NZU Strength and Conditioning Resource Pack









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CHAPTER 1 - USER GUIDE

We play Ultimate to have FUN - it's more fun when;
1) You're not injured
2) You're owning people on offense and defence!

This resource pack provides coaches and players with the tools to enhance various physical attributes to achieve these two goals. The physical attributes provide the structure for the resource pack with Chapters 3 to 6 each having;

1) A brief introduction to the definitions and principles concerning the physical attribute
2) Practices and structures to develop the physical attribute
3) Testing and assessments for the physical attribute

Chapter 2 provides the basic scientific principles which underpin **Chapters 3 to 6** and although is not essential reading it will certainly allow coaches to make more informed decisions for individual athletes. **Chapters 7 and 8** stand alone and deal with the two important issues of 'Nutrition' and 'Preparation for and recovery from exercise'. **Chapter 9** provides an integrated programme design example of a 4 week mesocycle leading up to a weekend tournament.

The programme construction process

This 4 step process will guide a player or coach in designing a session or programme.

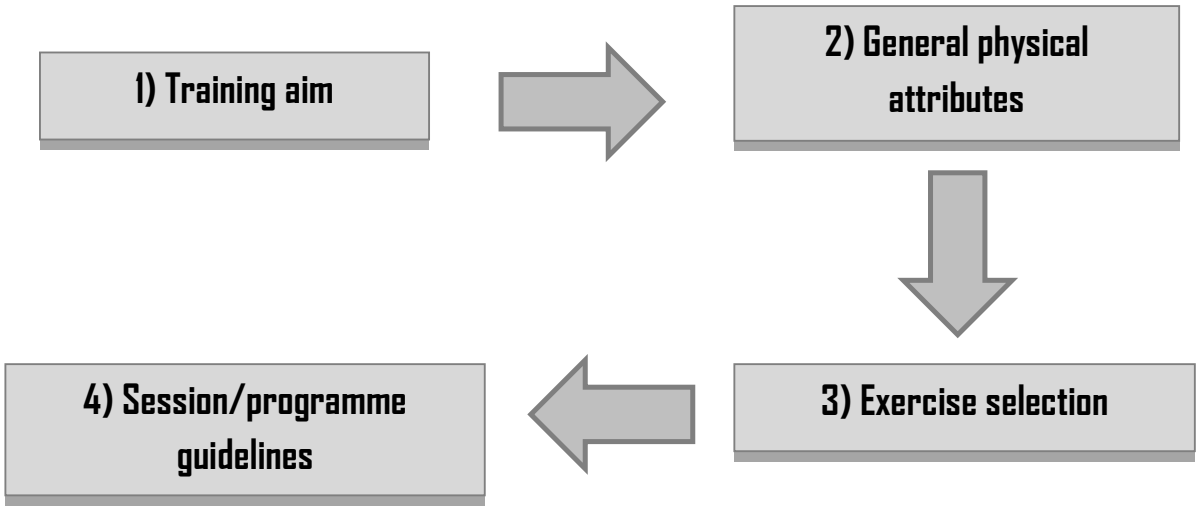


Figure 1 Four step programme construction process

1) Training aim

The **training aim** will arise when a **specific weakness** is located in a player or group from **testing or observation** e.g. a reliance on one leg to jump, a general loss of repeated sprint ability towards the end of games, lack of balance when cutting etc. or when the coach/player has a **pre-planned target** e.g. improving team's general cardiovascular

endurance for pre-season, achieving a particular strength to bodyweight ratio for the back squat etc. Whether the aim has a **performance enhancement** or **injury prevention** focus should also be considered. Although inevitably there will be crossover between the two.

2) General physical attributes

The coach/player should ask him/herself why the said weakness has occurred and select from the **general physical attributes** (Figure 4 overleaf) what areas are most appropriate for targeting e.g. is the reliance one leg to jump due to strength, balance or flexibility deficit compared to the other leg? See corresponding Chapter titles for definitions of the general physical attributes. Testing can be used at this stage to reinforce areas for targeting e.g. a single leg press strength difference in the weaker jumping leg.

3) Exercise selection

Once the general physical attribute/s have been determined the relevant sections of the chosen Chapters should be referred in locating the **exercises that are to be targeted**. The **movement pattern characteristics** associated with the aim should guide specific exercise selection. Such movement characteristics are the **major joints involved** and **their actions and the direction, loading and speed of the movement**. For example, one legged vertical jumping involves primarily extension of the ankle, knee and hip from in a vertical direction at high speeds from a shallow flexion point combined with having to both support and produce force to overcome bodyweight enough to become air bound. Therefore there is justification in using high force single leg extension exercises and one legged plyometric exercises, see Figures 2 and 3 below.

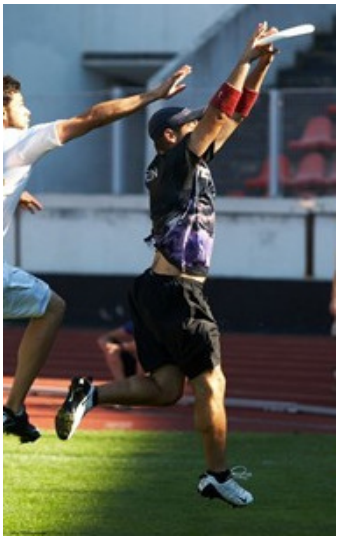


Figure 2 Four step programme construction process

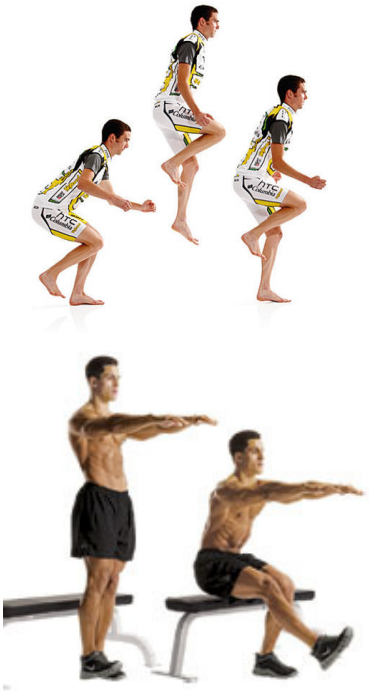


Figure 3 Single leg squat jumps and single leg squats

4) Session/programme guidelines

Once the appropriate exercises have been selected they need to be combined in sessions to create a programme which allows steady improvement. Refer to corresponding Chapters for session templates and the 'Principles of

Training' and 'Periodisation' sections in Chapter 2 for how to adjust training within and between a series of sessions to optimise adaptation.

The four step process along with the information outlined in this resource pack provides the tools to create training sessions and programmes for individuals and groups throughout the season. Continue to experiment progressively and carefully to tailor training to suit the needs of your group - athletes are individuals and not machines so may respond differently to similar training stimuli. Also keep in mind that just because something has been working doesn't mean something else wouldn't have worked better!

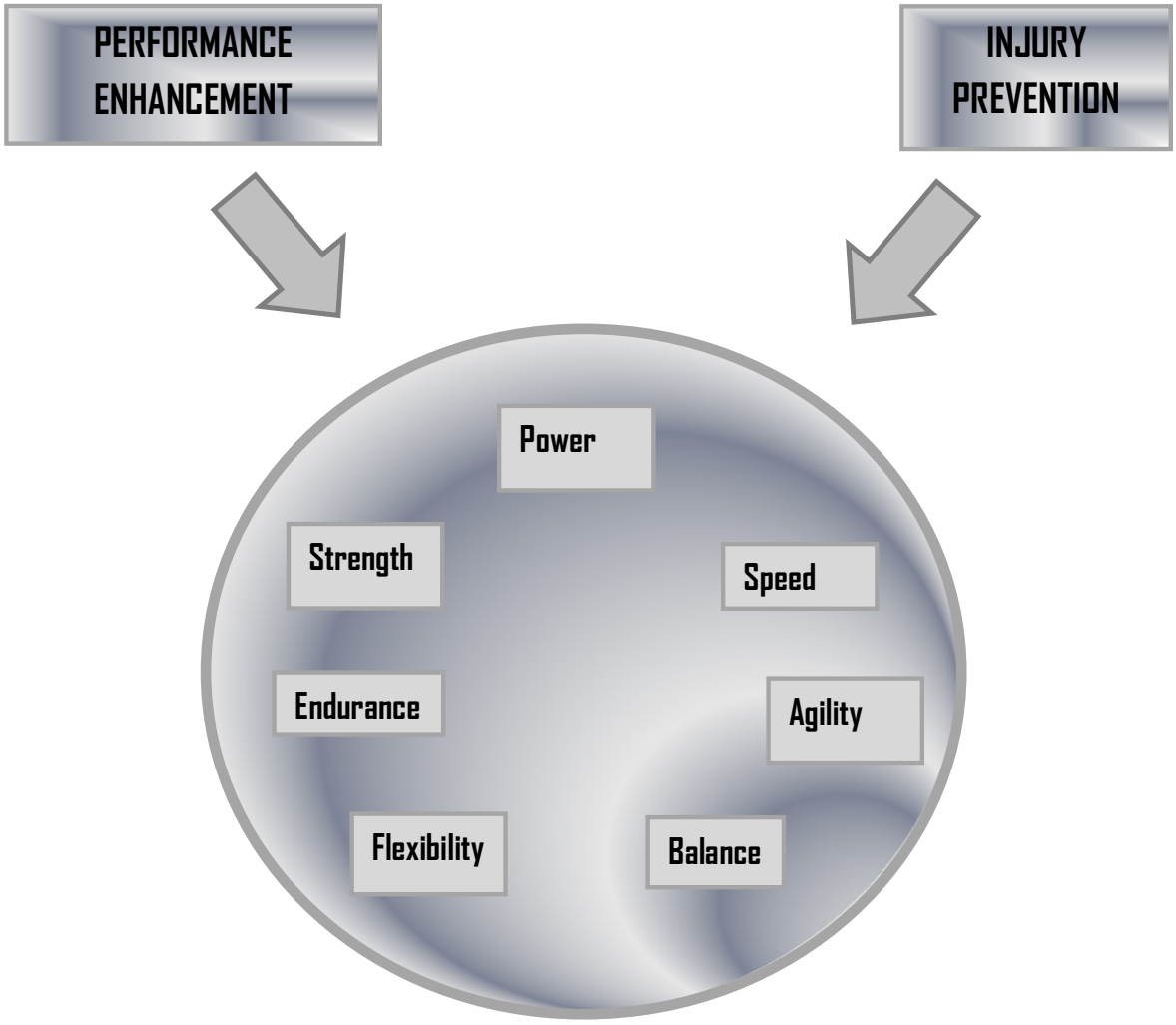


Figure 4 General physical attributes

Resource Pack Updating, Figures and Videos, and Feedback

As many exercises and movements in this resource pack may be unknown or known differently by many, figures and videos of all exercises can be found online at https://vimeo.com/pcgriffiths1990. Please get in contact via pcgriffiths1990@gmail.com for any questions, suggestions or feedback for the videos and picture or the resource pack

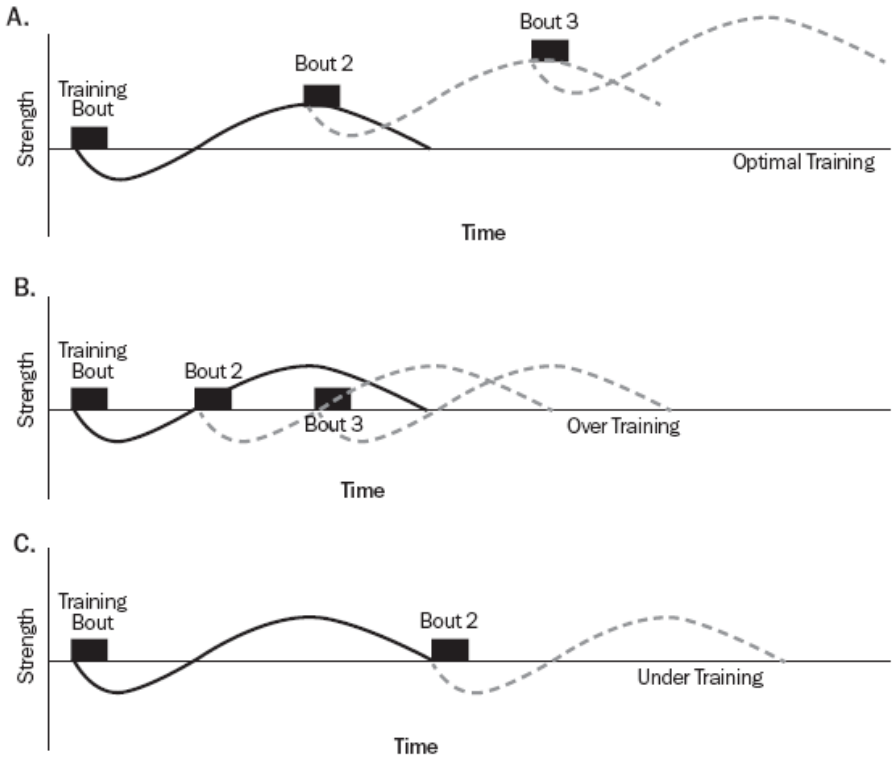
in general. An appendix of all figures and tables can be found in 'Appendices, References and Acknowledgements' at the back of the resource pack.

CHAPTER 2 - KEY TRAINING PRINCIPLES

All exercises, sessions and programmes in this resource pack are underpinned by several key training principles. Although it is not vital to know them in depth to follow the guidelines of this resource pack it is necessary if the individual wants to adapt and optimise theirs and others training in the most specific/individualised situations.

Overload and Supercompensation

Although highly simplified, the aim of training is to stress the body to a degree to which it will adapt to be able to cope with the bout with less stress the next time; this is termed **overload**. After an initial period of performance loss the body will recover to being more able than it was before; this is called **supercompensation**. If the stimulus for stress is not provided again or is not strong enough (i.e. overload not achieved) then the body will not adapt and after time will relapse. The ideal model is represented by A. in Figure 5 below where the session timing and intensity is timed so bouts build on supercompensation causing constant optimal adaptation. Parts B. and C. demonstrate what occurs when training is conducted without enough recovery and C. when there is too much. In the reality the perfect blend of rest and training methods will very rarely be achieved but it should always be the goal.



The effects on strength over a period of time of A) optimal timing of training, B) training too frequently and C) not training frequently enough

Figure 5 Supercompensation and overload

Principles of Training

In order to achieve overload the principles of training must applied in the correct way. These principles are volume, intensity, frequency, duration and type:

Volume: The amount of exercise that is included in a session usually defined by sets and repetitions e.g. 3 sets of 8 repetitions of back squats

Intensity: The difficulty of the exercise being performed i.e. 80% of 1 repetition maximum (1RM), 70% VO_2max, 80% of max speed, etc.

Frequency: The amount of times an exercise or session is performed in a period of time e.g. 2 strength sessions per week

Duration: The length of the work or rest periods in a session e.g. 30 seconds work to 30 seconds rest ratio during a circuit session.

Type: Simply, the description of the exercise e.g. resistance training with weights, plyometric circuit training, repeated 30m hill sprints etc.

A correct application of these principles will cause an appropriate amount of overload to allow adaptation to occur as previously explained. Different principles will have a different stress effect on the body and therefore cause different adaptations or similar adaptations through different mechanisms. See more in the 'Periodisation' section in this Chapter for using these principles to optimise adaptation across training cycles.

Force-Velocity (F-v) relationship of muscle

A principle of muscle function is that the **faster a muscle contracts the less force it will be able to produce**. This gives a relationship demonstrated by the curve below (Figure 6) with different combinations of force and velocity given different names. During **Ultimate games varying areas of the F-v curve will be targeted** e.g. Strength Speed- first step of a sprint from static, Power- double leg jump for the disc, Speed- a grab sideways for the disc. Therefore it is **important to train all areas of the curve** as we will only adapt to the area of the curve that we target.

Even though **maximal strength** may not be required during games it is **a ceiling for other areas of the F-v curve** i.e. at some point your maximal strength capacity will limit development of other areas of the curve. Targeting all areas of the F-v curve in training will mean at some point certain areas will develop to the detriment of others, therefore training needs to be optimised to suit the demands of Ultimate, refer to the 'Periodisation' section for more details. This 'optimal' level will almost certainly be individualised and has yet to be researched. However subjective feelings of performance and speed, strength etc. can be combined with objective improvements to make informed estimations.

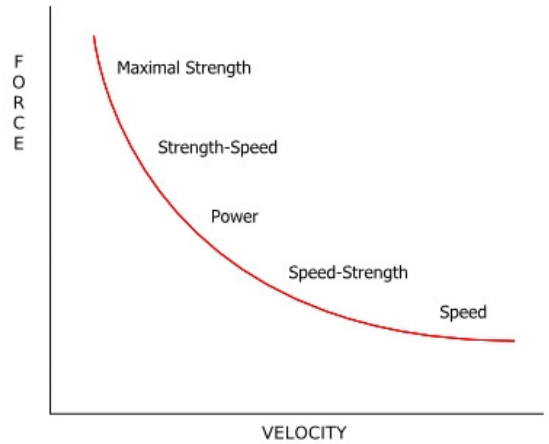


Figure 6 F-v curve

How a movement becomes more powerful: Strength is a skill

As previously shown by the F-v to get more powerful for a certain movement we need to increase our force and/or velocity producing capacity in some way. **Increasing muscle mass** is **only one part** of how **increase our force production**; we get stronger via 'technical' or neuromuscular adaptations such as increasing muscle fibre recruitment, synchronising muscle contractions, activating stronger muscles earlier on in a movement, increasing rate of muscle firing etc. Therefore **strength is a skill** in a sense that improving technique will make you stronger for a certain movement pattern.

Classic **bodybuilding style resistance training** demands **training to failure** using **slower exercise speeds** to elicit a great a hormonal response as possible to achieve muscle hypertrophy. Bodybuilders are only concerned with increasing muscle cross sectional area and not factors such as power to weight ratios and functional movement enhancement. We are. Therefore **1) it is not necessary to train to failure to get stronger**, and **2) quality is better than quantity**. It is better to perform less repetitions/use a lighter weight than to have poor technique as we will be reinforcing poor movement patterns and limited our ability to achieve certain neuromuscular adaptations. As our movement patterns become more and more ingrained then increasing intensity via volume and load is necessary to achieve is overload. However until certain neuromuscular competencies are developed then you will be building your house on the sand.

Periodisation: Optimising adaptation all year round

Periodisation refers to varying training throughout and between seasons to optimise overall adaptation and peak for the most important competitions. There are three terms used to describe periods of time within a periodised programme, namely;

- Macrocycle: The longest period of time i.e. a yearly season of an off-season, pre-season and in-season or possibly a bi-annual for world championships

- Mesocycle: The blocks making up a macrocycle e.g. a period of the macrocycle i.e pre-season can be split into several mesocycles lasting between 4 to 6 weeks

- Microcycle: The smallest period of time varying from one session to 1 to 2 week period

See Figure 7 for an example of a yearlong macrocycle of training focuses using the following periods of time to define an Ultimate season.

Off-Season May to August (maybe social tournaments and every 2 years either WUGC or WUCC)
In-Season February to April (major tournaments i.e. nationals)
Pre-Season September to January (with smaller tournaments/mixed)

Figure 7 A yearlong/macrocycle periodisation example

NOTE: Mesocycles targeting different physical attributes can overlap

CHAPTER 3 - MOVEMENT FUNCTION AND INJURY PREVENTION: FLEXIBILITY SRENGTH AND BALANCE

Injury and **poor movement function** can both arise out of a **lack of strength, flexibility** and/or **balance** at **one or several joints**. The decision should be made at **step 2 of the 4 step process** which of these (possibly all!) need to be targeted in order to correct the problem/s.

Flexibility

Flexibility is **site specific** and refers to the **range of motion** possible in **a particular plane** at an **individual joint**. Flexibility exists in **static** or **dynamic** conditions with static flexibility being a precursor for dynamic flexibility.

Dynamic stretching

Dynamic stretching occurs when, either purely by muscular contraction or also with momentum or elastic recoil energy, a certain range of motion at a joint is produced with the muscles lengthening or shortening. Dynamic stretching is key in preparing athletes for activity via. See Chapter 8 'Preparation for and Recovery from Exercise' for how to implement dynamic stretching.

Static stretching

Static stretching occurs when the muscles are contracting or relaxing statically to hold a particular range of movement around a joint. It can be used to enhance flexibility in the short term (i.e. in a warm up or cool down) or long term (i.e. adaptation after a period of specific flexibility training). See the 'Warming Up and Cooling Down' Chapter for how to incorporate static stretches into a warm up or cool down.

Static stretching can be used by itself in a flexibility session **after performing pulse and temperature raising drills/post mast or training when warmed up** (see the 'Warming Up and Cooling Down' Chapter for appropriate warm up drills for particular joints). Stretches should be held for 30 seconds to 2 minutes – find a tight spot and attack! Suggested long term adaptations to static stretching, as well as increased joint flexibility, are **enhanced muscle contractile velocity properties**. Therefore static stretching can be used in strength focused mesocycle to maintain muscle contraction velocity.

Static stretching exercise pool

Wrist
Flexion - Back hand together push in/outs
Extension - Palm together push in/outs

Elbow
Flexion - Assisted straight arm lean variations
Extension- Overhead flexed arm elbow pulls
- Flexed elbow pull across chest

Core
Extension - Prone arch back
- Swiss ball prone arch up
- Wide leg lean back (only ever hold for a few seconds)
Flexion - Mecca's
- Wide leg lean forward
Lateral flexion - Lean to the side
- Twist
- Dowel bar twists

Knee
Quads - Standing pull back
- Kneeling lean back
- **Hamstrings** - Standing toe touch variations
- Sit and reach
- Supine leg pull variations
- One leg forward head to knee variations

Shoulder
Flexion - Hand together reach forward and up
- Single/double arm assisted pull backs
Extension - Hand together reach backs
- Single/double arm assisted reach back leans
Horizontal abduction - Assisted straight/bent arm lean variations
Horizontal adduction - Straight arm pull across chest
Internal rotation- 90° shoulder and elbow back of hand push variations
External rotation- 90° shoulder and elbow palm push variations
Rotation- Bar dislocations

Hip
Front (flexor) - Kneeling knee together lean backs
- Lunge feet parallel lean variations
Back (extensor) - Supine flexed knee pull back variations
- Wide leg deep squat hold
Outside (abductor) - Press up position to leg across under body and sit
- Standing leg across front and lean
Inside (adductor) - Sitting soles together pull in and push out
- Lunge feet perpendicular lean variations
- Wide leg lean forward variations

Ankle
Calves – Calf wall leans (foot flat on ground)
- Prone, leg crossover lean
Dorsiflexion - One leg back dropdowns
- Pointed toe floor leans

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Self myo-fascial release (SMFR)

When we go to bed, adopt damaging postures due to injury, personality, job etc. **tissue can build up** in amongst musculature causing **decreased range of motion, stiffness and pain**. **Stretching can remove short term tissue build** up (e.g. after a night's sleep) but is not able to remove significant build up. Having some form of manual/hands on therapy can remove stubborn tissue build up and allow **increased range of motion** while **decreasing pain and stiffness** during movement.

A **sports massage is certainly preferable** but **SMFR** is a **cheap and easy** option. SMFR tools include **foam rollers, lacrosse/tennis/golf balls** etc. and involve applying pressure to tight/painful areas manually releasing tissue. The type of tool used depends on the individual. **It will hurt! Find a painful spot and apply pressure** by pushing the tool into the muscle or loading the area with bodyweight for periods of **10-30 seconds several times** over. SMFR can be used as part of a warm up, see Chapter 8 'Preparation for and Recover from Exercise', or as a session in itself/combined with stretching.

Example lower body static stretching and SMFR session: 30 minutes

Warm up
- 2-3 minutes low impact mobilisation drills
- 2-3 minutes dynamic stretches and mobilisation drills

Main body

All stretches held for 1 minute two times each and for both limbs when applicable
- Roll out buttocks area into Wide leg deep squat hold
- Roll out front thigh into Standing pull back stretches
- Roll out rear thigh into One leg forward head to knee variations
- Roll out calves into Calf wall leans
- Roll out shin into One leg back drop downs

Injury prevention ('pre-hab')

Developing capacities with a **performance focus** such as **strength, power** and **endurance** will all **have injury preventing effects** due to injuries being associated with fatigue and lack of strength at specific joints. Developing only these areas however neglect certain neuromuscular and strength capacities that have roles in injury prevention as opposed to performance enhancement. This Chapter targets **static strength** and **strength endurance** of postural and deep muscles because they contract statically for long periods of time and predominantly **maintain correct body position**. The exercises detailed in this Chapter also target **balance** more so than in performance focused Chapters and train **neuromuscular capacities** such as **proprioception** (the process of positional feedback from ligaments and response from the central nervous system).

Detailed below are the **most common injuries** sustained in team sports such as Ultimate and **specific injury prevention strategies** generally termed **'pre-habilitation'** or **'pre-hab'** to help prevent them. Note how often injuries at specific joints will often not originate only at the injury site i.e. core instability leading to knee ligament damage. Therefore **improving balance, co-ordination and strength in one area may well aid another area** and there will be various such instances with the following pre-hab exercises.

Ankle: Sprains and dislocations

Proprioceptive/balance exercises

- Single leg balance > Single leg balance with eyes closed > Single leg balance whilst performing upper and/or lower body movements i.e. arm swings, running action etc. > Singe leg balance whilst catching disc, ball etc.

Strengthening exercises

- Ankle inversion, eversion and rolling using bands of progressive tension
- Eccentric single leg calf raises on a smith machine

All exercises can be performed on a wobble board, stability ball etc. for added difficulty.

Knee: Ligament and hamstring injuries and patellar tendinopathy

Proprioceptive/balance exercises

- Single/double leg box drop holds
- Single leg drop and holds > Single leg drop and push up > Single leg drop and pop > Single leg drop and jump (advanced)
- Decline single leg squats > single leg squats performed on a wobble board, stability ball etc.

Strengthening exercises

- Nordic curl roll out > Nordic curl > Sing leg Nordic curl (advanced)
- Eccentric machine hamstring curls > Single leg eccentric machine hamstring curls
- Eccentric machine leg extensions > Single leg eccentric machine leg extensions
- Romanian dead lifts (RDL) > Single leg RDLs

As stated before developing sport specific endurance, strength across the F-V curve, reinforcing correct movement patterns in running, jumping, changing direction etc. and increasing flexibility and will also reduce the chances of injury.

Hip and lower back: Groin/thigh strains and lower back pain

Proprioceptive/balance exercises

- **Swiss ball double leg glute bridges and hip thrusts** > Swiss ball single leg glute bridges and hip thrusts
- **Swiss ball Russian twists** > Weighted Swiss ball Russian twists
- **Swiss ball bridge** with leg raises (either feet on floor or back on floor)
- **Side/front planks** on stability dome or Swiss ball
- **Single leg RDLs** > Weighted single leg RDLs

Strengthening exercises

- **Glute bridge** double leg > Glute bridge single leg > Weighted glute bridges
- **Hip thrusts** double leg > Hip thrusts single leg
- **Glute/hip** circuit exercises

*Many injuries arise out of **imbalances in strength between** and **within limbs** and **between opposing movements**. Utilising **unilateral (single limb) strength tests**, comparing muscle group strength of the same limb and comparing opposing movement strength will allow these imbalances to be **detected** and **targeted**.*

Shoulder: Acute trauma injuries and overuse

Proprioceptive/balance exercises

- **Crucifix hold variations** > Crucifix hold variations on Swiss/stability balls
- **Press up box hop** variations
- **Press up hold** variations on Swiss/stability balls

Strengthening exercises

- **Cable pulley/dumbbell external rotations** with shoulder adducted or abducted at 90º
- **Cable pulley/dumbbell internal rotations** with shoulder adducted or abducted at 90º
- **Overhead squats** (varied grip widths)

*These exercise progressions and sequences are designed for athletes who **have not previously suffered major injury** in these areas or **where the injury has not resulted in significant loss of training/playing time**. Although methods and outcomes for pre-hab and rehabilitation have similarities they are different due to the differing needs of the athletes involved. Therefore the **rehabilitation process should always be led by medical professionals**.*

Movement patterns

All sporting movements such as running, jumping, changing direction, throwing etc. are composed of key movement patterns. Movement pattern assessments take you through these patterns and **highlight** areas of **instability, pain and weakness**. These have implications for performance enhancement and injury reduction. Even though correcting movement patterns may not always affect game performance directly it may allow you to train more effectively in the gym and/or on field which will then have a carryover effect to game situations.

*The **difference between pre-hab** and **movement function** is that pre-hab refers to **specific injury sites** whereas movement function is concerned with the **whole multi-joint movement**. The **pre-hab exercises above will help improvement movement function** by correcting and improving the constituent parts involved in a particular movement pattern. Continue reading for exercises targeting movement patterns rather than injury sites.*

Functional Movement Screen (FMS)

The FMS was developed by Cook and Burton (2006) to and is widely used today to assess functional movement ability in team sport athletes. After a series of 8 tests individuals are scored on their functional movement ability. Interventions can then be devised to improve an individual's score.

FMS testing exercise pool

1) Deep Overhead Squat

Passing criteria:
- Heels flat
- Feet parallel, not sliding or rotating
- Hips below knees
- Shoulders retracted

2) Hurdle step

Passing criteria:
- Hips, knees and ankles aligned forward
- No dip of the bar left or right
- Little movement in spine

3) In line lunge

Passing criteria:
- Minimal upper body movement
- No dip of the bar left or right
- Back heel touching knee of front foot
- Feet stay in same position on floor

4) Shoulder mobility

Passing criteria:
- 11cm ≥ distance

5) Active straight leg raise

Passing criteria:
- At least 90°
- Floor leg minimal movement
- Foot out floor leg points straight up
- Both legs stay extended

6) Trunk stability push up

Passing criteria:
- Flat back and hip position maintained
- Shoulders level and retracted
- Elbows remain parallel with body

7) Prone rotary stability (same side or contralateral)

Passing criteria:

- Arm and leg in line
- Minimal spine and head movement
- Remaining upright

8) Seated rotation

Passing criteria:

- Spine remains straight and upright
- Bar touches person standing in front
- Bar level and in touch with chest

FMS Scoring System

0 = The individual has **debilitating pain** during the test i.e. it does not allow them to complete the movement

1 = The individual **cannot perform** the movement pattern **even with compensations**

2 = The individual **can perform the movement but must utilize poor mechanics** and **compensatory patterns** to accomplish the movement

3 = The individual **can perform the movement without any compensations** according to the established criteria

Movement Competency Screen (MCS)

The MCS was developed by Kritz (2012) and was created in response to criticism of the FMS. The scoring system for the MCS points the individual towards the current load they can apply to a particular movement pattern whilst maintaining correct technique (see load level pattern table below). The MCS then provides progressive exercises which correspond to the load levels to help improve an individual's movement competency score and move them up the load level system.

MCS testing exercise pool

1) Squat

2) Lunge and twist

3) Bend and pull

4) Push up

5) Single leg squat

MCS scoring system (sample table)

Pattern	Primary	Secondary	Score	Comments
Squat	Shoulders Lumbar Hips Ankles/feet	Head Knees Depth Balance	1 2 3	
Lunge and twist (lunge)	Balance Lumbar Hips Ankles/feet	Head Knees Depth	1 2 3	
Lunge and twist (twist)	Shoulders Lumbar Hips Ankles/feet	Head Knees Depth Balance	1 2 3	
Bend and pull (bend)	Shoulders Lumbar Hips Depth	Head Knees Ankles/feet Balance	1 2 3	
Bend and pull (pull)	Shoulders Lumbar Hips Depth	Head Knees Ankles/feet Balance	1 2 3	
Push up	Shoulders Lumbar Hips Depth	Head Knees Ankles/feet Balance	1 2 3	
Single leg squat	Depth Lumbar Hips Ankles/feet	Head Shoulders Knees Balance	1 2 3	

MCS Load levels for movement patterns

Load level	Scoring rationale	Repetition/load guidance
1 (Assisted)	2 or more primary regions checked	Perform 30-100 repetitions in 3 sets of each pattern maintaining correct technique.
2 (Bodyweight)	1 primary region/2 or more secondary regions	Perform 30-100 repetitions in 3 sets of each pattern maintaining correct technique.
3 (External load)	No primary region and only 1 secondary region	Exercises performed at near maximal-to-maximal load capacity while maintaining correct technique. 30-60 repetitions performed in 3 sets while maintaining correct technique.
4 (Eccentric)	Correct technique with external load	15-30 repetitions of each exercise performed in 3 sets while maintaining correct technique.
5 (Plyometric)	Correct technique performed eccentrically	15-30 repetitions of each exercise performed in 3 sets while maintaining correct technique.

FMS conditioning exercise progression pool

Squat	1) Bodyweight squat with bands 2) Bodyweight squat 3) Loaded squat (dumbbell, barbell etc.) 4) Drop and stick squat 5) Jump squat
Lunge	1) Bodyweight lunge with bands 2) Bodyweight lunge 3) Loaded lunge (dumbbell, barbell etc.) 4) Drop and stick lunge 5) Jump lunge
Upper Push	1) Push up with bands 2) Push ups 3) Weighted push up, Bench press, Military press 4) Drop and stick push up, Drop and stick dips 5) Explosive bench press, Clap press ups
Upper Pull	1) Vertical/horizontal pull up with bands 2) Vertical/horizontal pull up 3) Weighted vertical/horizontal pull up, Barbell row from bench or bent over 4) Pull up with release and catch 5) Power snatch, Pull up with quick hands
Trunk Rotatio	1) Two point prone hold 2) Standing and seated trunk twists 3) Weighted standing and seated trunk twists, Cable machine twists 4) Drop squat/lunge and twists 5) Medicine ball trunk rotation throws, Repeated drop lunge and twists
Trunk Bend	1) Good mornings/Sit ups with bands 2) Good mornings/Sit ups 3) Weighted good mornings/Sit ups 4) Drop and stick good mornings, Drop and stick leg raises/bench sit ups 5) Explosive sit ups, Power bag good morning throws
Single leg squat	1) Single leg squat with bands 2) Single leg squat 3) Bulgarian squats, Step ups, Kettle bell pistols 4) Drop and stick single leg squat 5) Bounding, Single leg CMJs

Assessing movement patterns in general

Although there is not yet any research on assessing other movement patterns the same principles from existing movement function screens can be applied to other common movements seen in Ultimate such as a **wide step out lunge and twist (backhand and forehand side) and single leg RDL**.

Example pre-hab and movement function session for knee and ankle stability and lunge movement pattern: 45 minutes

Warm up

- 1-2 minutes appropriate low impact mobilisation drills
- 2-3 minutes appropriate dynamic stretches and mobilisation drills

Main body

- Eccentric sing leg calf raises x5 (each leg) x3
- Bodyweight lunges x5 (each leg) x3
- Weighted lunges (holding dumbbells) x4 (each leg) x2
- Single balances on wobble board 30 seconds (each leg) x4
- Single leg box drop holds from 30-50cm x5 (each leg) x3

Cool down

- Ankle and knee stretches held for 30 seconds

CHAPTER 4 - STRENGTH AND POWER FOR PERFORMANCE ENHANCEMENT

Most Ultimate players are **familiar** with **power** and **jump training** in the form of **plyometrics** however there is widespread belief that **weight/strength training** will make a player **big and slow – this is absolute nonsense**. As can be seen from the F-v curve in Chapter 2, **without enhancing the ability to produce high amounts of force, power is limited**. The **only way to achieve** this is through **loading appropriate movement patterns** with **enough resistance** to **achieve high force outputs**. This chapter will equip a player or coach in developing a player's ability across the whole F-v curve.

General principles/recommendations

- Use **2 to 3 sets** and **1-10 reps** for all exercises depending on freshness of athlete, time constraints, the area of the F-V curve being targeted and period of season
- **Only work to failure occasionally** (i.e. climax of a Mesocycle) or if repetition maximum (RM) testing
- **Max effort** as **fast as possible up** through the effort and **controlled** on the **way down**
- **Rest** in between sets of **1-5 minutes**, should allow for **full/near full recovery**
- Correct percentages of 1RM for load levels targeting certain F-v curve areas during a general movement pattern will vary greatly depending on training status of the individual and the type of exercise used.

Speed-Strength, Power and Strength-Speed

Speed-Strength, Power and Strength-Speed Exercise Pool

- Clean or snatch pull from high blocks > low blocks > hang > floor

- Clean from high blocks > low blocks > hang > floor

- Power clean from high blocks > low blocks > hang > floor

The weight that can be moved will decrease from pulling to power cleaning with stimulation moving in the direction of velocity to strength along the F–V curve. Cleaning is the most technically demanding.

- Push Press clean or snatch grip from in front or behind neck

- **Split or power jerk** from blocks or rack

Push press is more upper body strength focused than the jerk which is more power focused although main drive for both exercises should come from legs.

- One hand dumbbell snatches

Less technical unilateral alternative to barbell snatches.

- Kettle bell/dumbbell swings

Good starter technique exercise for teaching full hip and knee extension.

- Weighted jump squat

- Weighted CMJ

Begin at **bodyweight** and add load up to **60% 1RM back squat** as technique allows. The jump squat uses **no prior movement** to enhance jump height i.e. jump still from starting position. The CMJ **uses this prior movement** to **enhance jump height** via elastic energy and the **stretch-shorten cycle (SSC)** principle of muscle.

- Plyometric progressions for movement patterns in **Chapter 5 'Speed and Agility'**

- Medicine Ball throw variations overhead from behind to front/front to behind, across body etc.

- Double leg jump

Technical drills

- 1-5 step jumps > Progressive jogging to sprinting and jumping >

Reactive jumps at varying speeds from different directions

Plyometric progressions

-CMJs > CMJ and pop > repeated CMJs

- Wood chop cable machine throw variations see medicine ball throw variations

These exercises develop rotational and linear force production applicable to backhand and forehand throws and pivoting. Wood chops focus more on Strength-Speed whereas Medicine Ball throws focus more on power and Speed-Strength.

- Single leg jump

Technical drills

- 1-5 step jumps > Progressive jogging to sprinting and jumping > Reactive jumps at varying speeds from different directions

Plyometric progressions

- Single leg CMJs > Single leg CMJ and pop > Repeated single leg CMJs

Trampoline jump variations

A good way of reducing joint impact stress whilst training jumping as well as enhancing the speed of movement patterns via overloading the neuromuscular aspects involved in muscle contraction.

Use early progressions for general conditioning and basic technical development. Once technique has been well ingrained utilise the later progressions for increased adaptation and more game specific conditioning.

Strength (Gym based)

Hip dominant

- Back squat

- Deadlift

Knee dominant

- Front squat

Key exercises for developing lower body strength.

- Leg press machine with **high feet** single or double leg

- Leg press machine with **low feet** single or double leg

Supplementary lower body strength exercises which place less stress on the lower back.

- **Romanian Deadlift (RDL)** single or double leg

- **Lunge variations** (step forward/back/to side)

Supplementary exercises that develop rear thigh musculature, important for preventing front/rear thigh muscle imbalances.

- **Hip thrusts** single or double leg

- **Split squat variations** (foot grounded/raised etc.)

- **Single leg squat** variations

Resistance mode progressions for Knee and Hip dominant exercises: *Bodyweight > Dumbbell held to chest > Dumbbells in either hand to side > Barbell across back/front*

Push

- **Military press**

- **Dumbbell pullovers**

- **Push up variations** (wide/narrow arm, plyo push ups, one hand, incline/decline etc.)

- **Bench press variations** (barbell/dumbbell, incline/decline etc.)

- **Bench fly variations** (bent or straight arm, degree of abduction)

Pull

- **Free weight row variations** (arched back on bench/from floor, straight back or flexed, dumbbell/barbell etc.)

- **Cable pull variations** (wide arm, pronated/supinated grip etc.)

- **Seated row variations** (wide arm, pronated/supinated grip etc.)

- **Pull up variations** (close hand pronated/supinated, wide arm pronated supinated etc.)

- **Dumbbell or barbell shrugs**

*Make sure to utilise **all types of push** and **pull** exercises during a **training year** to evenly develop the musculature of the upper body.*

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Core

- Reverse curls > Advanced reverse curls > Eccentric dragon flags > Dragon flags (advanced)

- Leg raises > Knee to elbow sit ups > Dynamic crunches > V-ups

- Kneeling roll outs > Press up position roll outs (advanced)

These exercises develop the abdominals from a number of different angles.

- Full sit outs

- Elbow to knee > Contra-lateral hand to foot reaches

- Lying sides > Oblique dips > Lateral bench raises > Weighted lateral bench raises

These exercises train upper and lower body balance and tax the cardiovascular system due to the dynamic whole body movements being used.

Dumbbell or barbell side bends

Russian twists

These exercises develop primarily the oblique muscles as well as the abdominals and certain muscles at the hip.

- Side/front plank > Weighted side/front plank > Side/front plank with arm and/or leg movements

Planks train static strength for the whole core. Progress from 30 seconds to 3+ minutes.

Developing strength outside the gym

Although **developing strength in the gym** is **vital in maximising potential as an Ultimate player** there will be occasions where access to a gym is not possible i.e. travelling, or the coach may want to do team strength work as part of a field session. Although **bodyweight exercises** have use in developing **muscular endurance** and the **F-V curve from power and below** often they **do not provide enough resistance to develop near-maximum to maximum strength.** Below are a series of field exercises that utilise isometric (static) and eccentric (muscle lengthening whilst contracting) exercises along with a few simple environmental aids that will develop strength. Due to the reduced the exercises below can be utilised in a circuit format rather the more traditional, see the 'Session Structure' session for examples.

Hip

Knee

3 man wooden bar **squat** isometric/eccentric

3 man wooden bar **deadlift** isometric/eccentric

Isometric **car/door frame/wall lunge/squat** at different angles

Partner wooden bar **single leg hip flexion/extension straight/flexed knee**

Partner wooden bar **single leg knee flexion/extension straight/flexed**

Partner **Nordic curl**

Push

Pull

Partner resisted press ups

3 man wooden bar **bench press** isometric/eccentric

3 man wooden bar **behind/in front of neck press** isometric/eccentric

Single/double arm standing partner wooden bar pull isometric/eccentric

Bent over 3 man **wooden bar pull**

Calf

Partner wooden bar **single leg calf push** isometric/eccentric **isometric/eccentric**

Core

3 man wooden bar **standing twist** isometric/eccentric

3 man wooden bar **good mornings** isometric/eccentric

Eccentric *exercises are* ***preferable to isometric*** *due to* ***enhanced strength*** *and* ***injury prevention adaptations.*** *However eccentric exercise causes more muscle soreness than isometric exercise so can be used when a shorter recovery time is needed, an athlete is returning from injury etc.*

Session structure

Session structure (i.e. what exercises are used in what order and with what loading) will vary according to the point of the season. Below are several example sessions for different points of the season as well as principles that can be applied whenever creating a session.

General Gym Session Structure

Block	Focus	Example exercise
A1	Speed-Strength/Power/Strength-Speed	Power cleans
A2	Speed-Strength/Power/Strength-Speed	Double leg CMJs
B1	Hip dominant	Single leg dumbbell RDL
B2	Push	Military press
B3	Core	Reverse curls
C1	Knee dominant	Dumbbell split squat
C2	Pull	Dumbbell bench rows
C3	Core	Side plank

This structure can be used in the off-season or at any time for whole F-v curve development. This is a good structure for beginners in the gym who have no structured S&C plan for the year or for a general strength session during a periodised year.

*If **not enough time for C block**, perform it **after block A in another session** later in the week. Make sure **all areas in blocks B and C** are targeted **at least once** during a week, **two is better**. **Three is best** if there is **enough time** for **rest and recovery** and the athlete is **adapted** well enough to handle the workload.*

Max strength and Strength-Speed session: 90 minutes

Warm up
- 1-2 minutes appropriate low impact mobilisation drills
- 2-3 minutes appropriate dynamic stretches and mobilisation drills

Main body
- Clean pulls from low blocks 5x3
- Push press 4x3
- Back squat x4x3
- Bent over barbell row x5x3
- Single leg press with low feet x3x3
- Advanced reverse curls x8x3

Cool down
- Lower and upper body stretches held for 30seconds

Power and Speed-Strength session: 90 minutes

Warm up
- 1-2 minutes appropriate low impact mobilisation drills
- 2-3 minutes appropriate dynamic stretches and mobilisation drills

Main body
- Power cleans from floor x6x3
- One hand dumbbell snatches x5 each side x3
- Medicine ball double arm throw over head
- Medicine ball lateral across body from floor
- Double leg CMJs x5x3
- Forwards single leg CMJ and hold x5 each leg x3

Cool down
- Lower and upper body stretches held for 30seconds

*When **maintaining** an **area of the F-v curve** use **large multi-joint exercises** to **increase time efficiency** of the sessions and put the exercises for this component at the **end of the session** as it is not the focus i.e. a set of back squats for strength maintenance at the end of a power and Speed-Strength session.*

Field Strength session: 45 minutes

Warm up
- 1-2 minutes appropriate low impact mobilisation drills
- 2-3 minutes appropriate dynamic stretches and mobilisation drills

Main body (players cycle round stations in groups of 3, perform each exercise for 20 seconds max effort each then repeat three times more)
- 3 man wooden bar squat (eccentric)
- Partner resisted press ups (eccentric)
- Bent over 3 man wooden bar pull (eccentric)
- Partner Nordic curl (eccentric)
- 3 man wooden bar standing twist (eccentric)
- Partner wooden bar single leg calf push (eccentric)

NOTE: For single limb/both sided exercises alternate sides for the 4 sets

Cool down
- Lower and upper body stretches held for 30seconds

Testing and assessment

Strength and Strength-Speed

Testing for **maximum strength** and **Strength-Speed** for **any** particular **movement pattern**, including all the exercises previously detailed, by **building up to the maximum load** that can be moved through the **full range** of **required motion** with **acceptable technique**. This process is called **1RM testing.**

Power and Speed-Strength

Because these areas of the F-v are **more reliant on velocity rather than force** any exercises previously detailed can be **subjectively or objectively assessed** for progression in **reducing time to complete the movement pattern** with the **same load**. **Distance measures** can also be used to assess progression e.g. the height of a CMJ or the distance a medicine ball is thrown.

Objective tests are of help after mesocycles *to test whether they have been successful in improving what they were supposed to. Testing is most accurately and precisely done via force plates, linear position transducers and other more advanced equipment. However, as most Ultimate players and coaches do not have access to such equipment,* ***constantly assessing movement competency*** *(i.e. stability, control, balance, economy of effort etc.) and using* ***1RM testing*** *will be the main mode of assessment. Refer to check points for movement competency assessment in Chapter 3.*

CHAPTER 5 - SPEED AND AGILITY

Definitions and common principles

Although speed has previously been used to describe muscular contraction properties along the F-v curve in this chapter **speed** refers to **time taken to propel the whole body over a given distance**. **Agility** is defined as the ability to **change the direction** and **position of the body** at the **desired speed** whilst maintaining **balance** and **control**.

Speed and **agility** are two of the **most important** attributes for a top level Ultimate player to possess and is **limited** by the **F-v abilities** of the athlete as well as **technique**. **No matter how good your technique is if your body cannot produce enough force quickly enough your speed and agility will not improve!** The previous chapter has dealt enhancing force producing capacities whilst **this chapter has a technical focus**.

All changes in direction and speed have **common key technical elements** that are based on biomechanical principles that can be applied across all types of direction change and speed movement skills:
- Applying the most amount of **horizontal force** possible in the **desired direction of movement**
- Applying this force in the **shortest amount of time possible** to allow **reduced foot ground contact time** and therefore **increased stride frequency**
- Maintaining **body position** and **centre of gravity** to ensure the athlete does not fall over and is able to optimally achieve the previous two technical elements.
- Co-ordinating limb movements so that the **least amount of time is taken to reposition the body** i.e. heel to buttocks leg recovery during sprinting, planting with correct foot angle during cutting etc.

Although each time a change in direction or speed is required in an Ultimate game it will have unique situational aspects, the general movement sequences detailed below make up all such changes; once ingrained they will allow an athlete to **spontaneously change body direction** and **speed** in an **efficient** and **effective manner**.

Agility

Jab Step

The jab step occurs when the **same leg** is primarily used for **braking and propelling** the body with **abduction of the hip** along with **extension of the knee and ankle** (see Figure). It involves a change of direction between approximately **35-90°** and is usually used during **short to medium distance cuts to lose a marker.**

Technical drills

- **Abductor skips**
- **Lean-recover**
- **Outside leg wall drives**

Ladder drill progressions

- **Icky shuffle** > Icky shuffle wide and hold > Icky shuffle high knees > Icky shuffle and pop > all same backwards

Serpentine course progressions

- **Progressively quicker runs focusing** on wide foot plant/high knee drive out/plant and hold/quick feet > Chaotic Serpentine Course > Reactive drills/courses

Plyometric progressions

- **Lateral abductor CMJ** and hold > Lateral abductor CMJ and pop > Lateral abductor alternating bounds
- **Outside leg wall jump** > Outside leg wall jump and hold > Outside leg wall jump pop > Outside leg wall repeated jumps

Crossover

The crossover occurs when **one is leg used primarily for braking** whilst the **other leg is primarily involved** in **propelling the body through adduction of the hip along with extension of the knee and ankle** (see Figure). It involves a change of direction between approximately **135-180°** and is usually used during **medium to long distance cuts to lose a marker.**

Ladder drill progressions

- Crossover shuffle > Crossover shuffle and hold > Crossover shuffle and pop > All same backwards

Shuttle progressions

- One turn at 75% pace > advance by 1) increasing speed of approach 2) introducing multiple turns 3) increasing distances between turns, all focusing on high knee escape drive/quick feet/low centre of mass > Partner races > Reactive runs

Technical drills

- Adductor skips
- Lean-recover
- Inside leg wall drives

Plyometric progressions

- Lateral adductor CMJ and hold > Lateral adductor CMJ and pop > Lateral adductor alternating bounds
- Inside leg wall jump > Inside leg wall jump and hold > Inside leg wall jump pop > Inside leg wall repeated jumps

Speed

Linear Acceleration

Linear acceleration refers to the ability to increase **linear speed in a given time frame**. This skill is usually utilised in moving from being **stationary or at a slow running speed to maximal speed** in an attempt to lose a marker.

Technical drills:

- Band resisted leg pull throughs
- Wall drives > Wall drive and holds > Single leg wall bounds
- Lean-recover
- Bird dogs
- Singe leg squat thrust variations

Plyometric progressions:

- Forward single leg CMJ and hold > Forward single leg CMJ and pop > Single leg bounds

Conditioning drills:

- Uphill sprints
- Weighted sled sprints (no more than 10% bodyweight, less weight is harder)
- Start variations into 10-40m sprints

Top Speed

Whilst most sprint distances are not long enough to achieve top speed having the ability to be able to keep accelerating to high speeds during longer sprints is an **important skill in losing markers/keeping up with offensive players.**

Technical drills:

- Swagger skips > Sprint skips > Flying high knee skipping
- Heel to butt actions
- Sprint action straight leg cycle kicks
- Seated/standing arm drives
- Bird dogs

bounds

- Lean-recover
- Bird dogs
- Singe leg squat thrust variations

Plyometric progressions

- Standing start bounds > Jog flying bounds > Sprint flying bounds

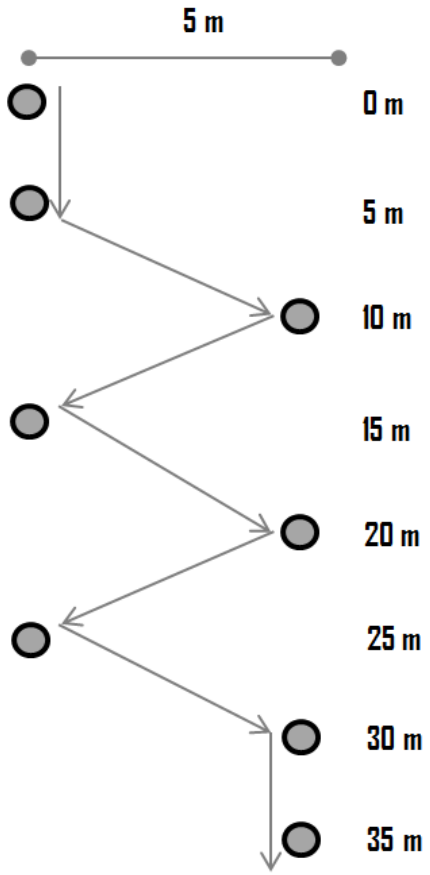
Conditioning drills

- Rolling sprints of 30m-80m
- Downhill/'overspeed 'rolling sprints

bounds

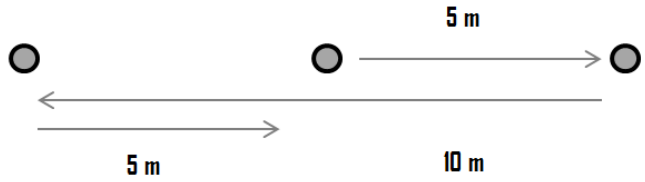
Agility

Serpentine Agility Test (SAT)



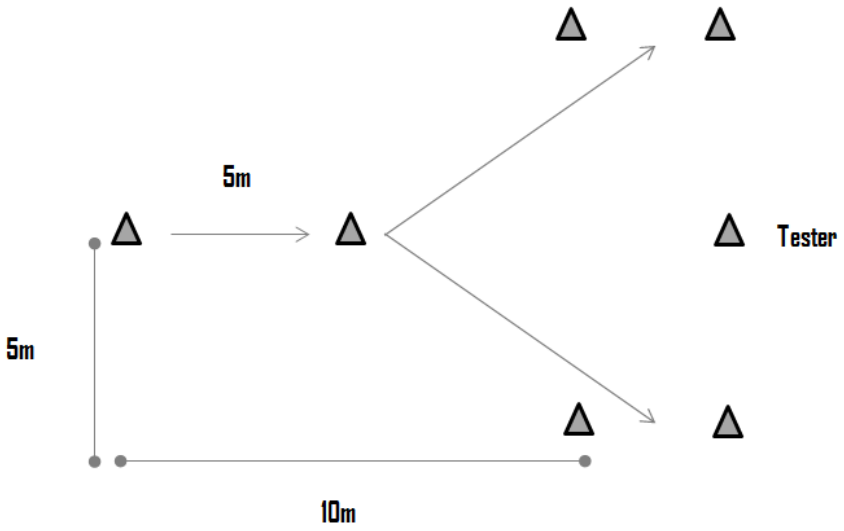
*The **RAT** assesses the **reactive ability of the jab step**. The athlete sprints from a 3 point stance start and jab steps either left or right through the two cones on a step signal from the tester.*

5-10-5 test



*The **SAT** assesses the **jab step ability** of an athlete whereas the **5-10-5 test** assesses **crossover ability.***

Reactive Agility Test (RAT)



Linear Acceleration and Top Speed

Testing for linear acceleration and/or top speed will by nature involve timing an athlete over a designated linear distance. For **acceleration** use a **static start** and **top speed** use **flying sprints.** Conditions of the sprint can be altered to make the assessment more game situation specific i.e. chasing after another player, start from a post-throw pivot position as if reacting to an offensive long cut after a turnover etc.,

- Static start sprint (varying start positions such as three point, prone etc.) e.g. 40m sprint from three point stance start.

- **Flying sprints** (athletes build up to top speed to start line) e.g. 20m build up into a 30m sprint 'flying 30'

CHAPTER 6 - ENDURANCE

Endurance is **the ability to repeat a movement or sequence of movements** and is specific **to load and work to rest ratio**. Therefore endurance could refer to any task however here it is referring to the **repeated whole body movements performed during Ultimate** and **training for Ultimate** such as running, sprinting, changes of direction, jumping etc.

Moderate intensity endurance

Sustained periods of moderate intensity exercise utilise primarily the aerobic oxidative energy system. Even though Ultimate does not involve such exercise type it is **important to have an adequately developed aerobic oxidative energy system** to for **efficient recovery in between high intensity bouts.** Below are some example sessions to develop the aerobic oxidative energy system.

- Tempo runs e.g. 75-80% effort 100-200m rolling runs x10-15 with walk back recovery

- 2-4 minute 80-90% intervals with 1-3 minute rest periods x 5-8

- Fartlek running/cycling

High end speed endurance

High end speed endurance is needed when **on offence or defence repeatedly covering large distances on the pitch at high speed** e.g. running long after the offensive player > chasing back as he cuts under > making a long cut on offense after a turnover etc. The **anaerobic energy systems,** as opposed to aerobic, are predominantly taxed during high end speed endurance.

- Maximal 80-100m rolling start sprints x3 to 4 with 2-3 minutes recovery in between

- 90-95% 100m rolling start sprints x4-10, with 2-3 minutes recovery in between

-HIT 30 second maximal uphill sprint protocol x4-8 with 4 minutes recovery in between

Muscular endurance circuits

Most endurance requirements in Ultimate involve movements from the **power to speed areas of the F-V curve** i.e. **body weight jumping** and **running**. There will be however certain movements that target more **strength-speed** areas of the F-v curve such as **changes of direction over small distances**, **wide repeated pivoting**, **maintaining an athletic position during defensive marking** etc. This type of endurance is referred to as **muscular endurance**. Muscular endurance is also important in **allowing athletes to undertake higher volumes of strength and speed-strength training**, increasing the potential to do work in sessions.

Type: Whole body dynamic exercises e.g. burpees, side/front/backwards power crawling, sumoes, split squat jumps and other appropriate plyometric exercises
Intensity: 90%+ maximal effort for each exercise
Duration: Work to rest ratios of **1:2-1:0.5** in sessions of **15-30 minutes** e.g. 30 seconds on 30 seconds off for a set of 8 exercises x3 with one minute rest in between sets

Agility and acceleration endurance

Agility and acceleration endurance targets similar areas of the F-v curve to muscular endurance but will use more specific movement patterns and will involve more slightly more velocity oriented movements.

- **Any agility exercises** using **rest, volume** and **intensity** modifications
- **10-40m sprints** from **static start** x5-30, 10-30 seconds recovery

*Most **strength or speed sessions** can be **turned into endurance sessions by manipulating duration** i.e. a 40m sprints for top speed training cane be turned into a top speed endurance session by reducing rest periods in between sets and increasing the repetitions.*

Testing and assessment

3 to 10km time trial

Although constant pace time trials are **not directly relevant match demands** of Ultimate they provide a good **indication of general cardiovascular** capacity and moderate intensity endurance, most often used at the beginning of **pre-season.**

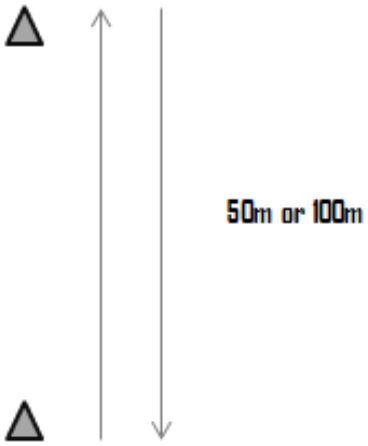
10 Cut Agility Test



Direction	Distance of stage (m)	Accumulative distance (m)
3 to 4	5	5
4 to 2	10	15
2 to 5	15	30
5 to 1	20	50
1 to 3	10	60
3 to 2	5	65
2 to 4	10	75
4 to 1	15	90
1 to 5	20	110
5 to 3	10	120

- The 10 cut agility test is an indicator of **agility endurance**.
- **Stand start 0.5 m behind cone 3** in three point stance position facing cone 5. Test begins on instruction from timer.

150m or 300m shuttle test



- The 150m or 300m shuttle test is an indicator of **high speed endurance** with similar shuttle tests having shown to effectively **predict VO_2 max.**
- **Stand start 0.5 m behind one cone** in three point stance position facing the other cone. Test begins on instruction from timer and the participant repeats the 50m shuttle either 3 or 6 times.

Repeated Sprint Ability (RSA)

Repeated Sprint Ability (RSA) is highly specific to team sport endurance demands and provides one of the most valid and useful assessments. Many combinations of sprint distances and recovery periods

- **6x30m sprints** from standing start with **20 seconds rest** in between
- S_{dec} (%) = {{{S_1 + S_2 + S_3 + … S_{final}}-1}/S_{best} x number of sprints} x100 (**see 'RSA excel spreadsheet'** for easy data entry and **calculation**)
- **S_{dec}** is a measure of performance drop off/speed reduction over repeated sprints (the higher the % the better)

CHAPTER 7 - NUTRITION

Nutrition is one of the most undervalued and misunderstood elements of physical preparation and is worthy of an entire book. This chapter will briefly deal with **supplementation** and **tournament nutrition**.

Supplementation

There are hundreds of supplements on the market, some helpful but many unnecessary and a waste of money. The most commonly used and evidenced will be talked about in brief below, namely **protein supplements, creatine and caffeine**.

Protein supplements

Protein supplementation in the form of powders, bars, shakes etc. are an easily digestible source of good quality protein. It is important to consume enough protein, **not just for muscle building but for recovery and repair after exercise.** Although there is a suggested 20-30 minute window post exercise where taking on protein will promote quick recovery, an individual needs to have regular sources of protein throughout the day.

For most people it is possible to consume enough good quality protein within their usual diet however those with very high calorie expenditures may find it hard to get enough protein from natural sources. In addition sources of good quality protein are not always easy to transport around and to take in that 20-30 minute window post exercise. Protein supplementation via bars and shakes help solve this problem.

Creatine

Creatine phosphate is a fuel source located in the muscles used by the body producing energy quickly for maximal intensity efforts. However there are limited stores of creatine phosphate and they become depleted after several seconds. Creatine supplementation **increases short term maximal effort exercise** endurance via increasing muscular creatine phosphate levels.

A recommended dosage is 2 x 5g (approximately two heaped teaspoons) for a week initially and then 2 x ~2.5 g on training days afterwards. Take creatine with a carbohydrate rich snack (e.g. fruit juice or banana) post training or matches and at another point in the day. Taking creatine will cause water retention in muscle due to it being used by the body to store it. This varies with individuals (usually a **few hundred grams at the most**) and in all likelihood the benefits of increased maximum intensity endurance will outweigh any weight gain.

Caffeine

Caffeine is well known to **enhance concentration** and **energy levels** and **reduce perceptions of fatigue**. Take 10 minutes prior to training/competition via good sources such as caffeine pills, coffee and energy drinks. Individualised responses determine dosage (i.e. less you consume in general less you will need to take prior to training/competition for same effect). Tea contains caffeine, though not as much as coffee per cup, as do other products such as Coca-Cola products and chocolate. **Athletes should not rely on caffeine** rather use it sparingly **to boost performance at carefully selected times** throughout a week or training/playing period.

Tournament nutrition

Nutrition needs and preferences (i.e. quantity, timing, nutrient source etc.) are **highly individualised;** therefore use the **general principles** of the guidelines below to flexibly cater for each member of the team.

Whole day

- ~5 litres/day fluid, more for hotter conditions (dehydration rates very individualised)
- Take fluid in small sips rather than large gulps to avoid bloating/fullness
- ~8 g/kg of bodyweight (BW) carbohydrate
- ~2 g/kg BW protein

1 litre homemade isotonic sports drink: 50 g sugar via fruit juice, squash/cordial, granulated sugar etc. and pinch of salt e.g. 500 ml fruit juice, 500 ml water and pinch of salt

Pre first game

- ~2-3 g/kg BW slow/medium release carbohydrate 2 hours before *e.g. white bread/rice/pasta, non-grain based cereal i.e. corn flakes*
- 30-60 minutes before slow/medium release carbohydrate *e.g. white bread/rice/pasta, sweet potatoes,*
- Avoid high fibre and fatty foods

During games

- 30-60 g/h via small ingestions of fast release carbohydrate *e.g. sports drink, fruit juice, sugary sweets e.g. jelly sweets, Smarties etc.*
- Sip fluid as often as comfortable during the game and half time
- Avoid high fibre and fatty foods

Post-game

- Medium/fast release carbohydrate and ~0.5 g/kg BW protein immediately after *e.g. white rice/pasta, chocolate milk, low fat cottage cheese, canned tuna, eggs, low fat yoghurt, apples, bananas, sweet corn, potatoes, sweet potatoes, malt loaf*
- Avoid high fibre and fatty foods if game is less than 1.5-2 hours away

In between games

- Don't eat too close to match i.e. 30-45 minutes before (will be individual preference and tolerances)
- Avoid high fibre and fatty foods
- Slow/medium carbohydrate every hour until evening meal *e.g. sweet potatoes and potatoes (no skins) white rice/past/bread/cereal, malt loaf*

Evening meal

- Majority of fibre and fat for day at this meal (not necessarily high, just don't avoid)
- Different colours of vegetables (for differing vitamins) *e.g. green leafy vegetables, carrot, cauliflower, beetroot etc.*
- Mixed release speed carbohydrate with a high protein component *e.g. steak, potatoes and roast vegetables*

Example day

- **Breakfast (7:30am):** 2 bowls of corn flakes and trim milk, 3 slices of white bread toast and jam, glass of orange juice
- **Pre game (8:45am):** A few spoonfuls of white rice/pasta green salad
- **During Game 1 (9:30am):** Handful of Jelly Babies on side line/at half time, sips of isotonic drink,
- **Post Game 1 (10:45am**): White French roll, low fat yoghurt
- **Snack (11:45am):** White rice/pasta green salad
- **During Game 2 (12:30pm):** Handful of Smarties on side line/at half time, sips of isotonic drink,
- **Post Game 2 (1:45pm):** Chocolate/strawberry milk, apple, tuna/ham white bread salad sandwich,
- **Lunch (2:45pm):** White rice/pasta, chicken, asparagus and chopped tomatoes, banana,
- **Snack (3:45pm):** ½ malt loaf
- **During Game 3 (4:30pm):** Handful of Smarties on side line/at half time, sips of isotonic drink,
- **Post Game 3 (5:15pm):** Chocolate/strawberry milk, wholegrain tuna/ham salad sandwich
- **Snack (6:15pm):** ½ malt loaf
- **Snack (7:15pm):** Cereal bar, nuts and raisins
- **Evening meal (8:15pm):** Main- Steak, potatoes, green vegetables and carrots with side of garlic bread, Dessert- Ice cream and fruit
- **Snack (10:00pm):** Whole grain oats with milk and jam

CHAPTER 8 - PREPARATION FOR AND RECOVERY FROM EXERCISE

Taking appropriate **short term steps** to **prepare for** and **recover** from exercise are **vital in preventing injury and enhancing performance**. Preparing for exercise is generally termed 'Warming Up'; although raising body temperature is an important part of physical preparation there are also other benefits outlined in the RAMP principle below.

R- Raising core body/muscle temperature and heart rate
A- Activating muscle involved
M- Mobilising the joints involved
P- Potentiating performance

Preparation for exercise

General warm up structure

Below is a warm up structure that can be used for any type of session or match. **1) SMFR** and **3) static stretching** are of **secondary importance** to the **other parts** of the warm up. Include **SMFR first** and **then static stretching** in the **suggested order if time allows**.

1) SMFR of tight areas/major muscles to be utilised
2) Low impact mobilisation drills
3) Static stretches and SMFR of tight areas
4) Dynamic stretches and mobilisation/potentiation drills
5) Technical drills specific to following session/game

1) SMFR of tight areas/major muscles to be utilised

See Chapter 3 and the 'Self myo-fascial release (SMFR)' section for more detail.

2) Low impact mobilisation drills

- **Star jump** variations
- **Rolly pollies**
- **Supine leg reach across** variations
- **Supine curl up and backs**
- **Spine extend/flex and flops**
- **Cat walk and up and downs**
- **Arm swing** variations

3) Static stretching of tight areas

See Chapter 3 and the 'Flexibility' section for details of different static stretches.

4) Dynamic stretches and mobilisation/potentiation drills

Hip dominant
- Open/close gates
- Leg swings forward and sideways
- Glute bridges/hip thrusts
- Single leg RDL walks
- High knees

Knee dominant
- Lunges > Lunge and twists (forward, back, sideways)
- Split squat variations
- Heel flicks

Ankle
- Calf skips
- Stiff ankle calf bounces

Upper body and core
- Full sit outs
- Shoulder walk variations i.e. around the clock
- Plyo push ups
- Floor crucifix hold variations

Whole lower body
- Squat drops
- Sumoes
- Split squat jumps on toes

Whole body
- Crawls
- Burpees

5) Technical drills specific to following session/game

Pre-game warm up example (45-60 minutes)

SMFR of tight areas/major muscles to be utilised (3-5 minutes)

Low impact mobilisation drills (2 minutes)

Static stretches and SMFR of tight areas (3-5 minutes)

Dynamic stretches and mobilisation/potentiation drills (10-15 minutes) All over 10m

- Shoulder walk round the clock x2 into plyo push ups
- Open/close gates
- Leg swings forwards and sideways
- Single leg RDL walks
- Swagger skips into high knee skipping
- Lunge and twist walks
- Single leg jump and lands progressing from jogging to sprinting 5m run up
- Single leg bounds

Technical drills specific to following session/game (25-35 minutes)

- 60 throw drill
- 70% to maximal effort simple game situation drill i.e. leading pass drill dump cut drill etc.
- Maximal intensity tactical game situation drill i.e. Break force and pull play, end-zone drill etc.

Recovery from exercise

Post-match/field session cool down

Although the last thing players may want to do after a match is more running, a short progressive cool down involving light exercise and stretching will help them recover more quickly.

- Pitch width shuttles with low impact/static mobilisation drills at end from run to jog to walk e.g. 60/50/40/30% and walk drills after 2 widths

Maintaining core body temperature and blood flow to and from the muscles via progressively reducing exercise intensity will speed up the process of fuel replenishment and removal of waste substances post exercise.

- Full body static stretch 15-30 seconds each

Stretching straight after matches help reduce feelings of stiffness and helps players maintain flexibility throughout a tournament.

Post last match of day recovery

Active recovery after each match is advised but recovery at the end of a tournament day is vital in

- Low impact mobilisation drills into **dynamic mobilisation drills**

Taking the body through mobilisation drills, in the same way as static stretching, help players maintain flexibility throughout a tournament as well help prevent poor postures being adopted by reinforcing correct movement patterns.

- Full body static stretch 1-2 minutes each

Same benefits as for stretching after matches but longer stretching time allows for increased long term flexibility adaptations as well.

- Self MFR/sports massage of all tight areas

Refer to Chapter 3 and the 'Self myo-fasical release (SMFR)' section for the benefits of SMFR/sports massage.

- Ice bath 10-18°C 2x10 minutes or 2-3x5minutes

Ice baths reduce tissue damage and swelling after strenuous exercise. They will help prevent injuries picked up during tournaments affecting performance in the short term.

Although ice baths, other cryotherapy techniques (i.e. ice packs, intermittent hot/cold showers etc.) and painkillers differ in their mechanisms of action and effects, they all seek to suppress the immune response after damage has been done to the body during exercise. Whilst applicable for tournaments and games when **short term performance is of primary concern** it **may be ill advised** for **general training sessions**. The initially damaging immune response is part of the supercomensation process and suppressing it may **reduce subsequent adaptations**. This is a general a recommendation, **always take the advice of your doctor, physiotherapist** etc.

CHAPTER 9 INTEGRATED PROGRAMME DESIGN

4 Week Training Diary for Pre-season (Mesocycle)

4 Week Training Diary for Pre-Tournament (Mesocycle)

REFERENCES AND ACKNOWLEDGEMENTS

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NOTE: references for specific pieces of information may be provided on request via pcgriffiths1990@gmail.com.

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