OUTWRK

MASTERCLASS SERIES

PERFORMANCE NUTRITION & OPTIMIZING INJURY RECOVERY

PERFORMANCE NUTRITION
AND STRATEGIES TO IMPROVE
RECOVERY FROM INJURY

LESSON SEVEN

INTRODUCTION

Sports nutrition is a topic near and dear to my heart.

Nutritional strategies to optimize performance, recovery and training adaptations within the context of a goal orientated diet (weight loss, gain or maintenance phase) are often over complicated and or ambiguous.

In this section we're going to cover two components of sports nutrition;

- Nutritional strategies around training to optimize performance and recovery
- Nutritional strategies for sports, exercise and or any other contributor to injury; focusing on the di-phased process involved in returning to activity

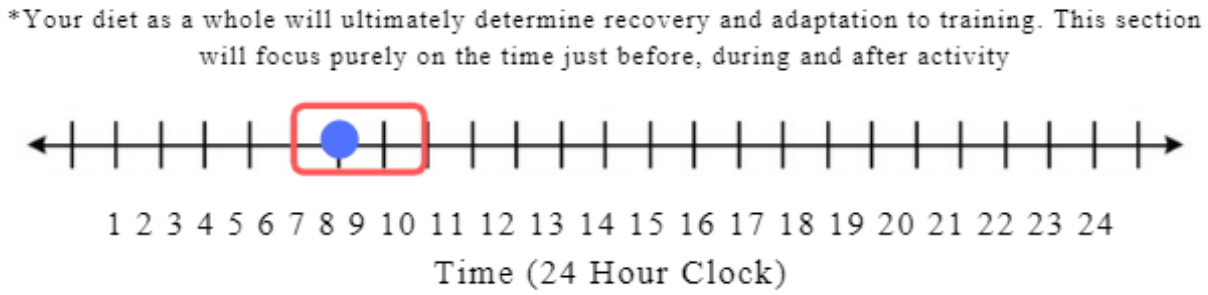
We are not going to be covering sports nutrition supplements in this section as I'd like to create a separate piece of work on this topic to give it a more complete, detailed explanation, analysis and overview on each of the more popular supplements.

NUTRITION AROUND EXERCISE

NUTRITION AROUND EXERCISE

The easiest way to wrap your head around nutrition and exercise is to compartmentalize it within the grander scheme of your entire diet that day.

Bear in mind it is your total dietary intake and breakdown which will ultimately determine recovery and body composition but for the purpose of this masterclass we are going to focus on "optimizing" performance and recovery for a given exercise session (be that competitive, practice or recreational).



This three hour window (red box on the timeline) around training (the blue dot, which, in real world implementation, the peri- training window isn't exactly three hours, but makes it easier to breakdown) can be broken into three distinct segments; pre-, intra- (during) and post-exercise.

NUTRITION AROUND EXERCISE

We're going to look at each segment individually, who should and shouldn't implement certain strategies and nutrient range recommendations for each of the three segments as well.

PRE-EXERCISE / ACTIVITY NUTRITION STRATEGIES

PRE-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

Before we address the acute (within 60 minutes) time prior to exercise we're going to give a quick nod to how the entirety of the diet can effect what your peri-training (around training) nutritional strategies look like.

The 24 hours leading up to exercise/activity/sport is equally, if not more so, as important for the adaptation from, and goal of improving, performance as the time surrounding the exercise/activity/sport.

It is during this period that we can use our diet to promote an optimal state of glycogen storage prior to activity. Glycogen, as we remember, is the body's primary energy source during physical activity.

The use of a higher carbohydrate diet has been shown to promote elevated levels of muscle glycogen which have translated into performance benefits amongst athletic populations.

PRE-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

This may negate the need for more acute carbohydrate dosages prior to training, especially for high intensity and or short duration activities (interval training, weight lifting, some track and field activities etc.).

Complimenting a higher carbohydrate intake (within the context of your given calorie intake) with an adequate protein intake will ensure greater recovery and adaptation to the given activity (if structured within a given progressive program and or a new stimulus).

As we get closer to exercise (within 60 minutes) we can start to manipulate our dietary intake to address factors that are typically related to improved recovery and performance;

- Reduced protein breakdown
- Increased Muscle protein synthesis
- Glycogen sparing

PRE-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

For example, a meal containing protein and carbohydrate (25 – 40g of protein and between 25 – 60g of carbohydrate depending on time between meal and beginning of exercise) is advised when feasible as this can not only provide an alternative fuel source (predominantly referring to the carbohydrate) to our stored glycogen, providing a “sparing” effect, but also provides amino acids which will aid in combating protein catabolism whilst increasing protein synthesis.

In times of more severe carbohydrate deprivation these amino acids can even be converted and used as an alternative energy source.

Notably, these meals are not a necessity and if you prefer to train fasted there is nothing wrong with this either (particularly if you train first thing in the morning). Using caffeine may be a viable substitute for pre-exercise nutrition as it appears to offer similar glycogen sparing benefits whilst also contributing to greater fat usage and further gains in performance.

PRE-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

One other thing to note is the importance of the form of carbohydrate; either high glycaemic or low glycaemic. Which form you choose is highly dependent on when the meal is consumed around exercise.

For example, a high glycaemic carbohydrate source would be typically consumed within 60 minutes leading up to exercise and would typically range between 30 – 60g for a meal.

A low glycaemic carbohydrate source would be more advised for any time beyond 60 minutes leading up to exercise and would be highly personalized (dependant on total calorie intake based on goals, lifestyle etc.) A serving of >60g would be my advice although it is highly dependent on the individual, their dietary setup and the activity they will be performing.

PRE-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

Key Points;

- Pre-exercise nutrition within the 60 minutes leading up to exercise **is not a necessity** (but that **does not mean it is not optimal**)
- **Caffeine** use before training **may be an effective substitute** for other nutrients and or have additional benefit
- Personally, I'd suggest **pre-exercise nutrition should be a priority for more endurance based activity/competition** (but only in the case that this wouldn't lead to performance detriment)
- The myth that "training fasted burns more fat" is **true in an acute sense** but the research has shown that **fat oxidation then decreases throughout the rest of the day to adjust** for this. Don't use this as a reason to train fasted if you think you'd perform better with food. **Energy deficit remains king** for weight / fat loss (although body composition can be altered with certain strategies if adhered to acurately and dependent on training experience).

INTRA-EXERCISE / ACTIVITY NUTRITION STRATEGIES

INTRA-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

Intra-exercise/activity nutrition, in my opinion, really only provides value to those who are either; engaging in long duration, endurance based activity and or those who are performing/competing in multiple, same day activities (of varying/similar types and intensities).

Intra-workout nutrition should be focused on two key aspects; hydration levels and provision of glycogen sparing, high glycaemic carbohydrate.

Concentrating first on hydration, (which is in contrast to the opening paragraph as, regardless of type,duration or intensity of activity, everyone should give focus to their hydration levels) recommendations for athletes for water intake consist of consumption of 250mls of water every 15 minutes of exercise.

If this can be performed evenly throughout the 15-minute period it would obviously be more ideal for the performer but this isn't always practical.

INTRA-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

Using the intermission and or any other stoppages would be an ideal time to “catch up” on the recommend amount of water consumption throughout training (if the recommendation of consuming 250mls every 15 minutes is not entirely feasible). Importantly, the athlete needs to earn self-moderation here as over hydrating may cause issues too (requiring toilet breaks etc.)

A very easy way to help athlete's self moderate is to educate them on "pee" colour; if it's clear to straw yellow you're in hydration status is exactly where we'd like it to be. This may be difficult however in endurance events and so advising them to sip on fluids as the previous paragraphs outlined is the best course of action.

Electrolytes are also important to consider. As we train we sweat (which is especially true if the environment is particularly hot or humid). This is to reduce core body temperature and obviously leads to loss of water. Electrolytes are also lost through sweat and water loss.

INTRA-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

The electrolytes are crucial for regulating hydration, sending signals throughout the body and maintaining correct muscle function. Consumption of electrolytes should not be isolated to just the few hours surrounding and involving exercise but throughout the entire day.

Reduced electrolyte levels can result in; impaired cognitive function, poorer decision making, reduced accuracy, reduction in muscle power/strength, increased muscular fatigue and increased risk of cramping (as well as more serious issues if deficiencies are severe).

If dietary intake of electrolytes is adequate then further supplementation is not required (which is the case for most athletes). Additional supplementation would propose no negative consequences and therefore would be something I'd advise most athletes to consider taking with water during exercise (especially those in long duration, endurance based activities, team sports or those exercising in warm to extreme heat / humidity climates).

INTRA-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

Carbohydrate intake during exercise can be a useful tool to reduce the usage of pre-existing carbohydrate stores by providing a readily available alternative and maintain / improve performance.

It is recommend to consume high glycaemic/ simple forms of carbohydrate during long duration, intermittent and or low intensity exercise.

When ingesting these it's helpful to be aware of the oxidative limits of our body and how, if we over consume carbohydrate during training, this can lead to abdominal pain and discomfort (which can compromise performance).

Our bodies are capable of oxidizing (which is essentially making use of/metabolizing) approximately 60g of carbohydrate an hour. This is due to the limitations of our carbohydrate transporters within the intestine and amounts over 60g may over-saturate them (leading to the abdominal pain/discomfort I mentioned).

INTRA-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

However, if we use multiple forms of simple carbohydrate e.g. glucose, fructose etc. our oxidative capacity can increase as our body utilizes different transporters for different forms of carbohydrate meaning there is a decreased likelihood of us running into an issue with carbohydrate transporter over-saturation.

Whilst intra-activity nutrition is mainly aimed at long duration, medium to low intensity activity, that isn't to say that there is no benefit from certain nutritional strategies during activity for high intensity, short duration work.

Interestingly, when compared to ingestion of carbohydrate, mouth rinsing with a carbohydrate / "sweet" mix (with and without swallowing / "sweet" fluid may be zero kcal too) has resulted in performance benefit. It may be worth trialing if you're calorie restricted but I'd stick to caffeine pre-exercise to avoid the odd looks of spitting out your juice in the gym.

INTRA-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

Key Points;

- Intra-exercise/activity nutrition is **mainly geared towards, and of benefit to those performing, long duration, low to medium intensity activities**.
- It may also be of **benefit to those performing multiple same day activities** (of varying type, intensity and duration).
- **Carbohydrate absorption and oxidation is limited to 60g** per hour (**unless a mix is used**) and may cause discomfort, bloating and, consequently, performance reduction if this is exceeded.
- **Intra-exercise / activity carbohydrate** is provided to **provide a readily available energy source** and to **prevent usage of pre-existing carbohydrate stores** (glycogen)
- Performers should be educated on the importance of hydration status and how to monitor / uphold / improve their hydration status.
- **Mouth rinsing may also be a viable alternative for those on calorie restricted diets**.

INTRA-EXERCISE / ACTIVITY NUTRITION STRATEGIES

POST-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

The post-activity window (approx. 60 - 120 minutes proceeding) is arguably the most important of the peri-activity nutritional strategies (in terms of enhancing recovery, adaptation to exercise and guaranteeing consistency in the following session).

Whilst there is a significant body of evidence to refute the old adage that "if you don't eat / drink any protein etc. immediately after training it was a total waste", we are looking to explore the argument; optimal over necessary as opposed to "you definitely must do x" against "you definitely must not do x".

Optimal over necessity is what we should always be striving for when feasible, but developing the knowledge to know that achieving what is necessary is not going to derail your entire progress (or even impact it overly significantly) is also equally important as life may not always allow for optimal.

POST-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

Optimal would be; aiming to consume an adequate source of protein and carbohydrates as soon as possible following activity succession.

Necessary would be; ensuring our total entire dietary intake gives the requisite amount of energy and quality protein required to recover (and, dependent on goal, retain muscle mass and or develop further lean body mass / improve body composition).

Optimal over necessary may only offer a small increase in recovery and adaptation metrics but, if we follow these strategies consistently over time, these small increases add up and may ultimately result in a significant difference further down the line (especially if you were able to compare your own physique, health, performance etc. metrics between an "optimal" strategy following version of you and a "necessary" strategy approach to nutrition version of you or whoever else).

POST-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

So, what does "optimal" post-activity nutrition look like, and why do we do it?

Well let's first look at the "why" then the what it looks like in practice.

Very simply the "why" we do it can be broken down into several distinct points;

- Replenish lost glycogen stores
- Reduce or halt muscle protein breakdown
- Increase muscle protein synthesis

As soon as possible after an activity (as the intensity and duration increase so does the necessity for urgency) it is the goal of the individual to restore any loss in muscle glycogen, reduce protein breakdown and further elevate muscle protein synthesis.

POST-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

These goals can be met with consumption of a protein and carbohydrate source after training.

Post-workout protein ingestion will not only further elevate muscle protein synthesis but it can also reduce protein breakdown. Post-workout carbohydrate can effectively “turn off” (if not severely reduce) protein breakdown, whilst also being used to replenish any reductions in glycogen stores.

Combining the two is the most optimal choice to make, however protein alone still offers significant benefit and is a tier above following the "what is necessary" approach (and truthfully, just under the protein + carbohydrate approach).

It may also offer the most "bang for your optimal buck" in terms of effectiveness and donation of daily energy intake to follow this strategy (as protein on it's own may only be around 110 - 140kcals whearas protein + carbohydrate may be twice this, up to 300kcals).

POST-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

So, how much protein and carbohydrate (if your dietary intake can facilitate this option without impeding anything else, be that nutrient intake, hunger, setting aside calories for foods you enjoy etc.) do we need after training to achieve this optimal recovery and adaptation effect?

The body of research on the subject generally recommends that;

Quality Protein (rich in BCAAs - at least 3g) and carbohydrate option; **25 - 40g protein** and an equal serving of easily digestible/ rapidly absorbing carbohydrate

Or

Quality Protein Alone option; **25g - 40g protein** (powdered or ready made shake)*See next page for protein sources (non-vegan and vegan/vegetarian options) rich in BCAAs

POST-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

Protein sources (non-vegan);

- Whey protein (17.77g of BCAA per 100g – 388kcals *realistically you'd only use 1 scoop which would provide anywhere between 4 to 6g of BCAA per 30g and 100 – 120kcals)
- Egg white (2.5g of BCAA per 100g – 48kcals)·
- Beef (5.4g of BCAA per 100g – 209kcals)·
- Chicken (4.5g of BCAA per 100g – 165kcals)·
- Cod (4.0g of BCAA per 100g – 105kcals)

Protein sources (vegan/vegetarian);

- Vegan protein powder (>10g BCAA per 100g - 388kcals)*realistically you'd only use 1 scoop which would provide anywhere between 4 to 6g of BCAA per 30g and 120 – 140kcals (also aim for a protein powder blend to achieve the complete amino acid spectrum)
- Tofu (7.5g of BCAA per 100g / 480kcals)
- Seeds, pumpkin and squash, roasted (7.1g of BCAA per 100g / 522kcals)
- Soybeans, roasted (6.5g of BCAA per 100g / 471kcals)
- Kidney beans, raw (4.3g of BCAA per 100g / 333kcals)
- Lima beans, raw (4.3g of BCAA per 100g / 338kcals)
- Broad beans, raw (4.2g of BCAA per 100g / 341kcals).

POST-EXERCISE/ ACTIVITY NUTRITION STRATEGIES

Key Points;

- **Post-activity nutrition**, as far as these strategies are concerned, are **focused on "optimizing" the recovery of, and adaptation to, activity, exercise, competition** etc.
- We are f**ocusing on reducing further muscle breakdown, increasing muscle protein synthesis and glycogen replenishment**.
- **Protein + carbohydrate is the preferred strategy** (as soon as possible) following activity succession. However, for **those who are on calorie restricted diets, or macronutrient restricted diets**, **protein alone is perfectly fine** (and a very close second best)
- Aim for **25 - 40g of Protein and an equal serving of carbohydrate** as soon as is feasible after training for optimal effect.
- Remember! **These strategies are to "optimize" performance and recovery but your overall dietary intake determines your weight, health, body composition, recovery etc.** This is the *extra few percent* which could make all the difference.

NUTRITION STRATEGIES TO OPTIMIZE RECOVERY & REHAB

NUTRITION'S ROLE IN RECOVERING FROM INJURY

Injuries are part and parcel of everyday life, especially if you're engaged in any high intensity activities and or competitive sports/activities.

Nutritional support is a key part of the recovery process from injury. In this section we aim to outline strategies that can be employed to promote rehabilitation and return to activity, instead of impeding it.

The key consideration, above all else, is that we must be mindful to avoid any nutritional deficiencies, as these can impair and lengthen the recovery and rehabilitation process.

These include deficiencies in; Energy, macronutrients, micronutrients and minerals.

NUTRITION'S ROLE IN RECOVERING FROM INJURY

Being deficient in any one of these dietary components can impair recovery and wound healing as well as exacerbating loss of muscle and tendon mass and function.

In this section we're going to briefly cover each; energy, macronutrients (the relevant one!) as well as micronutrients and minerals.

We'll also cover additional considerations that can be used/or taken into consideration when the aim is to get back to activity as soon as possible!

NUTRITION'S ROLE IN RECOVERING FROM INJURY

Energy

The temptation with injuries is to reduce energy to coincide with the reduction in activity. This is mainly due to fears that the reduction in activity will lead to weight/fat gain.

However, one of the key nutritional interventions to avoid muscle atrophy is to ensure that you are not employing a severe calorie deficit.

During the healing process, energy expenditure is increased in relation to the severity of the injury. The more severe, the more energy is expended (due to increased demand caused by the wound healing and tissue turnover processes).

In fact, **energy expenditure may increase anywhere from 15 – 50%**. Therefore, the perceived reduction in energy expenditure by the injured may be less than what is universally considered and therefore we should be aiming for energy balance (not a surplus or deficit).

NUTRITION'S ROLE IN RECOVERING FROM INJURY

Macronutrients

Akin to a large calorie deficit, an insufficient protein intake can result in significant muscle atrophy until normal eating/movement habits return.

You should be aiming for caloric balance and maintaining an adequate protein intake (which should be notably higher in athletic populations) to reduce the impact of atrophy during this time.

For most individuals an intake of >1.6kg body weight of protein is more than adequate (and may aid also provide secondary benefit for weight maintenance/body composition during this time).

NUTRITION'S ROLE IN RECOVERING FROM INJURY

Micronutrients and Minerals

As far as micronutrients and minerals go; It’s best to follow general practices, avoiding deficiencies and aiming to eat a predominately nutritiously dense and varied diet, consisting of 5-10 portions of fruit and vegetables a day.

If the injury is bone related, a vitamin D and calcium supplement may provide additional benefit to recovery, but shouldn’t take precedent over whole foods (although vitamin D should generally be supplemented as it's unrealistic to expect people to achieve the intakes associated with health benefit consistency with food alone).

Additional Considerations

Omega-3 Fatty Acids

- Omega-3 fatty acids have an anti-inflammatory function- Need to be conservative with recommendations due to its anti-inflammatory property as over usage can result in impaired wound healing (however the dosages associated with this effect are quite high; in excess of 8 grams)
- Omega-3 fatty acids may play a role in reducing muscle loss associated with muscle disuse- Appears to have an anti-catabolic effect

Alcohol

- Alcohol reduces MPS which can have obvious consequences for tissue repair and wound healing
- Impedes wound healing through impeded / altered inflammatory response
- Intake is associated with increased rate of muscle loss during periods of immobilization

NUTRITION'S ROLE IN RECOVERING FROM INJURY

Key Points

- Avoid severe calorie restriction
- Aim for a calorie balance/maintenance
- Maintain and or increase protein intake to increase MPS and maintain skeletal muscle mass
- Avoid micronutrient and mineral deficiencies
- Omega 3 (EPA & DHA) supplements or including oily fish etc. in your diet may reduce inflammation and improve muscle mass retention.
- Limit and or restrict entirely alcohol intake