

NATIONAL COACHING INSTITUTE

# Task 6

## Recovery and Regeneration

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## Overview

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## *Introduction*

After a heartbreaking 4-3 defeat to the United States in the 2012 Olympic Semi-Finals, Canada's Senior Women's Soccer Team needed recovery and regeneration (both physical and mental) before their next game. After playing a ninety minute game and thirty minutes of added time, the team gave up the game winning goal during the last minute of play. Furthermore, team morale was hurt by questionable officiating and the fact that some players might be suspended because of critical comments made to the press.

The team had three days to prepare for the bronze medal game against France. For the first day, coach John Herdman gave the team the day off and allowed them to degrief and deal with the defeat themselves. The players followed their post-game nutrition and recovery routines and "got rid of their ghosts" individually and in small groups. The athletes greatly appreciated this time and felt it made a big impact. Once everyone had cleared their minds, the team reconvened and came together again for two days of tactical preparation (Blair, 2012).

The worst situation would have been to compound the tough loss with a listless effort, allowing their emotions to dictate their performance. But because the team had cleared their heads first, they were able to play a strategic game and win on a last-second goal, giving the team and Canadian soccer something to build upon in the coming years.

## *The Impact of Recovery on Results*

Basketball teams in the Ontario University Athletics (O.U.A.) East Division play twenty-two games from November to February. Many games are played back-to-back on Friday and Saturday. Addressing recovery after the first game could equate to two or three wins in the final standings.

### **2011-12 O.U.A. Men's Basketball**

During the second half of the season (after the holidays and the crossover games had concluded), the teams that had the best records also did better on the second nights back-to-back games.

#### Overall Trends

Throughout January and February, shooting percentage dropped 2.1% from the first day of a weekend to the second. Offensive Efficiency fell three points per one hundred possessions and the defensive rebounding share increased 3.0%. Free Throw Rate and Three-Point Field Goal Attempts rose slightly, indicating that teams were less aggressive in their shot selection.

Back-to-Back	Shooting %			Pace	Points per 100 poss.	Def. Reb. Share	TOV%	FT Rate
	FG%	3P%	FT%					
First Night	44.1%	37.8%	69.6%	70.5	107.7	65.5%	20.6%	0.292
Second Night	42.0%	37.5%	72.2%	71.1	104.1	68.5%	19.9%	0.282
Change	-2.1%	-0.3%	2.6%	0.6	-3.6	3.0%	-0.6%	-0.010

## Team by Team Comparison

For back-to-back games, Carleton, Ottawa and Toronto boasted winning percentages that were equal or greater to matches following a rest day, maintaining or increasing their shooting percentages and offensive efficiency (fine motor skills). These teams were consistent in their defensive efficiency and rebounding share (effort) and free throw rate (aggressive play).

Teams which performed badly on back to back games, such as Laurentian, Queen's and R.M.C., shot poorly and allowed the opponent to score more points.

Team & Situation		Win%	Shooting %			Pace	Efficiency		Reb. Share		TOV%	FT Rate
			FG%	3P%	FT%		OFF.	DEF.	DRB%	ORB%		
Carleton 14-0	Rest	1.000	49.2%	43.1%	68.7%	67.7	128.3	77.5	77.3%	40.5%	17.2%	0.323
	B-to-B	1.000	54.7%	50.3%	82.0%	69.1	147.5	81.5	80.6%	40.9%	14.2%	0.249
	Change	-	5.5%	7.2%	13.3%	1.4	19.3	4.0	3.4%	0.4%	-2.9%	-0.075
Ottawa 10-4	Rest	.625	45.0%	33.3%	55.4%	67.9	110.5	105.1	70.6%	32.2%	20.3%	0.333
	B-to-B	.833	48.4%	48.6%	66.4%	72.4	125.7	91.9	67.4%	31.7%	18.4%	0.307
	Change	0.208	3.5%	15.3%	11.0%	4.5	15.3	-13.2	-3.2%	-0.4%	-1.8%	-0.026
Ryerson 9-5	Rest	.750	48.6%	45.9%	69.9%	68.3	120.6	96.2	65.4%	39.5%	19.0%	0.311
	B-to-B	.500	43.9%	37.4%	78.7%	71.9	109.0	99.3	71.4%	31.5%	18.1%	0.414
	Change	-.250	-4.7%	-8.6%	8.8%	3.5	-11.6	3.0	6.0%	-8.0%	-0.9%	0.104
Laurentian 9-5	Rest	.750	46.5%	43.8%	77.9%	73.4	122.4	103.6	68.5%	40.5%	17.9%	0.300
	B-to-B	.500	42.7%	36.6%	73.1%	70.9	108.4	111.7	75.4%	31.3%	14.1%	0.261
	Change	-.250	-3.8%	-7.2%	-4.8%	-2.5	-14.0	8.0	6.9%	-9.2%	-3.8%	-0.038
Toronto 7-7	Rest	.375	45.0%	37.4%	77.7%	71.2	110.4	111.3	60.1%	30.0%	16.9%	0.233
	B-to-B	.667	45.6%	38.5%	79.0%	72.4	112.2	97.7	66.7%	28.6%	19.1%	0.279
	Change	.292	0.6%	1.0%	1.4%	1.2	1.7	-13.7	6.5%	-1.4%	2.3%	0.046
York 5-9	Rest	.250	45.9%	39.2%	70.3%	72.3	110.7	107.7	64.1%	34.0%	21.1%	0.347
	B-to-B	.500	41.3%	32.7%	67.8%	74.6	97.0	99.9	70.8%	28.1%	23.7%	0.230
	Change	.250	-4.5%	-6.5%	-2.6%	2.3	-13.6	-7.8	6.7%	-5.9%	2.6%	-0.118
Queen's 2-12	Rest	.143	40.1%	31.0%	68.9%	71.5	96.6	97.8	64.6%	38.4%	23.0%	0.270
	B-to-B	.143	36.6%	29.3%	65.8%	69.9	89.3	102.0	69.6%	30.3%	24.1%	0.359
	Change	-	-3.5%	-1.7%	-3.2%	-1.6	-7.4	4.1	5.0%	-8.1%	1.1%	0.089
R.M.C. 0-14	Rest	.000	27.3%	24.6%	71.4%	71.6	55.9	140.1	50.7%	15.2%	30.7%	0.193
	B-to-B	.000	22.7%	24.7%	60.9%	68.4	52.9	144.0	51.8%	18.2%	26.1%	0.165
	Change	-	-4.6%	0.1%	-10.5%	-3.2	-3.0	3.8	1.2%	3.0%	-4.6%	-0.028

## Recovery and Travel

There is no particular home court advantage in the O.U.A. East on the first night of back-to-back games. On the first night, the visitors won 55% of games on the first night but on the second

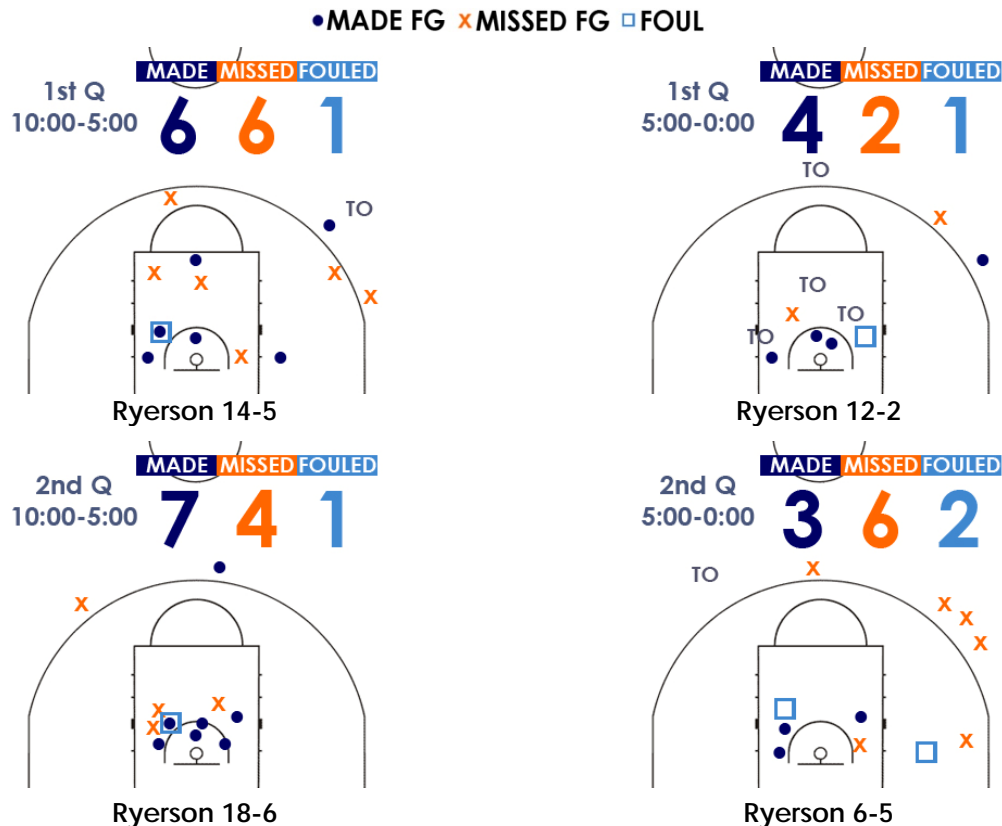
night, the team that had travelled won only 48% of the games, indicating that recovery on the road is an area of improvement for many teams. The home team maintained their level of offensive efficiency as the road team experienced shooting and scoring difficulties.

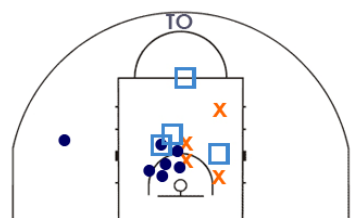
Home & Away	Win%	Shooting %			Pace	Efficiency		Reb. Share		TOV%	FT Rate	
		FG%	3P%	FT%		OFF.	DEF.	DRB%	ORB%			
Home	Rest	.452	42.2%	36.5%	72.1%	70.3	103.9	106.7	64.3%	31.3%	20.4%	0.294
	B-to-B	.520	41.4%	38.4%	71.7%	70.6	102.2	107.1	68.8%	27.2%	20.4%	0.277
	Change	.068	-0.8%	1.9%	-0.4%	0.3	-1.8	0.3	4.5%	-4.1%	0.1%	-0.017
Away	Rest	.548	46.0%	39.2%	67.2%	70.6	111.5	102.7	66.9%	36.7%	20.8%	0.291
	B-to-B	.480	42.7%	36.6%	72.6%	71.6	105.9	101.1	69.4%	32.2%	19.4%	0.287
	Change	-.068	-3.3%	-2.6%	5.5%	1.0	-5.5	-1.6	2.6%	-4.4%	-1.3%	-0.004

### 2012-13 Ryerson Rams Men's Basketball Team

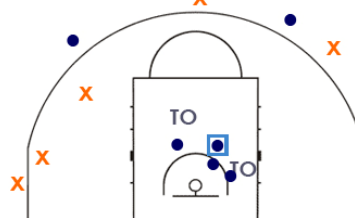
On September 6<sup>th</sup> 2012, Ryerson played Dawson College at the Mattamy Athletic Centre. Although it was an exhibition game, it can be used to observe the effects of fatigue over the course of a game since the Rams used only nine players who all played between fifteen and thirty-three minutes. Scoring and shot attempts were distributed primarily among Ryerson's top six players who played most of the game.

#### Shot Distribution throughout the Game

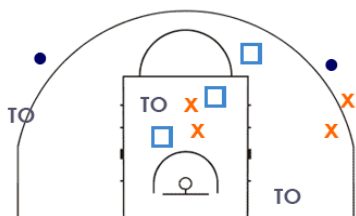




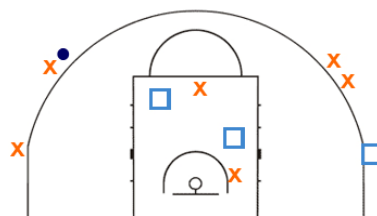
Ryerson 14-5



Ryerson 16-7



Ryerson 8-6



Ryerson 11-6

As the game progressed, Ryerson took more outside shots. Dawson College began playing a zone so some of these shots came from a penetration and kick situation but others occurred because the offense lacked the explosive first step to drive past the defense. There was less impetus to drive into the paint and into contact in order to finish.

The Rams won all of the five-minute intervals but the margins shrunk as the game progressed. Their scoring rate fell towards the end of the halves. If not for foul shots, the number of successful possessions would have been severely reduced.

### First and Second Half Comparison

Half	Shooting %			Pace	Efficiency		Reb. Share		TOV%	FT Rate
	FG%	3P%	FT%		OFF.	DEF.	DRB%	ORB%		
First	55.3%	37.5%	62.5%	37.0	135.1	48.6	85.7%	43.8%	10.8%	0.211
Second	39.5%	50.0%	70.0%	42.0	116.7	57.1	90.0%	27.3%	9.5%	0.526
Change	-15.8%	12.5%	7.5%	5.0	-18.5	8.5	4.3%	-16.5%	-1.3%	0.316

Overall shooting percentage and offensive efficiency dropped from the first half to the second half. Ryerson held a distinct talent advantage, which is evidenced in their excellent defensive efficiency, rebounding rate and turnover rate. Nonetheless, offensive rebounding fell during the second half because of fatigue among Ryerson's three forwards. Like they had done during the previous season, Ryerson took advantage of the opponent's fatigue by drawing more fouls and scoring more points from the line (first half: 5/8, second half: 14/20).



## *Recovery Practices in Recent Years*

More attention has been devoted to the area of recovery and regeneration in basketball. What was formerly an afterthought has become a central pillar of the training regiments of elite teams. Ten years ago, many teams in Canadian Interuniversity Sport (C.I.S.) did not follow organized recovery routines or left it up to individual players; now it is a part of regular training sessions.

Awareness among coaches, athletes and the population in general has increased with better coaching certification, coverage during big sporting events and YouTube videos which allow elite athletes to share their training strategies with their fans. There is room for improvement because the recovery is not sufficiently emphasized at the high school and club levels.

### **2002-03 University of Toronto Varsity Blues Men's Basketball**

A player from the University of Toronto from 1999 to 2003 recalled that the Men's Basketball Team did not prioritize recovery and regeneration and this interfered with performance when games were played on back-to-back nights. The player mentioned that the coaching staff urged players to get enough rest but did not provide specific information about stretching, nutrition and mental coping skills. He cited a game day jog that was to take place on the afternoon of Saturday games. Unfortunately, the run was not taken seriously by players and coaches and it was abandoned midway through the season.

Back-to-Back	Min.	Shooting %				Points	Rebounds	
		FG%	3P%	FT%	eFG%		ORB	TOTAL
First Night	24.8	56.2%	44.4%	67.6%	58.4%	10.8	2.3	5.2
Second Night	23.2	37.8%	40.0%	62.5%	40.5%	7.0	0.9	4.3
Change	-1.6	-18.3%	-4.4%	-5.1%	-17.9%	-3.8	-1.4	-0.9

Whether a lack of recovery was an issue for the entire team (the squad went 2-8 on back-to-back games) or simply this player, it was a missed opportunity for the coaching staff to intervene and improve performance. Even if the team's record would not have changed, this player could have enjoyed better shooting and more energy in games and a more satisfying experience overall.

### **2011-12 University of Toronto Varsity Blues Men's Basketball**

During the past season, the Varsity Blues were able to shoot well, execute offensively and win during those games. The Saturday routine includes getting up promptly for a morning shoot-around which allowed more hours of downtime during the afternoon so the players could relax, have a nap, stretch or otherwise prepare for the evening game. The recovery routine eliminated stress from the pregame preparation, rather than adding to it (DeGiorgio, 2012).

### **2012 Team Ontario U17 Boys**

To win Canada's U17 Boys National Championships, Team Ontario survived multiple training camps throughout the summer and was undefeated in a week-long tournament. Athletes also

fulfilled other commitments to travelling teams and personal training during the summer. Without significant recovery efforts, twice-a-day practices during three to four day training camps and the long summer season would wear the team down.

The routines are complicated but once players see the results, they participate because of engagement, not compliance. When Team Ontario players return to their original teams, they encourage other players to adopt their habits. During training camp, the team follows the same routines as they would at Nationals, increasing familiarity. The athletic therapist leads post-practice static stretching and dynamic stretching for a half-hour before bedtime, in addition to providing one-on-one treatment if needed. If there is an evening game, the team stretches together six to eight hours before the game.

The players use cold tubs to reduce soreness and stiffness. The team eats four meals together and hydration is vital. The coaching staff ensures that the players get nine or ten hours of sleep nightly and one or two hours of downtime prior to practice (Cheng, 2012). This comprehensive approach is atypical and surely contributes to the successful results, on and off the court.

### History of Recovery in Professional Basketball

Initially, recovery and regeneration, was not an important part of the National Basketball Association (N.B.A.). Teams would play upwards of twenty exhibition games in October to build support throughout their region. Back-to-back games were common; teams would play one night in Rochester and travel overnight by train to Fort Wayne. The train wouldn't stop in town and the players had to walk two miles from the tracks to a motel at three o'clock in the morning.

Based on his background as a military physical education instructor, Red Auerbach incorporated intense physical training into Boston's pre-season camp. Other teams habitually played themselves into shape but Auerbach believed that he could give his team an edge by raising their level of conditioning. The Celtics won eleven out of thirteen titles in the 1950s and 1960s.

Bill Sharman was a fitness fanatic when he played with the Celtics and was one of the first players to take an interest in vitamin supplements, stretching and pre-game preparation. When he was named coach of the Los Angeles Lakers, he instituted the game day shootaround, a routine that he followed as a player. Sharman was initially ridiculed but the morning shootaround enabled the team to recover from the previous game and prepare for the next one. The 1972 Lakers won thirty-three consecutive games and the championship.

Today, players have their own trainers and their own recovery routines. Many players ride stationary bicycles after games as part of their cool down. Kobe Bryant believes in shooting after games in order to alleviate some of the tension he feels after a competition. Multiple players wear compression garments.

Coaches and players must include recovery and regeneration throughout the Yearly Planning Instrument (Y.P.I.) in order to reach elite levels of performance. Otherwise, their performance will suffer. It may only amount to a couple of points per game but this is the difference between winning and losing at the highest level.

# 2

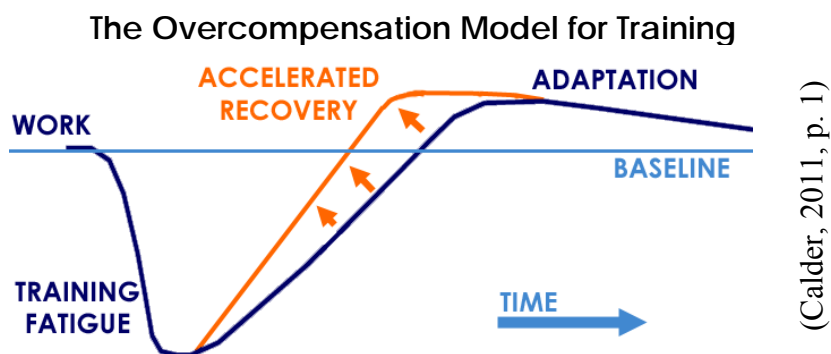
## Recovery Fundamentals

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# The Training Effect

Basketball consists of short rapid bursts of intense activity followed by periods of lower intensity recovery. A hard training session or competition causes mental and physical distress and stimulates the body to adapt. Afterwards, the athlete is fatigued until there is time for recovery. The body adapts and is now capable of greater performance. Effective coaches accelerate this recovery so the players can resume training sooner (Calder, 2011, p. 1).



After training, basketball players experience joint and muscle soreness, especially in the lower body. They have consumed the glycogen in their muscles and lose fluids via perspiration. As glucose is broken down in the muscle cells, lactic acid accumulates and impedes the ability of fast-twitch muscles to contract (Wells, 2012, pp. 38-40). The athlete is no longer able to maintain correct technique in their shooting form. Balance suffers in the defensive stance

Since basketball requires explosive movements to jump, attack the basket and sprint the length of the court, players should focus on developing fast-twitch muscles. Fast-twitch muscles used for basketball hypertrophy (grow) at a faster rate than slow-twitch fibres. The muscles can only work at full capacity for a shorter time period since they work without oxygen so more recovery time should be built into the training schedule. Allow forty-eight hours for the muscles to recover before training that part of the body again (Price, 2006, p. 112).

During the adaptation phase, muscles develop, strengthen and increase their energy stores. Both anaerobic and aerobic energy systems benefit. The body develops a greater capacity for lactic acid. Capillarization creates more blood vessels for the heart to pump oxygen where it is needed. Organs become larger and more powerful. Neural connections are formed and neurotransmitters levels respond more efficiently to stimulus (Wells, 2012, p. 162). When recovery occurs, basketball players can sustain maximal effort throughout longer shifts.

Different sources of physical fatigue in basketball affect each athlete uniquely.

Types of Physical Fatigue		
Type	Basketball Impact	Signs and Symptoms
Metabolic	Energy stores depleted, such as a lack of glycogen for anaerobic exercise.	<ul style="list-style-type: none"> <li>• Difficulty completing a workout or a game.</li> <li>• Maximal effort is not sustainable as long as usual.</li> <li>• Low energy level.</li> <li>• Feeling of nausea, dizziness or headaches.</li> </ul>

Central Nervous System	Neuromuscular junctions fail to transmit nerve impulse and initiate muscle action.	<ul style="list-style-type: none"> <li>• Feelings of fatigue or reduced motivation.</li> <li>• Delayed response time under pressure.</li> <li>• Difficulty completing a complex task.</li> <li>• Increased incidence of illness and infection.</li> </ul>
Neurological	High intensity sessions or repetitive movements overwhelm athlete.	<ul style="list-style-type: none"> <li>• Reduced localized force production.</li> <li>• Difficulty performing a complex task.</li> <li>• Technique becomes sloppy.</li> <li>• Low blood pressure.</li> </ul>
Peripheral Nervous System	Muscle fatigue causes lower at maximal effort and performance suffers.	<ul style="list-style-type: none"> <li>• Reduced localized force production.</li> <li>• Maximal effort is not sustainable as long as usual.</li> <li>• Technique becomes sloppy.</li> <li>• Muscle soreness and joint pain.</li> </ul>
Environmental and Travel	Ideal Performance State disturbed. Disruption of sleep and meal schedule.	<ul style="list-style-type: none"> <li>• Athletes do not seem ready or start slowly.</li> <li>• Mental and physical errors occur early.</li> <li>• Low energy level.</li> <li>• Irritability, mood swings &amp; negative body language.</li> </ul>
Psychological Fatigue	Conflicts between team members. Other lifestyle stresses (school, social life).	<ul style="list-style-type: none"> <li>• Poor interaction and communication with coaches and teammates.</li> <li>• Lack of focus on task at hand.</li> <li>• Irritability, mood swings &amp; negative body language.</li> </ul>

(Calder, 2011, p. 9)

## Recovery Strategies

Both coaches and athletes are accountable for recovery and regeneration.

### Recovery Responsibilities

#### Coaches

- inform and educate athletes about proper recovery and regeneration
- make recovery part of the team’s culture and establish clear standards
- create a routine that is easy to follow and is adaptable to different facilities
- supervise team recovery activities and motivate all athletes to participate
- plan practices and team schedules so there is enough time for recovery
- support all players, give corrections and intervene if additional help is needed
- provide all athletes with the information they need and individualize programs
- learn about new recovery techniques and incorporate them into the team routine
- engage in coach recovery

#### Athletes

- listen to the instructions of coaches and ask questions if unsure
- take recovery as seriously as practices, training and games
- perform the routine as well as possible
- encourage teammates to participate and give each other feedback
- complete the recovery activities every day, even when tired
- eat properly and carefully monitor foods, supplements and medications consumed
- notify the coaches and therapists for signs of fatigue, overtraining and injury
- realize that recovery and regeneration is necessary for elite performance
- keep a log of training and recovery sessions

## Hydration

Basketball players suffer a progressive in sport-specific skills at levels of one to four percent of body weight. For most athletes, there is a dehydration threshold of two percent of bodyweight which leads to fatigue, reduced anaerobic performance, impaired vigilance and decision-making abilities and muscle cramps (Ziv & Lidor, 2009, p. 561).

During activity, athletes should consume 150 to 350 millilitres (six to twelve ounces) every fifteen to twenty minutes. Afterwards, athletes should drink 475 to 650 millilitres (sixteen to twenty-four ounces) for every pound lost due to perspiration (Beck, 2009). Making rehydration part of active recovery encourages young athletes to drink enough fluid.

Drinking a six percent carbohydrate solution improves shooting and intermediate sprinting performance (Ziv & Lidor, 2009, p. 582). Ingesting a carbohydrate drink during intermittent activity improves glycogen synthesis and heightens physical and mental performance. Athletes performed better on sprinting and agility drills, scored higher on a concentration test and reported enhanced feelings of vigour (Welsh, Davis, Burke, & Williams, 2002, p. 732).

Team Ontario emphasizes hydration: each player is given a case of twenty-four water bottles for each three to four day training camp and players drink liberally during practices. Afterwards, pairs of roommates are given a litre of chocolate milk to share. The constant presence of liquids - ranging from water to chocolate milk to Gatorade - at meals, training sessions and residence rooms ensures athletes are mindful of fluid consumption and properly hydrated (Cheng, 2012).

## Nutrition

Snacks are also a part of a good recovery routine, in order to replenish what has been lost. Glycogen, derived from carbohydrates, is converted into glucose which is processed into adenosine triphosphate and lactic acid by the anaerobic metabolism. Intense exercise depletes muscle glycogen stores, which lowers performance (Karp, Johnston, Tecklenburg, Mickleborough, Fly, & Stager, 2006, p. 79).

After a workout, consume about fifty to seventy-five grams of carbohydrates within half an hour and 1.2 to 1.5 grams for every kilogram of body weight over the next few hours. Ingesting protein at a carbohydrate:protein ratio between 2:1 and 3:1 can improve endurance performance (Karp, Johnston, Tecklenburg, Mickleborough, Fly, & Stager, 2006, p. 79). Eat within thirty minutes because delaying two hours halves the rate of glycogen synthesis (Wells, 2012, p. 175).

Consuming chocolate milk before exercise lengthens time to exhaustion by fifty percent compared to a simple carbohydrate replacement drink (Karp, Johnston, Tecklenburg, Mickleborough, Fly, & Stager, 2006, p. 86). Pre-game snack suggestions include bagels, juice, bananas, carrots, nuts, yogurt and granola bars. The closer to the next workout, the more athletes can rely on simple carbohydrates (high glycemic index).

Antioxidant and vitamin supplements can reduce the effects of training. A team that is travelling and competing often could benefit from taking a daily multi-vitamin to make up for missed

meals. More than fifty percent of players in the Spanish First Division take dietary supplements, almost all on a daily basis (Ziv & Lidor, 2009, p. 561).

## Sleep Habits

Sleep contributes to Long-Term Athlete Development (L.T.A.D.), impacting the ability to train and the response to training. Sleep quantity and sleep quality are integral to recovery, reducing the risk of overtraining, raising resistance to illness and boosting post-injury recuperation (Samuels & Alexander, 2011, p. 4). Sleep deficits lead to confusion and short attention spans, impaired fine motor skills, weak energy levels and a reduced motivation to train (Lamberg, 2005, p. 21).

Athletes in the Train to Compete stage need about eight to ten hours of sleep supplemented by a daily nap (Samuels & Alexander, 2011, p. 11) but only fifteen percent of adolescents get the sleep that they need (National Sleep Foundation, n.d.). Most get seven hours and a sleep debt accumulates, progressively harming performance (Lamberg, 2005, p. 21).

When male collegiate basketball players endeavour to increase their nightly sleep time from eight hours to ten, they shoot more accurately. Reaction and intermediate sprinting times were lowered after extended sleep (Mah, Mah, Kezirian, & Dement, 2011, pp. 945-946).

	Team Shooting Performance	
	<u>8 hr/night</u>	<u>10 hr/night</u>
Free Throws	79%	88%
Three Point Shots	68%	77%

According to the Profile of Mood States, during the time that the post-secondary athletes logged more sleep, their scores in all areas rose substantially. They also reported better performance in games and practices and enhanced mental and physical well-being (Mah, Mah, Kezirian, & Dement, 2011, p. 948).

Coaches can assist athletes by encouraging sleep routines -- at night so that athletes avoid screen time and get to bed on time and in the morning so that they get up in time for school and eat breakfast. Thirty minute naps can help a player recover from a morning practice or prepare for a game or practice later in the day. Coaches should consider postponing training if players are sleep deprived. Teams can create a sleep advantage by getting more than enough hours ahead of time so that they can survive a harried schedule or travel (Samuels & Alexander, 2011, p. 11).

## Preparation for Movement

Throughout the year (including the off-season), athletes should perform some low intensity exercise such as multi-directional joint movement, mobility exercises and active stretching (Stein, 2011). This is not a quick fix and consistency over a long period of time is required.

These exercises are an effective warm up because they activate the muscles needed to play sport, raise the athlete's heart rate and stimulate cutaneous blood flow. They could serve as a cool down because they reduce muscle soreness and disperse lactic acid. On off-days, these activities continue



to develop physical performance factors (especially balance and flexibility) and strengthen muscles, tendons, ligaments and joints. The athlete can move more efficiently and compete longer before fatigue sets in. “Pre-hab” exercises prevent and reduce the severity of injuries.

At training camp and the National Championships, Team Ontario performed dynamic stretching routines outdoors before going to bed each night (Cheng, 2012). Athletes who perform multiple competitions in a single day, such as during an A.A.U. tournament in the summer, or a multi-day tournament, such as the provincial championships and C.I.S. Final 8 tournament, will benefit from an active recovery after a game (Wells, 2012, p. 171). Routines could also be performed at the beginning of training sessions, between games or early in the morning to prepare for the day. An activity such as yoga or Pilates could also fit this need.

Movement preparation should start gradually since athletes may initially feel very tight. Perform the exercises with good balance and correct technique before stretching the range of motion, adding resistance or increasing the number of repetitions. The level of difficulty should be progressive. Encourage those who are struggling and emphasize personal bests instead of competition between teammates.

Adapt light muscle activity to the athletes on the team. Exercises for the lower body (lunges, squats, leg swings, groin stretches) enable guards to drop their hips and explode towards the rim as they make a ball move. Exercises for the core and pillar (leg lifts, split squats, yoga poses) enable centres to post up with more stability. Exercises for the knee, ankles and feet (barefoot stretches, ankle rotations, single-leg squats) prevent common basketball injuries.

The movements should promote co-activation (engaging the entire body, not just the part which is in use) which will increase balance. The exercises could be performed independently or combined with basketball movements.

### Cold Water Immersion

Cold Water Immersion reduces muscle inflammation post exercise and speeds the healing process so the body can perform again. The low temperature arouses the Central Nervous System, which must be trained in order to prepare for elite performance (Wells, 2012, p. 177).

Taking minute long dips in a plunge pool with two minutes in between offers significant improvement in muscle soreness and agility and smaller gains in vertical jumping ability (Montgomery, Pyne, Hopkins, Dorman, Cook, & Minahan, 2008, p. 1142). If unavailable, athletes could fill a bathtub with enough cold water to cover the lower body or take contrast showers (alternate cold/hot). **Caution: do not overuse cold water immersion or injury could result.**

Although adolescent athletes may initially object to the ideal of a cold bath, they will change their minds when they notice how they feel afterwards, especially in terms of reduced muscle soreness. Cold Water Immersion was mandatory for members of the U17 Boys Ontario Provincial Team during training camps but the players became eager participants once they experienced the positive effects (Cheng, 2012).

## Massage

Using a foam roller or a ball for self-massage, basketball players can loosen their muscles and reduce inflammation and cellular stress (Ford, 2011). Massage therapy decreases the level of cortisol in the body, eliminating stress and muscle soreness. Massaged muscles regained fifty-nine percent of the strength lost due to exercise within four days (Wells, 2012, p. 182). The massage augments the cells' capability to create new mitochondria which are energy sources for muscular endurance (this can help sprinting, posting up and vertical jumps) (Taylor, 2012).

Massage can be part of a warm up (light, rapid strokes) or a cool down (slow, relaxing strokes). About twelve to twenty strokes on each muscle area can provide a thorough total body message. Take time to address any individual tightness. Since it can be performed with little or no equipment, it is a good activity for athletes to do on their own, according to their needs.

## Compression Garments

Wearing compression garments are popular for basketball players for reasons of fashion and function. Many young players wear sleeves or compression shorts because they have seen their heroes do so. Adolescents must understand why Dwyane Wade and Dwight Howard wear the items so they can use them correctly. Anecdotal evidence suggests that there is a placebo effect in terms of self-reported skill level, fatigue and performance (Rebel, 2010).

Lower body compression shorts increase muscle activation and offer gains in explosiveness. Since an athlete can perform deeper squats wearing the garment, vertical leap, first step, and acceleration are boosted. Repeated sprint times are lower, suiting elite basketball players (Doan, et al., 2003, p. 602). Athletes who wear compression gear on their legs perform better at repeated vertical jumps (95% of baseline, compared to 85% for the control group) (Wells, 2012, p. 179).

The garments offer support for the joints and muscles and reduce oscillation, curbing rate of injury and muscle soreness over the course of a tournament or a week of hard training (Montgomery, Pyne, Hopkins, Dorman, Cook, & Minahan, 2008, p. 1139). Since compression gear protects the muscles and prevents adaptation, it should be worn during competition or for two to three hours after exercise, not during the training sessions (Wells, 2012, p. 182).

# *Psychological Recovery for Adolescents*

Coaches should interact with players and build relationships so they develop a better sense of what is happening within the team. Within these close relationships, coaches can observe whether intervention is needed for any team member and athletes feel confident enough to report their sources of stress to the coach.

## Adversity

In order to succeed, elite athletes must partake in physical, technical, tactical and mental training. One aspect of mental training for competitive sport is the ability to overcome adversity. In

academic and athletic pursuits, it often those with greater perseverance who succeed (Duckworth, Peterson, Matthews, & Kelly, 2007, p. 1098). During intense training sessions, adolescents need coping skills to remain motivated from one workout to the next. If athletes mentally give up, recovery and regeneration suffer.

The Canadian Short Track Speed Skating team incorporated psychological skills training into the Y.P.I. prior to the 2010 Winter Olympics. The goal of the training was to make athletes more autonomous when coping with performance anxiety. A three-year plan - including individual and team assessment, introduction of key concepts, self-regulation, intervention when required and on-going evaluation - was credited with the team's successful performance in Vancouver and will be continued in further Olympiads (Beauchamp, Harvey, & Beauchamp, 2012, p. 80).

Coaches can help develop grit in older teenagers and post-secondary athletes by offering specific feedback, addressing why a failure occurred and creating a strategy to overcome it. Players must divorce themselves from failures and understand that it is not something personal, pervasive or permanent, but something malleable that can be changed with a growth mindset. Identifying those who are weaker in consistency of effort and perseverance despite adversity using a standardized test, a log book or organized observations enables a coach to provide extra help to those who need it (Duckworth, Peterson, Matthews, & Kelly, 2007, p. 1091).

Although overcoming adversity necessitates error correction, maintain a positive tone. Spend much more time teaching the right way to do something than the wrong way. Being too negative can increase anxiety among players, interfering with performance in training sessions and games (Walsh, 2009, p. 85). John Wooden devoted more than fifty percent of his teaching time to instruction, frequently providing non-judgmental objective feedback that consisted of a brief admonishment sandwiched between modelling of the correct technique. Wooden's tone was positive forty-eight percent of the time with starters and sixty-six percent of the time with reserves, maintaining high standards for the best athletes while encouraging less skilled players to improve (Gallimore & Tharp, 2004, pp. 122, 129).

## **Athlete Burnout**

Athlete burnout in Canada threatens elite sport and overall health and fitness. Players drop out at the cost of lost L.T.A.D. effort and medal potential. In society, physical activity reduces childhood obesity, health care costs, and the risk of chronic disease, like cardiovascular problems, cancer, Type 2 Diabetes and osteoporosis later in life. More than forty percent of basketball players drop out of the sport during their Grade 9 and 10 years (Butcher, Lindner, & Johns, 2012, p. 152).

Certainly, spots on varsity squads are limited and other interests arise as teenagers transition into high school but coaches can mediate this difficult time so that athletes maintain a positive attitude towards sports. Males are more likely to burn out because they did not enjoy the sport and wanted to participate in another sport or activities; females cited the same reasons, plus a belief that they were not good enough (Butcher, Lindner, & Johns, 2012, p. 154). Basketball players born later in the year are more likely to drop out of competitive sport than those born in the first three months of the year (Delorme, Chalabaev, & Raspaud, 2011, p. 125)

Adolescents feel good about sport when they are challenged by high standards. It is not sufficient to include difficult activities in the practice; coaches must demonstrate belief in the athletes, provide meaningful constructive feedback and include individual and team goal setting. (Fraser-Thomas & Côté, 2009, p. 10). Some coaches forgo recovery routines as part of “toughening up” the team but this is destructive in terms of athlete development and retention.

Elite athletes grow up in a vacuum, receiving praise for their basketball skills but little insightful feedback. One of the best things that experienced players and coaches can teach a young athlete is how to train and how to manage their lives (Barkley, 2012). Teenagers enjoy sport when they develop meaningful adult and peer relationships and view the activity as a part of a positive life experience (Fraser-Thomas & Côté, 2009, p. 9), like teamwork skills or personal improvement.

Communication with young athletes (and their parents) is especially important. When a young athlete feels confident in the sport and senses that they have input in their future, they are more likely to be intrinsically motivated, generating greater determination and self-satisfaction (María, Balaguer, Castillo, & Duda, 2012, p. 175). The communication starts at the beginning of the year - when the coach outlines the team’s philosophy and standards - and continues throughout the year as the staff listen and act as mentors.

Family and friends must be supportive because they contribute whether an athlete’s experience is positive or negative (Fraser-Thomas & Côté, 2009, p. 11). Given scarce time and resources in youth sport, they can help players follow recovery routines and reinforce the coaches’ message.

### **Substance Abuse**

Alcohol and drug use is incongruent with elite performance, and may be illegal depending on the age of the athlete and the state or province. At the highest level of sport, the difference between winning and losing is very slight. Abusing these substances directly hurts performance, impedes recovery and regeneration and may lead to a positive doping result.

A quarter of teenagers in Ontario admitted to binge drinking in the previous year and many view heavy drinking as a social norm (Public Health Division, 2009, p. 39). About half of high school athletes consume some alcohol, compared to three-quarters of collegiate athletes. The effects of alcohol last up to ninety-six hours and can reduce performance by twenty to thirty percent (Underwood, 2009). Alcohol use can inhibit R.E.M. sleep, lead to dehydration, disrupt muscle recovery, interfere with the digestion and absorption of protein, vitamins and nutrients, lower metabolism, slow the body’s ability to heal injuries and hinder learning and decision-making (Firth & Manzo, 2008).

One third of collegiate athletes admit to marijuana use within the past year; 11.2% used marijuana during their season compared to 28.4% who did in the off-season (Yusko, Buckman, White, & Pandina, 2008, p. 16). Cannabis use can raise blood pressure and counteract the effects of the cool down routine. Although it can reduce the feelings of muscle soreness, it does not promote muscle recovery. The effects can last up to a month, lengthening reaction times and hampering visual perception and co-ordination (Thomas, 2010).

## *Recovery Routines*

Training generates fatigue so that the body adjusts. However, fatigue must not be excessive or performance will suffer (Badau, et al., 2011, p. 2). Recovery and regeneration develop physical performance factors, technique and efficiency (Kellman, 2010, p. 95). Recovery can take the form of a break from stress, a reduction of stress or a change of stress. Sources of stress and appropriate strategies are unique to individuals so any recovery efforts should be customizable.

### **After a Training Session**

Symptoms of fatigue from a particular training session linger and the effects of can become cumulative if there is no recovery or regeneration.

#### **Physical Recuperation over Time**

Day	1	2	3
Elimination of Fatigue	60%	30%	10%

(Badau, et al., 2011, p. 4)

Feelings of fatigue are high at the beginning of the year when athletes begin the pre-season phase and when there is a change in training (Hoffman, Bar-Eli, & Tenenbaum, 1999, p. 77). An athlete who is accustomed to their routine may sense more fatigue when one workout is more intense or training focuses on a different part of the body or utilizes new methods.

Adolescent athletes should follow a daily recovery regiment, including sufficient sleep and proper nutrition and hydration. They should be monitoring their own progress by tracking their own vital signs, perceived exertion during workouts and feelings of fatigue. Athletes must and initiate their own routines when required (Kellman, 2010, p. 97). For example, an athlete in the Train to Compete stage should definitely be responsible for icing a body part when it is sore. To maintain interest, a variety of recovery strategies should be employed (Calder, 2011, p. 6).

Elite athletes must develop routines for everything from skill development, preparation for competition and recovery. Recovery and regeneration is often ignored in club and high school basketball, either because the young athletes are unaware of proper technique, shy about being the only one on a team (at first) who follows a recovery routine or inconsistent about performing the routine in an unfamiliar space or with limited time.

A recovery mindset requires a player to do something time consuming (stretching or taking the time to eat right) or awkward (like a cold tub or lower body massage) which will not benefit them immediately (Nike Football, 2011). Adolescents often feel invulnerable and possess high social needs. Long-term goals are less meaningful so an objective like “injury prevention” is not taken as seriously as it is by older athletes (Enright, Shulda, & Lapsley, 1980, p. 112).

A great deal of encouragement is required for the players to buy into a recovery and regeneration regiment. If the activities can be performed easily and as a team, athletes are more likely to partake. Once it becomes part of a team culture, athletes will not only join the group but take the routine with them and establish it with other squads.

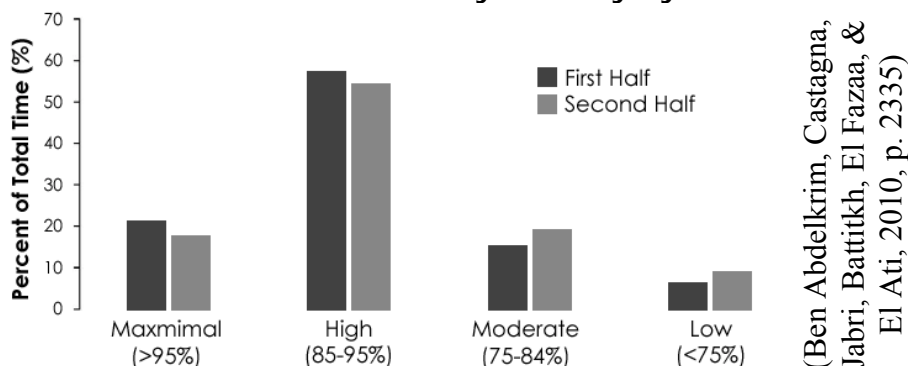
## During and After a Competition

Crucial moments of the game - when a series of plays can influence the final result - occur at the beginning of the first and third quarters. This is when elite coaches plan strategy and establish an emotional tone. Fiery speeches or tactical adjustments aside, these stunts rely as much on a team's commitment to recovery and regeneration as anything else (Fernandez, 2011).

Recovery Factors which Impact Critical Moments			
Factor	First Quarter	Third Quarter	
Physical	Anaerobic Lactic Fitness	<ul style="list-style-type: none"> <li>a high aerobic fitness base eases recovery during pauses in the action</li> <li>interval training prepares players for basketball conditioning</li> </ul>	
	Muscle Activation	<ul style="list-style-type: none"> <li>warm up with dynamic stretching and exercises to activate muscles</li> <li>include C.N.S. exercises to stimulate the entire body</li> </ul>	<ul style="list-style-type: none"> <li>organize half-time to include warm up                             <ul style="list-style-type: none"> <li>treat the warm up seriously</li> </ul> </li> <li>quickly activate muscles after a break</li> <li>wear compression garments</li> </ul>
	Nutrition	<ul style="list-style-type: none"> <li>consume foods which are simple carbohydrates and low in fat and protein (with a high glycemic index)</li> <li>drink 400 to 600 ml of water two hours before competition</li> </ul>	<ul style="list-style-type: none"> <li>consume carbohydrates that can be easily processed</li> <li>drink beyond thirst (150-350 ml every fifteen minutes)</li> </ul>
	Fatigue	<ul style="list-style-type: none"> <li>rest properly</li> <li>follow recovery routine</li> </ul>	<ul style="list-style-type: none"> <li>enhance peripheral blood circulation                             <ul style="list-style-type: none"> <li>neuro-muscular stimulation</li> <li>biking on the sideline</li> </ul> </li> <li>adjust substitution pattern based on the tempo of the game</li> </ul>
Mental	Focus	<ul style="list-style-type: none"> <li>give all team members a role</li> <li>prepare for game situations in practice</li> </ul>	<ul style="list-style-type: none"> <li>provide descriptive feedback</li> <li>breathing exercises</li> </ul>
	Energy	<ul style="list-style-type: none"> <li>team organizes energizing routine</li> <li>bench provides energy for starters</li> </ul>	<ul style="list-style-type: none"> <li>show high energy level in warm up</li> <li>keep all players engaged</li> </ul>

Blood lactate levels are highest at the end of the second quarter, perhaps because the slower tempo of the final period allows more time to dissipate lactic acid or because most high intensity exertion occurs in the first part of the game (McInnes, Carlson, Jones, & McKenna, 1995, p. 73).

### Breakdown of Activity Intensity by Half



Half-time should include exercises to combat blood lactate buildup and perform well at the start of the third quarter. Winning teams combat fatigue and maintain their energy, force production and execution throughout the game, gaining an advantage over less conditioned opponents.

## Tapering

Towards the end of the season, physical fatigue accumulates and the mental stress of each competition rises. Travel may also disrupt an athlete's Ideal Performance State. A taper is a period in the Y.P.I. that reduces the training load so athletes are more prepared for peaks (significant competitions when they need to be at their best). Teams may also practice a mini-taper in order to prepare for big games during the season.

Taper periods occur when the athletes have undergone all potential adaptations. When the negative effects of fatigue are removed, the athlete is able to raise their performance level (Mujika & Padilla, 2003, p. 1182). During a taper phase, muscles rest and increase their ability to produce power (Wells, 2012, p. 41). Fast-twitch muscles are more affected by a taper than slow-twitch fibres (Wells, 2008) so this is an important part of a basketball training plan.

Coaches can expect an improvement of about three percent during a taper. Tapering should begin about ten to fifteen days before the peak period. This is somewhat built into the O.U.A. play-off schedule as teams stop playing back-to-back games in mid-February and there are bye weeks for top performing teams. The taper should follow a "fast decay" model: training volume should exponentially decrease by large amounts early in the taper before declining gradually as time progresses (Mujika & Padilla, 2003, p. 1186).

Basketball players, who rely on a mix of all three energy systems and fast-twitch muscle fibres, should reduce training volume by a moderate amount (about sixty percent). The intensity of training should be maintained but sessions should be less frequent and shorter in length (Wells, 2008). Although a basketball team may focus more on execution of their offensive and defensive systems or preparation for the opponent's tactics, these "walkthroughs" should occur at game intensity in order to prime players for competition.

Although a coach may see a player less frequently in practice, this does not mean that there should be less contact. Athletes show less fatigue, depression and tension along with greater arousal and motivation (Wells, 2008). Some athletes will need exercises to focus their emotions so they can control their arousal whereas others may need to be energized so they can maintain their training intensity. Coaches could also devote more time to recovery and regeneration, ensuring that players are still following their routine.

## *Overtraining*

Short-term overtraining (also called overreaching) lasts less than three weeks and is reversible with super-compensation. Long-term overtraining cannot be easily overcome and leads to an impaired state of health lasting two to four weeks (or longer) (Lehmann, Foster, Gastmann, Keizer, & Steinacker, 1999, p. 3).

Due to the length of the season, players experience physical and mental fatigue: C.I.S. teams usually practice from Monday to Thursday and play on Friday and Saturday while high school teams might practice or train five times per week or more. In addition, there are individual skill

development and training sessions. This fatigue is cumulative and reduces performance. Without sufficient recovery, agility, speed and vertical jumping ability decrease while muscle soreness increases (Montgomery, Pyne, Hopkins, Dorman, Cook, & Minahan, 2008, p. 1140).

### Overreaching

If athletes are in a state of overreaching, the response of the coach determines how long the fatigue will persist. Scaling back intensity or volume of training enables recovery. Athletes know how they are feeling more than anyone else and coaches should be in tune with this (Georgevski, 2012). Expert coaches must listen to the needs of the athletes and adjust their planning, rather than following the Y.P.I. no matter what.

Adjust the coaching tactics according to the vigour of the athletes. If the group is dispirited one day try to bring some energy into practice by modeling the way. A fun game which incorporates a skill can engage team members without imposing too much stress. If the team remains sluggish after a couple of events, change the energy system trained from anaerobic lactic to aerobic. If developing power, lower the number of repetitions and total time of the workout; continue only as long as the drills are performed correctly. Substitute activities with a lower intensity level, for example balance and flexibility exercises for explosive plyometrics.

### Overtraining

Without proper recovery, overtraining occurs in one third of national basketball players during the pre-season phase (Lehmann, Foster, Gastmann, Keizer, & Steinacker, 1999, p. 4). The immense physical demands of basketball increase the production of free radicals, which have negative effects on muscular fatigue, cell damage and overtraining (Ziv & Lidor, 2009, p. 562). When athletes are overtrained - due to excessive training or competition - performance plateaus, motivation dissipates, and sleep and personal health suffers. It becomes harder to train and easier to fatigue (Ghasemnezhad, 2011, p. 200).

Training gains deteriorate as fatigue counteracts the positive adaptation of the training effect. Mental stresses such as frustration, depression and anger cause an athlete to feel tired although the signs and symptoms of physical fatigue are absent. Illnesses become more common as the immune system breaks down. Players may have a reduced appetite which leads to a loss of lean muscle mass and diminished strength (Price, 2006, p. 109).

Overtraining is not easily reversed and an athlete may need several months to recover (Wells, 2012, p. 162). An overtrained player who normally starts may need to come off the bench or adjust their role from someone who attacks the basket to a shooter. Lower intensity physical activity, such as preparation for movement or yoga, between training sessions can help recovery.

For the sake of the short varsity basketball season (September to March), coaches must prevent overtraining by assessing players constantly and identifying overreaching before it becomes a barrier to high performance (Kellman, 2010, p. 99).



## *Evaluation and Assessment*

Testing enables coaches to determine if the team's training is effective and benchmark progress against established standards. Effective training means that athletes are making progress throughout the season and that the methods meet the needs of the athletes being coached. Sixty percent of N.B.A. strength and conditioning coaches test for aerobic capacity compared to fifty percent who assessed anaerobic capacity (Ziv & Lidor, 2009, p. 563). Given the number of physical performance factors required elite performance, a range of tests is appropriate.

### **VO<sub>2</sub> Max - Maximal Oxygen Uptake (20m Léger Test)**

VO<sub>2</sub> Max (also referred to as maximal oxygen uptake) is the heart's ability to pump oxygen to the muscles throughout the body to power exercise (Wells, 2012, p. 2). Although basketball makes use of the anaerobic lactic energy system during short intervals of play and the ATP-PC system for high intensity running and jumps, an athlete's aerobic base determines how quickly they can recover and continue to play hard. There is significant correlation between a player's VO<sub>2</sub> Max and the oxygen uptake during games and the percentage of game time that is devoted to active movements such as sprints and jumps (Narazaki, Berg, Stergiou, & Chen, 2009, p. 429).

#### **Oxygen Uptake During an N.C.A.A. Basketball Scrimmage**

	<u>Male</u>	<u>Female</u>
VO <sub>2</sub> Max (ml/kg/min)	57.5	50.3
VO <sub>2</sub> Play (% of Max)	36.9 (64.7%)	33.4 (66.7%)
VO <sub>2</sub> Rest (% of Max)	22.8 (41.1%)	21.3 (42.7%)

(Narazaki, Berg, Stergiou, & Chen, 2009, p. 427)

The twenty metre Léger shuttle run test (the "Beep Test") can be easily executed by high school and club coaches and provides comparable validity to a more complex treadmill test in a lab. The Beep Test is comprised of a series of levels with an increasing number of intervals per level (and increasing speed). The athlete must run the 20 metre distance before the beep sounds; two consecutive misses retires the runner from the test.

At Level 1, the speed is 8.5 km/hr; the speed increases by 0.5 km/hr for each level. An athlete's VO<sub>2</sub> Max score is based on the maximum attained speed:

$$\text{VO}_2 \text{ Max} = \text{Maximum Attained Speed} \cdot 6.65 - 35.8$$

(Flouris, Metsios, & Koutedakis, 2005, p. 168).

Appropriate targets for an elite varsity high school team are Level 11 for forwards (since they run less and perform less intense movements) and Level 13 for guards.

### **Anaerobic Capacity (Yo-Yo Intermittent Recovery Test)**

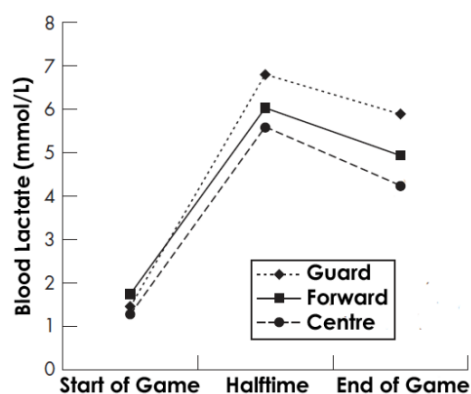
Basketball players run up and down the court, a distance of ninety-four feet (28.651 metres), recovering during offensive and defensive possessions when they work at less than full intensity for about thirty seconds. Shifts last a few minutes, interrupted by short stoppages due to fouls

and violations and longer respites to accommodate timeouts called by coaches. Players usually run a distance greater than the distance from one foul line to another (fifty-eight feet or 17.678 metres) but less than baseline to baseline.

Ninety-three percent of live ball intervals consisted of less than ten sprints (Castagna, Abt, Manzi, Annino, Elvira, & D'Ottavio, 2008, p. 924). A repeated sprint test, consisting of fifteen metre sprints, separated by thirty seconds of recovery, indicates anaerobic capacity. Basketball players begin to show deterioration in speed between the fourth and seventh sprints. The ability to perform exercise for a shot-clock interval of twenty-four to thirty seconds worsens as the game progresses (Castagna, Impellizzeri, Rampinini, D'Ottavio, & Manzi, 2008, p. 208).

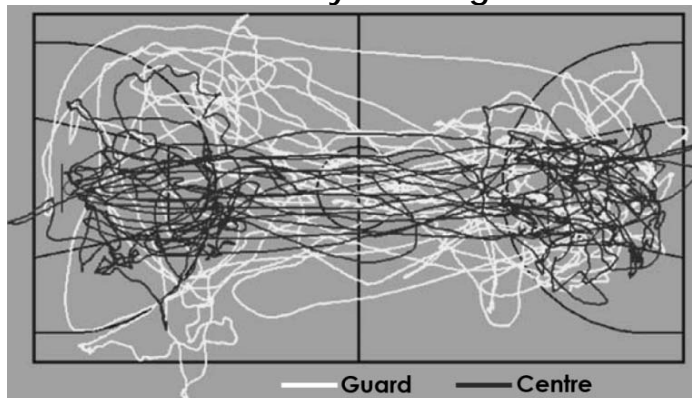
The Yo-Yo Intermittent Recovery Tests - published by Nike SPARQ and available as a smartphone app - measures anaerobic capacity and is highly correlated to fatigue in basketball (shown by performance on a basic repeated sprint test). The coach sets up a twenty metre course and the athletes follow the instructions from the tape. Speed and distance covered increase as the level rises (Castagna, Impellizzeri, Rampinini, D'Ottavio, & Manzi, 2008, p. 206).

### Blood Lactate Concentration



(McInnes, Carlson, Jones, & McKenna, 1995, p. 73)

### Time Motion Analysis during a Quarter



(Vučković, Dežman, James, & Erčulj, 2010, p. 72)

Guards cover more distance and work at a higher level of intensity than forwards and centres so coaches could consider different Yo-Yo levels for each position, for example Level 10 for guards, 9 for forwards and 8 for centres).

### Mood Changes (Profile of Mood States)

A test such as the Profile of Mood States for Adolescents (POMS-A) or the Recovery-Stress Questionnaire for Athletes (RESTQ-Sport) could be used to assess each player's level of fatigue over the course of the season. The former asks players to evaluate themselves according to twenty-four adjectives which are compiled into ratings for tension, depression, anger, vigour, fatigue and confusion. The latter determines the mental and physical stress faced by an individual and whether they are able to apply recovery strategies.

All of the POMS-A states can change over the course of the year so it is important to have mental training strategies in order to disperse tension and anger and cope with confusion as needed. Sometimes increased depression and fatigue signify staleness but context is important as

these moods are also impacted by factors away from the sport. Vigour is linked to team and individual performance (Hoffman, Bar-Eli, & Tenenbaum, 1999, p. 78).

### Perceived Exertion (Blood Lactate and Heart Rate)

For intermittent sports such as basketball, soccer and handball, heart rate, blood lactate and perceived exertion are highly correlated (Castagna, Manzi, Impellizzeri, Anis, Ben Abdelkrim, & Ditrollo, 2002, p. 2437). Coaches can use heart rate monitors and handheld device to determine how close athletes are to their Lactate Threshold in order to structure training time appropriately.

Postsecondary basketball players should have a resting heart rate of 55.9 beats per minute with a maximum of 188 to 192 bpm (Ghasemnezhad, 2011, p. 201). After the warm up, practices should allow players to reach the anaerobic threshold, which is about eighty-six percent of their maximal heart rate (about 160 bpm) (Castagna, Abt, Manzi, Annino, Elvira, & D'Ottavio, 2008, p. 2438). During games, heart rate fluctuates from 150 bpm at rest and 170 bpm during play. During timeouts and foul shots, heart rate falls but rises when the action resumes (Narazaki, Berg, Stergiou, & Chen, 2009, p. 428).

#### Basketball Players during an Intermittent Treadmill Test

<u>Speed (km/hr)</u>	<u>Rate of Perceived Exertion</u>	<u>Blood Lactate (mmol/L)</u>	<u>Maximum Heart Rate (%)</u>
Rest	n/a	1.1	29%
8	1.9	1.6	72%
10	2.9	1.7	80%
12	4.4	2.3	85%
14	6.1	3.8	91%
Maximum	9.0	9.2	100%

(Castagna, Manzi, Impellizzeri, Anis, Ben Abdelkrim, & Ditrollo, 2002, p. 2437)

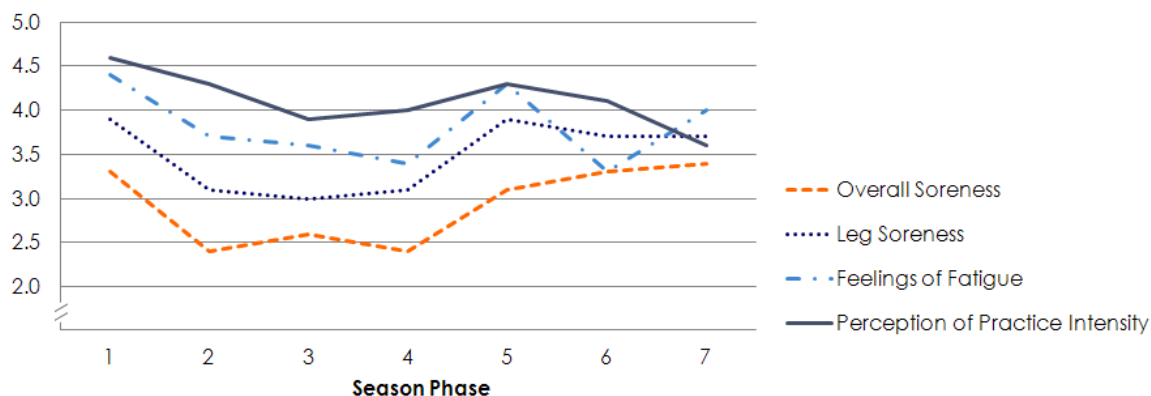
When players understand how they feel when they are working at an intensity that matches the Lactic Threshold and the conditions of games, they can monitor their efforts during team training and individual workouts. Coaches can subsequently create conditions to maximize those efforts.

For a cool down routine, athletes can take their heart rates in order to track their recovery progress. Athletes could also understand their blood lactate levels at the end of a typical workout and measure an appropriate recovery time for a cool down routine post workout (usually one minute per mmol/L, aerobic workouts require a ten minute cool down) (Wells, 2012, p. 172).

### Physical Feelings of Fatigue (Self-Evaluation)

Self-evaluation of muscle soreness, fatigue and practice intensity provides a snapshot of how an athlete feels over the year. Soreness and fatigue is high at the start of the year as athletes adjust to the higher intensity of training camp. It then lowers and plateaus for a while, before rising during the second half of the season. Ratings of practice intensity may be lower because the coach has tapered the training schedule or because athletes are not working as hard due to fatigue.

### Muscle Soreness and Feelings of Fatigue over the Season



(Hoffman, Bar-Eli, & Tenenbaum, 1999, p. 78)

## Coach Recovery

Coaches are often subject to mental and physical stress because of the demands of the job. Mental pressure accumulates because of the desire to please as many people - players, parents, administrators, colleagues - as possible and the burden of winning and losing. Physical strain occurs when meals, workouts and relaxation times are missed because of a busy schedule.

Players recover best when they can follow routines together. Likewise, coaches cannot recover when they are isolated. It is necessary to create a trusted network of supporters with whom to confide. Leaders must delegate responsibilities to other staff members but should not delegate their core duties, such as generating a philosophy for the team and holding everyone accountable. Although the numbers on the scoreboard are imposing, those involved in sports cannot define themselves by winning and losing (Walsh, 2009, pp. 225-226).

Maintain a healthy routine as much as possible: eat regularly, exercise and get enough sleep. Large doses of caffeine (more than 200 mg daily - there is 415 mg in a Venti Starbucks coffee) cause nervousness, sleep disruption and indigestion (Health Canada, 2003). Regular exercises elevate the mood in the short-term and address long-term depression (Weir, 2011). A lack of sunlight triggers seasonal affective disorder, resulting in depression and fatigue (National Health Service, n.d.).

Most importantly, keep things in perspective. After a set period of time, get over the emotions from an outcome (good or bad) and begin the process of critically analyzing what occurred. Coaches pursue their vocation because it is a chance to educate others. Find the fun in day-to-day coaching and it will spread to the rest of the coaching staff, the players and the community.

# 3

## Recovery for Basketball

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## Basketball Warm Ups

Performance during competitions is based on habits formed during training. The purpose of team warm ups is to get players ready to practice at **Game Intensity** and **Quality**. Warm ups should prevent injuries, develop athleticism, and enable players to reach their I.P.S.. A good warm up should increase body temperature and heart rate, reduce muscle stiffness, and prepare athletes for competition. Components should consist of cardio work, dynamic stretching, some routine skill development, and a speed element.

Static stretching is not appropriate for basketball because it reduces performance in activities which require strength, speed, and power. Also, dynamic will keep heart rate up and help players get ready to perform (Reynolds, 2008). It is unfortunate that far too many high school teams follow the identical warm up of static stretching, lay-up lines and free throws. Dynamic stretching can incorporate the sport-specific movements basketball players need to get ready.

### Practices

Since a thorough warm up is time consuming, include a variety of activities to keep the practice interesting and maximize instructional time. Every warm up includes footwork, pivoting and post play, ballhandling, and 1-on-1 drills. After the warm up, the team participates in station work in order to improve a sport-specific performance factor.

Plan practices so that there is enough time to warm up properly before beginning the main part of practice. All team members - especially coaches - should arrive on time at the start of practice to begin the warm up. If high school players have trouble to getting to the gym immediately after the bell, schedule a later start time so team members can take care of their academic and social errands (briefly), get changed and clear their heads before practice.

### Practice Routine

4:10-4:12	★ Call to Order      Acknowledge Last Practice Player and Best FT Shooter						2	
4:12-4:40	<b>TEAM WARM UP</b>	CARDIO/FOOT.	Closeout Key	4	PIVOT/POST	Seal/Perimeter	4	28
		ANKLE & DYNAMIC STRETCHING		10	BALLHANDLING	FC Drive & Kick	4	
		SPEED/CNS	Acceleration	2	1-ON-1	Influence	4	
4:40-4:52	Fitness		6 Core Stations			1:2	ST	12

- Cardio Warm Up (5-10 minutes)
  - *Purpose:* Raise Heart Rate
  - *Examples:* Exit Cuts, Transition, Ball Reversal
    - Emphasize Practice Themes
- Ankle Exercises (2 minutes) • Baseline to Halfcourt
  - *Purpose:* Injury Prevention, Preparation for Basketball
  - *Examples:* Walk on Toes/Heels and Outside/Inside of Feet, Hops (forwards, backwards and sideways), Jumps and Twists, Rollovers

- Dynamic Stretching (5-10 minutes) • Baseline to Halfcourt
  - *Purpose:* Loosening Up
  - *Examples:* Baseline to Halfcourt Stretches, Opposite Sidelines
    - Calves: Floor Sweeps, Calf-Backs
    - Hamstrings: Walking Leg Extensions, Lateral Leg Extensions
    - Quadriceps: Heel Kick with Arm Extension, Rapid Heel Kicks
    - Hip Flexors: Grasp Knee, Rapid Knee Lifts
    - Groin: Sumo Squats (Alternating Sides), Pull Ankle towards Groin
    - Pillar/Core: Lunges with Russian Twist, Opening Up
    - Total Body: Jogging, Bounding, Defensive Footwork, Closing Out
  
- Speed (1-2 minutes)
  - *Purpose:* Get Up to Game Speed, Activate Central Nervous System
  - *Examples:* Acceleration and Deceleration, Cuts, Full-Speed Ballhandling
    - Maximum Speed
    - Few Repetitions
  
- Post Play and Pivoting
  - *Purpose:* Build Correct Habits, Teach All Skills to All Players
  - *Examples:* Post Entry and Basic Moves, Pass Out of Double Team, Passing Tag
    - Protect the Ball and Decrease Turnovers
    - Help Guards and Forwards Work Together
  
- Ballhandling (5 minutes)
  - *Purpose:* Emphasize Correct Technique
  - *Examples:* Dropping Hips, Basic Ball Moves, Drive and Kick, Passing
    - Gradually Increase to Game Speed
    - Attack the Basket
  
- 1-on-1 Drills (5 minutes)
  - *Purpose:* Raise Competitive Intensity
  - *Examples:* Limited Dribbles, Fullcourt 1-on-1, Influence Drill
    - Pressure Ball Consistently
    - Incorporate Decision Making

#### Demonstration Links

- ➔ Part I: [http://www.youtube.com/watch?v=OszKhhrG\\_Po](http://www.youtube.com/watch?v=OszKhhrG_Po)
- ➔ Part II: <http://www.youtube.com/watch?v=-QIDzlycKAA>

## Games

Pregame instructions can be completed before the team hits the court. Interrupting the warm up for a brief team meeting is unnecessary for a well-prepared squad. The first part of the warm up follows a traditional format, with cardio, dynamic stretching, and speed. The middle part of the warm up emphasizes game situations such as catching the ball ready to shoot, driving to the hoop and kicking to a shooter, and post play. The final minutes of the warm up are designed to raise the team energy level and bring everyone together.



## Suggested Itinerary for a Twenty Minute Pre-Game Warm Up

Move quickly from one drill to another in order to maintain the high energy level. When performance is lacklustre or the details are suffering, the coach who is overseeing the warm up should enthusiastically urge the players to be aggressive and intense, without sacrificing precision.

- **≥20:00:** In the Hallway
  - Cardio
  - Ankle Exercises
  - Dynamic Stretching
  - Getting Loose
- **20:00:** 3 Laps around Half-Court
  - Finish with “Rapid Fire” down the centre of the court
- **18:00:** Two Lines
  - Give and Go
  - 90 seconds each side
- **15:00:** Downscreen Post Isolation
  - V-cut to 1-on-1 Attack
  - Downscreen to Seal
- **12:00:** Exit Cuts
  - Penetrate and Kick
  - Elbow Pull-Ups/ Corner Jumpshots
- **9:00:** “5 Ball” in the Halfcourt
  - Catch and Shoot on the Wings
  - Penetrate and Kick with Spot-Up Variation
- **6:00:** Defensive Work
  - 3-Player Pass and Close Out
  - 5-on-5 Shell Drill
- **3:00:** Sprint Sideline to Sideline (x3)
- **2:15:** Team Building Activity
- **1:30:** Team Enters Huddle
- **0:00:** Opening Tip-Off

## Individual Work

Adolescents must begin to understand what they require to get ready. If an athlete requires additional warm up time for injury prevention to a specific body part, apply their equipment or reach I.P.S., they should take responsibility to do so. Occasionally, a teenaged athlete buys equipment like ankle braces but does not arrive to the gym earlier so they can put them on without wasting practice time.

When attending a tryout or a practice in a new setting, the warm up routine may be disorganized or haphazard. Rather than nonchalantly shooting around, focused players who are looking forward to dedicated practice will follow a proper warm up routine *for themselves* and model the way *for their teammates*.

Anyone could be in the gym - such as another coach or a scout - and that idle time might turn into an informal tryout, even at the international level (MacKay, 2008). Little details like stretching correctly, completing the entire drill and executing game situations (instead of flashy shots such as dunks they cannot produce in games) separate elite athletes from the crowd.

## Basketball Cool Downs

A good cool down should return heart rate its resting rate, lower the levels of lactic acid and adrenaline in the body, and reduce soreness after activity or the next day. Cool downs should assist athletes to reach their I.P.S. during the next game or practice.

As the season progresses and the athletes become accustomed to the routine, leading the drills and stretching enables player initiative. A cool down should last about one minute for every millimole of blood lactate per litre ten. Blood Lactate for basketball players is between 4 and 6.5 mmol/L (depending on position) (McInnes, Carlson, Jones, & McKenna, 1995, p. 73) at the end of the game. When significant aerobic training has occurred, cool down routines should last at least ten minutes (Wells, 2012, p. 172).

### Practices

From the start of the season, a team should be consistent with their routine. Components should consist of some routine skill development, cardio work, and static stretching. The cool down is the last item that players cover each practice so it is a time to emphasize sound training (mental and training) principles and reinforce key basketball points (technical and tactical). Every cool down includes free throws, rebounding and boxing out, and moving without the ball. The drills and static stretching provide opportunities for student-athlete leadership by having a player take charge.

### Practice Routine

Plan practices so there is enough time for a full cool down routine. It's difficult for players to multi-task so leave additional time if there is important information that must be communicated to the players.

5:37-6:00	<b>COOL DOWN</b>	REBOUND.	Swim Moves	5	MOTION	Downscreens	5	23
		FTs	Sets of Two	5	STATIC STRETCHING		8	
<b>DISMISSAL</b>	<b>6:00</b>	<b>NEXT</b>	Friday April 1 <sup>st</sup> 2009		<b>TIME</b>	<b>4:05-5:45PM</b>	<b>GYM</b>	<b>GYM A</b>

- Rebounding (5 minutes)
  - *Purpose:* Practice Efficient Technique, Emphasize Important Skill
  - *Examples:* Box Out the Foul Line Circle, 2-on-2 (with a Coach Shooting)
    - Keep Score to Demonstrate the Points Created by Rebounding
    - Alternate between Offence and Defence
- Free Throw Shooting (5 minutes)
  - *Purpose:* Simulate Game Situations, Maintain Technique Despite Fatigue
  - *Examples:* Team/Individual Competitions, Select Random Players, Ask for Volunteers
    - Sets of Two
    - Under Pressure (with a Reward or Consequence)
    - Practice Mental Training Skills (Visualization, Breathing)
    - Teammates Watch Each Other Shoot

- Cardio Cool Down (5 minutes)
  - *Purpose:* Lower Heart Rate
  - *Examples:* Cuts and Passing, Motion Offense Reads, Moving without the Ball, 3-on-3 without Dribbling
    - Perfect Offensive Sets or Reads between Teammates
    - Emphasize Pivoting and Correct Footwork
    - Utilize the Mind and the Body

➔ **Demonstration Link:** <http://www.youtube.com/watch?v=OJXhAqL2CSs>

- Team or Individual Breath and Stretching (10 minutes)
  - *Purpose:* Increase Flexibility, Dissipate Lactic Acid, Prevent Injuries
- Deep Breathing
- Posture
  - Relaxed Stance
  - Walking
  - Balancing on Single Foot
- Ankle (with or without shoes)
  - Walking on Edges of Feet
  - Rolling on Balls of Feet
  - Ankle Circles
  - Rolling on a Tennis Ball
- Static Stretches (from top to bottom)
  - “W” Stretch with Head Lean
  - Shoulder across Body
  - Hip/Oblique Stretches
  - Back (Cobra and Child Stretch)
  - Seated Groin Stretch
  - Single Knee Cross
  - Leg Stretches
- Reflection/Relaxation

➔ **Demonstration Link:** [http://www.youtube.com/watch?v=J93Lq\\_L-iks](http://www.youtube.com/watch?v=J93Lq_L-iks)

## Games

Teams should cool down after every game, despite the emotions of a big win or loss. In addition to the physical benefits, a cool down helps players mentally come down from a tough competition. The team should degrief before they debrief their performance with coaches.

Use whatever facilities are available, such as hallways, alternate gyms, classrooms, or locker rooms. Avoid the other team and do not interact with other spectators. Coaches should supervise the cool down to prevent any incidents. Teammates should support each other and grow closer at this time. Leaders must take an active role in these cool down sessions.

- Cardio Cool Down (5-10 minutes)
  - Gradually Lower heart Rate
  - Suggestions: Jogging, Bounding, or Walking
- Static Stretching (10 minutes)

## Individual Work

Later in the evening, further static stretching can increase flexibility. Ankle work - or even simple skipping - can provide significant benefits in terms of stability and foot speed. Players who have a history of injury can use time while they are watching television or sitting in front of

a computer to stretch that area of the body. Posture and balance can be improved while walking to and from school. Deep breathing can reduce stress in all areas of a student-athlete's life.

## *Active Recovery*

Preventing injuries and recovering from exercise are two important elements of practice planning. Studies have shown that active recovery removes lactic acid from the body twice as quickly as non-active recovery (rest). Include time for active recovery on practice plans and teach athletes how to recover during and after exercise.

During exercise, lactic acid metabolizes in the body. This lactate acid lowers the body's pH level, which may impede performance by inhibiting key glycolytic enzymes and reducing the power of muscle contractions (Micklewright, Sellens, Gladwell, & Beneke, 2006, p. 315).

Basketball makes use of the Anerobic Lactic energy system 28.1 percent of the time (Ben Abdelkrim, El Fazaa, & El Fazaa, Time-motion analysis and physiological data of elite under-19-year-old basketball players during competition, 2007, p. 70). The rapid sprints, changes in directions, accelerations, and decelerations require athletes to practice and play at maximum intensity. The higher intensity of the exercise, the more blood lactate created. When blood lactate reaches a threshold, the athlete must lower their intensity level.

### **The Benefits of Active Recovery**

After activity, the lactic acid is cleared from the body slowly. Compared to non-active recovery, more blood lactate is removed in a shorter period of time. A fifty percent recovery can be achieved in under ten minutes, instead of over twenty. Working at fifty to sixty percent intensity achieves optimal lactic acid removal.

Also, this activity triggers cutaneous vasodilation which brings more oxygen to muscles (Wilson, Carter, Cutler, Cui, Smith, & Crandall, 2004, p. 671). Relaxation and psychological recovery are also increased. Active recovery can be continuous or intermittent. Athletes who maintain higher levels of personal fitness recover more quickly than those who do not (Monedero & Donne, 2000, p. 594).

### **Active vs. Passive Recovery**

For athletes who sprint frequently, active recovery is not necessarily the best approach. In repeated sprints, Passive Recovery results in lower sprint times and fewer signs of fatigue (Castagna, Abt, Manzi, Annino, Elvira, & D'Ottavio, 2008, pp. 924-925). Recovery mode does not impact blood lactate level in youth basketball players so this is not a consideration for training sessions (Castagna, Abt, Manzi, Annino, Elvira, & D'Ottavio, 2008, p. 927).

Per game, guards participate in sixty-seven sprints and a total of 104 high intensity sport-specific movements compared to fifty-six and ninety-four for wings and forty-three and eighty-four for centres, respectively (Ben Abdelkrim, El Fazaa, & El Fazaa, Time-motion analysis and

physiological data of elite under-19-year-old basketball players during competition, 2007, p. 72). For games, coaches can encourage players to develop Passive Recovery routines that conserve energy and substitute when repeated sprints have occurred without the interruption of a whistle.

## Combined Recovery

Basketball players can also massage themselves between exercises or use a basketball as part of warm up and cool down exercises (Ford, 2011). Recovery which combines activity and massage clears blood lactate levels quickly between bouts of high intensity exercise and maintains levels of maximal performance. Massage techniques include stroking, effleurage (light touches), and taponement (rhythmic tapping) to the lower extremities (Monedero & Donne, 2000, p. 594).

## Active Recovery during Practices

Practices should prepare athletes for games. A variety of dynamic drills at maximum intensity require athletes to be in top condition, which can be hampered by excessive blood lactate levels. In order to make the most of limited practice time, players should utilize active recovery.

Active recovery exercises should have a work:pause ratio of 1:1 to 1:2. The intensity should be fifty to sixty percent of maximum intensity. General drills include: walking, jogging, and dynamic or static stretching. Sport-specific drills include: free throws, stationary dribbling, and low to mid intensity shooting.

Coaches can make active recovery a part of the practice routine in a number of ways:

- Young athletes need as many repetitions as possible. Dribbling and shooting at a medium intensity level reinforce good habits and dissipate lactic acid.
- During station work, high intensity skill stations can be mixed with lower intensity ones.
- Instead of permitting athletes to leave the gym to get a drink of water, encouraging them to keep a water bottle and make use of it during periods of active recovery saves time and minimizes disruptions during practices.
- Free throws are shot in sets of two, under pressure, after an interval of high intensity activity. An action as simple as pulling individual players out of the drill or scrimmage in order to shoot free throws will simulate games.

## Incorporating Training Principles in Practice

4:10-4:32	Ballhandling ✓ <ul style="list-style-type: none"> <li>• Establish Correct Footwork</li> <li>• Maximum Speed</li> </ul>	○ Perf. Factor: Speed Ladder ○ Fullcourt Dribbling <ul style="list-style-type: none"> <li>• Two Ball</li> <li>• Push Dribble</li> </ul> Knife Drill → <ul style="list-style-type: none"> <li>• Minimum Dribbles</li> </ul> Competition: Fullcourt 1-on-1 <ul style="list-style-type: none"> <li>• Ballhandling Under Pressure</li> </ul> Act. Rec.: Tennis Ball Passing	1:1	AA AE BA SP QU	5 5 5 5 2
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In training sessions, coaches can pick two or three skills to emphasize. First, train the physical performance factors associated with the skill. Allow the players to master the technique before

increasing the difficulty. Bring the drill up to game speed. Conclude by adding the defence, ideally as part of a competitive situation. Afterwards, finish with a brief active recovery time.

## Hydration

During active recovery, sweat rate remains higher so athletes must remember to remain hydrated during games and practices (Wilson, Carter, Cutler, Cui, Smith, & Crandall, 2004, p. 670). Coaches should make a special emphasis of this point so young players do not forget to drink fluids while partaking in active recovery.

## Active Recovery during Tournaments

When athletes play multiple games in a short period of time, lactic acid can contribute to fatigue and exhaustion. Players must look after themselves physically and mentally. Proper nutrition and hydration are essential. Degriefing and debriefing between games reduces mental fatigue.

After games or between games during games, a fifteen minute recovery interval removes lactic acid and prepares athletes for subsequent games. A combined recovery (rest-active and massage-active) improve the rate of lactate removal comparable to active recovery but conserves glycogen stores in muscles.

# *Yoga and Basketball*

Given the volume of training and number of competitions, basketball players need to recovery from the physical and mental stresses of the sport. Previously a last resort scorned because of its image, yoga has become a more popular option for National Basketball Players. Initially adopted by mavericks like Kareem Abdul-Jabbar, yoga is now practiced by several teams who keep a yoga instructor on the training staff and individual players who have made it a part of their personal workouts (Stack, 2011).

A quotation by Bill Purvis that is frequently touted by leaders in speeches and tweeted by physical trainers states that, “if you always do what you’ve always done, you’ll always be where you’ve always been.” Older professional players have turned to yoga to extend their playing careers and maintain their performance while younger ones have used it to stand out in a crowded field. Over the years, more teams have joined the bandwagon and one instructor, Kent Kaitch, estimates that he’s worked with a quarter of the athletes in the N.B.A. (Stack, 2011).

## Rest and Recovery Benefits

Competitive sport requires athletes to undergo both mental and physical recovery in order to maintain elite levels of performance. Along with other tools like massage, hydrotherapy and a combination of active and passive rest, yoga is a tool which meets these needs. (Badau, et al., 2011, p. 259). Yoga can improve the mental aspects of basketball, like motivation focus and performance anxiety of competitive sport and physical performance factors like co-ordination and balance demanded by fine motor skills like free throw shooting (Bansode, 2012, p. 2).

## Sport-Specific Benefits

Athletes have improved foul shooting percentage by incorporating visualization, centering themselves and breathing exercises into their routine. Given yoga's emphasis on mindfulness, it would aid those who have mastered correct technique via dedicated practice but still experience difficulty achieving a state of flow under pressure. Yoga breathing exercises elevate mood and self-confidence (Bansode, 2012, p. 6). Learning breathing technique from yoga can also transfer to weight lifting and other training (Stack, 2011).

Dwyane Wade uses yoga to recover during the long season and increase flexibility in his lower body, hips and back (Murphy, 2012). Given the athleticism that is prevalent in the game today, it is critical that he stretch these muscles as he ages in order to maintain his first step. Driving towards the basket demands hip flexors, finishing at the rim the lower body and jumping and landing dozens of times per game his back.

Players adopt yoga late in their career because exercises reduce back and leg injuries - key muscles featured in basketball - and strengthen the core (Bansode, 2012, p. 6). Devoting a few minutes before or after practices and games for yoga exercises reduces stiffness and soreness (Stack, 2011). Pre-season yoga training has been a tool for veteran to prevent muscle injuries and quicken recovery times (Murphy, 2012).

## Youth Benefits

Yoga is an accessible activity that can be implemented by young players during team sessions or independently after activity, helping youth who are dealing with pressure at school, in sport or at home by lowering perceived stress and enhancing their sense of well-being. Student-athletes who participate in a yoga program experience an increase in self-control. They also gain greater adaptability, conflict resolution and self-awareness skills (Ramadoss & Bose, 2010, p. 78).

Some young players may struggle with mindfulness, attending to the present moment and observing their environment. In the classroom, this may materialize as a student who strays off-task and loses sight of their goals. On the basketball court, it might be represented by an athlete who forgets their responsibilities or experiences difficulties reading the play. Childhood adversity can interfere with brain development and exacerbate these difficulties. Yoga intervention which emphasizes mindfulness can reduce persistent worrying thoughts for at-risk youth (Mendelson, Greenberg, Dariotis, Gould, Rhoades, & Leaf, 2010, pp. 985, 991).

## Basketball Exercises

Yoga breathing exercises before practice, such as focused deep breaths or quick repeated breathing before practice can augment lung function over the course of a six-month season (Bansode, 2012, p. 6). The breathing techniques from yoga also transfer to games and training sessions, including weight lifting (Stack, 2011). Daily fifteen minute yoga sessions which incorporate breathing, meditation and a small number of poses can reduce stress in youth (Ramadoss & Bose, 2010, p. 78).

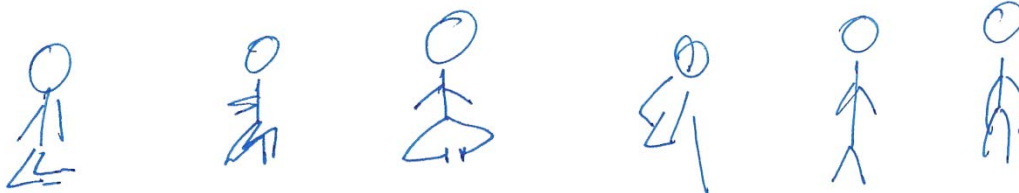
Programming recovery sessions twice a week for thirty to sixty minutes so all team members become aware of proper technique and create a routine, critical for young athletes (Badau, et al., 2011, p. 259). Professional teams that incorporate yoga into their recovery routines twice weekly have seen gains in balance, flexibility, mindfulness, self-consciousness and breathing patterns (Stack, 2011). Educators feel that short sessions are adaptable to all manner of teaching and coaching environments (Ramadoss & Bose, 2010, p. 79).

During poses, players may not feel as comfortable or as athletic as they normally do but it is important that they persevere to get the full benefit of the exercises. When athletes adopt a innovative routine recommended by a new trainer or a peer, they usually adapt eventually and reap the benefits (Murphy, 2012). Even mixing in a few poses into a static stretching routine can provide a refreshing change of pace.

## Sample Poses

### Meditation • Corpse, Easy, Mountain

**Feet & Ankles** • Hero, Thunder, Cobbler      **Knees** • Janu Siransana, Uttansana



**Back** • Child Pose, Downward Dog      **Core and Pillar** • Open Lunge, Plank, Cobra



**Groin** • Warrior I, Garland      **Hips** • Triangle, Upavistha Konasana, Half Moon



**Single Leg** • Tree, King Dancer      **Total Body** • Upward Salute, Mountain, High Lunge



### Demonstration Links

- ➔ Part I: <http://www.youtube.com/watch?v=0T60LUa12yc>
- ➔ Part II: <http://www.youtube.com/watch?v=-Cyn9-CrLkY>



# 4

## Injury Reduction

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# *The Importance of Injury Reduction*

Athletic participation contains a risk of injury. Despite the many positive benefits of sport, coaches must be wary of possible negative consequences. Firstly, coaches can prevent injuries by obtaining training and certification and planning ahead. When injuries occur, coaches can take leadership and help athletes receive the care that they need. As the athlete recovers, coaches can help them return to play safely.

Learning about injuries related to basketball meets the legal responsibilities of a coach and allows athletes to play the sport more. If there is a risk of harm to participants - from unlikely to highly probably, minor to disastrous - there is an expectation that coaches will address it.

Injuries cannot be entirely prevented, only reduced. Reducing the occurrences of injuries, their severity and recovery time can help teams immensely as the season progresses. Coaches can reduce the impact of injuries by making players aware of the risks of participation, instruct correct skills and training methods and managing fatigue (Stein, 2011).

## *Basketball-Related Concussions*

### Introduction

Traumatic Brain Injuries - as they are now known - have been a part of basketball since it first became popular in the first part of the twentieth century. Unfortunately, ignorance of the risk of these injuries has also plagued the sport at all levels. The first N.B.A. All-Star Game was created to raise funds for a great player who suffered a blow to a head during a game and subsequently lapsed into a coma.

Maurice Stokes was an elite power forward who could score, rebound and pass. He was one of the first athletes in the sport who combined tremendous strength with quickness, agility and explosiveness. In a game near the end of the 1958 season, Stokes drove to the basket and hit his head on the floor. He was knocked unconscious for several minutes and returned to the game after he was revived with smelling salts. Three days later, on a flight after playing in a play-off game, Stokes collapsed on a team flight, suffering from post-traumatic encephalopathy.

He lapsed into a coma for three weeks and awoke a quadriplegic with no speech function. Years of rehab, assisted by teammate Jack Twyman enabled Stokes to communicate and perform some basic tasks. Stokes died in 1970. In a three-year career, he averaged sixteen points, seventeen rebounds and five assists per game. Contemporaries said that had his career continued, he would have been known as one of the top ten basketball players of all time (Carter, 2004).

Hopefully, if an injury like Stokes' was to occur today, teammates, coaches and trainers would be more cognizant of concussions and their effects when diagnosing the injured athlete and determining when they can return to play, providing the support needed to make a full recovery.

## Concussions Defined

A concussion is caused by a blow to the head which shakes the brain inside the skull. A mild traumatic brain injury (M.T.B.I.) causes cells in the brain to discharge electricity (normally utilized to activate neurons) at once, destroying short-term memory and confusing the victim. Although visible signs, such as a bruise on the head, may not be visible, the victim could be suffering from a range of physical, mental and emotional symptoms (Ogilvie, 2011).

M.T.B.I.s can be caused by a single blow to the head or a number of small impacts over the course of a game or a sport season. As the head accelerates and decelerates along with the rest of the body, the brain – suspended in fluid – continues moving and collides with the inside of the skull.

Thirty thousand Canadians are diagnosed with a concussion annually although researchers believe that the number is much higher (Ogilvie, 2011). The concussion rate among Canadian junior hockey and high school football players is much higher than previously thought and many adolescent athletes may suffer from M.T.B.I.s that are not diagnosed.

## Basketball and Head Trauma

Despite an overall twenty percent decline in basketball emergency room visits for children and adolescents in the past fifteen years, concussions have increased seventy percent. The increase is a combination of a greater awareness of M.T.B.I.s and their effects and a sport that grows bigger, faster and stronger every year (Hutchison, 2010).

Among youth sports, basketball is second in terms of concussion rate, accounting for nine percent of all concussions. It ranks behind football but ahead of soccer, hockey and baseball. The high number of M.T.B.I.s can be attributed to basketball's high participation but the concussion rate is still rising. In the past ten years, the concussion rate for boys has doubled, whereas it has tripled for girls (Barker-Pope & Bradford, 2010).

## Youth and Head Trauma

Children and adolescents are more likely suffer a concussion from a blow to head (in basketball, concussions are caused by collisions with another athlete, the floor or the ball) than a fully-developed adult (Richards, 2011). Young people heal from concussions slower than adults and a head injury can impact them throughout their teen years and into adulthood (Metzl, 2010). Student-athletes may suffer headaches, nausea and confusion which hamper their academic performance. M.T.B.I.s make it hard to learn and study as the brain activity in class triggers the same symptoms as exercise (Hammer, 2011).

## Suspected Concussions

After a suspected head injury, the athlete should be removed from play and examined by a coach or trainer. Coaches must be especially attentive and observant since young athletes may conceal how they feel in order to continue to play or because the symptoms have not yet taken effect (McClincy, Lovell, Pardini, Collins, & Spore, 2006, p. 33).

Concussion Symptoms		
<u>Physical</u>	<u>Mental</u>	<u>Emotional</u>
<ul style="list-style-type: none"> <li>• General Confusion</li> <li>• Loss of Consciousness</li> <li>• Short-Term Memory Loss from Before or After the Injury</li> <li>• Slow Reaction Time</li> <li>• Weak Concentration</li> </ul>	<ul style="list-style-type: none"> <li>• Headaches</li> <li>• Decreased Playing Ability</li> <li>• Dizziness</li> <li>• Irregular Sleep Habits</li> <li>• Poor Co-ordination or Balance</li> <li>• Vision Trouble</li> <li>• Vomiting or Nausea</li> </ul>	<ul style="list-style-type: none"> <li>• Anxiety</li> <li>• Depression</li> <li>• Irritability</li> <li>• Moodiness</li> <li>• Sudden Change of Emotion or Inappropriate Emotions</li> </ul>

### Duration of Symptoms

The length of time that the athlete is affected by symptoms indicates the severity of the concussion. Those who exhibit more than five minutes of on-court mental status changes have longer post-concussive symptoms and greater memory decline. High school athletes who fall into the former group may be ready to return to play in about a week but those in the latter category will need longer (Lovell, et al., 2003, p. 302).

### Multiple Concussions

High school players who sustained a previous concussion were three times more likely to have a second concussion during the same season. The concussion symptoms on the court were more severe and a longer recovery time was necessary (Collins, Lovell, Iverson, Cantu, Maroon, & Field, 2002, p. 1175). Young people who have sustained multiple concussions reported significantly more symptoms and reduced memory scores on baseline tests (Iverson, Gaetz, Lovell, & Collins, 2004, p. 440).

### Treatment

Treat a suspected concussion as a T.B.M.I. unless shown otherwise and remove the player from the game. If they have show symptoms of a concussion, they should not play again in the game or the rest of the day (in the case of a tournament). The player may need to consult a physician; encourage them to return with a written diagnosis (most doctors have standard forms for head injuries that detail the grade of the concussion and a timeline for returning to activity).

Coaches should monitor the athlete for worsening symptoms, including seizures, which indicate bleeding in the brain or a more severe injury. Someone should check on the athlete for the next twenty-four hours to monitor them. The athlete can go to sleep but should be awoken every two to three hours to ensure they are recuperating (ThinkFirst-SportSmart, 2010).

### Concussion Grade

Concussions are graded from one (least serious) to three (most serious). Although more serious grades of concussions are more likely to present more acute effects of greater intensity at the time of the injury, these symptoms are not the only distinguishing trait. Symptoms may persist

longer for the higher grades. Recovery times for high school athletes do not appear correlated to the severity of the concussion (McClincy, Lovell, Pardini, Collins, & Spore, 2006, p. 37).

<b>Concussion Recovery Times (Ready to Return to Play)</b>		
<u>Grade</u>	<u>1 Week</u>	<u>2 Weeks (Includes Week 1)</u>
1	5.0%	18.3%
2	34.3%	74.0%
3	11.1%	44.4%

### Second Impact Syndrome

It is important to give youth plenty of time to recover before they return to play; someone who comes back too soon is at a greater risk of an M.T.B.I. which may compound the severity of the symptoms. Less severe impacts could aggravate the swelling caused by the first concussion and may lead to a worse injury or even death. The majority of victims of second impact syndrome are high school student athletes aged thirteen to eighteen, perhaps due to greater sensitivity to M.T.B.I.s for that age group or incorrect diagnosis (Lovell, et al., 2003, p. 295).

### Recovery Timeline

Athletes must progress through a series of steps symptom-free before they can resume contact sports. In case post-concussion syndrome returns after the activity, the athlete must be symptom free for the remainder of the day. Proceed through each step one day at a time (ThinkFirst-SportSmart, 2010).

<b>Six-Step Return to Play Guidelines</b>	
<u>Step</u>	<u>Description</u>
1	<ul style="list-style-type: none"> <li>• Complete Rest</li> <li>• No School, Physical Activity and Computer Use</li> </ul>
2	<ul style="list-style-type: none"> <li>• Light Aerobic Exercise</li> <li>• No Weight Lifting</li> </ul>
3	<ul style="list-style-type: none"> <li>• Sport-Specific Activity</li> <li>• No Body Contact or Jarring Motions</li> </ul>
4	<ul style="list-style-type: none"> <li>• Non-Contact Drills</li> </ul>
5	<ul style="list-style-type: none"> <li>• Drills with Body Contact</li> </ul>
6	<ul style="list-style-type: none"> <li>• Return to Competition</li> </ul>

Gradually increase the duration and intensity of the activity as the athlete recovers. Consult a physician if symptoms return at a later stage.

### Legal Responsibilities

Coaches and organizations have a duty of care towards the athletes participating in basketball programs. The standard of care to be provided is based on what a reasonable coach at that level would do, written standards and common sense. The risk of harm from concussions must be

appropriately managed; given the recent news coverage of M.T.B.I.s and their effects, failure to exercise any care in this regard would constitute negligence on the part of the coach and place the organization in a position of vicarious liability (Corbett, Findlay, & Lech, 2008, p. 29).

### Coaching Certification

Most youth coaches are unfamiliar with the symptoms of a concussion and correct treatment. Only a handful of coaches use an assessment tool although about half would be willing to do so if one was made available. Common misconceptions can lead to premature return to play decisions and an increased risk of second impact syndrome (Valovich-McLeod, Schwartz, & Bay, 2007, p. 141).

### Emergency Action Plan

In Canada, it is the responsibility of Canadian coaches to plan for possible crises, such as building evacuations and catastrophic injuries (Corbett, Findlay, & Lech, 2008, p. 230). A detailed Emergency Action Plan should include contingencies for when a concussion is suspected - for example listing who will render first aid and test the injured player - to ensure prompt and thorough treatment and prevent second impact syndrome.

The National Collegiate Athletic Association requires all member schools to have a concussion-management plan in order to treat players, reduce the occurrence of second impact syndrome injuries and make sound Return to Play decisions (Amber, 2010).

### Baseline Tests

Composite baseline tests can roughly determine the extent of an athlete's injury although pen and paper tests like the Sports Concussion Assessment Tool are less reliable than more expensive computerized tests. Although they are used by many National Hockey League and National Football League clubs, costly interactive tests like imPACT are not a feasible option for most school and community teams (McClincy, Lovell, Pardini, Collins, & Spore, 2006, p. 38).

### Proper Instruction

Failing to teach a skill is required to perform a sport at that level - even allowing athletes to perform a skill incorrectly - could be a legal liability for a coach if it leads to an injury (Richards, Game Misconduct: Violence, Abuse and Young Athletes, 2011). When coaches develop physical performance factors such as explosiveness, strength and speed, they must be equal conscious of instructing skills lacking in adolescents, such as balance, body awareness and agility (Reynolds, 2011). If one athlete is going to explode towards the rim at high velocity, others must be able to see what will happen and protect themselves.

### Managing Aggression

During a game, fouls, screens, hand-checks and other forms of contact will occur. These common plays could escalate to the point of recklessness or assault, causing a serious injury,

possibility an M.T.B.I.. Acts of violence are judged based on what a reasonable competitor would do: if the act exceeds the parameters of a normal game, there may be grounds for criminal or civil proceedings.

Coaches must not only instruct the technical aspects of the sport-specific movements in order to minimize injury to the player and the opponents but help athletes manage their aggression throughout the game and amidst instinctive reactions (Corbett, Findlay, & Lech, 2008, p. 41). Players must know how to defend and foul safely because a hard foul could lead to a collision and a concussion.

### Return to Play Guidelines

Every organization should have a Return to Play policy for athletes who have suffered (or are suspected to have suffered) a concussion. Young athletes badly want to play and do not understand the risks of returning to play too soon. In a worst case scenario, players or parents may conceal symptoms in order to play or coaches and organizations may overlook medical advice in order to win. A black and white policy is clear, easy to follow and takes the personal element out of the situation.

Students who take their time as they recover make better progress than those who push themselves. St. Michael's College School created a "Return-to-Learn" program which emphasizes student health over athletics. The six-level program begins with bed rest at home and gradually reintroduces class time, time online and homework. A student must be symptom-free for a week in order to move on to the next level (Hammer, 2011). At the University of Toronto, athletes must wait twice the duration of the symptoms plus twenty-four hours before returning to play (Richards, Return-to-Play Guidelines, 2010).

### Conclusion

Basketball is becoming safer and safer each day. It is an excellent way for young people to stay fit, make friends and have fun; physical inactivity is a far greater risk than any sport-specific injury (Richards, 2011). Parents and coaches should not prevent youth from participating in the sport but become aware of how it is evolving. Concussions are a critical issue in all sports in the twenty-first century and it is paramount to be fully aware of the signs and symptoms and the proper care for M.T.B.I.s.

## *Sport-Specific Injuries*

### Introduction

All things considered, boys' high school basketball is not a dangerous sport -- relative to football, hockey and wrestling, the risks of harm are not that high. Nevertheless, many athletes and coaches mistake the sport for a non-contact activity and do not properly prepare. When conducting practices and workouts, coaches must be mindful of both acute and overuse injuries.



## Rate of Injury

Basketball is a contact sport played at high speed. It has been estimated that male high school basketball players suffer an injury rate of 0.56 injuries per season. These injuries occur at a rate of 4.8 injuries per thousand athlete exposures. In games, intensity is higher and injuries occur at a rate of 16.9 injuries per thousand hours of game exposure (Caine, Maffulli, & Caine, *Epidemiology of Injury in Child and Adolescent Sports: Injury Rates, Risk Factors, and Prevention*, 2008, pp. 22-28).

Despite a practice:game ratio of 3:1, 50.3% of injuries occur during games, likely due to an increase of intensity. Fortunately, half of the injuries require less than a week of recovery and thirty percent of injuries require one to three weeks of recovery.

Professional players in the N.B.A. suffer an injury rate of 19.3 per thousand hours of game exposure. The difference in injury rates is likely due to the dramatic increase in intensity at the professional level, where training and competition push the human body to its limits (Fleming, 2010).

## Common Sport-Specific Injuries

Many basketball movements use the lower body to generate explosive power. Cutting sharply, stopping and changing direction and jumping and landing place athletes at a high risk of an acute injury. Two thirds of basketball injuries are to the lower body. Common injuries are: Knee (19.1% of all injuries, 13% of game injuries), Ankle (16.9% of all, 20.9% of game), Lower Back (9.0% of all, 7.2% of game) and Feet and Toes (7.9% of all, 5.0% of game) (Rechel, Yard, & Comstock, 2008, p. 200).

Symptoms of an acute injury include sharp localized pain. The onset of the pain follows contact to the affected area or a sudden movement, like planting a foot while cutting or landing on a foot after a jump. Swelling, reduced movement and lack of stability or weakness may also signal an acute injury (National Institute of Arthritis and Musculoskeletal and Skin Diseases, 2009).

Many basketball players suffer strains, sprains and tears of the Anterior Cruciate Ligament (A.C.L.), especially female athletes. The A.C.L. is a stabilizer running behind the kneecap which connects the thigh bone to the shin bone. A blow to the side of the knee can injure the A.C.L. as can a non-contact injury like cutting or landing after a jump.

When an athlete tears their A.C.L., a popping sound is followed by intense pain and swelling within six hours. In the case of a serious knee injury, do not attempt to move the joint. A splint should be used until evaluation by trained medical personnel has been performed. Do not return to play until proper evaluation and treatment has taken place (Sports Injury Clinic, n.d.).

The treatment for an acute injury ranges from rest, ice, compression and elevation to treatment from a sports therapist including surgery, immobilization and physiotherapy. This article is not meant to provide medical advice. Consult a physician if a serious injury is suspected.

In the case of young athletes, caution is recommended. Continuing to play can aggravate the injury or cause another injury because the distraction due to pain reduces athlete focus.

## Overuse Injuries

Basketball players who train excessively are at-risk for overuse injuries to the lower extremities. Half of all youth injuries are overuse injuries, likely due to an organized training program that pushes a growing body past its limits (Hyman, 2009).

### Ankle and Foot Injuries

Achilles Tendinitis is a strain of the Achilles tendon at the back of the foot if the calf muscle becomes tight while running or jumping. When basketball players devote more time to strength training, they may inadvertently shorten the gastrocnemius muscle and tighten the Achilles tendon, creating more plantar flexion and exposing the ankle joint to a greater risk of sprains (Leanderson, Wykman, & Eriksson, 1993, p. 205).

Plantar Faciitis is strain of the ligament along the arch of the foot which can cause tenderness, swelling, or pain while running and jumping. The injury may require two to three weeks of rest. A lump on the arch of the foot may indicate a rupture of the ligament (Sports Injury Clinic, n.d.).

### Knee Injuries

Anterior Knee Pain is the most common knee overuse injury (Cumps, Verhagen, & Meeusen, 2007, p. 206). Chondromalacia Patellae occurs when knee cartilage rubs against the bone and Patellar Tendinitis involves micro-tears to the tendon which joins the kneecap to the tibia (Sports Injury Clinic, n.d.). These conditions may lead to soreness during or after workouts. Athletes should wait for soreness to subside before commencing the next workout.

### Back Injuries

The most common back injury for high school athletes during training is acute (short-term) back pain caused by a muscle strain (Rechel, Yard, & Comstock, 2008, p. 200). The injury may be caused back overtraining: lack of recovery between workouts, too much resistance, or too many repetitions.

Strengthen the back, core and pillar muscles with exercises such as plank variations and the superman stretch. Also, encourage players to keep their legs bent (instead of their backs) for better balance and posture.

### Joint or Muscle Soreness

Minor soreness after a workout can be treated with rest, ice and gentle massage or stretching. Young athletes should not persevere during a sprain (stretching a tendon or muscle beyond its limits) or strain (minor muscular tear). The difference between soreness and a serious injury is

that soreness is dull pain over a larger area whereas a strain is sharp pain localized to one area (Sports Injury Clinic, n.d.).

### Stress Fractures

The continuous pounding of running or the high impact of jumping and landing can cause stress fractures, such as the second metatarsal bone in the big toe, the navicular bone, or the heel. Symptoms are tenderness and swelling at the point of the injury and pain that worsens during the activity. Athletes should see a doctor if a stress fracture is suspected and may need to immobilize the foot for six to eight weeks (Sports Injury Clinic, n.d.).

### Young Athletes

During and immediately following a growth spurt, young athletes are at additional risk for an acute injury. When limbs and muscles grow in size, they place additional stress on tendons which can be slower to develop. Boys may suffer from reduced flexibility in their joints (Hawkins & Metheny, 2001, pp. 1703-1704).

Inadequate treatment and rehabilitation in youth sport lead to re-injury and overuse injuries. Coaching staff must monitor closely and employ good judgment when the player is too young to do so for themselves (Caine, Caine, & Maffulli, Incidence and Distribution of Pediatric Sport-Related Injuries, 2006, p. 509).

### Physical Fitness and Fatigue

Lack of physical fitness is a major risk factor for injury (Hergenroeder, 1998, p. 1059). Teams that are not in peak condition may be unable to handle the intensity and volume of the training. As athletes tire during practice or competition, the risk of injury increases. Muscles and tendons are pushed beyond their limits, contributing to overuse injuries and mental focus wanes. Stress from outside the sport also contributes to this fatigue (Kerr & Minden, 1988, p. 171).

## Psychological Factors Contributing to Injuries

In addition to the intense nature of the sport and overtraining, there is a multitude of mental factors that amplifies the risks facing athletes. Excessive pressure to perform in sport may contribute to both physical and mental harm (Hergenroeder, 1998, p. 1063).

### A-Trait Anxiety

Athletes experiencing high A-Trait anxiety lose focus and awareness of the game situation. Even minor irritations, such as the daily hassles which accumulate from time to time can increase the risk of injury. Players who experienced a high degree of aggravation faced a greater risk of acute injury during the following week (Williams & Andersen, 1998, p. 10).

If an athlete is worried about something not directly related to the task at hand, they are not focused. Basketball is a dynamic game that requires players to remain aware of the ball and nine

other players. Poor perception may cause players to enter risky situations where acute injuries are more likely, for example by missing vital visual or auditory clues (such as another player diving for the same loose ball), instigating contact, or pushing themselves beyond their abilities (Andersen & Williams, 1988, p. 299).

### A-State Anxiety

A-State anxiety raises muscle tension, one of the top factors for lower extremity injuries in basketball (Williams & Andersen, 1998, p. 17). This tension disrupts co-ordination and flexibility, leading to sprains, strains and other injuries (Andersen & Williams, 1988, p. 299). Hormones such as Adrenaline, which is released to cope with stressful situations, may interfere with attentional focus or raise aggression to the point of generating a dangerous situation (Sports Injury Bulletin, n.d.).

### Previous Injury

Previous injury may cause an athlete to doubt themselves and consequently hesitate or favour a specific body part. This may lead to lack of focus or incorrect technique. Also, muscle or tendon which has already been hurt may have a lower tolerance for training, which makes it more susceptible to an overuse injury (Caine, Maffulli, & Caine, *Epidemiology of Injury in Child and Adolescent Sports: Injury Rates, Risk Factors, and Prevention*, 2008, p. 32). A single ankle sprain can reduce confidence, increase postural sway and elevate the risk of future injury (Leanderson, Wykman, & Eriksson, 1993, p. 204).

### Self-Confidence

Athletes should maintain a positive frame of mind. Some players may feel that they are a failure should they fail on the court. Worry about disappointing themselves, friends, coaches, or family members can heighten anxiety. Participants in youth sports should pursue mastery-oriented goals and strive to meet their needs for socialization and fun. Youth who remain fixated on performance-oriented goals could push themselves too far, aggravating minor injuries or soreness (Hergenroeder, 1998, p. 1062).

Players with low self-confidence in their abilities are about four times more likely to be injured than those who are more confident. This low perception leads to a self-fulfilling prophecy as a fear of injury and failure results in a loss of focus and a real injury (Kontos, 2004, p. 453). The answer is not false praise but objective communication between players and coaches about what is possible at that moment. Positive team environments provide all players with social support which can boost confidence and relieve anxiety (Johnson, Ekengren, & Andersen, 2005, p. 33).

### Prevention

Simple education in proper technique, hydration and nutrition, training strategies and common injuries can make a difference in the number of sports injuries suffered by adolescents (Caine, Maffulli, & Caine, *Epidemiology of Injury in Child and Adolescent Sports: Injury Rates, Risk Factors, and Prevention*, 2008, p. 45).

## Understanding the Sport

Sports injuries peak in adolescence because of increased risky behaviour. Young males may inaccurately perceive the risk of injury inherent in a situation and attempt an ill-advised action (Kontos, 2004, p. 453). Most concussions are the result of collisions, which can be minimized if the player is cognizant of their surroundings (Hutchison, 2010).

Coaches must inform athletes about the real risk of their sport. Honest and thoughtful self-evaluation of one's body while exercising minimizes overuse injuries (Johnson, Ekengren, & Andersen, 2005, p. 33). When young athletes are fixated upon a sport, they may not make sound judgments about their physical and mental health. It's particularly necessary for parents and guardians to understand the risks of athletics so they can model sound judgments (Hyman, 2009).

## Technique

Injury rates are correlated to the level of play. As skill increases, so does the risk of injury (Hergenroeder, 1998, p. 1059). In practice, athletes may attempt skills that are beyond their abilities. In games, players work even harder to keep up with expert opponents. As the level of competition rises, knowledgeable coaching in practices and workouts is imperative.

Balance, strength and agility are required to perform advanced basketball skills. A player who is balanced is not only more effective but more stable. This stability distributes stress evenly throughout the lower extremities while running and jumping. Balance training reduces the risk of ankle sprains among young players (Cumps, Verhagen, & Meusen, 2007, p. 212).

Sport-specific agility and plyometric drills allow athletes in the correct technique and build capacity. Training routines initiated during the pre-season phase of the Y.P.I. and continued during the competitive phase reduce acute injuries significantly (Caine, Maffulli, & Caine, Epidemiology of Injury in Child and Adolescent Sports: Injury Rates, Risk Factors, and Prevention, 2008, pp. 34-35).

## Exercises to Stretch and Strengthen

A warm up routine including cardiovascular work, ankle strengthening and dynamic stretching and speed work prepares athletes for training. Dynamic stretches are favoured over static ones, which decrease performance in activities requiring strength, speed and power. Pre-activity static stretching may stiffen muscles and tendons, raising the risk of injury (Kovacs, 2006, pp. 6-7).

Flexibility training - during cool down routines and at home - will improve balance and reduce injuries (Leanderson, Wykman, & Eriksson, 1993, p. 205). Athletes with increased flexibility have a reduced risk of injury (Watson, 2001, p. 224).

Areas of need for a basketball players are the hips (abduction and flexion), groin, core and pillar and ankles. When coaches observe a young athlete struggling with flexibility due to a growth spurt or inactivity, they should intervene in order to minimize the risk of injury. Since the relationship between flexibility and injury rate is U-shaped, practice moderation (Watson, 2001, p. 225).

“Pre-hab” exercises strengthen a body part before it is injured. Before or after practices, a player can perform minor exercises to stretch the ankle joint, such as balancing, small hops, lifts and pivots. Teams can include a specific ankle warm up (with or without shoes) and players could even work on their ankles at home while watching television.

Strengthening the hamstrings and quadriceps will reduce the risk of A.C.L. injuries. A few repetitions each practice can make a big difference without consuming too much time. Athletes who have sustained an injury should always follow the instructions of their doctor or therapist.

### Mental Training

Individuals with a history of personal stress and possessing few coping skills will experience more injuries. Practice should not only include physical training but mental preparation as well. When practice mimics the pressure of game situations, players are constantly putting their skill, athleticism and coping skills to the test (Sports Injury Bulletin, n.d.).

Participants in a stress management program experienced half of the injuries as a control group without any specific training (Williams & Andersen, 1998, p. 20). These techniques may include pre-game visualization, positive self-talk and breathing exercises. Prior to participating in competitive sport, athletes should enter an I.P.S..

The words and actions of coaches strongly influence young athletes. If a coach seems out of control, team members could adopt this personality and play carelessly (Sports Injury Bulletin, n.d.). Coaches and adults should behave consistently, reacting calmly to both success and failure. A coach who brings the stress from their other life into practice or reacts to a bad break during a game like it's the end of the world models a poor example.

### Planning and Periodization

Throughout the season, teams should follow an organized training program. Coaches should increase capacity gradually and provide suitable rest periods. Soreness may occur, especially early in the training program. Wait for soreness from a prior workout to diminish before training again. If soreness occurs frequently, decrease the intensity of the workout.

Daily contact with players permits coaches to assess the team's stress level throughout the season and monitor the risk of injury. When a coach senses that a team is tired, they can shorten the workout to prevent an overuse injury. Taper periods reduce physical demands of players at key times during the year when mental pressures are greatest.

### Conclusion

Despite the best precautions, injuries are inevitable. By utilizing safe facilities and equipment, certifying themselves in First Aid and sport-specific training and closely supervising athletes, coaches can minimize the frequency and severity of injuries. A coach's initial reaction to an injury - providing appropriate care and encouragement - is critical for the athlete's recovery.

# 5

## Resources

- [YouTube Playlist...](#) page 1
- [Works Cited...](#) page 1





## YouTube Playlist

The video clips used for instructional purposes can be found on my YouTube channel.

→→→ Link: <http://www.youtube.com/user/coachbourgase>

Since some players are shown, the clips from this assignment are unlisted and the links must be entered exactly as shown in order to be viewed.

- **Basketball Warm Up**
  - Part I: [http://www.youtube.com/watch?v=OszKhrg\\_Po](http://www.youtube.com/watch?v=OszKhrg_Po)
  - Part II: <http://www.youtube.com/watch?v=-QIDzlycKAA>
- **Basketball Cool Down**
  - Cardio Cool Down: <http://www.youtube.com/watch?v=OJXhAqL2CSs>
  - Static Stretching: [http://www.youtube.com/watch?v=J93Lq\\_L-iks](http://www.youtube.com/watch?v=J93Lq_L-iks)
- **Yoga for Basketball**
  - Part I: <http://www.youtube.com/watch?v=0T60LUa12yc>
  - Part II: <http://www.youtube.com/watch?v=-Cyn9-CrLkY>

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*"No matter what business you're in, you can't run in place or someone will pass you by. It doesn't matter how many games you've won."*

*- Jim Valvano*