



**The Rugby League
Coach Education Programme**

The Think Coaching E-Link

Issue 03

Welcome

This issue of the "Think Coaching E-Link is devoted to the important subject of conditioning. The two articles represent slightly differing points of view and perspective, but will hopefully be both informative and thought provoking to the reader.

Conditioning is a massive subject and one that we will visit again in the future. Please feel free to contribute an article on the subject for future publication.



ARTICLE 5

Physical Preparation for Rugby

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Introduction

An aspect of strength and conditioning that assumes great importance in a collision sport such as rugby is developing the levels of strength and hypertrophy of muscle and connective tissue to allow players to stay fit to play and train. Iain Balshaw is a current example of a player whose talent led him to be introduced to senior professional and international rugby very early in his player career, arguably before he had attained a level of physical preparation to endure the physical rigours involved. The recurring injury set-backs that continue to blight Balshaw's attempts to come back from injury are testimony to the risks and consequences of inadequate or inappropriate physical preparation.

Program Design

Program design reflects the principles of training specificity and an overall desire to develop athleticism via the use of coordinated whole-body training movements. Accordingly, strength training emphasis's sport-specific actions, rather than concentrating on training single muscle groups in isolation. Based upon qualitative assessment of the physical work involved in the key aspects of match play, the predominant biomechanical action is triple extension of hips, knees and ankles - often transmitting force through the shoulders as the point of contact during collisions with other players. This 'triple extension' characterizes both the high-force activities involved in contesting and retaining possession in set-piece and open play, and the high-power (high force/fast movement speed) dynamic actions associated with jumping and tackling.

A primary goal of the strength program therefore is to enhance strength and power for this triple-extension movement. There is a need for both strength (heavy load) training and explosive power training that emphasis's this specific movement. Resistance training activities selected are primarily 'closed kinetic chain' (feet planted) multi-joint movements. The principle lifts for all phases of the periodised strength training program are the high-force 'Power lifts' (a misnomer) - Squat and Dead lift - and the explosive Olympic lifts and their derivatives. Additional exercises to develop the muscle groups that assist the prime mover musculature are included to develop active joint stability. Likewise, resistance training exercises are incorporated to address any pre-existing muscular imbalances or sites of previous injury.

Injury Profiles of Match-play

There is currently a lack of comprehensive published epidemiological studies in either code of rugby football. From the available studies, injuries in rugby league are predominantly lower limb, which is thought to be a consequence of the large number of tackles in a rugby league game. Upper limb and head/neck injuries are the next common in this version of the game. In the case of rugby union, the added elements of contesting at the tackle area (rucks and mauls) and Scrummaging pose an increased hypothetical risk of cervical spine (neck) injuries, particularly in the tight forward positions (prop, hooker and lock). Of particular concern is the possible incidence of hyper flexion of the cervical spine as the head is pushed downwards into the ground under the weight of teammates and/or opponents, as in the case of a collapsed scrum, ruck or maul. These are potentially the most debilitating or even fatal injuries rugby players are exposed to.

Strength Training - Exercise Selection

Whole Body - Structural Lifts

- Dead lift
- Parallel Back Squat

Lower Body

- Lunge
- Split Squat
- Single-leg Toe Raise

Back

- Romanian Dead lift (Stiff-legged Dead lift from Knee)
- Back Extensions - with Barbell

Chest

- Bench Press
- Incline Dumbbell Bench Press
- Incline Dumbbell Flies
- EZ Bar Pull-overs

Upper Back

- Dumbbell Upright Rows
- Bent-over Barbell Rows
- One-arm Dumbbell Rows
- Bent-over Dumbbell Raises

Shoulders

- Standing Dumbbell Shoulder Press
- Dumbbell Lateral Raise
- Dumbbell Front Raise

Arms

- Dumbbell Bicep Curls
- EZ Bar Triceps Extensions

'Speed-Strength' / Explosive Power Training - Exercise Selection

Ballistic Resistance Training

- Jump Squats
- Bench Throws
- Ballistic Push-ups
- **Olympic Lifts**
- Hang Clean Pull
- Clean Pull
- Power Clean
- Push Press

Injury Prevention/ 'Prehabilitation'

A Lower Extremity;

Stability ball work to train the hamstrings and hip extensors, which are particularly prone to injury in running-intensive sports. This training modality develops strength, balance and motor control in a way that replicates the horizontal forces and range of motion featured in running.

Ankle stability exercises to develop proprioceptive sense and balance. Exercise selection aims to target the peroneal muscles.

Exercises to include toe raises holding weights (dumbbells), as part of the player's strength training program in the gym, and supplementary functional training using specialised apparatus, such as ankle discs.

B Upper Body

As a consequence of the high degree of mobility of the shoulder joint it is reliant on dynamic (i.e. muscular) stability. This factor is of critical importance; given the shoulder is the main point of

contact in all collision phases. Specifically, during tackles, ruck cleans, and the engage at scrum-time the shoulders are subject to high impact forces. Thus, injury prevention for the upper body mainly addresses the muscles of the rotator cuff, and the stabilizer muscles around the scapula. A minimum of one workout a week is dedicated solely to single-joint 'auxiliary' exercises, mainly comprising raises in various planes. Dumbbells, free weights, EZ bar and Theraband are used for resistance.

C Neck

There is a harness commercially available that allows free weights to be hung from the head to allow specific training of the neck musculature. Both isometric (static hold) and dynamic actions are performed. This helps develop the capacity to resist forces acting to hyper flex the cervical spine.

Plyometric Training

Introduced in pre-season on non weight-training days. Depth jumping is approached with caution for players weighing in excess of 100kg. The recommendation for these players is that depth jump drop height should not exceed 18 inches (46cm). As training macro cycles progress, plyometric exercises are introduced into gym sessions, prior to weight training. The progression in-season involves plyometric drills being 'complexed' (alternated) with heavy whole body power- and Olympic lifts.

Sprint Work

Technique drills are performed to develop efficient running mechanics. Bounding is implemented in association with plyometric training. Resisted and assisted methods are used to develop stride length and stride frequency, respectively.

Core Stability

Rugby football requires a strong core and good motor control to stabilize the trunk and maintain upright posture whilst changing direction at speed. This aspect is similarly important when being lifted to contest possession at line-outs and kick-offs. Strong core and lumbo-pelvic stability are necessary for efficient transfer of force from the ground-up during collision phases (tackling, cleaning rucks and Scrummaging). These elements are similarly important from the point of view of guarding against injury. The focus is on Swiss ball work, using medicine balls for added resistance as necessary.

Agility & Quickness

There is a focus on ladder drills and some low banana step work. The emphasis is on developing quick feet. As training advances, these are supplemented by one-on-one attacker/defender work with a tether joined by Velcro or popper fasteners. The aim of the attacker is to 'wrong-foot' his opponent and thus break the tether bond; the defender aims to shadow his partner to keep the tether intact. This develops motor control for the close quarter reactive movements involved in evading tacklers, and getting into an optimal position to make a tackle when defending.

Warm-up and Stretching

Warm-up (low intensity aerobic activity) should precede all training sessions as well as matches. For practice sessions on the training pitch, this will be in the form of sub maximal running - generally with a ball-handling element to maintain the players' interest. In the case of gym sessions, ergo meters such as rowing machine, climber or Nordic skier are ideal, due to the fact these are whole body activities. The rationale for this general warm-up is that it raises core and muscle temperature to decrease muscle viscosity, which guards against muscle-tendon injury.

The consensus is that ballistic stretching is now largely contraindicated, on the grounds that it can cause musculo-tendinous damage, and also evokes the stretch reflex - hence doesn't allow the muscle to relax. Furthermore, there is increasing evidence that static stretching may be counter-productive prior to matches and high-intensity training sessions with a high muscular power requirement.

There is increasing evidence that static stretching leads to an acute impairment of dynamic strength and power output. In addition, the injury prevention effect traditionally advocated with static stretching also appears to be absent, based on recent studies. Likewise, there is recent evidence that 'Proprioceptive Neuromuscular Facilitation' (PNF) stretching also has a negative effect on dynamic performance capabilities - evident from acute reductions in vertical jump height.

Given this, it appears prudent to avoid both static and PNF stretching prior to matches and training sessions with an emphasis on speed or emphasis power. This would include sprint work, agility and quickness drills, and plyometric training - as well as explosive power training (Olympic lifts or ballistic resistance exercises) in the gym.

Static and PNF stretching does still have its place from the point of view of flexibility training for long term increases in joint range of motion. This should be implemented prior to strength training gym sessions, and during warm-down post-match and after training. In addition, gastrocnemius and soleus stretches should be included for injury prevention, particularly for players presenting with calf stiffness or plantar fasciitis, as is common among athletes in running- and jumping-intensive sports.

Dynamic stretches, such as walking lunges, sprint technique drills and rehearsals of sport-related actions at low-moderate intensity are all advocated as alternative 'specific' warm-up modes to prepare the athlete for competition (and speed/power training) in a way that doesn't hinder subsequent performance or risk injury. These are performed with increasing intensity as warm-up advances, by way of progressively warming up the athlete in readiness for the match.

Metabolic Conditioning

There is growing interest in sport-specific methods to condition athletes for team sports. This reflects the principles of 'Specificity of Training', which stipulate that the most effective mode of training to prepare the athlete for competition is that which most closely replicates competitive performance conditions. Conditioning drills that incorporate skills and movements specific to the sport are increasingly implemented, with the aim of simulating the movement patterns and metabolic conditions encountered during competition. However, practically it is very difficult to design drills to simulate the continuum of intensities and movement patterns encountered during rugby match play. A solution that circumvents the need for structured conditioning drills is the use of skill-based conditioning games. The conditioning games are continuous and require players to operate in the upper range of Work: Relief ratios encountered during match play.

The skill-based conditioning games approach accounts for movement specificity to a greater extent than traditional conditioning methods. This is significant, as the more specific an activity is to the training mode in which endurance gains were made, the greater the degree to which these gains are expressed. The games format requires players to react to the movement of both team-mates and opponents, as well as following the ball. In this way, the conditioning games training mode incorporates the changes in direction and velocity, and 'utility' movements (lateral and backwards locomotion) that feature in match play. A key parameter contributing to endurance performance is exercise economy. Running efficiency is identified as a major avenue for advancing performance in highly-trained endurance athletes. Exercise economy is closely related to patterns of motor unit recruitment, and as such improvements are highly specific to the speeds and power outputs at which athletes habitually train. Skill-based conditioning games training format should similarly enhance economy for the range of sport-specific modes of locomotion and the continuum of velocities that feature in match-play. Indeed conditioning games may be the optimal training mode available to promote these adaptations.

Reduced relative incidence of injury is reported among rugby league players when performing conditioning games, in relation to traditional conditioning activities - i.e. running without a ball. Injury rates were adjusted for time engaged in a particular mode of training for the duration of a

rugby league season. The majority of injuries were sustained during traditional conditioning work without a ball or skill element, in contrast to the low incidence of injury when participating in skill-based conditioning games. The underlying reasons for the apparent decreased occurrence of injury associated with conditioning games remains to be clarified. There are indications that skill sports athletes exhibit enhanced agility when holding the implement of their sport. Similarly, it may be that an underlying factor decreased injury is improved motor control when performing sports movements, as opposed to running without a ball. Improved neuromuscular control is identified as helping guard against 'non-contact' injuries. Whatever the mechanism, the benefits of less time away from the training pitch due to injury will be readily obvious to the coach and athlete.

ARTICLE 6

PHYSICAL PREPARATION What's your priority?

Sean Cassidy - Redcliffe Dolphins RLFC

Whether you're the team coach or strength and conditioning coach, you have a vested interest in the physical preparation of the players. Any training you implement will have an effect on the players' bodies. Is the result of the training you implement improving the individual's body? Or is it eventually going to cause an injury?

After working with players at various levels over a number of years, and watching and listening to others and through self-education, I have established the following philosophy in relation to physical preparation:

Priority One: Optimal Health

Priority Two: Injury Prevention

Priority Three: Enhance Performance

If the athlete is not healthy (optimal nutrition and rest) they cannot train or play to the best of their ability, and subsequently have a greater chance of injury. If an athlete is not able to play or train due to injury you cannot enhance their performance. I used to focus on helping players become bigger, faster, stronger and fitter than before, until I realised it is fruitless if they get injured along the way.

In his 1997 book 'Winning and Losing, Losing and Winning – Lessons from a decade of physically preparing the elite athlete', Ian King wrote the following in relation to performance enhancement and injury prevention.

In fact I believe that most injuries are actually caused by the way athletes train. The only injury acceptable is an unavoidable impact injury. Virtually all soft tissue injuries are avoidable. But imagine that – most injuries may be induced by training, during which focus is geared towards performance enhancement. Isn't this ridiculous! (King, pg.25)

Yes, it is ridiculous!

Jeff Galloway, an Olympian and running coach said: *“The single greatest cause of improvement is remaining injury-free to train.”* (‘Optimum Sports Nutrition’, Dr Michael Colgan, 74)

If you want your team to be successful, you have to have the majority of them available all season. If you don’t, you might as well start booking a trip to Bali! So what causes injuries? Listed below are 15 factors that contribute to injury from the ‘Injury Specialisation Seminar – Kings Sports International 2000’.

1. History (injury, sport/s played, training etc.)
2. Sport potential
3. Asymmetrical activities (eg. a golf swing, kicking a ball)
4. Imbalances in body
5. Imbalances in training
6. Inappropriate progression or intensity (including warm up)
7. Overtraining or inadequate recovery
8. Psychological/Emotional (ie. some people expect them)
9. Fatigue
10. Skill level
11. Unmatched competition
12. Inadequate physical preparation
13. Nutrition (including fluid and fuels)
14. Genetics
15. Age

A number of these factors we cannot change, for example age and genetics, however a number of these factors we can, through training, assessment and therapy.

I would like to briefly discuss some of the main factors and give some examples of common training methods I feel cause injuries in Australia.

Imbalances in Body

If an athlete has imbalances in flexibility and muscle tension, then they are at a much greater risk of suffering an injury because of the changes in movement patterns. To find out if an athlete has imbalances in flexibility and muscle tension, you need to get your hands dirty and compare their flexibility on both sides (eg. left side hip flexors versus right side hip flexors) and feel the level of tension. Once you do this a few times it becomes easy to pick up any differences in muscle tension and any tight spots. Both of these issues (length and tension) can be addressed by flexibility and massage.

Due to limitations in finances, time, and lack of understanding of the importance of these factors, we generally don’t get to know enough about imbalances in individuals’ bodies.

Imbalances in Training

A great example of this is the bench press or any other horizontal pushing action. Have a look at your training programs, and look at the volume and sequencing of horizontal pushing actions compared to horizontal pulling actions (eg. bench pulls). Most programs I look at have a much greater volume, sometimes 3-4:1 of horizontal push versus horizontal pull movements. Additionally, they are usually sequenced prior to horizontal pulling actions, which leads to a greater training effect for these movements.

Have you noticed how many shoulder injuries there are in Rugby League? The heavy contact nature of the game is a major factor, but so too is bad posture. Excessive bench press type movements and lack of stretching cause a rounding of the shoulders and the upper arm to turn inwards. This change in posture increases the chances of overuse type injuries and injury from heavy contact.

Exercise	Number of Sets
Type of Movement	
Bench Press	2
Horizontal Push	
Dumbbell Bench Press	2
Horizontal Push	
Bench Pulls	2
Horizontal Pull	

The above program has two horizontal pushing movements compared to one horizontal pulling movement. Sequencing the horizontal pushing movements first and second in the program allows for a greater training effect for these movements. Also, reducing the number of sets to two decreases the threat of an overuse injury.

Have a look through any strength training programs your players are doing over a period of a few months, and also have a look at their standing posture.

Inappropriate Progression

A good example of this is the onset of shin splints as off-season training starts. It surprises me how many players get shin splints every off-season. I assume this is because they progress in training intensity too quickly. If you have ever had any players with shin splints, you would know the injury can linger and greatly reduce the number of opportunities to train.

For this type of player, without knowing the ins and outs of their history and training programs, I would suggest reducing their overall training volume, especially long running sessions.

Overtraining

In Australia, we love volume in training, and have a history of being good at it. We've had some of the best distance runners and swimmers in the world. It is in our culture to do large volumes of work. We think more is better, well guess what, sometimes less is more. It's not a matter of how much training we are able to do, but what is optimal for the athlete physically and psychologically. For there to be positive effects from training, a player needs to have recovered from previous training sessions.

Have you ever read about an athlete competing after having not trained for a number of weeks because of injury or illness, and they come out and give one of their best performances? I would assume that the forced rest has allowed their body to recover and adapt, this may not always be the case, but it is a strong possibility.

Peter Robinson, a triathlete in the Australian 'Formula One Men's Series' is a perfect example. In a 1999 race, Robinson put in a blistering run leg to beat Miles Stewart and Craig Walton across the line. A newspaper article titled 'Major series upset' revealed Robinson was unable to train the week prior to the event because of a rolled ankle. In the article Robinson said: "Maybe I was fresh because of it but I wouldn't recommend it as the way to prepare for a race."

Olympic 100-metre butterfly bronze medallist Geoff Huegill is another example. In the recent World Championship Trials Huegill was underdone due to an illness that halted his training program for a month. Despite the disrupted preparation he edged out Michael Klim to win his pet event, with a time marginally slower than the one he posted in the Olympic final.

These results are just two examples demonstrating that the optimal amount and type of training depends on many variables. A younger player with an NRL team, with little work commitments would be able to do a greater volume and intensity of training than an older player, who works 40-hour weeks.

This off-season with Redcliffe (November to December), we did only two traditional volume

sessions. During this period, once a week we had an intense football related competition (non-contact). We chose to do this so our players could recover faster, having less chance of injury from overtraining. Most of the players work 30 to 50 hours a week away from football, and simply would not recover from a greater volume of training. This also allowed us to focus on strength development in the gym.

Have a look at these factors that contribute to injury, and take the time to objectively look at your training programs to see if you're increasing the likelihood of player injuries.

Optimal Health first.

Injury Prevention second.

Performance Enhancement third.

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The Rugby League Coaching Magazine website has a wide variety of products that are useful for coaches. They can be contact via this link <http://www.rlcm.com.au/home.htm>

What are your thoughts on conditioning?

What type of articles would you like to see on conditioning in the future?

Would you like to submit a conditioning article to be included in a future issue?

This is YOUR chance to be heard and we welcome and encourage you to contribute.

Drop us a line at haydn.walker@rfl.uk.com

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