

Recovery modern techniques used to reduce sport fatigue

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Abstract: At the elite level of sport where the differences between winning and losing are small, the Techniques use of recovery strategies to enhance and improve performance, therefore provides an important consideration in the search for optimal performance. Furthermore reduce of fatigue during or at the end of the training or competition, within this a fatigue comes from a lot of factors, training and competition, nutrition, psychological stress, lifestyle, quality and amount of sleep, health..., Therefore an understanding of the recovery strategies is essential and important to the high-performing athlete in a bid to reduce fatigue and enhance performance.

There are a number of popular methods used by athletes to enhance recovery, Their use will depend on the type of activity performed, the time until the next training session or event and equipment and/or personnel available. Therefore In this study therecovery strategies including therapeutic and supplemental strategies, passive recovery strategies, nutrition for recovery and active recovery strategies reduce the fatigue.

Keywords: recovery Modern Techniques, Sport Fatigue.

ملخص:

في المستويات الرياضية العالية والنخبوية أين يكون الفرق بين الفوز والخسارة ضئيلاً جداً يمكن التطبيق الأمثل لاستراتيجيات الاسترجاع لتحسين الأداء واتمامه، فهو يوفر اعتباراً مهماً في البحث عن الأداء الأمثل. علاوة على ذلك، الاسترجاع يساهم في تقليل التعب أثناء أو في نهاية التدريب و المنافسة، يأتي التعب من عدة عوامل واسباب منها التدريب والمنافسة، التغذية، الضغط النفسي، نمط وجودة الحياة، وكمية النوم، الصحة، درجة حرارة البيئة. لذلك فإن فهم وتطبيق استراتيجيات الاسترجاع أمر ضروري ومهم للرياضيين في المستويات العالية في محاولة للحد من التعب وتحسين الأداء. هناك عدد من الطرق الشائعة التي يستخدمها الرياضيون لتعزيز الاسترجاع، يعتمد استخدامها على نوع النشاط المنجز، والزمن المتاح بين حصص التدريب والمعدات، وبالتالي فإن هذه الدراسة تتضمن استراتيجيات الاسترجاع بما في ذلك الاستراتيجيات العلاجية والتكميلية، واستراتيجيات الاسترجاع السلبي، والتغذية من أجل الاسترجاع واستراتيجيات الاسترجاع النشط والتي تقلل من تعب الرياضيين.

الكلمات المفتاحية: تقنيات الاسترجاع الحديثه، التعب الرياضي.

Introduction:

Recovery techniques from exercise training in the competition is a vital component of the overall exercise program, and paramount for performance and continued improvement. If the rate of recovery is appropriate, higher training volumes and intensities are possible without the detrimental effects of overtraining. Therefore, an understanding of the recovery strategies is essential and important to the high-performing athlete in a bid to reduce fatigue and enhance performance. Considerable individual variability exists within the recovery process due to training status (trained , untrained), factors of fatigue and a person's ability to deal with physical, emotional and psychological stressors, the aim of this study is to search and improve the recovery strategies and to do so we have to look the factors causes of fatigue, define fatigue, and fatigue indicators, in this research I mentioned a lot of causes of fatigue at the elite athletes, from the training and competition, nutrition, psychological stress, lifestyle, quality and amount of sleep, health, environment temperature. And then I talked about the recovery strategies within this strategies we can make a difference between athletes special at the overreaching training, and the competitions. within this What are the recovering strategies method the athlete can apply to recover high level to reduce a fatigue ? What the athletes at the high level do to improve their recovery?

Passive recovery is broad category of recovery methods that occur without significant physical or psychological effort. Instead of using energy or resources to dissipate fatigue, passive recovery relies on preventing the use of resources for other endeavors so that they can be routed towards recovery.

1- Keywords:

1-1- Defining recovery: Recovery is regarded as a multifaceted (eg, physiological, psychological) restorative process relative to time. In case an individual's recovery status (eg, his or her bio psychosocial balance) is disturbed by external or internal

factors, fatigue as a condition of augmented tiredness due to physical and mental effort develops.¹

1-2- **Elite athletes:** Elite athletes are individuals having achieved excellence within the context of their sport. There are various discrepancies regarding the specific criteria needed to achieve 'elite' status. Whereas some studies define the elite based on their level of play (e.g., national or international), others provide standards such as professionalism, experience, and training time and/or frequency to delineate elite athletes from their novice counterparts (Swann, Moran, & Piggott, 2015). Given that every sport discipline has unique developmental pathways and competition streams, homogenizing the elite across sports becomes a very challenging task.²

1-3- **fatigue:** inability to maintain a given exercise intensity.³

2- Objectives:

- Knowledge the causes of fatigue, Fatigues effects on sport performance, Indicators of fatigue.
- Knowledge the recovery strategies, and which recovering strategies method the athlete can apply to recover high level.
- knowledge of recovery applications

3- **Fatigue:** Fatigue is an important concern for all athletes, sportspeople and coaches, and in clinical exercise science. There remains considerable debate about the definition of fatigue, what causes it, what its impact is during different forms of

¹ Halson SL: Monitoring training load to understand fatigue in athletes. Sports Med. 2014;44:139–147.

² Dieter Hackfort, Robert Schinke, Bernd Strauss: Dictionary of Sport Psychology. 1st edition. Academic Press. 2019.

³ Brooks, George, Thomas Fahey, and Kenneth Baldwin: Exercise Physiology: Human Bioenergetics and Its Applications, 4th Edition (McGraw-Hill Education, 2004. p 15.

exercise, and what the best methods are to combat fatigue and improve performance.

3-1- Defining fatigue: Another source of confusion is that researchers often use the terms 'fatigue' and 'exhaustion' interchangeably. A participant who is no longer able to maintain a given power output during a time to exhaustion test will often be classified as having reached 'exhaustion'. However, they may still be fully capable of continuing exercise at a lower intensity. The definition of exhaustion as: a total loss of strength; to consume or use up the whole of.¹

The term 'fatigue' has many definitions, and this makes the consistent interpretation and comparison of research findings into fatigue difficult.

1- The moment when a participant is unable to maintain the required muscle contraction or performed workload.

2- Extreme tiredness after exertion; reduction in efficiency of a muscle, organ etc. after prolonged activity.

3- The failure to maintain the required or expected force.

4- Fatigue produced by failure to generate output from the motor cortex.

5- A loss of maximal force generating capacity.

6- A reversible state of force depression, including a lower rate of rise of force and a slower relaxation.

7- Any exercise-induced reduction in the ability of a muscle to generate force or power; it has peripheral and central causes.

8- Failure to continue working at a given exercise intensity.

9- Any exercise-induced reduction in the ability to exert muscle force or power, regardless of whether or not the task can be sustained.

¹ Moore B, ed. The Australian Concise Oxford Dictionary (4th edn). South Melbourne: Oxford University Press. 2004.

10-A progressive reduction in voluntary activation of muscle during exercise.¹

11-fatigue: inability to maintain a given exercise intensity.²

3-2- **The causes of fatigue:** The most common non-medical causes of tiredness in the athlete are inappropriate training plan, poor sleep, lifestyle stressors, inadequate macronutrient intake and suboptimal hydration. Review of the training history, sleep habits and nutrition may reveal factors contributing to tiredness. With regards to training, specifically, increase in volume, intensity and frequency of competition should be looked at. In terms of sleep, evidence indicates adults require at least 7 hours of sleep. Beyond sleep duration, quality can be assessed using an activity tracker or App. Nutrition history should focus on macronutrient deficiency and iron intake. Advice from a registered sports dietician is ideal.³

This table shows the most causes of fatigue for elite athletes:

Table (1) most causes of fatigue for elite athletes.⁴

TRAINING/COMPETITION	Volume, intensity, duration, type of training/sport, degree of fatigue, recovery from previous training/competition
NUTRITION	Carbohydrate, protein and other nutrient intake, fluid and electrolyte balance
PSYCHOLOGICAL STRESS	Stress and anxiety from competition
LIFESTYLE	Quality and amount of sleep, schedule, housing situation, leisure/social activities, relationship with team members, coach, friends and family, job or schooling situation
HEALTH	Illnesses, infection, injury, muscle soreness and damage
ENVIRONMENT	Temperature, humidity, altitude

¹ Phillips, S: Fatigue in Sport and Exercise. London: Routledge, new york, NY 10017,2015. page 3.

²Brooks, George, Thomas Fahey, and Kenneth Baldwin: Exercise Physiology: Human Bioenergetics and Its Applications, 4th Edition (McGraw-Hill Education, 2004. p 15.

³ sara forsyth . The Tired Athlete: An issue of Under recovery, MSc, MD, CCFP(SEM), Dip, Sport, Med(CASEM).2019.

⁴shona L. Halson: recovery techniques for athletes. J. sports. 2014. Sci.sse 120.

3-3- Fatigues effects on sport performance: In a properly overloading program, cumulative fatigue slowly rises each week, until it reaches levels high enough to encumber performance. At his point, the athletes entered into a very specific state of physiology called overreaching.

Overreaching describe a state wherein accumulation of fatigue is such that overload training is no longer sustainable. If overreaching is sustained for a very short time, one can continue to train productively. And if this brief overreach is followed by period of reduced training, it allows for high levels of adaptation, called functional overreaching.

New technique acquisition: When athletes are training at overreached state, they often lose the capacity to acquire new technique, that's why learning new techniques at the end of practice is not ideal.

Speed: Our ability to achieve maximal movement speeds begins to decline at around the same time as our capacity to learn new technique. This means that after a few days of high fatigue, short distance sprint speed, striking speed, and reactive quickness begin to decline.

Known technique refinement: In a highly fatigued state, days after new technique expression and speed begin to suffer, the ability to perfect an already learned technique will decline as well.

Known technique expression: Athletes who are too fatigued to express techniques well at the correct speed will often revert to slowing down in order to get the technique right, which allows them to execute the move.

Peak power: After several day of training in high fatigued state, power begins to measurably decline.

Strength: Strength begins to decline after about two weeks of overreaching, but is reversible and super-compensatory if period of overreaching do not exceed three weeks, because strength is easily measured and more resistant to decline.

Body composition change: As fatigue aggregates, the net metabolic balance of the body begins to shift toward catabolism.

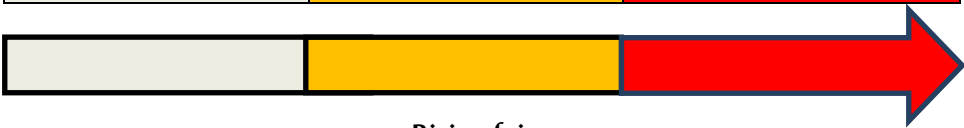
Increased chance of illness: The longer fatigue sustained, the more physical resources the body requires to ameliorate it.

Increased injury risk: Injury risk becomes exponentially greater as fatigue rises and continues to be sustained.

3-4- Detecting fatigue :

Table 02 : Indicators of fatigue

Leading	concurrent	Lagging
Recent nutrition	Movement velocity	Heart rate variables
Recent psychological state	Perception of effort	Desire to train
Recent physical task level	Relative performance	Mood disturbances
Recent training load	Strength	Appetite suppression
Technical condition	Competition performance	Sleep disturbances
Learning proficiency		Illness
Jump height		Wear and tear injuries



Rising faigue

4- Recovery strategies: There are a number of popular methods used by athletes to enhance recovery. Their use will depend on the type of activity performed, the time until the next training session or event and equipment and/or personnel available. Some of the most popular recovery strategies for athletes include hydrotherapy, active recovery, stretching, compression garments, massage, sleep

and nutrition's. I would like to talk in this research about four recovering strategies like it shows in this hierarchy :

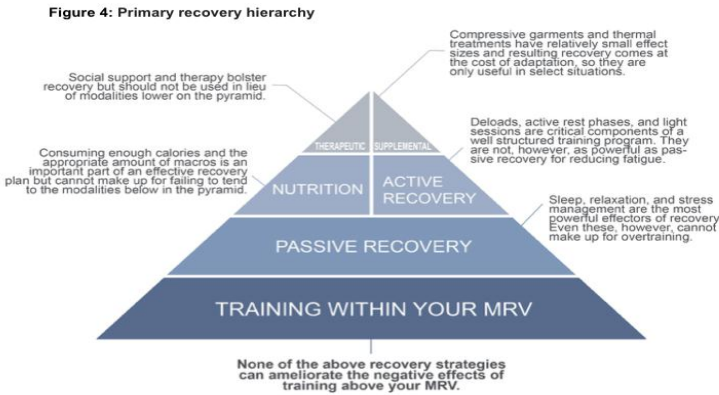


Figure 01: recovery strategies hierarchy.

5- **Passive recovery:** is a broad category of recovery methods that occur without significant physical or psychological effort. It relies on preventing the use of resources for other endeavors so that they can be routed towards recovery.

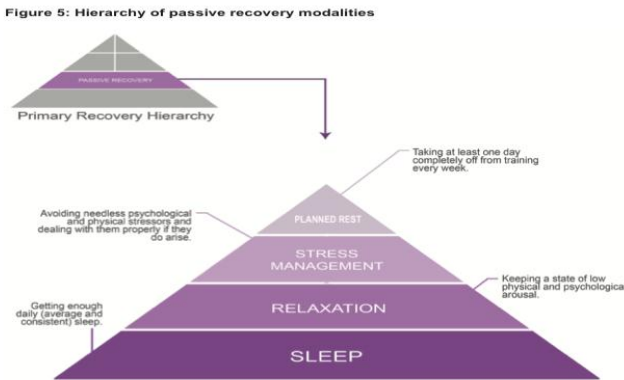


Figure 02: passive recovery hierarchy.

5-1- **Sleep:** The benefits of good sleep come into particular focus for athletes. Post-exercise recovery with extra sleep accelerates the building of muscle, strength, and

endurance. Without proper sleep, athletes suffer from poorer reaction times, longer recovery times, and worsened performance.

How does sleep affect athletes?

The amount of sleep an athlete gets impacts their reaction time, attention and focus, physical recovery and injury proneness. The body restores itself during sleep, so it is necessary for recovery from intense training. A person who is sufficiently well-rested will not waste any resources on staying awake or straining to stay focused and alert. Thus, their body and their mind can focus solely on their athletic performance.

5-2- Relaxation and massage: Massage is a widely used recovery strategy among athletes. However, apart from perceived benefits of massage on musclesoreness, few reports have demonstrated positive effects on repeated exercise performance. Furthermore, increased blood flow is one of the main mechanisms proposed to improve recovery (thus improving clearance of metabolic waste products). However, many studies reported no increase in blood flow or lactate removal during massage. Indeed, in a recent study, Wiltshire and colleagues (2010) reported that massage actually impaired blood flow and lactate removal.¹

Several reviews of the effects of massage have concluded that while massage is beneficial in improving psychological aspects of recovery, most evidence does not support massage as a modality to improve recovery of functional performance. However, as massage may have potential benefits for injury prevention and management; massage should still be incorporated in an athlete's training program

¹ Wiltshire, E.V., V. Poitras, M. Pak, T. Hong, J. Rayner, and M.E. Tschakovsky. Massage impairs post exercise muscle blood flow and "lactic acid" removal. Med. Sci. Sports Exerc. 2010. 42: 1062-1071.

for reasons other than recovery.¹ Probably the most common application of a physical relaxation technique used to reduce athletes' somatic anxiety symptoms is the collection of psychological skills grouped under the rubric of progressive muscle relaxation techniques. Although these specific skills exist in several different uses, the most common enables performers to learn the skill of physical relaxation through a series of logical, progressive stages. The primary goal is for performers to reach an end point where the skill, and thus a relaxed physical state, can be attained very rapidly in practically any stressful situation.

Traditionally, when learning the skill, athletes will advance through different stages where the amount of time it takes to achieve a relaxed state progressively decreases. During the preliminary stage of learning the skill, performers are required to systematically focus their attention on different gross muscle groups within the body, consciously tensing and relaxing to increase self-awareness of the difference between a tensed (anxious) state and a relaxed (less anxious) one. To supplement this process, athletes will usually be provided with some form of audio track that contains a set of instructions that methodically guides them through the muscle groups of their body. As with all the stages of the program, athletes will not progress to the next stage until they are proficient in the technique.

5-3- Stress management: A summary of the psychological skills presented under the umbrella of the structuring approach is one that advocates combining various techniques into an integrated framework. Creating individualized psychological skills programs that are designed to meet the specific needs of the athlete is recommended. The important distinctions of these programs over those that attempt to solely manage the level of anxiety is the creation of an appraisal process

¹ Wilcock, I.M., J.B. Cronin, and W.A. Hing. Physiological response to water immersion: a method for sport recovery? *Sports Med.* 2006. 36: 747-765.

whereby athletes gain control over themselves, the situation, and the anxiety symptoms that they experience in stressful environments. This approach also enables sport psychologists to take into account the specific activation demands of the tasks and events in which performers compete. A final caveat to the restructuring approach is that, to date, research has indicated that it is the more elite performers who may gain the most out of such an approach, whereas for lower level athletes, programs based on relaxation may be more suitable in the first instance. It appears, therefore, that the more advanced psychological skills used within the restructuring approach are more suited to elite level performers. Whichever approach is used, a suitably trained sport psychologist should design and deliver the content of the program, at least until athletes become proficient with the skills they are developing.¹

5-4- **Planned rest:** The idea of planned rest is very simple: no structured training activities, this means no scheduled chalk talk, no lifting, no technique, no scrambling, or anything being prescribed by the sporting staff. This doesn't mean that the athlete must be locked away at home doing direct relaxation all the day. No structured training simply means that the athlete can do whatever he wants within some reasonable boundaries. One of the biggest benefits in planned rest is in psychological fatigue management.²

¹ Britton Brewer. Sport psychology, Blackwell Publishing. 2009. P 30.

² James Hoffman. Mike israel. Melissa davis. Recovering from training. 2015. P35.

Figure 7: Hierarchy of nutritional factors for recovery

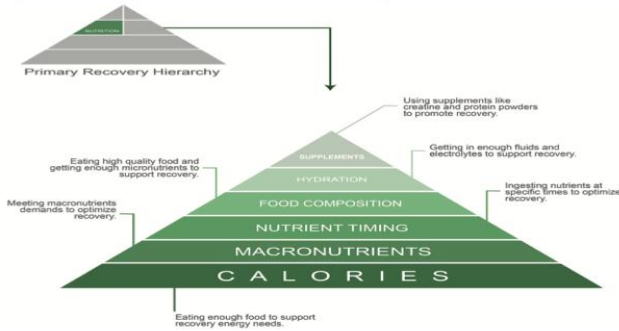


Figure 03: nutritional factors for recovery hierarchy.

6- Nutrition for recovery: The availability of nutrition information for athletes varies. Younger or recreational athletes are more likely to receive generalized nutritional information of poorer quality from individuals such as coaches. Elite athletes are more likely to have access to specialized sports-nutrition input from qualified professionals. A range of sports science and medicine support systems are in place in different countries to assist elite athletes, and nutrition is a key component of these services. Some countries have nutrition programs embedded within sports institutes (eg, Australia) or alternatively have National Olympic Committees that support nutrition programs (eg, United States of America).¹ However, not all athletes at the elite level have access to sports-nutrition services. This may be due to financial constraints of the sport, geographical issues, and a lack of recognition of the value of a sports-nutrition service.²

¹Burke LM, Meyer NL, Pearce J. National nutritional programs for the 2012 London Olympic Games: A systematic approach by three different countries. In: van Loon LJC, Meeusen R, editors. Limits of Human Endurance. Nestle Nutrition Institute Workshop Series, volume 76. Vevey, Switzerland: Nestec Ltd; 2013:103–120.

²Zinn C, Schofield G, Wall C. Evaluation of sports nutrition knowledge of New Zealand premier club rugby coaches. *Int J Sport Nutr Exerc Metab.* 2006;16(2):214–225.

Athletes eat several times per day, with snacks contributing to energy requirements. Dietary intake differs across sports, with endurance athletes more likely to achieve energy and carbohydrate requirements compared to athletes in weight-conscious sports.¹ A review found daily intakes of carbohydrate were 7.6 g/kg and 5.7 g/kg for male and female endurance athletes, respectively. Ten elite Kenyan runners met macronutrient recommendations but not guidelines for fluid intake. A review of fluid strategies showed a wide variability of intake across sports, with several factors influencing intake, many outside the athlete's control. Nutrition information may be delivered to athletes by a range of people (dietitians, nutritionists, medical practitioners, sports scientists, coaches, trainers) and from a variety of sources (nutrition education programs, sporting magazines, the media and Internet).² Of concern is the provision of nutrition advice from outside various professional's scope of practice. For example, in Australia 88% of registered exercise professionals provided nutrition advice, despite many not having adequate nutrition training.³ A study of Canadian high-performance athletes from 34 sports found physicians ranked eighth and dietitians, 16th as choice of source of dietary supplement information.⁴

¹Burke LM, Slater G, Broad EM, Haukka J, Modulon S, Hopkins WG. Eating patterns and meal frequency of elite Australian athletes. *Int J Sport Nutr Exerc Metab.* 2003;13(4):521–538.

²Heaney S, O'Connor H, Michael S, Gifford J, Naughton G. Nutrition knowledge in athletes: a systematic review. *Int J Sport Nutr Exerc Metab.* 2011;21(3):248–261.

³McKean MR, Slater G, Oprescu F, Burkett BJ; Do the nutrition qualifications and professional practices of registered exercise professionals align? *Int J Sport Nutr Exerc Metab.* 2015;25(2):154–162.

⁴Burke LM, Cox GR, Cummings NK, Desbrow B: Guidelines for daily carbohydrate intake: do athletes achieve them? *Sports Med.* 2001; 31(4):267–299.

6-1- **Calories:** your training bettered body needs to be rebuilt, and consuming requisite calories results in the availability of both energy and the building blocks needed for that repair.

6-2- **Macronutrients:** It is the ratio of carbohydrate, protein, and fats consumed that dictates what building blocks are available and at what rate they can be digested and used to repair your tissues and facilitate recovery.

7- Table 3: daily carbohydrate intake recommendations for recovery from sport training.

Sport training duration	Carbohydrates per lb bodyweight
1 hour	1 gram
2 hours	2 grams
3-4 hours	3 grams
More than 4 hours	4 grams

7-1- **Nutrient timing:** Timing is not huge concern for the recovery, but its big enough that it can make a difference in results.

Carbohydrate timing:

- intra training carbs can benefit long duration exertions.
- Post training carbs can support multi day sessions.
- More carbs should be consumed post training.
- Excessive single meal carbs amounts should be avoided.

Protein timing: Protein must be consumed regularly for best results.

Fat timing: Fat intake should be avoided near the training window.

7-2- **Food composition:** Food composition is the variable that deals with the kinds of actual foods that comprise a diet, and applies to all three macros categories, and ranks all foods from each category in the following manner.

6-4-1- **Proteins :**While protein consumption prior to and during endurance and resistance exercise has been shown to enhance rates of muscle protein synthesis

(MPS), a recent review found protein ingestion alongside carbohydrate during exercise does not improve time-trial performance when compared with the ingestion of adequate amounts of carbohydrate alone.¹

6-4-2- **carbs:** carbs source are ranked based on their degree of processing. Vegetables, fruits, and whole grains that are unprocessed tend to be slower digesting and also tend to have a higher concentration of vitamins, mineral, phytochemicals, and fiber than more processed sources.

6-4-3- **fats:** are split into multiple types, which have differing effects on our physiology.

7-3- **Hydration:** Hydration is important before and during training, but it's equally as important after training more than once a day. If you want to recover as much performance capability as possible. Making an effort to hydrate right after your first training session is over and consistently consuming fluids in the interval between the two sessions can enhance your chance of recovery. In order to promote recovery between bouts within session , like between sets of exercises, fluids must be consumed within an hour before the training.

7-4- **Supplements:** There is six kinds of supplements that can help with recovery a bit, but their effects are always disproportionately small compared with the recovery strategies we talked above .

6-1- **essential fats:** essential fats are the fats our bodies cannot make internally, which thus need to be consumed in the diet.

6-2- **multivitamins** as with essential fats, most balanced diets provide enough vitamins and minerals to support recovery.

¹van Loon LJ: Is there a need for protein ingestion during exercise? Sports Med. 2014;44 Suppl 1:S105–S111.

6-3- whey protein: by acting as a very fast digesting and super high quality protein source, whey protein can enhance post-exercise recovery and adaptation.

6-4- carbohydrate drinks or powders: sometimes rapidly and easily digested processed carbs can aid recovery.

6-5- creatine: creatine doesn't offer a whole a lot of long term recovery assistance, but it is perhaps the most effective supplement for within recovery training.

8- Active recovery

Figure 6: Hierarchy of active recovery modalities

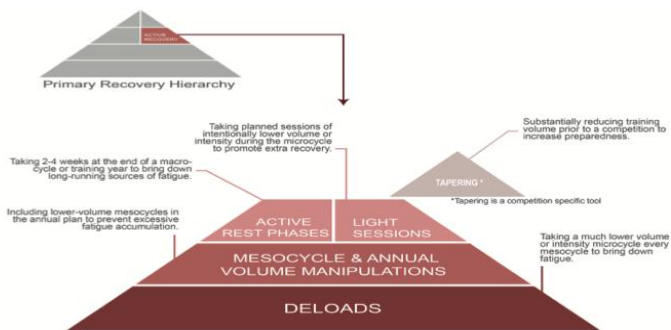


Figure 04: active recovery hierarchy.

Active recovery methods are not as powerful as passive recovery

8-1- **Deloads:** A deload is a period of training (typically one micro cycle in length) with deliberately reduced training volume. The deload is strategically placed after planned overreaching periods of training in order to reduce fatigue and prepare an athlete for the next phase of training.

And deload is training at low volumes enhances blood flow to the muscles in need of recovery. Deloads should be applied after planned overreaching phases, which for most athletes means once every 3-6 weeks.

8-2- **Mesocycle and annual volume manipulations:** Refer to the periodic alteration of total training volume from all sources throughout the year. And the application of this technique will vary depending on the sport or activity most of it

after 2 to 6 months of high volume training, intermittent lower volume phases can allow desensitization and time for recovery.

8-3- **Active rest phases:** are typically implemented after long increments of arduous training or competition. Under these circumstance, stress levels can be very high and recurrent burnout is common problem, active rest is a critical intervention. For the athletes this phases will occur 1-3 times throughout the year.

8-4- **Light sessions:** A light session or light day is a training session in which either all or specific activities are deliberately trained at reduced volume. A light session is generally about 50% of the normal overload volume of the activities being trained. Taking only one light session a week maybe adequate.

7-5- **Tapering:** describes a reduction of the training stimulus in order to simultaneously lower fatigue and express preparedness. the total of training volume should be reduced by about 50% from the preceding training mesocycle.

8- **Therapeutic and supplemental recovery:** Heat, cold, and temperature contrast have been used for decades to manage pain and injury.

8-1- **Cold application:** Direct application of cold, such as icing, cold water immersion, cooling vests and cryotherapy. Application period about 15-20 minutes are widely accepted and can also be repeated multiple with breaks of about 5-20 minutes to drop temperature approximately 10-15 degree Celsius.

8-2- **Heat application:** Using heat include hot packs and gels, warm water immersion, and acute exposure to heat in the sauna or steam room. Application times is about 20-25 minutes, repeated bouts are generally not required, and suggests the temperature of about 36 degrees Celsius at the skins surface is needed for sufficient heat penetration.

8-3- **Contrast application:** Contrast involves alternating heat and cold application, typically using sauna, water immersion, or local application technique. For treatment using water immersion, two tanks of hot and cold water, alternating

between hot and cold packs is recommended, heat should be at 33-44 degree Celsius, and cold should be around 10 degrees Celsius. The athletes starts with 5-7 minutes of heat, followed by 1-2 minutes of cold. This is followed by 4 more minutes of heat and another 1-2 minutes of cold.¹

Conclusion:

Learning the skills required to optimized the athletes recovery, can also broadly benefits the athletes many aspects of their life sport. If the trainer or the athletes can manage training, nutrition, stress, to do everything on time they are already doing better than most, a pretty significant bonus to simply if the elite level athletes follows an intelligent training program. Especially the time at the competition where the schedule of the participants is very close between games, where the recovery from fatigue very helpful for the elites athletes and makes a difference in the results. and I believe that this article will be the good introduction for the program proposal for recovery techniques and methods in the futures.

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