



SPORT NUTRITION

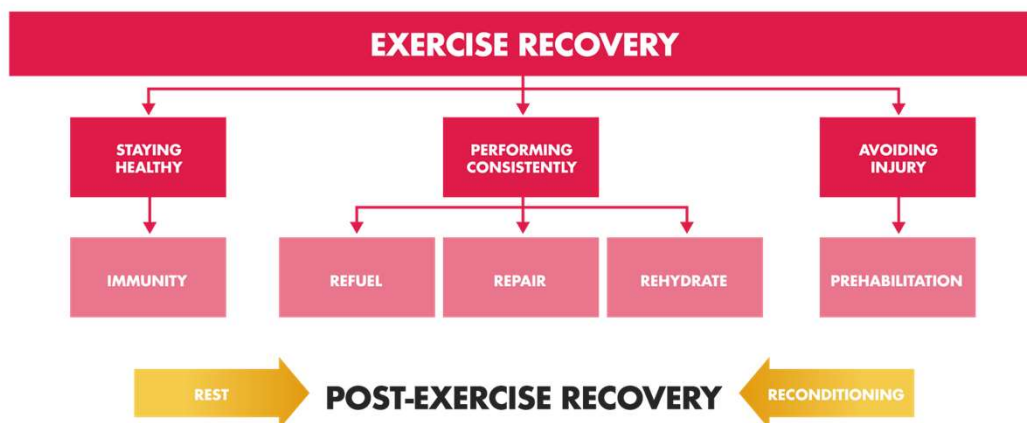
POST-EXERCISE RECOVERY

This resource was created by Oliver Witard, Senior Lecturer in Exercise Metabolism and Nutrition, Kings College London in collaboration with the GetPRO Professional team

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RECOVERY

WHAT IS POST-EXERCISE RECOVERY?

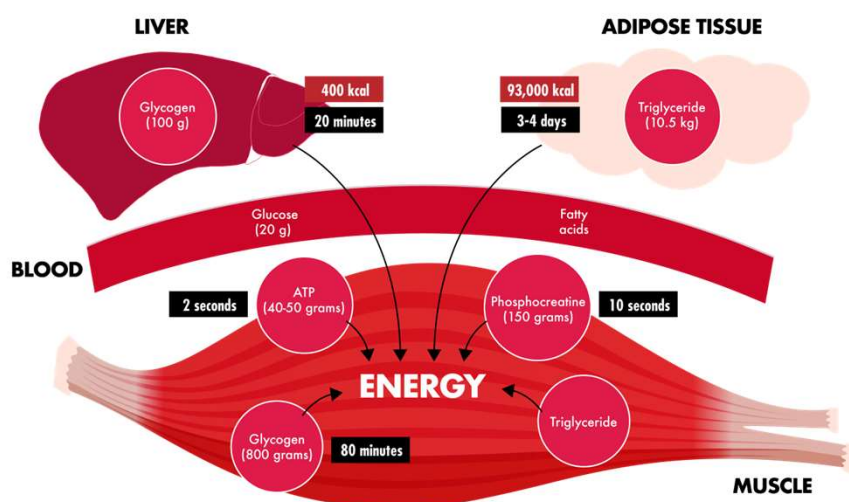


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- Many factors can influence exercise recovery.
- Exercise recovery can be classified into (a) long-term recovery outcomes and (b) short-term recovery during the post-exercise recovery period ranging from hours to days.
- Whereas long-term exercise recovery is mostly concerned with minimising risk of illness and injury, short-term goals of post-exercise recovery are focussed on maintaining the quality of subsequent training sessions or competitive performance on match day – in other words day-to-day recovery.
- There are multiple strategies that can be used to promote long-term and short-term recovery. These strategies can be classified as lifestyle strategies (e.g. stretching, compression garments), therapeutic strategies (e.g. hydrotherapy, massage, and psychological counselling), or nutritional strategies.
- The focus of this presentation is on **nutritional strategies** for post-exercise recovery with emphasis on best nutritional practices for refuelling, muscle repair and rehydration.
- Rest and muscle reconditioning also form important aspects of the recovery process.

WHY REFUEL?

RESTORE MUSCLE GLYCOGEN AND PHOSPHOCREATINE STORES



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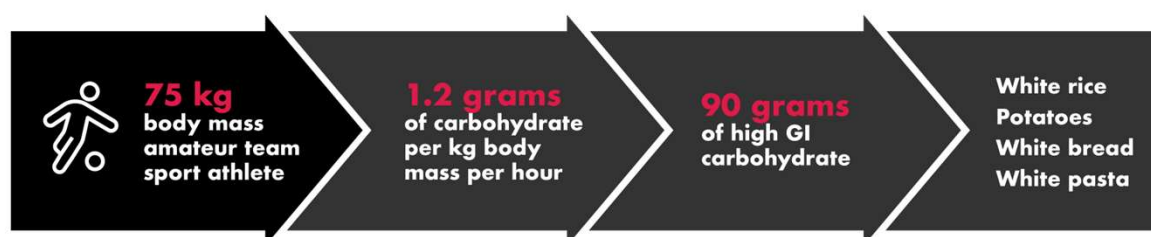
- Why is refueling important for the amateur team sport athlete?
- Refueling is important because we only have a finite amount of stored carbohydrate and phosphocreatine to fuel high intensity intermittent exercise.
- Using a sports car analogy, our fuel tanks are housed within 4 different tissues of the body.
- ...namely adipose tissue, the liver, the blood and the skeletal muscle which is of course particularly active during exercise.
- Our “fat fuel tank” is primarily located in adipose tissue and is of considerable size storing almost 100,000 calories of energy which, in theory, is sufficient to fuel ~80 hours of continuous exercise, albeit at a low-intensity, so not of particular relevance to the amateur team sport athlete.
- On the other hand, our “carbohydrate fuel tank” is split between the liver, bloodstream and muscle, and...
- ... compared with fat is limited to only 2-3000 calories of energy (depending on feeding status), which is sufficient to fuel only 1.5 hours of exercise and therefore

more relevant to the team sport athlete.

- For all out sprints that require a maximal rate of ATP resynthesis, our muscles stores of ATP and phosphocreatine are used but will only last for a maximum of 10 seconds.

HOW TO REFUEL POST EXERCISE

CARBOHYDRATE IS KING



AVOID ALCOHOL OR HAVE ONLY IN MODERATION

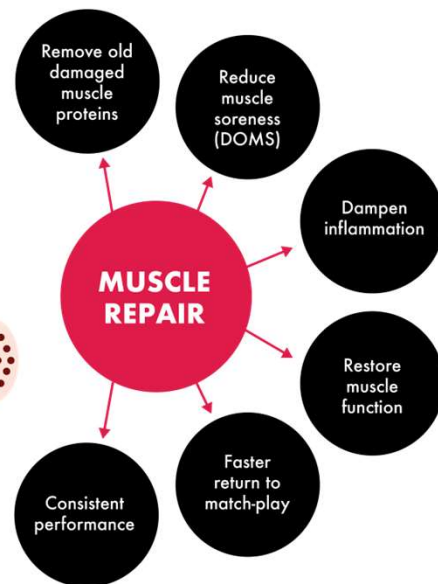
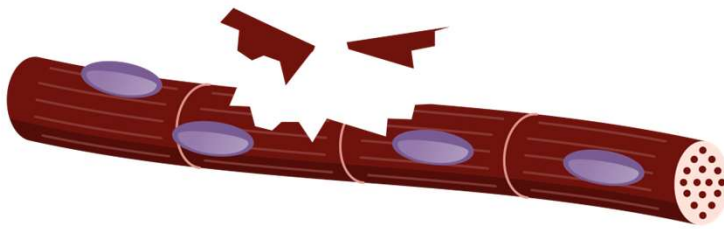
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- So, what is best nutrition practice for muscle refueling?
- Well, carbohydrate is certainly king in this regard.
- If we take, for instance, a 75 kg amateur team sport athlete ...
- And apply the scientific recommendation to consume 1.2 grams of carbohydrate per kg body mass per hour ...
- This individual should target the ingestion of 90 g of carbohydrate within the first hour of finishing exercise ...
- And for every 2 hours up until the next meal is ready.
- Try to select what we call high glycemic index carbohydrates such as white rice, potatoes, white bread, white pasta that release glucose into the blood rapidly once digested.
- The science shows that this fast glucose response triggers the release of insulin which is important for stimulating an enzyme called glycogen synthase which switches on the muscle glycogen restoration process.

- On a cautionary note, alcohol intake should be moderated as part of the refuelling strategy.
- This is because, based on animal studies, alcohol has been shown to impair glycogen repletion in skeletal muscle following high intensity short duration exercise ...
- ... By decreasing lactate disposal, decreasing glucose uptake into the muscle, and reducing the activity of key enzyme called glycogen synthase that drives the synthesis of glycogen.

WHY REPAIR?

SORENESS, INFLAMMATION
AND MUSCLE PERFORMANCE

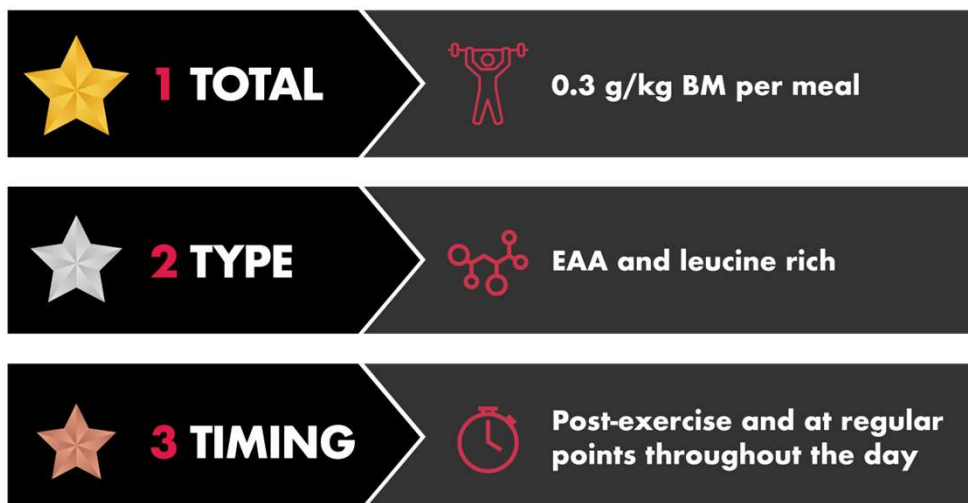


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- Why is muscle repair important for the amateur team sport athlete?
- Well, the multidirectional stop-start nature of team sports requires an element of eccentric based muscle contractions.
- This is where the muscle lengthens under tension.
- In doing so, the muscle becomes more prone to microtears and damage when placed under stress such as exercise.
- The muscle repair process involves a series of physiological events, including
- The removal of old damaged proteins, the delayed onset of muscle soreness, inflammation, and a reduction in muscle function.
- As such, best nutrition practice should focus on one of more of these events in order to speed up return to match play and ensure consistent performance over the season.

PROTEIN FOR MUSCLE REPAIR AND REMODELLING

TOTAL, TYPE AND TIMING



EAA: essential amino acids

WHY REHYDRATE?

PHYSICAL AND MENTAL HEALTH AND PERFORMANCE



- Why is it important for team sport athletes to rehydrate effectively?
- Well, reasons relate to the general health of the individual and multiple sport performance outcomes from both physical and mental perspectives.
- The primarily health related factors are shown on the right in dark pink ...
- The primarily exercise performance related factors are shown on the left in light pink ...
- Of course, there is plenty of overlap between health and performance factors, i.e., the regulation of body temperature is particularly important during the exercise performed in the heat.

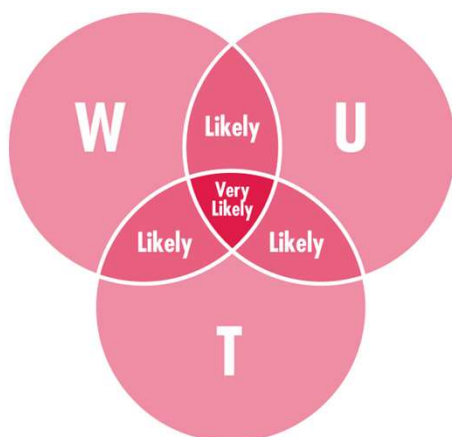
REHYDRATION

HOW SHOULD WE MONITOR OUR HYDRATION LEVELS?

W **Weight:**
Have you lost more than 2% body mass?

U **Urine:**
Is your urine a dark colour?

T **Thirst:**
Are you thirsty?



EXAMPLE OF HOW URINE COLOUR MIGHT VARY WITH HYDRATION STATUS


Probably adequately hydrated


Possibly dehydrated


Probably dehydrated

Note: Colour reproduction may vary slightly from the original - do not use this chart for diagnostic purposes

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- Prior to considering best practice hydration guidelines, it is important to understand how best to monitor our hydration levels ...
- ... without needing access to sophisticated laboratory equipment.
- This WUT diagram combines 3 indicators of hydration status.
- On completing training or match play, if you have lost more than 2% of your original body mass on completing a training session or a match, ...
- Have a dark yellow/golden urine colour ...
- And you are thirsty ...
- You are very likely to be dehydrated and therefore need to quickly put in place a rehydration strategy.

REHYDRATION

HOW SHOULD WE MONITOR OUR HYDRATION LEVELS?

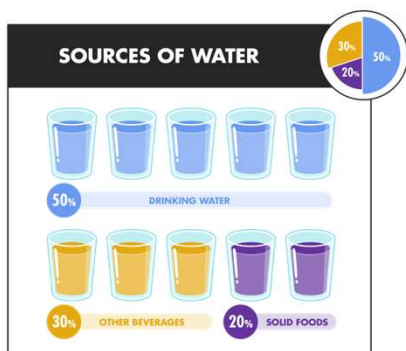
Date	Weight yesterday morning (kg)	Weight this morning (kg)	Weight change (kg)	Thirsty (Yes/No)	Dark yellow urine (Yes/No)	Comments
01/11	75	72	-3	Y	Y	Very likely dehydrated Need to drink more during and after training or matchplay
02/11	72	73	+1	N	N	I have my hydration strategy down. Repeat!
03/11	73	76	+3	N	N	Very likely over hydrated. Need to drink less during during and after training and matchplan

You may want to log this information in diary format such as this over a series of days.

REHYDRATION

HOW SHOULD AMATEUR TEAM SPORT ATHLETES REHYDRATE?

1. Drinking water
2. Other tasty beverages (milk, sports drinks, juices)
3. Solid foods



League table on water content of foods

1. Fruits/vegetables = 80-95% water
2. Yoghurt = 75-85%
3. Rice/pasta = 70-85%
4. Fish = 65-80%
5. Eggs = 65-75%
6. Meat = 40-65%
7. Soups, custard = 60-65%
8. Cheese = 40-60%
9. Bread and cookies = 30-40%

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- Do bear in mind that you have a variety options available in terms of rehydration.
- In addition to water and other tasty beverages such as milk, sports drinks and juices, solid foods also contain water.
- Some examples of commonly consumed foods with a high water content are listed on the right.

KEY MESSAGES

THE 3 Rs

REFUEL

Aim to consume carbohydrates with a high glycaemic index in the hour post-exercise to refuel the muscle

REPAIR

Prioritise protein and omega-3 rich foods to promote muscle repair and reconditioning during post-exercise recovery

REHYDRATE

Ensure to fully rehydrate after exercise to replace both fluid and sodium lost through sweating

- So, we have 3 key messages when it comes to sport nutrition for post-exercise recovery.
- The first is to fuel and carbohydrate is king.
- The second is to repair the muscle in order to maintain consistent performance during subsequent training sessions or matchplay.
- And finally, rehydration is important for health and performance and should be monitored daily.

REFERENCES

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