



**The Rugby League  
Coach Education Programme**

**The Think Coaching E-Link**

**Issue 19**

### **Introduction**

Happy New Year and welcome to the first issue of 2006. In this issue we publish two well researched articles from Colin Baker who looks at injuries and injury rates within Rugby League. Colin is the current National League Three Coach of the Year, having guided St Albans to third place in the competition in 2005.

### **Coach Development**

2006 will once again see a National Coaching Conference, this is likely to be around Grand Final time. A second Coach Development Camp is planned for October, with additional projects happening throughout the year. These include new projects in Sheffield and Halifax, as well as extensions to existing projects such as the highly successful Lancashire Service Area.

All of this will be underpinned by further resource development and the introduction of the United Kingdom Coaching Certificate (UKCC).



# Injuries in Rugby League

By Colin Baker

## Definition of Injury

An injury has been defined as any pain or disability suffered by a player and subsequently assessed by the trainer (Gabbett, 2003). It was further classified in terms of subsequent missed matches in a 3-year study of a professional Australian club (Gibbs, 1993), and according to time away from training or playing at a professional British club (Gissane *et al.*, 1997). However, considerably higher injury rates were reported when *all* injuries sustained were recorded, as opposed to just those resulting in loss of game or training time (Hodgson-Phillips *et al.*, 1998). Although there are clearly differing injury rates between studies, attributable to a variety of factors (Hodgson-Phillips *et al.*, 1998; Stephenson *et al.*, 1996), a common denominator is the high incidence of injury in rugby league (Gabbett, 2003).

## Match injuries

### *Incidence of Match Injuries.*

Research demonstrates that injury rates typically increase as the playing level increases (Gabbett, 2004).

**Table 1;** Incidence of match injury in rugby league players (senior).

Study	Playing level	Incidence of All injuries	Injury Missed matches
Estell <i>et al.</i> , 1995	Professional	210.7	38.5
Gissane <i>et al.</i> , 1997	Professional	114.3	34
Hodgson-Phillips <i>et al.</i> , 1998	Professional	346	52.3
Seward <i>et al.</i> , 1993	Professional	139	44
Stephenson <i>et al.</i> , 1996	Professional	114.3	34
Gabbett, 2003	Semi-professional	824.7	67.7
Gabbett, 2000	Amateur	160.6	
Gabbett, 2001	Amateur		26.8

(Incidence of injury expressed as number of injuries per 1000 player-position game hours).

The 1.3-2.2 fold higher injury rates in professional rugby league have been attributed to the higher playing intensity at elite level (Gibbs, 1993; Stephenson *et al.*, 1996). The incidence of injury in the semi-professional game have been reported as high as 824.7/1000 player-position game hours (Gabbett, 2003). It is believed that a combination of high fitness and moderate skills contributes to this, as opposed to low fitness/low skill in the amateur game (Gabbett, 2000), and high fitness/high skill in the professional game (Gabbett, 2003).

However, progressive increases in incidence of injury have been reported over consecutive seasons at the elite level (Hodgson-Phillips *et al.*, 1998). It is also reported that match injury rates increase when players are given insufficient off-season recovery from injuries (Hodgson-Phillips *et al.*, 1998), suggesting that pre-existing injuries and player fatigue may contribute to match injuries in rugby league (Gabbett, 2004).

Severe match injuries are those that resulted in a player missing matches (Gabbett, 2004). It has been stated that ~15.6-30% of rugby league injuries are major, resulting in more than 5 matches being missed (Gibbs, 1993; Gabbett, 2001). This is very high and demonstrates that a considerable number of injuries are severe, resulting in a significant loss of playing time (Gabbett, 2004).

*Site, Type and Cause of Match Injuries.*

The most recent studies document the head and neck as the main injury site in rugby league (Stephenson *et al.*, 1996; Gabbett, 2000) where traditionally it was reported as the knee (Gibbs, 1993).

**Table 2;** Injury sites in professional matches (Stephenson *et al.*, 1996).

Injury Site	% of total injuries sustained
Head and Neck	33.3%
Thigh and Calf	17.9%
Knee	10.2%
Thorax and abdomen	9.2%

It was noted that in semi-professional players only 10% of reported injuries were to the head and neck, whilst over 20% of injuries sustained were to the thigh and calf (Gabbett, 2003). It has been suggested that the reason for the difference between levels could lie with a variation in playing styles and defensive strategies (Gabbett, 2004). However, it should also be noted that the semi-professional study (Gabbett, 2003) did not include facial injuries in the head and neck category, whereas previous studies had done so (Stephenson *et al.*, 1996; Gabbett, 2001). The inclusion of facial injuries into the “head and neck” category would have led to a value 16.5% higher than that reported for thigh and calf injuries (Gabbett, 2003).

The most common type of injury sustained during matches was haematomas and strains (Stephenson *et al.*, 1996; Hodgson-Phillips *et al.*, 1998; Gissane *et al.*, 1997; Gissane *et al.*, 1997; Gabbett, 2004), these account for 32.3% of all professional rugby league injuries (Gissane *et al.*, 1993). Contusions, lacerations (Seward *et al.*, 1993) and joint injuries (Gissane *et al.*, 1998) are also common types of injuries sustained, with severe joint injuries most commonly responsible for players missing matches (Gibbs, 1993; Gissane *et al.*, 1998; Norton & Wilson, 1995).

The tackle has been identified as the major cause of injury in rugby league (Stephenson *et al.*, 1996; Gissane *et al.*, 1997). This would be expected as players are involved in an average of 41 physical collisions per match (Gissane *et al.*, 2001).

**Table 3;** A study of a professional rugby league club over 4 seasons (Stephenson *et al.*, 1996).

% of total injuries	Cause
46.3%	Being tackled
21.3%	Making tackle
32.4%	Other undefined activities

*Positional Variations.*

Forwards have higher injury rates in the tackle, both tackling and being tackled (Gissane *et al.*, 1997), which reflects their larger involvement in physical collisions in rugby league (Meir *et al.*, 1993). It has been reported that elite forwards average 55 physical confrontations per match whilst

backs average 29 (Gissane *et al.*, 2001). However, there was a 136% increase in injury rates for backs when there was a change from a winter to a summer season (Gissane *et al.*,1998). This could reflect a change in playing patterns. Previous research has shown that the ball carrier is the player most likely to receive an injury (Gissane *et al.*,1997). Therefore with a propensity to move the ball wider, sooner, due to harder playing surfaces, the backs have the ball for an increased amount of time. Subsequently, they are involved in more collisions and suffer an increased risk of injury (Gissane *et al.*,1998).

Another explanation could lie with a rule change (law 2.3.1) that took place at the same time as the switch of seasons. It was decided that where a player gathers the ball from an opposition kick in general play and doesn't subsequently pass or kick it, the initial tackle will be counted as "zero tackle" (Rugby Football League, 1996). This effectively gives a team 7 possessions in these circumstances. Due to the structure of the team it is usually the backs that collect these kicks and run the ball back to gain territory. As the ball carrier is at the highest risk of injury (Stephenson *et al.*, 1996) it is likely that law changes and playing styles have affected positional injury rates.

However, studies of professional rugby league have consistently shown higher injury rates in forwards than in backs.

**Table 4;** A 4 year study of a professional British rugby league club (Gissane *et al.*,1997).

Position	% of total match injuries
Forwards	56.3%
Backs	43.7%

#### *Time of Injury.*

Professional rugby league rates are similar (Seward *et al.*, 1993) or only slightly greater (Norton & Wilson, 1995) in the second half of matches compared to the first. This is very different to studies of the amateur game where over 70% of injuries occurred in the second half due to poor fitness levels and fatigue (Gabbett, 2000). This is not unexpected given the higher fitness levels of professional players.

#### *Seasonal Variations.*

Early studies indicated that more injuries occurred in the early stages of the season in professional rugby league (Gissane *et al.*,1993; Seward *et al.*, 1993). However, a more recent study (Hodgson-Phillips *et al.*, 1998) reported an increase in injuries towards the end of the competitive season. It is likely that the introduction of play-offs and the Super League Grand Final (as opposed to the traditional end of season league leaders becoming champions) has led to an increase in intensity towards the end of the season, and therefore an increased risk of injury.

### **Training Injuries**

The majority of studies have concentrated on match injuries, however, where studies have been completed on injury rates in training; they are considerably lower than those in matches (Hodgson-Phillips *et al.*, 1998). Training injury rates are lower at elite level than sub-elite, reflecting a greater access to specialised medical support (Hodgson-Phillips *et al.*, 1998).

**Table 5;** Injury rates in training at elite and sub-elite level.

Playing Standard	Incidence of Injury	Subsequent missed matches
Professional (Hodgson-Phillips <i>et al.</i> , 1998).	12.2	1.4
Semi-professional (Gabbett, 2003).	45.3	1.0

(Injury incidence expressed as number of injuries/1000 training hours.)

It is unusual for training injuries to result in missed matches (Gabbett, 2004). The most common site (72.1%) of training injuries is the lower limbs (thigh, calf, knee, ankle and foot) and muscular strains are the most common type of training injury (Gabbett, 2002). The major cause of these injuries is overuse and overexertion (Gabbett, 2003). It is believed that the requirement for players to accelerate, decelerate and change direction (Meir, 1993) has led to increased injury rates for joint injuries and muscular strains. The high incidence of overexertion is believed to be due to an increase emphasis on game specific speed, power and agility conditioning drills (Gabbett, 2004).

Forwards had a significantly higher incidence of training injuries on all sites and suffered more overuse and muscular strains (Gabbett, 2002).

**Table 6;** Injury rates/1000 training hours (Gabbett, 2002).

Position	Injury rates/1000 training hrs
Forwards	52.7
Backs	38

This reflects a tendency towards increased training specificity to maximise training adaptations and cater for the specific skills and physiological demands of different playing positions (Gabbett, 2004).

Training injuries occur predominantly (55.3%) towards the end of sessions, as teams often integrate skills and conditioning to develop skills under fatigued conditions (Gabbett, 2002). It would appear that fatigue contributes to an increase in training injuries in the latter stages of training sessions (Gabbett, 2003). There appears to be no variation in the pattern of training injuries throughout the season for professional rugby league players (Hodgson-Phillips *et al.*, 1998).

### **Conclusion**

It is clear that the incidence of rugby league injuries typically increases as the playing level is increased. The head and neck is the most common site of injury and muscular strains are the most common type of injury. Injuries are most likely to be sustained in the tackle, by the tackled player. During training, thigh and calf strains are the most common injuries, frequently caused by overexertion.

It is reported that player fatigue may influence the incidence of injury, with most injuries occurring in the second half of matches and the latter stages of training sessions. It is also likely that changes in playing intensity may influence injury rates as match injuries increase in the latter part of the season.

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## ARTICLE 2

### Introduction

- During a match players are exposed to multiple physical collisions, therefore musculoskeletal injuries are common (Gibbs, 1994).
- Gissane and his colleagues concluded that rugby league had a higher injury rate than high-risk occupations such as mining and quarrying! (Gissane *et al*, 1993).
- The challenge for a coaching team is to keep players fit and well throughout the season. Doug King suggests that injuries in rugby league fall into 2 main groups; those that are not preventable and those that are (i.e. muscle imbalances, lack of fitness or decreased agility).
- To stop those injuries that are *not* preventable the game would become very different to the way it is now (King, 2002).
- Therefore, the aim of this article is to examine prevention and recovery strategies and produce some recommendations for coach education programmes.

### *Current Situation*

Research illustrates that injury rates are highest at the elite level of rugby league (Gabbett, 2004a). Below is an overview of the current findings on professional rugby league injuries.

Table 1; Overview of injury incidence in elite rugby league (Gabbett, 2004a).

Injury	Match Injuries	Training Injuries
Most common site	Head and Neck	Thigh and calf
Most common type	Muscular strains	Muscular strains
Most likely sustained	In tackle, by tackled player	By overexertion
Time	Latter stage of season	Latter stages of session

- Fatigue is clearly identified as a potential influence on injury as most injuries occur in the second half of the season and latter stages of training sessions (Gabbett, 2004a).
- It has also been suggested that changes in playing and training intensity may influence injury rates as they tend to increase at the latter part of the season as the play-offs raise the intensity of the matches played (Gabbett, 2004b).

### Recovery and Prevention Strategies

- “*To recover is, in essence, to prepare*” (Johnstone & Nance, 2004 pg13) limiting the impact of past performances is just as important as training for the next.
- It wasn't that long ago that recovery meant “a few beers” after a game, thankfully there is now a more professional approach to recovery.
- Billy Johnstone heads the conditioning for the North Queensland Cowboys. He schedules recovery sessions for early in the morning after a game. He believes this encourages players to get up together, eat fruits and breads and get their medicals done. Johnstone then gets them into the pool and they stretch.
- Followed by a low impact (70-85%HRmax) workout to increase aerobic response, lactate removal and phosphocreatine regeneration (Reilly, 1998). The water offers buoyancy and less strain on the joints preventing any exacerbation of structural lower limb damage that may have occurred in the match (White&Bitcon, 2004). Yet, it also provides some resistance to test the muscles.
- This session tells Johnstone who has had a big night and who has been carrying an injury but not revealing it to the coaching staff (Johnstone & Nance, 2004).
- Alcohol is the major enemy of effective recovery. Those players who have a big night out can weigh less than they did after the game. This dehydration sets preparation for the following week back by at least 12-14hrs.

- Johnstone always reminds his players that all good-looking people leave nightclubs by 1am!

Monitoring player's body weight will not only assess hydration levels but also acts as a crude indicator of recovery or Unexplained Under Performance Syndrome (White&Bitcon, 2004). Weighing player's in their shorts before and after matches and training, always using the same regularly calibrated scales can do this. Steve Nance at the Brisbane Broncos assigns separate water bottles to each player to monitor those who drop fluid most quickly and to take note of whether or not they ingest enough to cover their exertion. In the tropical heat and humidity of Queensland they work on 2 litres/kg of body weight loss. Nance stresses the importance of educating player's to not simply rinse their mouth or head with the water (Johnstone&Nance, 2004).

### *Ice Baths*

- Blunts the body's inflammatory response and reduces swelling (White&Bitcon, 2004). Ice therapy was shown to reduce muscle stiffness. Therefore, following matches, or sessions involving collisions, ice baths can enhance recovery and regenerative processes within the body and reduce the chances of soft tissue and contact injuries manifesting themselves in the subsequent 24-48hrs.
- The Brisbane Broncos alternate between 60s stints in an ice bath and a hot shower, to improve blood flow, due to a combination of vasoconstriction (cold-induced) and vasodilation (heat induced). However, with all strategies the principles of progression and overload should be adhered to, otherwise alternative health risks could arise.

### *Massage*

- A relatively inexpensive and readily available recovery tool that can be used for both restorative and regenerative recovery (White&Bitcon, 2004).
- Provides feedback to the coaching team about the physical state of specific injuries. Restorative massage can be used after training and matches, facilitating the drainage of venous blood therefore altering vascular pressure (White&Bitcon, 2004). It will also increase the temperature of the injured area.
- It has also been suggested that massage is twice as effective in releasing muscular tension as passive rest (Birukov&Pogosyan, 1983).
- Clearly, massage is an ideal tool in any recovery strategy.

### *Stretching*

- A controversial topic when related to performance.
- Benefits in injury prevention are less so.
- Raupach suggests that lengthening the muscle allows it to work more effectively and enhances its ability to stabilise joints, or areas of the body that facilitate a better transfer of energy through the muscular system (Raupach, 2002).
- Current attention focuses on "core stability", which in physical terms allows a player to brace his back whilst his arms and legs are exercising, allowing a more effective transfer of energy to the limbs from the large and strong muscles in the back and pelvis. Additionally, it protects the back from injury as muscular forces are not absorbed by, but transferred from the back during forceful activity i.e. collisions, being tackled.
- Certain elements i.e. tight hamstrings and quadriceps pulling the pelvis into rotation whilst running will hinder this process.
- No amount of stabilisation will correct this; therefore stretching is an integral part of stabilisation (Raupach, 2002).
- Stretching is beneficial to injury prevention, especially injury recurrence, as there is usually some compromise of soft tissue flexibility with injury.

## Training Loads

- The quest for improved fitness can lead to coaches overtraining players (Gabbett, 2004c).
- Fatigue and overexertion influence injury rates, and therefore coaches that fail to monitor training loads and make the appropriate changes run the risk of repeating mistakes over and over again (Gabbett, 2004c).
- Rugby League players require multiple physical qualities (agility, strength, power, endurance, speed, skill) and there is also positional-specific individualisation, therefore it is more difficult to assess training loads than in individual sports (i.e. swimming) where distance covered during a session can be monitored (Gabbett, 2004c).
- Gabbett has adapted a system used by Grant Thomas, coach of St Kilda, table topping Aussie-Rules team. It is based on recording the players Rating of Perceived Exertion (RPE) upon completion of the session.

**Table 2;** Rating of Perceived Exertion (Gabbett, 2004c)

0	Rest
1	Very, Very Easy
2	Easy
3	Moderate
4	Somewhat Hard
5	Hard
6	
7	Very Hard
8	
9	Very, Very Hard
10	Maximal

This intensity score would be multiplied by training duration to provide an overall training load, which can be transferred to a spreadsheet;

**Table 3;** Example of a weekly training load for a rugby league team (Gabbett, 2004c).

Training Activity	Session RPE	Session Duration	Training Load (units)
Weights	5	45	225
Skills/ Conditioning	7	90	630
Weights	6	45	270
Skills/speed/power	5	60	300
Skills	2	30	60
Match	8	80	640
Recovery	0	0	0
<b>Total Weekly Load</b>			<b>2125</b>

By documenting training loads coaches can apply a programme that most benefits the team, minimising injuries and enhancing performance.

## Structure

- A recovery strategy for the season can be broken down into micro and macro cycles. Billy Johnstone at North Queensland Cowboys has 3 segments of recovery just for match day!
- Different formats are required depending on how many days turnaround between matches.
- There are also times of differing adversity, in British Super League (and to a lesser extent the NRL) there is a distinct divide between top and bottom teams, subsequently some

matches are expected to be less intense and players are rested, similar to Premiership soccer. While it may not be evident by player's being officially stood down, they may play a limited number of minutes, whilst carrying a relatively minor injury. However, this applies mainly to the teams in the top half of the competition; there is more pressure on the coach at the bottom to field his best players.

## **Conclusion**

- Coach Education programmes should encourage the use of recovery/prevention strategies for elite Rugby league players.
- It should be built around a combination of several mini-strategies.
- Ideally a low impact, sub-maximal workout scheduled as soon as possible after matches.
- Monitoring of players weight and hydration levels and the use of contrast bathing are useful techniques in any recovery strategy.
- Sports massage and stretching should be readily available at all clubs, and according to Billy Johnstone flexibility could be the major area of advancement in years to come. He believes the team that masters flexibility will go a long way to maintaining player health in times of increased muscle mass and momentous collisions.
- It is crucial that the coach monitors players training loads, as overexertion is the major cause of training injuries.
- Once a strategy has been developed attention should be paid to its structure to allow for shorter and longer turnarounds between matches and periods of greater and lesser adversity.

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