classified as anabolic (anabolic-androgenic) steroids or corticosteroids. Corticosteroids, such as cortisone or prednisone are drugs that doctors often prescribe to help control inflammation in the body. Corticosteroids are not the same as the anabolic steroids that are often linked with illegal use in sports.

Anabolic steroids (anabolic-androgenic steroids) are synthetic versions of the male hormone testosterone. They are a class of drugs that are legally available only by prescription and are prescribed to treat a variety of conditions that cause a loss of lean muscle mass.

Commonly Used Steroids

A. Androstenedione (Andro)

Androstenedione (Andro) is a designer steroid often mentioned in relation with athletes, although there is little scientific evidence to support its effectiveness in improving sports performance. Andro is a supplement made from a naturally occurring steroid hormone. In 2004, the U.S. Food and Drug Administration banned the sale of Andro due to increasing evidence that showed serious health risks to those using the substance.

B. Primobolan (Methenolone)

This banned steroid has been linked to several Major League Baseball players, including Alex Rodriguez. It can be injected or taken in a tablet form. Primobolan has been a popular steroid among athletes because it builds strength without muscle bulk, and without many of the negative side effects of other steroids.

C. Tetrahydrogestrinone (THG)

Tetrahydrogestrinone (THG) is another designer steroid that has a similar chemical structure to other banned steroids. It appears that THG was specifically manufactured so it would not be detected in doping tests. The FDA banned the sale of THG in 2003, saying it was not a supplement but an unapproved drug, which makes any sale or use of it illegal.

D. Clenbuterol

Clenbuterol (Clen) is a selective beta-2 agonist/antagonist and a bronchodilator sometimes prescribed for obstructive pulmonary disease. Like anabolic steroids it can increase lean muscle mass, but it also has potentially serious side effects.

E. DHEA

DHEA (dehydroepiandrosterone) is a natural steroid prohormone that's produced by the adrenal glands. The body then converts DHEA to male and female sex hormones (estrogen

and testosterone). DHEA supplements have been marketed as anti-aging supplements but research on this is limited at this time.

DHEA supplements were taken off the U.S. market in 1985 and made available only by prescription. DHEA was then reintroduced as a nutritional supplement in 1994 after the passing of the **Dietary Supplement Health and Education Act**. DHEA is still considered a banned substance by many sports organizations and athletes are cautioned about its use.

Other Banned Anabolic Steroids

Anabolic steroids are banned by all major sports bodies including the Olympics, the NBA, the NHL, and the NFL. The World Anti-Doping Agency (WADA) maintains an extensive list of all banned performance-enhancing substances. Some include the following:

Oral Steroids

- i. Anadrol (oxymetholone)
- ii. Oxandrin (oxandrolone)
- iii. Dianabol (methandrostenolone)
- iv. Winstrol (stanozolol)
- v. Injectable Steroids
- vi. Deca-Durabolin (nandrolonedecanoate)
- vii. Durabolin (nandrolonephenpropionate)
- viii. Depo-Testosterone (testosterone cypionate)
- ix. Equipoise (boldenoneundecylenate)

Why Athletes Take Steroids?

The widespread use of anabolic steroids among athletes is in the hopes of improving performance. Although drug testing is widespread, new designer drugs are made specifically to avoid detection. However, technology continually evolves, blood and urine samples from years earlier are now being retested with new science and exposing athletes who used illegal substances in the past.

Health Risk of Steroid Abuse

There are many health risks from the use and abuse of anabolic steroids.

Effects of Anabolic Steroid Abuse in Men

- i. Infertility
- ii. Breast development
- iii. Shrinking of the testicles
- iv. Male-pattern baldness
- v. Severe acne and cysts

Effects of Anabolic Steroid Abuse in Women

- i. Deeper voice
- ii. Enlargement of the clitoris
- iii. Excessive growth of body hair
- iv. Male-pattern baldness
- v. Severe acne and cysts

Other Effects of Anabolic Steroid Abuse

- i. Delayed growth in adolescents

- ii. Tendon rupture
- iii. Increased ldl cholesterol
- iv. Decreased hdl cholesterol
- v. High blood pressure
- vi. Heart attacks
- vii. Enlargement of the heart's left ventricle
- viii. Cancer
- ix. Jaundice
- x. Fluid retention
- xi. HIV/AIDS
- xii. Hepatitis
- xiii. "roid rage" - rage and aggression
- xiv. Mania
- xv. Delusions

Anabolic Steroids and Withdrawal

Athletes who use steroids can experience withdrawal symptoms when they quit. The symptoms include mood swings, depression, fatigue and irritability, loss of appetite, insomnia, and aggression. Depression can even lead to suicide attempts, if untreated.

Amphetamines - Stimulants - Performance Enhancing Drugs

Amphetamines, sometimes called "speed" or "uppers," are central nervous system stimulant drugs that increase alertness, self-confidence and concentration, and decrease appetite while creating a feeling of increased energy. The chemical structure is similar to the naturally occurring adrenaline and noradrenaline that is produced by the body. The effects of amphetamines are similar to cocaine, but last longer.

Amphetamines, such as Benzedrine, Adderall, and Dexedrine, are sometimes prescribed for ADHD (attention deficit hyperactivity disorder).

Amphetamines may provide some minor, short-term benefits. Current research shows that 10-30 mg methamphetamine may improve reaction time and cognitive function, increase the feelings of alertness, decrease a sense of fatigue and increase euphoria. But this also came with a tendency to make more high-risk choices. The researchers also stated that at a higher dose, they expected subjects to experience agitation, an inability to focus attention on divided attention tasks, inattention, restlessness, motor excitation, increased reaction time, and time distortion, depressed reflexes, poor balance and coordination, and an inability to follow directions. One of the risks of even moderate amphetamine use in an athlete is that due to a distorted perception of pain or fatigue, he may ignore injury warning signs and play even when injured.

Other Effects of Amphetamines

Potential short-term side effects of amphetamines include:

- i. Headaches
- ii. Increased blood pressure
- iii. Increased heart rate
- iv. Insomnia

- v. Weight loss
- vi. Hallucinations
- vii. Convulsions
- viii. Heart rhythm abnormalities
- ix. Heart attack

Long-term use of amphetamines can result in an increase tolerance for the drugs and the need to continually take more for the same effect. It's not uncommon for athletes to become dependent on the drug and have difficulty withdrawing from amphetamines. Sudden withdrawal can cause depression, weakness and extreme fatigue. Long-term use of amphetamines can result in:

- i. Uncontrollable movements of the face
- ii. Paranoid delusions
- iii. Nerve damage
- iv. Irritability
- v. Insomnia
- vi. Confusion
- vii. Tremors
- viii. Anxiety
- ix. Irregular heartbeat
- x. Dizziness
- xi. Hypertension

Use in Sports

Despite the negative side effects and addictive nature of amphetamines, some athletes continue to use them in hopes of gaining a small performance advantage. If you are considering using these stimulants, keep in mind that nearly all forms of amphetamines are on the banned substance list of most, if not all, sports organizations.

III Androstenedione - Andro steroids

Anabolic - Androgenic Steroids in Sports

The muscle-building supplement that Mark McGwire made famous, Androstenedione (Andro), is classified as an anabolic steroid and as such, it is illegal to use without a legitimate medical reason. For years Major League Baseball did not ban andro despite evidence that its use could be hazardous to those taking it without a legitimate medical reason. It had been previously been banned by the Anti-Doping Agency, International Olympic Committee, the NCAA, the NFL and the men's and women's tennis tours.

In January of 2005, the Anabolic Steroid Control Act was amended with the Controlled Substance Act that added anabolic steroids and prohormones to the list of controlled substances. This makes possession of the substances a federal crime. In 2004, the United States Food and Drug Administration (FDA) banned the sale of Andro, because of evidence to support increased health risk when using this substance.

Androstenedione is a supplement made from a naturally occurring steroid hormone. The body metabolizes androstenedione into testosterone, which is considered a steroid. When supplements

of testosterone are taken in high doses, they are known to have an anabolic effect increasing muscle size and strength

Sports Supplements and Athletic Performance

Athletes often look for alternative nutrition to perform at their best. Supplements are a multi-million dollar business that offers some good and some unnecessary products. Here are some tips and information about the more common over the counter supplements.

Types of Supplement

A supplement is something added to the diet, typically to make up for a nutritional deficiency. Ideally, it should be used as a substitute for eating well. Supplements include the following:

- I- Vitamins
- II- Amino Acids
- III- Minerals
- IV- Herbs
- V- Other Botanicals

Products classified as dietary supplements are not required to meet any Food and Drug Administration (FDA) standards. There are no regulations that guarantee the safety or purity of something sold as a supplement. Therefore, supplements are not:

- i. Required to meet the same safety requirements as over-the-counter or prescription drugs or food ingredients
- ii. Held to specific manufacturing standards
- iii. Guaranteed to meet product potency or purity ratings
- iv. Required to prove the effectiveness of any health claim they make
- v. Required to meet safety or efficacy testing prior to going to the market

The FDA is prohibited from removing a product from the market unless it can prove that the product will cause a medical problem. Most health risks of supplements are discovered after the product is on the market. Supplements that are pulled from the market are usually linked to a reported serious health risk or death that is tied to the use of the product.

Ergogenic Aids and Performance Enhancing Substances

Erogenic aids consist of substance, drugs, procedures and even devices that are intended to improve athletic performance. Some of these substances are naturally occurring, easily available and completely legal while others are manufactured, illegal, or banned by many sporting organizations.

Common Sports Supplements Used by Athletes

I. B-Vitamins

Vitamins are essential for the body to function properly, but there may be a link between the B-vitamins (thiamine, riboflavin, vitamin B-6, B-12 and folate) and performance in high-level athletes.

II. Caffeine

Caffeine has been used by endurance athletes for years as a way to stay alert and improve endurance.

III. **Creatine**

For some athletes, creatine supplementation improves repeated bouts of high-intensity exercise, such as sprinting, weight lifting or power sports.

IV. **Ephedrine**

Research hasn't found any improvement in strength, endurance, reaction time, anaerobic capacity, or recovery time with ephedrine supplements.

V. **Glucosamine**

Glucosamine has been used to treat osteoarthritis and helps stimulates cartilage. But does it help athletic performance?

VI. **Glutamine**

Glutamine (L- Glutamine) is classified as a nutritional supplement and is not regulated or banned by most sports organization.

VII. **Hydration and Sports Drinks**

Adequate fluid intake for athletes is essential to comfort, performance and safety. The longer and more intensely you exercise, the more important it is to drink the right kind of fluids.

VIII. **Protein Supplements**

Protein is a necessary nutrient that everyone needs to function properly. Both athletes and sedentary individuals need to get adequate protein.

IX. **Ribose**

There is clear evidence that shows an athletic performance benefit of ribose supplements.

How to Evaluate Supplement Health Claims

It's difficult to wade through the research regarding health or performance benefits of many nutritional supplements. These tips will help you make an informed decision about what actually works.

B-Vitamins and Athletic Performance

Vitamins are essential for the body to function properly, but there may be a link between the B-vitamins (thiamin, riboflavin, vitamin B-6, B-12 and folate) and performance in high-level athletes. The B-vitamins are called 'micronutrients' and are used to convert proteins and carbohydrates into energy. They are also used for cell repair and production.

Researchers at Oregon State University found that athletes who lack B-vitamins have reduced high-intensity exercise performance and are less able to repair damaged muscles or build muscle mass than their peers who eat a diet rich with B-vitamins.

II Sports Supplements -- Caffeine

Caffeine has been used by endurance athletes for years as a way to stay alert and improve endurance. It is one of the best-researched nutritional supplements, and the overwhelming scientific evidence suggests that, in moderation, it has no adverse health effects.

Caffeine Claims

- Improves athletic performance
- Increases energy
- Delays fatigue

- Improves fat burning by increasing fat metabolism
- Spares muscle glycogen
- Enhances body fat loss

Research Shows

- Acts as a central nervous system (CNS) stimulant
- Raises epinephrine levels
- Increases alertness
- Delays fatigue
- May slightly spare muscle glycogen
- Does not promote body fat loss

Tips and Cautions

- 3-6 mg/kg of caffeine one hour prior to exercise improves overall endurance
- Side effects include nausea, muscle tremor, palpitations and headache
- Increases the effect of (potentiates) ephedrine side-effects so they should not be taken together.
- Acts as a diuretic, so adequate fluid intake is crucial

Caffeine use is fairly common among athletes at all levels of competition. Keep in mind that caffeine is on the IAOC banned substance list, so athletes in international competition would be wise to moderate its use.

Creatine and Athletic Performance - Sports Supplements

Creatine is a compound synthesized (made) in the body and transported to muscle tissues where it fuels short bouts of intense energy production. To meet the demands of a high-intensity exercise, such as sprinting or power sports, muscles generate energy from chemical reactions involving adenosine triphosphate (ATP), phosphocreatine (PCr), adenosine diphosphate (ADP), and creatine. Stored PCr can fuel the first 4-5 seconds of a high intensity effort, but after that, another source of energy is needed.

Once synthesized, creatine is moved to the muscle. The amount of creatine that can be moved and stored is limited, however so additional supplementation beyond this capacity can't be used. Creatine can be made in the body, but it is also available in the foods we eat, particularly beef.

Creatine Supplements and Exercise: The goal of creatine supplementation is to increase muscle phosphocreatine and make more ATP available to fuel the working muscles. This improves an athlete's ability to perform repeated bouts of short, high-intensity exercise before becoming fatigued.

Optimal creatine supplementation seems to include a loading phase for about 4 days followed by a reduced maintenance phase. Individuals have varying responses to creatine depending upon their personal needs.

Research on Creatine Supplementation: Research on creatine has found the following positive effects, however most experts agree that more study is needed to determine the long-term safety and benefits of creatine supplementation.

- Improves high power performance during a series of repetitive high power output exercise sessions.
- Requires high intensity training to be effective, but supplementation does not replace training.
- Does not increase endurance.
- Does not exert an anabolic effect.
- May augment gains in muscle hypertrophy during resistance training, especially in those with compromised skeletal muscle due to injury or disease.

Creatine Supplementation: Tips and Cautions

- Reports of more muscle cramping, strains, and pulls with use.
- Increased renal stress / damage.
- Increased risk of heat illness - athletes should up fluid intake with creatine.

Creatine has been used by athletes for over ten years, yet there is very little research regarding safety or long-term effects. More and more research is beginning to look at possible benefits of this supplement. What little research there is seems to suggest that creatine works to build muscle in those who, through illness or disease, have a compromised muscle mass and strength.

Additionally, athletes with high creatine stores don't appear to benefit from supplementation, whereas individuals with the lowest levels, such as vegetarians have the most pronounced increases following supplementation. In healthy athletes, creatine seems to enable an athlete to maintain a higher training load.

Keep in mind that, as a supplement, creatine is not regulated. What you buy may or may not contain exactly what the label says, so check out the manufacturer first.

Sports Supplements - Glucosamine and Athletic Performance

Glucosamine has been used to treat osteoarthritis and helps stimulates cartilage cells to synthesize glycosaminoglycans and proteoglycans. In studies oral glucosamine sulfate has had a beneficial effect on inflammation and mechanical arthritis.

Glucosamine Claims

- Protect cartilage against damage from weight-bearing exercise
- Slows cartilage breakdown
- Stimulates cartilage growth
- Cures arthritis

Research Shows

- Glucosamine plays a role in maintenance and repair of cartilage
- Glucosamine stimulates cartilage cells to synthesize cartilage building blocks
- Glucosamine may have an anti-inflammatory action by interfering with cartilage breakdown

Tips and Cautions

- Glucosamine is most effective for early arthritis when cartilage is still present
- Glucosamine is less effective for severe arthritis
- Glucosamine appears safe, however, more long-term research is needed to determine effectiveness

- Glucosamine is a standard therapy in Europe, however, the U.S. suppliers are not regulated, so finding a trustworthy manufacturer can be difficult.

Glutamine Prevents Muscle Breakdown and Improves Immune Function

Glutamine (L-Glutamine) is a naturally occurring non-essential amino acid that is commonly stored in muscles and released into the blood stream during times of stress. It is used by the immune system during times of stress such as physical trauma, burns, starvation, and even during prolonged and intense exercise such as training for marathons. When there is a deficiency of glutamine or when the amount of glutamine is drastically reduced during increased stress, the body experiences a suppression of the immune system until glutamine levels are restored through either diet or supplements.

Intense endurance exercise not only depletes glutamine stores, but has been linked to a temporary decrease in immune system function and a susceptibility to upper respiratory infections and other illness.

Natural Sources of Glutamine :Glutamine is most abundant in high-protein foods, such as meat, fish, legumes, and dairy. Two particularly high vegetable sources are uncooked cabbage and beets. Cooking can destroy glutamine, especially in vegetables. General food sources of glutamine include:

- Animal sources such as meat, fish, eggs, milk, yogurt, and cheese
- Uncooked plant sources including beans, spinach, and cabbage and beets.

Sports Supplements - Ribose and Athletic Performance

Ribose has many important roles in physiology. Among them, ribose is a necessary substrate for synthesis of nucleotides, and it is part of the building blocks that form DNA and RNA molecules. The role that is most focused on in the supplement crazed performance enhancement world is that ribose is essential to regenerate ATP, the energy of the body.

Ribose Claims

- Increases the synthesis and reformation of ATP
- Improves high power performance
- Improves recovery and muscle growth
- Quickly restores energy levels in heart and skeletal muscles

Research Shows

- Ribose does improve the heart's tolerance to ischemia in patients with coronary heart disease (CHD)
- There is no evidence of an ergogenic effect in healthy individuals
- There is no research published in peer-reviewed journals that shows an athletic performance benefit

Tips and Cautions

- The only research that supports a ribose supplement comes from research on patients with heart conditions who lack the ability to synthesis ribose in the first place.

- The bottom line on ribose is that there is still a great deal of research to be done before any claims of athletic performance benefits can be made unequivocally. You'd be wise to save your money and put in some time at the gym rather than relying on this supplement just yet.

Sports Supplements - Ephedrine and Athletic Performance

Ephedrine is a drug derived from the plant *Ephedra equisetina*. It has been used for hundreds of years as a CNS stimulant and a decongestant. A synthetic form of the drug, pseudoephedrine, is a common ingredient in over-the-counter and prescription cold and allergy products. Structurally similar to amphetamines, it increases blood pressure and heart rate. The mechanisms behind ephedrine's effect on weight-loss appear to be those of increasing energy expenditure through increased lipolysis; increasing basal metabolic rate through thyroxine; and decreasing food intake by suppressing appetite.

Ephedrine Claims

- Increases body fat loss
- Improves athletic performance
- Improves concentration

Research Shows

- Research has found no effect of ephedrine on strength, endurance, reaction time, anaerobic capacity, or recovery time after prolonged exercise
- Ephedrine products have been found to contain from 0% to 100% of the amount listed on the label
- Side effects vary and do not correlate with the amount consumed
- Caffeine potentiates the effect of Ephedrine and the combination can be dangerous

Tips and Cautions

- Ephedrine is banned by the NCAA and the IOC
- FDA has documented 40 deaths and more than 800 side effects linked to Ephedrine use

Side effects include:

- i. Irregular heart rate
- ii. Elevated blood pressure
- iii. Dizziness
- iv. Headache
- v. Heart attack
- vi. Stroke
- vii. Seizure
- viii. Psychosis
- ix. Death

Glucosamine and Chondroitin

For over two decades there has been a debate in the treatment of osteoarthritis about the use of the joint supplements glucosamine and chondroitin. Osteoarthritis is a condition that causes problems of wearing out of the normal smooth cartilage surfaces of the joints. Often called wear-and-tear

arthritis, osteoarthritis causes joint pain, swelling, and deformity. Osteoarthritis is the most common type of arthritis

How do glucosamine and chondroitin work?

Glucosamine and chondroitin are two molecules that make up the type of cartilage found within joints. Inside your joints, cartilage undergoes a constant process of breakdown and repair. However, to be properly repaired, the building blocks of cartilage must be present and available. The theory behind using the glucosamine and chondroitin joint supplements is that more of the cartilage building blocks will be available for cartilage repair.

- **Glucosamine** is a precursor to a molecule called a glycosaminoglycan-this molecule is used in the formation and repair of cartilage.
- **Chondroitin** is the most abundant glycosaminoglycan in cartilage and is responsible for the resiliency of cartilage.

Treatment with these joint supplements is based on the theory that oral consumption of glucosamine and chondroitin may increase the rate of formation of new cartilage by providing more of the necessary building blocks.

Androstenedione

- Anabolic - Androgenic Steroids in Sports

In January of 2005, the Anabolic Steroid Control Act was amended with the Controlled Substance Act that added anabolic steroids and prohormones to the list of controlled substances. This makes possession of the substances a federal crime. In 2004, the United States Food and Drug Administration (FDA) banned the sale of Andro, because of evidence to support increased health risk when using this substance.

Androstenedione is a supplement made from a naturally occurring steroid hormone. The body metabolizes androstenedione into testosterone, which is considered a steroid. When supplements of testosterone are taken in high doses, they are known to have an anabolic effect increasing muscle size and strength.

EPO and Blood Doping in Sports

What Is Blood Doping?

Blood doping is a method of increasing athletic performance by artificially increasing an athlete's red blood cell (RBC) count. Because red blood cells carry oxygen to the muscles, having a higher RBC count can dramatically improve an athlete's aerobic capacity and delay fatigue. Athletes looking for a way to boost their RBC initially turned to blood transfusions, where an athlete stored and re-infused his or her own RBCs or the RBCs of someone with the same blood type. This practice is banned in professional sports.

What Is Erythropoietin (EPO)?

The most recent means of artificially boosting RBC counts involves a drug that has been the target of accusation and speculation among the professional cycling world for more than a decade.

Erythropoietin (EPO) is a naturally-occurring hormone, produced by the kidneys, that stimulates the production of red blood cells. This hormone can also be manufactured and injected into the skin or directly into the blood stream (intravenously). EPO may be used in medical practice to bring patient's RBC into normal levels.

The use of artificial EPO as a means of increasing athletic performance first showed up 1980s and has recently been linked with drug-use scandals in professional cycling. Despite the creation of an EPO detection test in 2000, some claim that EPO doping is still widespread in pro sports.

Most recently, EPO abuse in cycling made the news when Floyd Landis, the 2006 Tour de France winner who was stripped of his title after testing positive for doping, confessed to years of using performance-enhancing drugs.

Erythropoietin (EPO) EPO has its dangers. EPO injections thicken the blood, which increases the strain on the heart. This is particularly dangerous when the heart rate slows down, such as during sleep. The increased thickness, or viscosity, of the blood increases the risk of blood clots, heart attacks, and strokes. According to the book "The death of Marco Pantani" by Matt Rendell, some cyclists reportedly set an alarm each night to wake up and cycle on a trainer for ten minutes to jump-start their circulation and reduce the possible health risks of using EPO.

EPO is on the banned substances list in professional cycling, and riders are regularly tested to detect its presence.