



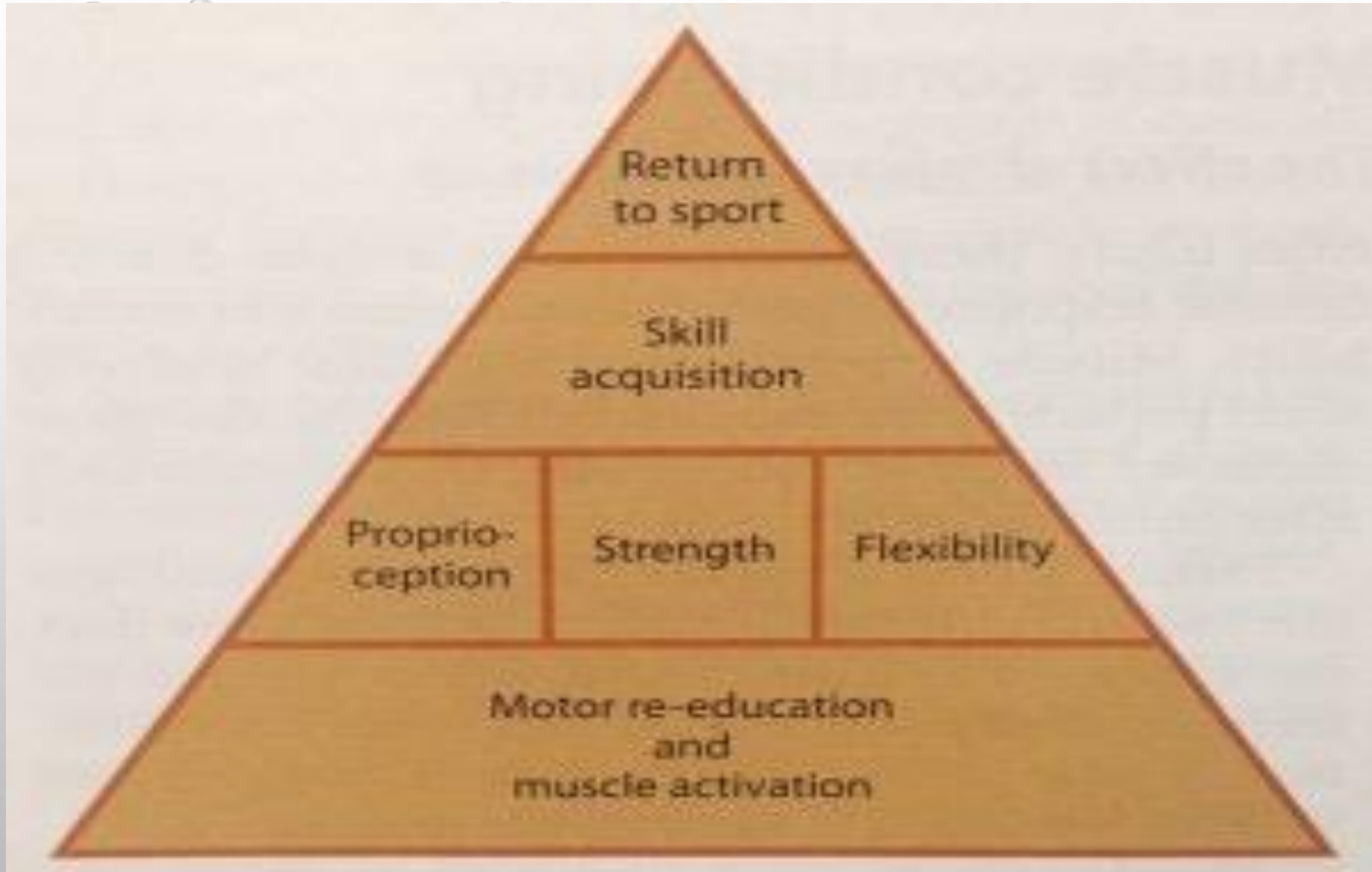
INJURY PREVENTION

LIMERICK TRIATHLON CLUB

FEB 2016

The background features a light gray gradient with several realistic water droplets of varying sizes scattered in the corners. The droplets have highlights and shadows, giving them a three-dimensional appearance.

Prehabilitation or Rehabilitation??



STRESSES & STRAINS ON OUR JOINTS

WHAT PLACES EXCESSIVE STRESSES & STRAINS ON OUR SPINE AND OTHER JOINTS DURING SPORTING ACTIVITIES?

- 1. INFLEXIBILITY** - TIGHT OR SHORTENED MUSCLES ARE COMMONLY ASSOCIATED WITH SPORTING INJURY
- 2. LIFTING TECHNIQUES** - INCORRECT TECHNIQUES CAN PLACE EXCESSIVE COMPRESSIVE FORCES ON MUSCLES & JOINTS
- 3. POSTURAL TECHNIQUES** - THIS CAN RANGE FROM POSTURAL MALALIGNMENT TO POOR MECHANICS OF MOVEMENTS. CAN RESULT FROM SECONDARY CAUSES SUCH AS ENVIRONMENTAL FACTORS

4. **STRESS** - THE INTENSITY OF DAILY PRESSURES INCREASES AND THE ABILITY TO COPE WITH EVERYDAY TASKS DIMINISHES.

5. **ENVIRONMENT** - THE ATHLETE'S LIFESTYLE, SURROUNDINGS AND OCCUPATION. '24 – HOUR ATHLETE'

6. **INJURY**- PAIN IS OUR BODIES WAY OF PROTECTING THE SITE OF INJURY- MOVEMENT INCREASES THE PRESSURE ON THE SENSORY NERVE ENDINGS.

INCREASED MUSCLE TENSION OR EVEN SPASM WILL ALSO LIMIT THE MOVEMENT OF AN AFFECTED AREA

PRINCIPLES OF INJURY PREVENTION & MANAGEMENT

- **COMPONENTS OF FITNESS:**

STAMINA: THE ABILITY TO EXERT YOURSELF OVER A LONG PERIOD OF TIME.

SUPPLENESS: THIS IS A WIDE RANGE OF MOTION AROUND A JOINT OR JOINTS.

STRENGTH: THE ABILITY TO EXERT A FORCE ON PHYSICAL OBJECTS USING MUSCLES

SPEED: THE ABILITY TO COVER A DISTANCE IN A MINIMUM TIME



SKILL: A SKILL IS THE ABILITY TO PERFORM A LEARNED TASK OFTEN WITH MINIMUM TIME OR ENERGY USED.

SPECIFICITY: DIRECTLY TRAINING TO PERFORM IN AN ATHLETES CHOSEN FIELD OR REHABILITATION MEANS

PSYCHOLOGICAL ASPECTS: REFERS TO THE ROLE THAT COGNITION AND EMOTIONS PLAY IN ANY GIVEN PSYCHOLOGICAL PHENOMENON

WARM UP: TO PREPARE THE BODY FOR THE MAIN PHASE OF THE WORKOUT. TO INCREASE THE BODY TEMPERATURE. TO INCREASE BLOOD FLOW SO ENABLING OXYGEN TO REACH THE WORKING PARTS OF THE BODY.

COOL DOWN: TO ALLOW THE CARDIOVASCULAR SYSTEM GRADUALLY RE-ESTABLISH EQUILIBRIUM AT A LOWER INTENSITY. GRADUALLY LOWER THE HEART RATE TO PREVENT BLOOD POOLING.



The Training–Injury Prevention Paradox

Should Athletes Be Training Smarter *and* Harder?

Reference: by Tim Gabbett, BJSM 2016

Designed by @YLMsportScience

THERE IS DOGMA THAT HIGHER TRAINING LOAD CAUSES HIGHER INJURY RATES BUT...

EVIDENCE

High chronic workloads may also reduce the risk of injury

Across a wide range of sports, well-developed **PHYSICAL QUALITIES** are associated with a reduced risk of injury

Under-training may increase injury risk



Reductions in workloads may not always be the best approach to protect against injury

Non-contact injuries are not caused by training itself, but more likely by an inappropriate training program

Excessive and rapid increases in training loads are likely responsible for a large proportion of non-contact, soft-tissue injuries

TRAIN SMARTER *and* HARDER

TRAINING AS A 'VACCINE' AGAINST INJURIES!

- ▶ Physically hard (and appropriate) training develops physical qualities, which in turn protect against injuries
- ▶ Monitoring training load, including the load that athletes are prepared for (by calculating the acute:chronic workload ratio) is one best practice approach to reducing non-contact injuries



SPORTS SPECIFIC CONDITIONING

PRINCIPLES OF TRAINING

- PERIODISATION
- SPECIFICITY - DIRECTING TRAINING TO PERFORMANCE IN THE ATHLETE'S GIVEN SPORT – EFFICIENCY
- OVERLOAD - AIM? PERFORM TO GREATER INTENSITY OR GREATER VOLUME AT A GIVEN INTENSITY OR TO DECREASE RECOVERY TIME BETWEEN EFFORTS OF A GIVEN VOLUME/INTENSITY
- INDIVIDUALITY

HIGH TRAINING WORKLOADS ALONE DO NOT CAUSE SPORTS INJURIES: HOW YOU GET THERE IS THE REAL ISSUE

LARGE INCREASE IN ACUTE:CHRONIC WORKLOAD RATIO = INCREASED INJURY RISK ++

Acute workload (1 week) Acute:chronic ratio
Chronic workload (3 weeks)



Reference: by Gabbett, Hulin, Blanch & Whiteley, BJSM 2016

Designed by @YLMsportScience

- **FITNESS TO INCLUDE:**

MUSCLE BALANCE/ PHYSICAL SYMMETRY-- MAJOR MUSCLE GROUPS WORK IN PAIRS. THOSE MUSCLE PAIRS NEED TO BE BALANCED IN TERMS OF STRENGTH AND FLEXIBILITY.

JOINT INTEGRITY- JOINTS SERVE AS LINKS BETWEEN STRUCTURES, THAT ACT TO STABILIZE AND CONTROL BONY SEGMENTS.

MOTOR SKILLS- NON-FITNESS ABILITIES THAT IMPROVE WITH PRACTICE (LEARNING) AND RELATE TO ONE'S ABILITY TO PERFORM SPECIFIC SPORTS AND OTHER MOTOR TASKS.

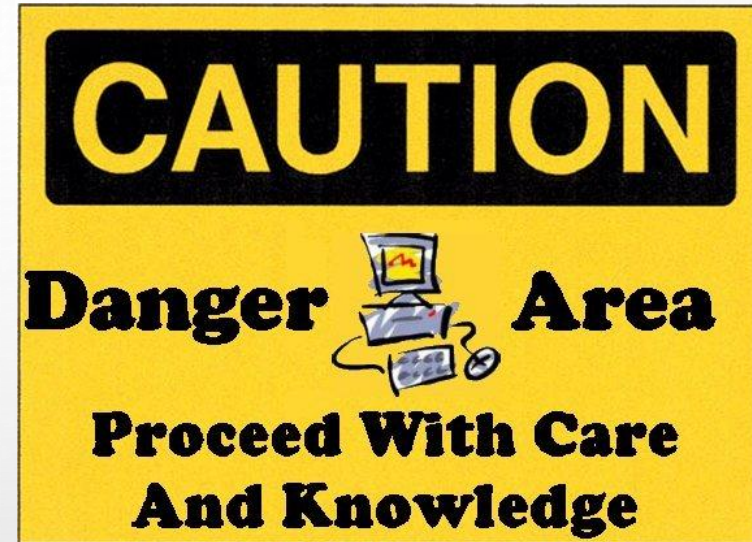
PSYCHOLOGICAL FACTORS- POSITIVE MENTAL WELL-BEING/ RECOVERY

DEFINE OVER TRAINING:

- OVERTRAINING IS A PROCESS OF EXCESSIVE TRAINING IN HIGH PERFORMANCE ATHLETES THAT MAY LEAD TO PERSISTENT FATIGUE.
- MAY LEAD TO PERFORMANCE DECREMENTS DESPITE CONTINUED TRAINING- THIS A VICIOUS CYCLE DEVELOPS & OFTEN LEADS TO OVER TRAINING SYNDROME.
- COMBINATION OF EXCESSIVE TRAINING LOAD & INADEQUATE RECOVERY.

- PERSISTENT MUSCLE SORENESS
- LOSS OF CO-ORDINATION
- PROLONGED FATIGUE
- DIZZINESS

- PERFORMANCE INCONSISTENCY
- ELEVATED RESTING HEART RATE
- TIGHTNESS IN THE CHEST
- HEAT STRESS



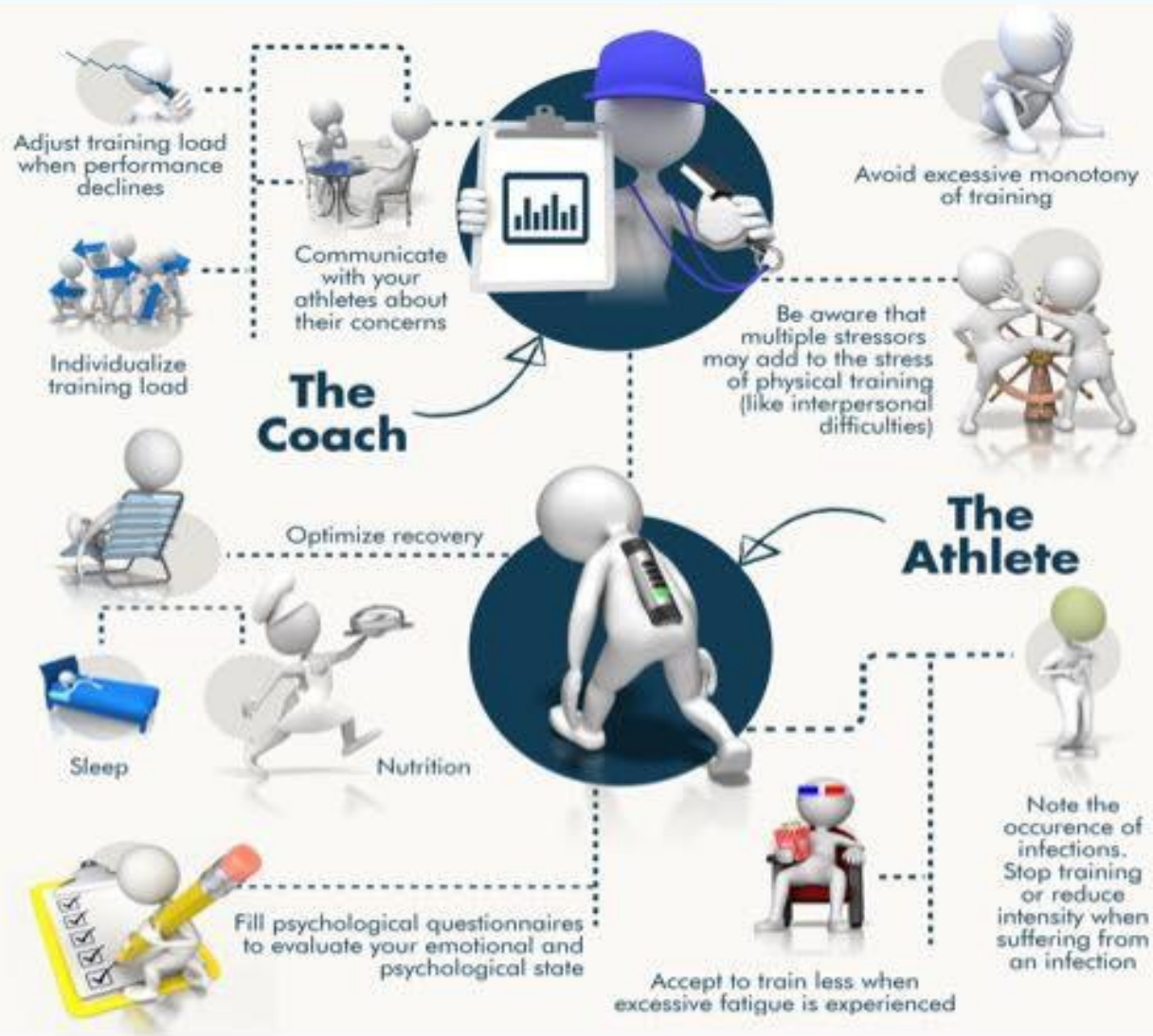


Easy Tips to prevent the **OVERTRAINING SYNDROME**



By Romain Meeusen & Kevin de Pauw, in *Recovery for Performance in Sport*, Human Kinetics, 2013

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POSTURAL DEFORMITIES

- OUR SPINE HAS TWO NATURAL CURVES? WHAT ARE THEY?
- THE SPINE'S NATURAL CURVES BECOME EXAGGERATED, CAUSING UNNATURAL CURVES OR DEFORMITIES DUE TO

1. CONGENITAL
2. ENVIRONMENTAL
3. TRAUMATIC

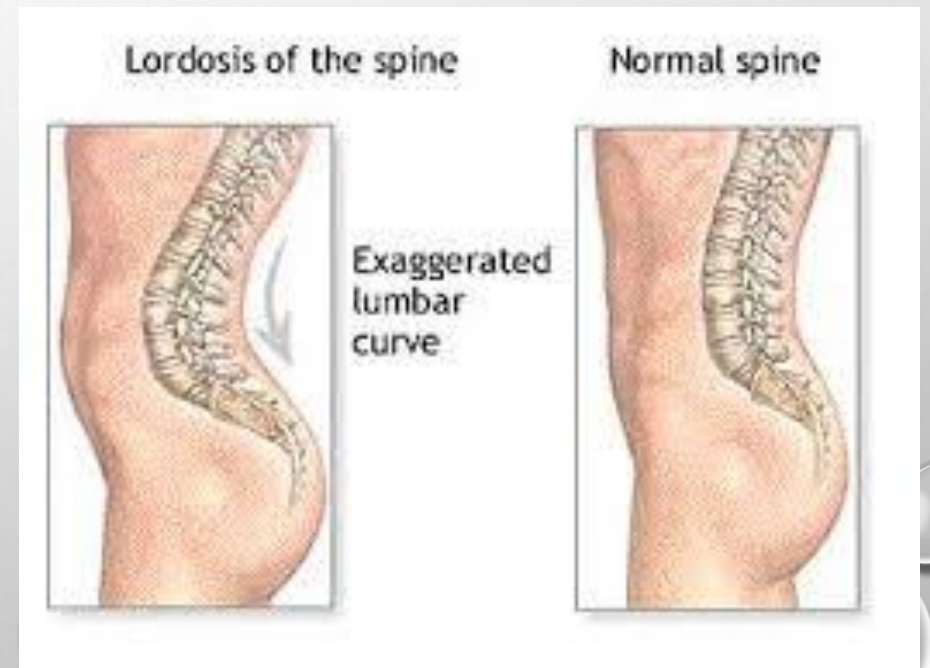


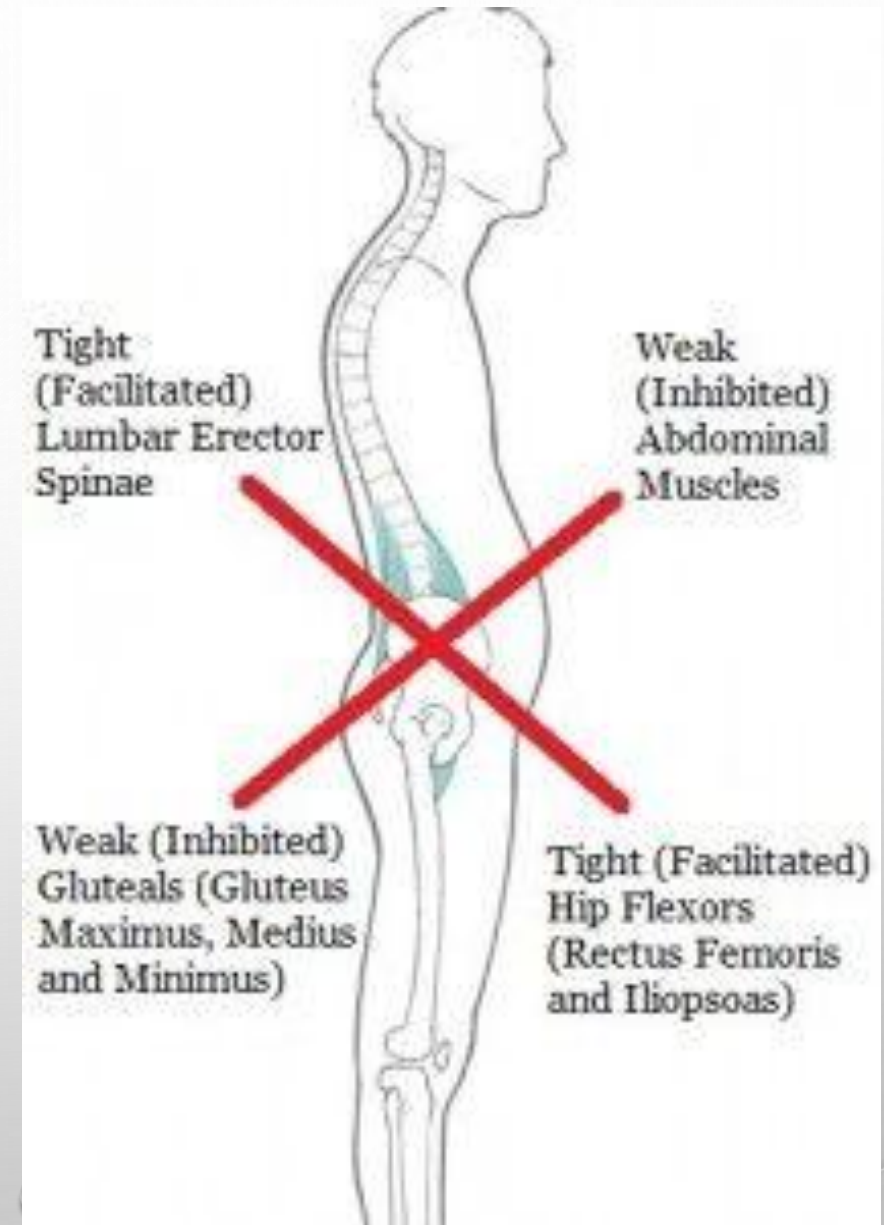
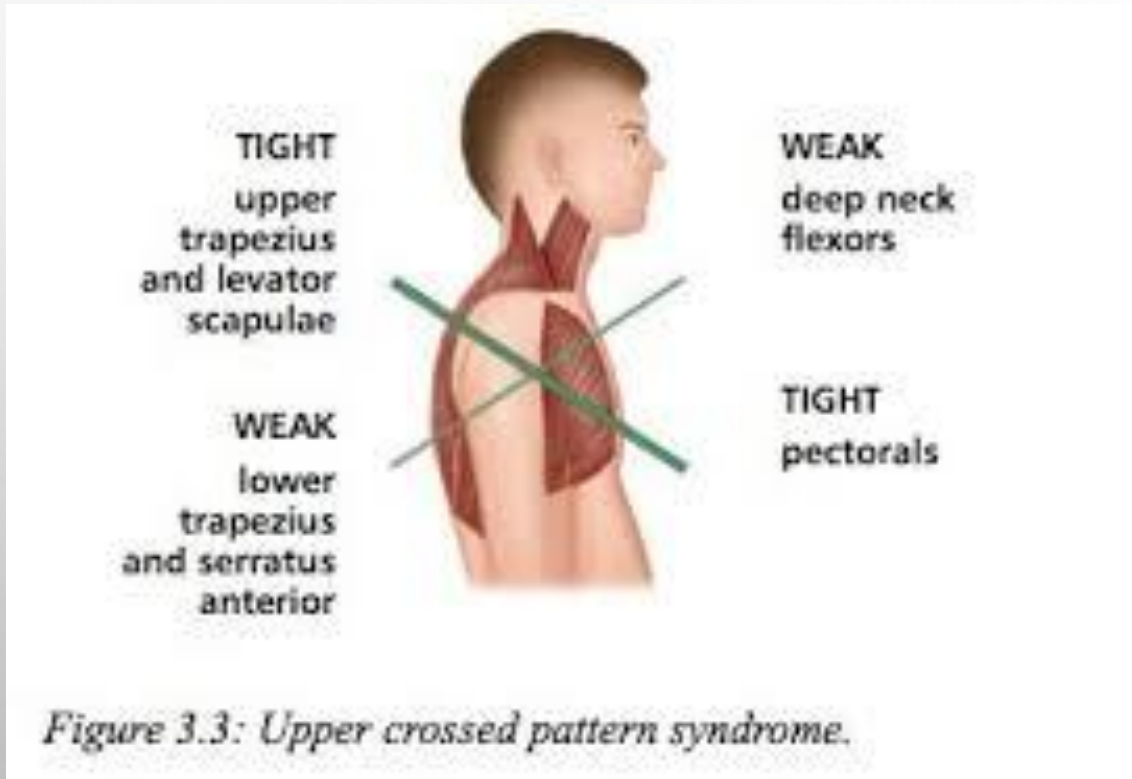
POSTURE TYPES

- **KYPHOSIS / DOWAGER'S HUMP / ROUND BACK** : AN EXAGGERATED OUTWARD (TOWARDS POSTERIOR) CURVATURE OF THE THORACIC & CERVICAL SPINE.
- PROGRESSIVE SPINAL DISORDER (STRUCTURAL KYPHOSIS)
- POOR POSTURE/ SLOUCHING (POSTURAL KYPHOSIS)



- **LORDOSIS**: IS AN EXAGGERATED INWARD (TOWARDS THE ANTERIOR) CURVATURE OF THE LUMBAR SPINE BUT CAN ALSO OCCUR IN THE CERVICAL SPINE.
- THE PATIENT MAY APPEAR **SWAYBACK** WITH BUTTOCKS MORE PROMINENT & IN GENERAL AN EXAGGERATED POSITION
- ANTERIOR PELVIC TILT

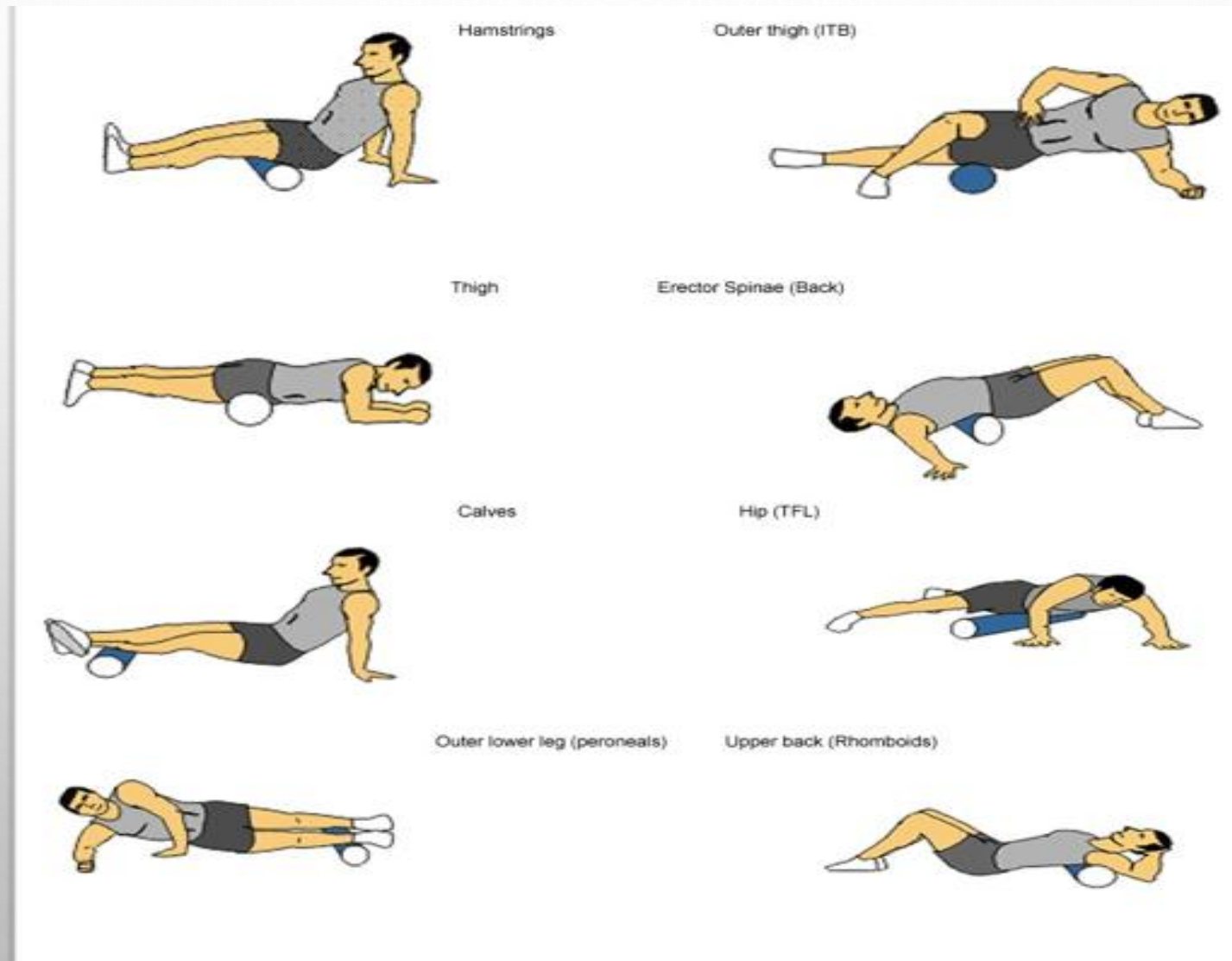




IMPORTANCE OF THE MUSCULATURE OF THE LOWER TRUNK IN MAINTAINING CORRECT ALIGNMENT OF THE VERTEBRAL COLUMN

- **ILIOPSOAS-** STRONGEST HIP FLEXOR. IT IS A POSTURAL MUSCLE AND WHEN IT SHORTENS IT PULLS THE LUMBAR SPINE FORWARD, INCREASING THE CURVE.
- **ERECTOR SPINAE-** IN THE LUMBAR REGION ARE ALSO POSTURAL AND THEREFORE ADD TO THE POTENTIAL FOR LORDOSIS.
- **PIRIFORMIS-** ALSO A POSTURAL MUSCLE, WHEN TIGHT CAN PUT PRESSURE ON THE SCIATIC NERVE AND CAUSE LATERAL ROTATION OF THE HIP.
- **GLUTEUS MAXIMUS-** RESPONSIBLE FOR PULLING THE PELVIS BACKWARDS WHICH REDUCES THE EXCESSIVE CURVE.
- **RECTUS ABDOMINUS-** SHOULD GIVE SUPPORT TO THE LUMBAR SPINE FROM THE FRONT AND PREVENT THE SPINE FALLING FORWARD.

FOAM ROLLING



STRETCHING- WHY BOTHER??



FLEXIBILITY & ROM

- FLEXIBILITY IS THE RANGE TO WHICH OUR MUSCULAR AND CONNECTIVE TISSUES WILL ALLOW A JOINT OR GROUP OF JOINTS TO MOVE IN THE 'ABSENCE OF PAIN'.
- HYPERMOBILITY (LAXITY)- EXCESS ROM BEYOND THE ACCEPTED NORMS. INSTABILITY OF A JOINT.
- HYPOMOBIITY- INSUFFICIENT MOVEMENT OF A JOINT OR BODY PART. NORMALLY FOLLOWING AN INJURY.

BENEFITS OF STRETCHING:

- *MENTAL RELAXATION:* FOR PREPARATION OR RECOVERY.
- *MUSCULAR RELAXATION:* RELIEVING TENSION & IMPROVING NEUROMUSCULAR FUNCTION. DECREASING CHANCES OF INJURY.
- *INCREASED FLEXIBILITY:* SUBSEQUENTLY JOINT ROM- IMPROVE PERFORMANCE, DECREASE INJURY RISK.
- *IMPROVED POSTURE:* ACHIEVE TOTAL BODY SYMMETRY THROUGHOUT THE MUSCULO-SKELETAL SYSTEM.
- *IMPROVE FITNESS:* SUPPLE MUSCLES, HEALTHY JOINT FUNCTIONING & ROM / MOBILITY ALL CONTRIBUTE

- *PREVENTION OF LOWER BACK PAIN: 'MOBILISED, FLEXIBLE & STRENGTHENED LUMBAR SPINE- MAY PREVENT LBP' CAILLIET '98*
- *RELIEF OF MUSCLE SORENESS: SLOW STRETCHING MAY REDUCE EFFECTS OF DOMS.*
- *RELIEF OF CRAMP: SHORTENED INVOLUNTARY CONTRACTION OF MUSCLE RELIEVED BY PASSIVE STRETCHING OF CRAMPED MUSCLE.*
- *IMPROVE MOTOR SKILLS: INCREASING FLEXIBILITY- ESSENTIAL FOR SKILL MOVEMENT & CONDITIONING*
- *INJURY PREVENTION: MUSCLE, TENDON AND LIGAMENTS SUPPLENESS.*

DURATION OF STRETCH:

- **MAINTENANCE STRETCHING**

- SHORT DURATION

(6-10 SECONDS)

- USED DURING A WORK OUT

- REMAINS AT EXISTING LENGTH

- **DEVELOPMENTAL STRETCHING**

- LONG DURATION

(20-30 SECONDS)

- USED DURING COOL-DOWN

- INCREASE MUSCLE LENGTH





CRYOTHERAPY:

- ICE PACK: CRUSHED ICE (0°C) V COMMERCIAL COLD PACK

GREATER COOLING ACHIEVED WITH CRUSHED ICE ESP. WHEN APPLIED WITH AN ELASTIC BANDAGE.

- ICE MASSAGE: FROZEN WATER IN A STYROFOAM CUP, NOT FOR USE DURING ACUTE PHASE



INDICATIONS FOR USE:

- PRIMARY REASON IS **RELIEVING PAIN & MUSCLE SPASM** FOLLOWING MUSCULOSKELETAL INJURY. DUE TO SLOWED NERVE CONDUCTION VELOCITY.
- **RESTRICTION OF BLOOD VESSELS** IN ORDER TO REDUCE SWELLING.
- **DECREASE SECONDARY INJURY-** HYPOXIC CELL DEATH
- **REDUCTION OF METABOLISM** BY COOLING TISSUE REDUCES OXYGEN DEMAND.- MORE CELLS SURVIVE THE PERIOD OF HYPOXIA

THERMOTHERAPY:

- THE APPLICATION OF *HEAT* TO TREAT DISEASE AND TRAUMATIC INJURIES IS REFERRED TO AS THERMOTHERAPY.

INDICATIONS FOR USE:

- INCREASING THE EXTENSIBILITY/ ELASTICITY OF COLLAGEN TISSUES
- DECREASING JOINT STIFFNESS
- REDUCING PAIN
- RELIEVING MUSCLE SPASM
- REDUCING INFLAMMATION, OEDEMA, EXUDATES IN THE POST ACUTE PHASE OF HEALING
- INCREASED BLOOD FLOW.



REASONS FOR CONTRAST BATHING?

- CONTRAST THERAPY, CONSISTS OF ALTERNATING APPLICATIONS OF HEAT AND COLD.
- PRIMARILY USED IN THE TREATMENT OF THE EXTREMITIES.
- 1:3/ 1:4 MINUTE RATIO OF COLD : WARM
- CYCLES OF VASODILATION/VASOCONSTRICTION, CREATING A PUMPING ACTION TO REDUCE SWELLING. CREDIBILITY??
- ALSO A POPULAR RECOVERY MODALITY.



IMPORTANCE OF A WARM-UP:

- FUNCTION IS TO PREPARE THE BODY PHYSIOLOGICALLY FOR SOME UP-COMING PHYSICAL WORK.
- GRADUALLY STIMULATE THE CARDIO-RESPIRATORY SYSTEM – INCREASE BF TO WORKING MUSCLES & INCREASE MUSCLE TEMP
- THUS INCREASING THE ELASTICITY/PLIABILITY OF THE MUSCLE.

15-20 MINUTES DURATION

- 2-3 MINUTES WHOLE BODY ACTIVITIES- USE LARGE MUSCLE GROUPS
- POST LIGHT SWEAT- SPORTS SPECIFIC STRETCHING.
- INCREASE IN INTENSITY- SPORTS SPECIFIC SKILLS.
- STAY WARMED UP & READY

IMPORTANCE OF A COOL DOWN:

- COOL DOWN PERIOD IS ESSENTIAL.
- ENABLES THE BODIES HOMEOSTASIS TO RETURN TO RESTING STATE GRADUALLY, HR & CIRCULATION.
- RETURNING CORE & MUSCLE TEMPERATURE.
- DECREASING BLOOD & MUSCLE LACTIC ACID LEVELS MORE RAPIDLY.
- REDUCING THE CHANCES OF MUSCLE SORENESS POST STRENUOUS ACTIVITY.
- SHOULD LAST ABOUT
15-20 MINUTES DURATION.

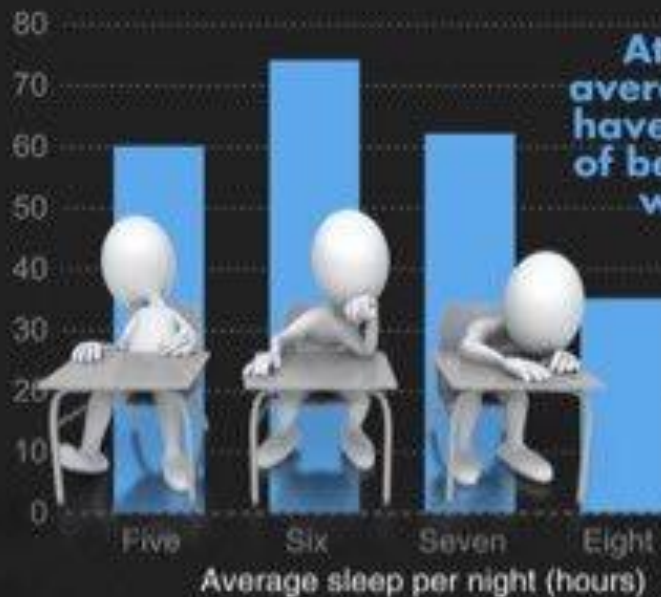


Likelihood of Injury Based on Hours of Sleep per Night

Designed by
@YLMSportScience



Likelihood of injury over 21 months



Athletes who sleep on average <8 hours per night have 1.7 times greater risk of being injured than those who sleep ≥ 8 hours



Reference

Chronic Lack of Sleep is Associated With Increased Sports Injuries in Adolescent Athletes
by Milewski et al. in J Pediatr Orthop 2014

RECOVERY/ REST

- INCREASED EMPHASIS ON RECOVERY FOLLOWING BOUTS OF HEAVY TRAINING OR COMPETITION.
- AIM IS TO MAXIMISE PERFORMANCE AND MINIMISE POTENTIAL FOR INJURY
 - RESTORATION OF FUNCTION
 - NEUROMUSCULAR RECOVERY
 - TISSUE REPAIR
 - RESOLUTION OF MUSCLE SORENESS
 - PSYCHOLOGICAL RECOVERY
 - DECISION MAKING

POWER NAP

*Designed by
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15-20 minutes

Restore alertness

Easy way to get some relaxation
and to reduce mental fatigue

Restore wakefulness,
promote learning and
boost memory

Reverse the hormonal
impact of a night of
poor sleep

**Enhance both
physical & cognitive
performance**

Reduce stress and
immune perturbations
after a short night

Have caffeine right before
you nap to improve post-
nap alertness and cognitive
functioning

