

AIS SPORTS SUPPLEMENT FRAMEWORK

MIXED MACRONUTRIENT SUPPLEMENT

(BAR, POWDER, LIQUID MEAL)

What is it?

Mixed macronutrient supplements provide a compact and practical source of variable amounts of protein and carbohydrate, plus micronutrients, for use in situations where it may be impractical to eat, or access, whole foods or when appetite is suppressed. This typically occurs around exercise.

What does it look like?

- > A range of mixed macronutrient supplements are available in the form of powders, bars/ balls and ready to drink (RTD) shakes. They can vary markedly in their macronutrient composition, from carbohydrate-based products with a small amount of protein, to those which are rich in protein but intentionally lower in carbohydrate.
- > Some mixed macronutrient supplements are fortified with micronutrients, typically containing 25-50% of the Nutrient Reference Values (NRV) of various vitamins and minerals per serve, while others may also include proposed 'performance enhancing' ingredients (creatine, BCAA's, carnitine etc.). In this role, they provide a convenient portable and non-perishable snack with a potentially valuable macronutrient and micronutrient content.
- > The specific composition of mixed macronutrient supplements can vary markedly. The form and composition of the product will influence their appropriate use by athletes (Table 1).

Table 1. Varieties of mixed macronutrient supplements

Variety	Energy	Carbohydrate	Protein	Comment
High carbohydrate powder or bar	800-1200 kJ (200-300 kcal)	>40g	<10g	Useful for pre, during and post event fuelling.
High carbohydrate, high energy powder or bar	>1200kJ (>300 kcal)	>40g	<10g	Generally contains higher amounts of fat. Energy dense fuel source, useful for athletes with high energy needs.
High protein, high energy RTD, powder or bar	>1200 kJ (>300 kcal)	20-60g	20-30g	Energy dense protein source for athletes looking to increase muscle mass, promote recovery or as a snack for athletes with high energy needs.
High protein, lower energy RTD, powder or bar	<1200 kJ (<300 kcal)	<30g	15-30g	Suitable for athletes with lower energy needs requiring a convenient protein source.
Meal / snack replacement bars	700-1200 kJ (180-300 kcal)	<40g	7-15g	Often contain nuts, fruit, grains and other 'whole food' ingredients. Convenient snack when real food isn't available.

Note: Some mixed macronutrient products do not fit precisely into one of the above categories: this is particularly the case for bars that are much larger or smaller than the typical 50-60 g product. Larger bars (>90g) can often be divided in half, or 2 smaller bars may be consumed to provide similar nutrient profiles to those listed in this table.

How and when do I use it

- > Mixed macronutrient supplements can be used in a variety of situations as a short-term replacement of whole foods. A range of common uses and appropriate scenarios is provided below; it is noted that the macronutrient supplement may achieve a number of these goals simultaneously.
- > To provide a convenient source of carbohydrate to support fuelling and/ or recovery goals before, during or after exercise.
 - a pre-exercise snack for athletes who experience pre-event nervousness with accompanying loss of appetite or reduced gut function or who need to eat immediately before an exercise session (e.g. early morning training)

- intake during prolonged exercise (e.g. ultra-endurance events) conducted at moderate intensities over many hours or days, to reduce flavour fatigue by providing a greater range of tastes and textures or to provide the benefits from consuming protein and other nutrients
- [note that there is a separate fact sheet on sports/energy bars with additional information on this theme]
- > To provide a convenient source of protein and energy when whole foods are not available or practical to consume.
 - a post-exercise recovery option to stimulate protein synthesis and adaptation, for athletes who have suppressed appetite or an inability to store or prepare whole foods for immediate intake.
 - an addition to a meal or snack to boost energy and protein intake towards sports nutrition goals when the residual choices fail to do this or when the environment does not allow the athlete to store or prepare their own meals/snacks
 - when training/competing in a foreign country and the food supply/food safety (hygiene) is questionable
 - [see separate fact sheet on isolated protein supplements with additional information on this theme]
- > To provide a compact, portable and less filling source of extra energy and protein between meals.
 - a convenient and nutrient-dense energy boost for adolescents undergoing a growth spurt, athletes undertaking heavy training loads or during periods of lean mass gain, especially when appetite is insufficient to drive the intake of required food amounts
- > To provide a low fibre/residue source of energy and nutrients when it is useful to manipulate body mass and bowel contents in the day(s) before competition.¹
 - In weight category sports, to replace the food weight and fibre content of normal meals and foods with a compact and lightweight source of key nutrients over the day(s) prior to weigh-in. This may allow a small but potentially important reduction in body mass prior to the weigh-in without compromising nutritional status/goals
 - In endurance sports (e.g. running, cycling), to reduce gut contents in the day(s) prior to the race to enhance performance by reducing the risk of gastrointestinal disturbances. The small reduction in the mass of gut contents may counteract the weight gain associated with glycogen loading and/or provide a small performance advantage in its own right

Are there any concerns or considerations?

Unnecessary expense

Sports foods such as mixed macronutrient supplements are not needed at every training session or in the everyday diet and may be an unnecessary expense. In general, the use of whole foods to meet fuelling and recovery goals will be more cost-effective and provide a wider range of important nutrients.

Unnecessary energy intake or poor handling of weight management goals

Athletes need to consider their physique and broader nutritional goals when deciding whether to consume energy-dense mixed macronutrient supplements. In the case of athletes who have short- or long-term restrictions on dietary energy intake, overuse of energy dense, low satiety products such as shakes and sports bars may create problems with energy balance and overall nutrient density of the diet.² In such cases, the athlete should focus on using whole foods with higher satiety scores for their sports nutrition goals or should arrange their training/eating timetables so that an existing meal or snack fulfils their recovery goals.

Athletes should always seek the advice of a Sports Dietitian before undertaking any low residue eating strategies to promote acute weight loss. Weight management for athletes in weight category sports requires a holistic approach to weight management, both acutely and chronically, with due consideration also given to recovery strategies post weigh-in.

Gut discomfort

- > Although most athletes tolerate mixed macronutrient supplements well, small number of athletes will suffer from significant gastrointestinal issues and may need an individualised protocol. High protein, low carbohydrate bars may be a particular concern, given their reliance on sugar alcohols to promote flavour and retention of moisture while also moderating refined carbohydrate intake.
- > Individuals with fructose malabsorption or FODMAP intolerance should also be aware of the fructose content of mixed macronutrient supplements containing multiple transportable carbohydrates.

Allergy risk

Mixed macronutrient supplements may contain tree nuts, milk and gluten (from wheat flour, oats and barley) and may need to be avoided by individual athletes who have allergies to any of these items.



Where can I find more information?

Sports Dietitians Australia

www.sportsdietitians.com.au/factsheets

Supplement safety information

www.sportintegrity.gov.au/what-we-do/anti-doping/supplements-sport

References

1. Reale et al. (2017). Acute-weight-loss strategies for combat sports and applications to Olympic success. *Int J Sports Physiol Perf*, 12, 142-51.
2. Moura et al. (2007). Effects of food form on appetite & energy intake in lean & obese young adults. *Int J Obesity*, 31, 1688-95.

The Australian Institute of Sport (AIS) Supplement Framework is an initiative of the Australian High Performance Sport System. The AIS acknowledges the support of members of the National Institute Network (NIN) and National Sporting Organisations (NSO) and their staff in delivering content expertise. This information is intended to help athletes, coaches and scientists make evidence-based decisions about the use of supplements and sports foods. Before engaging in supplement use, we recommend that each individual refer to the specific supplement policies of their sporting organisation, sports institute or parent body, and seek appropriate professional advice from an accredited sports dietitian www.sportsdietitians.com.au.

Athletes should be aware that the use of supplements may have doping implications. Athletes are reminded that they are responsible for all substances that enter their body under the 'strict liability' rules of the World Anti-Doping Code. Some supplements are riskier than others. The Sport Integrity Australia (SIA) app is a useful resource to help mitigate the risk of inadvertent doping by helping to identify supplements that have been batch-tested. The SIA App provides a list of more than 11,000 batch-tested products. We recommend that all athletes consult the educational resources of SIA regarding the risks associated with supplements and sports foods. While batch-tested products have the lowest risk of a product containing prohibited substances, they cannot offer you a guarantee that they are not contaminated www.sportintegrity.gov.au/what-we-do/supplements-sport.

© Australian Institute of Sport
Last updated March 2021

