SAFE & STRONG
ERASMUS+ PROJECT

Guidelines on Safe Body Weight Regulation Methods

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Title: Guidelines on Safe Body Weight Regulation (BWR) Methods

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ABOUT SAFE & STRONG

The Safe and Strong project is a 24-month initiative focused on addressing harmful weight loss practices in young judo athletes. It aims to educate and raise awareness among athletes, coaches, and parents about safe and healthy body weight regulation (BWR) methods to reduce health risks and enhance performance.

OUR CONSORTIUM

The consortium involves judo clubs from Slovenia (JC Zmajčki), Croatia (JC Rijeka), and Italy (JC Yama Arashi Udine), united by the need to ensure safe sports practices.

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E-BOOK CONTENT

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PART 1

Awareness of Rapid Weight Loss Risks in Judo to Optimise Safe Weight Management in Young Judokas

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PART 1 CONTENT

JUDO AS A WEIGH SENSITIVE SPORT

Judo competitions are divided by gender, age categories, and especially weight categories. Weight categories with the competition weight control theoretically allow fairer and more evenly contested disputes between athletes of similar body size and characteristics (Artioli et al., 2016; Reale et al., 2017). Therefore, body composition and body weight are important factors that determine the choice of weight category in judo (Kukovica et al., 2023).

To gain a competitive advantage, many judokas commonly adopt the rapid weight loss procedures (RWL) shortly before competitions, a practice that is widespread among them (Artioli et al., 2016). RWL in judo is characterised by a reduction in body mass, usually one week before the competition (Lakicevic et al., 2020).

A recent study revealed that among elite male and female judokas ranked in the top 150 International Judo Federation (IJF) ranking list, a staggering 96% practice RWL (Štangar et al., 2022). This trend has been in judo for some time, as a study in 2010 highlighted a similarly high trend of 90% RWL techniques before official weigh-in sessions (Artioli et al., 2010). In general, participants aim to be at the higher end of their weight class category to gain a physical edge over lighter opponents (Berkovich et al., 2016).

In judo average RWL has been reported in the range of 2–10% of the body mass of the athlete, with most of it achieved in the last 2–3 days prior to the competition weigh-in (Artioli et al., 2016). As judokas can't maintain their body weight inside their weight category, they fluctuate in body mass with RWL and rapid weight gain (RWG) after the weight-in or competition (Franchini et al., 2012), they are considered weight cyclers (Artioli et al., 2016).

The IJF introduced official weigh-ins the day before competitions, while in 2015 a control weigh-in was also implemented on competition day, to limit the extreme RWL practices (Štangar et al., 2022). Four randomly selected judokas from each weight category are weighed again, and their weight must not exceed their category limit by more than 5% (IJF, 2022). This additional measure was implemented by the IJF to further restrict weight differences among judokas on competition day. However, research showed that the IJF's rule, allowing a maximum weight gain of 5%, prevents athletes from excessive weight gain but does not prevent them from dehydrating before the competition (Ceylan, 2024). Research highlights that RWL practices start very early in judo at the average age of 12.5 (Artioli et al., 2010; Berkovich et al., 2016).

ASSOCIATED RISKS OF RAPID WEIGHT LOSS (RWL) IN JUDO

Literature reports that weight-making strategies such as RWL may jeopardise the athlete's health and safety (Burke et al., 2021) and impair judokas' performance (Ceylan et al., 2022). The most severe consequence of RWL is death, and unfortunately, it has been reported in judo and other combat sports(Burke et al., 2021). This may occur due to heat stress, dehydration and hyperthermia (Bialowas et al., 2023) which are adverse effects associated with RWL (CDC, 1998). Athletes use a variety of RWL methods to achieve the targeted weight category. These methods include (Artioli et al., 2010; Berkovich et al., 2016; Connor et al., 2022; Naulleau & Goulet, 2020; Reale et al., 2018; Štangar et al., 2022):

- long periods of fasting (24 h)
- skipping meals,
- dietary changes,
- severe fluid restrictions,
- exercising in plastic or rubber suits,
- increased/extra exercise,
- saunas,
- hot baths and hot water immersion,
- supplements and natural diuretics,
- water loading,
- vomiting,
- clyster

These methods are typically associated with cardiovascular complications and/or heat stroke secondary to severe fluid restriction, passive heat exposure or strenuous exercise to induce large sweat losses, or combinations of these RWL strategies (Burke et al., 2021). It has been reported that a substantial reduction in body water with plasma volume is associated with cardiovascular strain and impaired thermoregulation in hot environments (Burke et al., 2021). This is additionally enforced on the judoka's body through plastic/rubber suits, hot baths/hot water immersions, and saunas (Artioli et al., 2010). Water loss and dehydration may lead to electrolyte imbalances that increase the risk of muscle heat cramps (Maughan & Shirreffs, 2019).

Dehydration, one of the most common RWL strategies in judo, may greatly decrease judoka motor function, increase heart rate (Ceylan, Aydos, et al., 2022) renal impairment (Martínez-Aranda et al., 2023), and adverse effects on neuromuscular and cognitive systems (Ftaiti et al., 2001). RWL has also been shown to cause acute and chronic hormonal imbalances (Degoutte et al., 2006; Roemmich & Sinning, 1997), promotes bone loss (Prouteau et al., 2006), and weaken the immune system, increasing infection risks (Lakicevic et al., 2020; Suzuki et al., 2003) while significantly inducing muscle damage (Roklicer et al., 2020).

RWL can have an adverse effect on athletes psychologically as it negatively affects mood and mental well-being while causing maladaptive eating behaviours (Gordon et al., 2021). Additionally, it has been shown that RWL strategies didn't optimize the decision-making processes in the judo fight (L. de S. Fortes et al., 2017). Research has also shown that mood states in judo athletes are aggravated after ≥ 5% RWL, resulting in a significant increase in tension and a significant drop in vigour (Lakicevic et al., 2024). Additionally, RWL elevates anxiety, anger, fatigue, depression, and confusion (Horswill et al., 1990; Yoshioka et al., 2006). Even bigger negative impacts occur when the acute RWL becomes chronic with repeated RWL cycling due to numerous competitions (Burke et al., 2021).

From a competition point of view, RWL has been shown to impair both the aerobic and anaerobic performance of athletes (Franchini et al., 2012), upper body power (Silva et al., 2010) and specific judo performance (Ceylan, Kons, et al., 2022; L. S. Fortes et al., 2017). Moreover, a 5% RWL has been associated with an increased risk of injuries (Agel et al., 2007; Green et al., 2007).

YOUTH ATHLETES

The above-mentioned risks are highly applicable to youth athletes, especially as athletes report that they on average, started practising RWL at the average age of 12.5 (Artioli et al., 2010; Berkovich et al., 2016). However, youth athletes should avoid RWL in judo as much as possible in order to qualify for competition and the desired weight category. Dehydration impacts youth judokas differently from adult athletes. Young athletes sweat less effectively than adults and rely on blood redistribution to regulate temperature rather than evaporative cooling (sweating) (Falk & Dotan, 2008), making them more prone to heat stroke due to a rise in core temperature, especially in hot environments like saunas (Lakicevic et al., 2022). Weight cycling, in combination with remaining in the specific weight category for 2 years and longer, suppresses the natural growth and development that normally occurs during childhood and adolescence (Berkovich et al., 2016; Yoshida et al., 2024). Young athletes peak in bone and height development around the age of 12 in girls and 14 in boys (Golden et al., 2014), therefore, energy deficiency in the growth phase hinders growth and may also impact additional metabolic systems and physical performance (Mountjoy et al., 2018).

It was reported that RWL in youth impacts several Mental and Cognitive Changes Attributable to Hypohydration/Dehydration (Carl et al., 2017):

- Decreased psychomotor function
- Decreased reaction time
- Decreased accuracy
- Decreased mental endurance
- Decreased alertness
- Increased problem-solving time
- Increased fatigue
- Increased levels of perceived exertion
- Temporary learning deficits
- Mood swings and
- Changes in cognitive state

Additionally, a recent study showed that early RWL practices at U12, U14 and U16 are negatively associated with performance at the top level compared to judokas who started RWL practices later at the cadet level at 18 years (Štangar et al., 2022). An early start of RWL combined with its negative consequences could be a selective and success-related factor in judo that may prevent a successful long-term career (Štangar et al., 2022).

GUIDELINES FOR HEALTHY REGULATION OF BODY MASS

Generally, coaches and athletes should follow the following guidelines for safe body mass regulation for youth athletes (SBMR) (Carl et al., 2017):

- Gradual weight loss of 0.5kg/week in growing athletes with excess body fat
- Weight loss should be due to excess body fat, not muscle mass
- Diet is well-balanced and consists of 6–10 g/kg per day of carbohydrates, 0.85–1.7 g/kg per day of protein, and 1 g/kg per day of fat
- Maintain euhydration
- Preferably to lose weight in the off-season
- Caloric intake meets the energy costs of living, growth, and sports activities

TEAM OF EXPERT'S SUPPORT

Regulation of body mass in a youth athlete should be done slowly and under the supervision of well-educated coaches who cooperate with a multidisciplinary team that should be incorporated into the National Judo Association. These individuals should be (AIS, 2020):

- **Sports Dietitian—guidance should be required** when an athlete is struggling with weight management, aiming for a lower weight category, or identified by a health professional as engaging in weight practices that impact their performance, health, or lifestyle.
- **Psychologists—their guidance should be required** with any athlete with mental or psychological health issues related to weight-making or participation in a weight-category sport, including those struggling with progress despite a structured weight management plan, exhibiting disordered eating behaviours, body image concerns, or significant weight fluctuations between competitions.

- **Sports Doctor—its guidance should be required** with any athlete with medical or health issues related to weight making or participation in a weight-category sport, including youth athletes (<18 years) in exceptional circumstances considering weight making, athletes seeking to compete in a lower weight category deemed "borderline" after body composition assessment and ASD consultation, those requiring diagnosis of suspected nutrient deficiencies, individuals with recurring injuries or illnesses, those experiencing complications during weight making (e.g., dizziness, fainting, nausea, cramps, blood pressure changes, sweat cessation, or cognitive alterations), or athletes with mental health issues related to weight making or their sport.

BODY COMPOSITION ASSESSMENT

Morphological diagnostics involves measuring a judoka's body composition and anthropometric characteristics. Conducting body composition assessments at the beginning of the preparatory period/beginning of the season is crucial, as it allows time to adjust the training program/periodisation and collaborate with the athlete to determine the most suitable weight category for the competition year. It is particularly important to measure body composition in younger age groups because, too often, young judokas are kept in lower weight categories for potential competitive results, disregarding their normal physical development (Šimenko, 2016).

Body composition analysis provides insights into the athlete's physique, helping determine whether the preparatory period training program should focus on building muscle mass (hypertrophy), reducing fat mass, or maintaining muscle mass while enhancing muscle fiber activation (Šimenko, 2016).

Dual-energy X-ray absorptiometry (DEXA) represents the gold standard in body composition evaluation, but it is not as widely available and affordable for smaller clubs. The most common and affordable method for body composition testing would, therefore, be the bioelectrical

impedance analysis (BIA). This technique provides fast, detailed and practical information, including the amount of muscle mass, fat mass, hydration status, intracellular and extracellular fluid levels, mineral and protein content, visceral fat levels, phase angle, and the distribution of muscle mass across the left and right arms and legs, as well as the trunk (Šimenko, 2016).

However, in order for the testing procedure to be valid and reliable, certain predispositions need to be met (Rauter & Simenko, 2021):

- Measurements should be made by a qualified professional who follows the correct procedure and can adequately interpret the results to the athletes, parents and coaches;
- The measurements need to be taken between 8 and 10 a.m.;
- Athletes need to abstain from large meals after 9 p.m. the evening before the analysis;
- On the day of the testing, they should not eat or drink before the end of the procedure;
- Athletes should refrain from extreme physical exertions 24 h before testing, and the last training session should have been performed at least 12 h before the assessment;
- Athletes shouldn't consume alcohol 48 hours before the testing;
- Athletes need to empty their bowels and bladder at least 30 minutes before the measurement;
- To properly distribute the tissue fluids, the athletes need to be in the standing position for at least 5 minutes before the test;
- The BIA needs to be cleaned before every measurement.

IDENTIFYING AN APPROPRIATE WEIGHT CATEGORY

After the body composition is evaluated, the results should be interpreted to the athlete and his parents. Body fat should be primarily targeted. The health guidelines identify body fat (BF) equivalent to 5% body mass (BM) in males and 12% BM in females as the lowest acceptable levels that still support a healthy athlete (American College of Sports Medicine, 2018). However, in youth male athletes, we should/might target 6-8% BF and in females 12-14% BF. In this way, we can help to choose the correct weight category by lowering BF% while allowing the body to develop its musculoskeletal system or even induce hypertrophy. The decision to maintain or change the weight category should be a joint decision between the parent-coach-athlete triangle. Additionally, regular weight checks are recommended on a monthly basis for coaches to monitor athletes' development and not to catch anyone by surprise. Especially in the pre-competition period. Moreover, the competition calendar should be established and communicated to the athlete and parents/guardians. If an athlete needs to change the weight category, it is advisable not to put him in too many competitions in his first year, but to focus more on training camps or training with higher age categories. If the athlete is in the weight loss or weight gain training period, we should avoid strong competitions as the athletes would not be optimally prepared. If the youth athlete's BM is ≥5%, then it's weight category; we should start the conversations to change it and go one category higher.

Case 1: Male / Weight Category -50kg / 15 years old

BIA Analysis		
Age	**15 years**	**DECISION**
Weight Category	**-50 kg**	**move up to -55 kg**
Body Mass	**56 kg**	**6 kg over category or 10,7 %**
Skeletal Muscle Mass	**28 kg**	**Can eat normally and gain 1-2 kg of muscle mass**
Body Fat %	**5,10 %**	**nothing more to lose**

The athlete currently exceeds his weight class limit by 6 kg and already has a body fat percentage of 5.1%, which is near the physiological lower limit. Attempting to lose approximately 10.7% of body mass before each competition would be both counterproductive and potentially harmful to health and performance. Furthermore, considering that the athlete is in puberty—a critical phase for natural growth and skeletal-muscular development—continued weight cutting may interfere with this process and pose long-term health risks. Therefore, it is strongly recommended that the athlete move up to the next weight category as soon as possible to support healthy development and sustainable performance.

Case 2: Female / Weight Category -66kg / 15 years old

BIA Analysis		
Age	**15 years**	**DECISION**
Weight Category	**-66 kg**	**stay in the category**
Body Mass	**66,8 kg**	**only 0,8 kg over category or 1,2 %**
Skeletal Muscle Mass	30 kg	**Can be increased by 5 kg over the next seasons**
Body Fat %	**19,10 %**	**Lose 7,1 % of Fat mass in preparatory period to be in recommended 12%**

The athlete is currently only 0.8 kg (1.2%) over her weight category, which makes remaining in the current weight category both feasible and safe. With strategic planning, her performance and body composition can be optimized without excessive restriction. During the preparatory period, the athlete should aim to reduce approximately 7.1% of fat mass in order to reach the recommended 12% body fat level. With this we open the room for gaining strength via a gradual increase of up to 5 kg muscle mass via training and normally growth development in puberty.

TARGETS FOR BODY MASS DEVELOPMENT FOR THE SEASON

The whole-year periodization plan should have body composition/development in mind and be based on body composition and motor performance tests. Body mass should be checked monthly or at least 1-2 months before the competition. The main target is not to be over 5% of BM of the competition weight category, 21 days before competitions 2-3% and 14 days before competitions 2%. Ideally, we can hit the weight-in without RWL. Otherwise, 2-3% RWL in 7-10 days would still be in the acceptable range for youth athletes. It is recommended that a weekly weight loss target should not be greater than ~1% BM (AIS, 2020)

ACUTE BODY MASS REGULATION METHODS

Athletes can reduce the need for excessive sweating and dehydration by strategically managing fiber, carbohydrate, sodium, and fluid intake. They should understand optimal recovery nutrition, know their body and prioritize familiar, tested carbohydrate sources and fluids that enhance performance and well-being before competitions. Relying solely on dehydration for 5-8% body mass loss is unsafe and dangerous. Instead, a balanced approach involving gut content, carbohydrate stores, and body water manipulation is recommended. The initial body mass should reflect a well-hydrated, well-nourished state to allow effective adjustments via the previously mentioned methods(Reale, 2018b).

MANIPULATION OF GUT CONTENT

The whole gut transit, depending on food type and its combination, can take from 10 to 73 hours (Lee et al., 2014).Therefore, strategies to speed up the transit might be of benefit. Combat sport athletes commonly fast, which limits portion sizes or reduces total food volume before weigh-in. Consequently, this reduces the mass of intestinal contents and thus the total BM (Brito et al., 2012).

Various strategies can help in the safe manipulation of gut content:

- Dietary strategies such as the consumption of low-weight, energy-dense foods in the hours and days before weigh-in are preferable as they reduce total food volume without impacting energy and macronutrient intake (Reale, 2018b).
- BM can also be reduced by reducing the consumption of "bulking" fiber-rich foods, reducing undigested plant matter within the gut and reducing water, which in total decreases fecal bulk. Research has shown that the consumption of a low fiber diet for just two days begins cleansing the bowel and a linear relationship has been shown to exist between fiber intake and bowel cleanliness (Wu et al., 2011). It is recommended to reduce dietary fiber from habitual intake (>30 g/d) to a Low fiber diet (<10 g/d) for 4 days, which may result in 1–2% decrease in body mass (Reale et al., 2018; Ricci et al., 2025).

- Protein Source Manipulation to Reduce Gastrointestinal Mass: Manipulating the type of protein consumed in the final days leading up to weight-in can reduce gut content and improve bowel clearance. Specifically, replacing meat-based proteins (e.g., chicken, beef,…) with dairy-based proteins (e.g., yoghurt, kefir, casein,…) can help. Fermented dairy products (such as yoghurt and kefir) contain probiotics that enhance gut motility and reduce transit time (García-Burgos et al., 2020; Turan et al., 2015), while increasing short-chain fatty acids, strengthening the gut barrier, and improving motility (Aslam et al., 2020). Additionally, Milk-derived proteins like whey are highly digestible. Whey is absorbed particularly quickly, while casein forms a light curd that's digested more efficiently than meat protein, producing less residual bulk. However, in the case of rapid weight loss and gut manipulation, whey is a better option compared to casein as whey remains soluble in gastric conditions, while casein coagulates into curds, which slows digestion(Fitzpatrick et al., 2024; van Eijnatten et al., 2024).

MANIPULATION OF GLYCOGEN CONTENT

Dietary carbohydrates are stored as glycogen in skeletal muscle (350–700 g) and the liver tissue (80–100 g) (Knuiman et al., 2015) , serving as energy reserves that can be mobilized for glucose needs, with glycogen binding water at a 1:3 ratio (Fernández-Elías et al., 2015). However, young athletes have been shown to store less glycogen than adults (Aucouturier et al., 2008). Nonetheless, the ability to manipulate these glycogen stores represents another strategy available to regulate body mass in a controlled way. It is advisable to decrease the volume of training before competition, and therefore reducing/restricting carbohydrate intake in order to deplete glycogen stores would be a logical strategy. Research has shown that 7 days of a low carbohydrate diet (< 50 g/day) in combination with training and a minor energy deficit (< 10%) can achieve a ~2% BM reduction while maintaining strength, power and anaerobic capacity (Sawyer et al., 2013). However, carbohydrate restriction as a practice should be limited when possible and implemented only as needed for rapid weight loss (Ricci et al., 2025).

MANIPULATION OF BODY WATER

Water makes up about 60% of body weight (Stevens et al., 2006), and its rapid fluctuation makes dehydration a common strategy for acute weight loss among combat sport athletes (Reale, 2018b). Mild dehydration (< 2% BM) is unlikely to affect relevant performance; however, larger magnitudes may not be advisable (Reale et al., 2017). Athletes have two methods available to them to decrease body water; consume less fluid and/or excrete more fluid (Reale, 2018b). However there are several strategies to do this:

- Additional passive sweating should only be used when necessary and when sufficient recovery time is available in a form of a dry heat in preference to steam saunas, as this results in greater fluid losses for a given period of time and especially less physiological strain (Pilch et al., 2014). However this method should be done under a strict supervision of a coach, while an athelete should never use the sauna on its one – at least in pairs for safety reasons. Compared to adults, youth athletes have a greater tendency to experience elevations in core body temperature in hot environments (Lakicevic et al., 2022). Coaches should carefully monitor the athletes core temperature during any type of sauna use to prevent hyperthermia 40°C (Ricci et al., 2025).

- Sodium plays a key role in fluid retention by regulating extracellular water balance. In the context of rapid weight loss, reducing dietary sodium intake can help decrease total body water (TBW) by lowering plasma osmolality and promoting natriuresis (sodium excretion), which in turn leads to increased urine output and mild dehydration. If needed, during fight camps a lower sodium intake of < 2.3 g daily could be used (Reale, 2018a; Ricci et al., 2025). A 3-4% BM can be targeted with a method of decreased sodium intake for 2-3 days, or 1 day fluid restriction in training in combination with passive and/or active sweating (AIS, 2020). Reducing sodium intake to 1,000–1,500 mg/day can lead to a loss of around 600 mL (0.57 kg) of water weight on the first day, and up to 1.4 kg over a week due to decreased fluid retention (Macedonio & Dunford, 2009).

- In the literature we can find water loading or hyperhydration as an effective tool for body water manipulation (Naulleau & Goulet, 2020; Reale et al., 2018). A study by Reid et al. investigated the effects of water loading on body mass reduction in senior combat sport athletes. Athletes consumed high volumes of water (100 ml/kg/day) for three days, followed by fluid restriction (15 ml/kg/day) on the fourth day. On day 5 they experienced a body mass loss of 3.2% (Reale et al., 2018). However, there is no study up to date on youth athletes. However, due to a usage of this method in youth a protocol that has been shown to be safe is presented. Therefore, it should be stated that his method should only be done under strict supervision of a coach/sports doctor/dietitian as it may increase the risk of hyponatremia (water intoxication) in extreme and uncontrolled practices (AIS, 2020) – more water is not better (Noakes, 2003)!

- The rest of the methods like hot water emersion have been used in research on elite adult athletes (Ricci et al., 2025), so direct application to youth athletes with lower body temperature regulation is not advisable at the moment.

CONSIDERATIONS FOR WEIGHT LOSS

- Coaches should communicate to parents that their child needs to lose weight for a particular competition. Only good communication in the athlete-coach-parent triangle can give maximal support and a safe outcome in RWL.

- All of the rapid weight loss (RWL) strategies mentioned can be effective tools for temporarily reducing body mass in athletes. However, these methods must be approached with caution and should always be tested well in advance during training phases, not for the first time in the lead-up to a main event. Every athlete responds differently to dehydration, dietary shifts, and digestive changes, and unexpected outcomes such as fatigue, GI distress, or underperformance can occur if strategies are not individualized. Therefore, it is critical that RWL protocols are trialed, monitored, and adjusted under professional guidance, ideally with input from a qualified sports dietitian or performance team.

- Athletes, parents, and coaches should also be educated about judo's nutritional demands.

- Additionally, judokas should be encouraged to keep a food diary to see where, when, and what they eat, especially in relation to training and competition.
- Portion control and eating small, frequent meals, especially during training, aid recovery and support weight loss. Spreading calories over six meals instead of three boosts thermogenesis, the calorie-burning process during digestion, which explains the warmth felt after eating.

- Sports drinks will add to your overall calorie intake. If weight loss is a priority then they may not be needed; water, sugar free squash and low-calorie sports waters may be more appropriate

- Dietary education for young athletes should emphasise optimal eating patterns to support health, normal growth and sport participation demands, with emphasis on a balanced intake of nutrient-dense carbohydrates, high-quality protein and sufficient dietary calcium, vitamin D and iron. Overall, the basic KN of nutrition strategy of young judoka.

PART 2

Nutrition Strategy of Young Judokas

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PART 2
CONTENT

INTRODUCTION

Why is a good nutrition strategy important for a young athlete?

- It supports the period of intensive growth and development and allows one to reach one's full potential.
- It supports the increased daily energy and nutrient requirements due to training.
- With the right pre-, during and post-nutrient intake, it improves the benefit of training and increases performance. It provides energy for exercise, supports recovery and muscle growth.
- It strengthens the immune system.
- It reduces the chance of an injury.
- It can train the gut to utilise more nutrients and reduce gastrointestinal symptoms.
- It supports competition-specific requirements for optimal performance.
- It cares for long-term health.

For all these benefits, it is not just important to eat the right amount, but also to eat a good quality and variety of food at the appropriate time.

Athletes' food choice is influenced by many factors. The aim of this e-book is to:

- Provide the knowledge that is needed for making the right food choices;
- Give practical tips for young athletes on how to develop a good nutrition habit supporting their sport engagement;
- Encourage coaches to communicate with athletes about nutrition and give it importance;
- Help parents to know how they can support their child-athlete.

BASICS

Why do we eat?

- For energy – "fuel".
- For "building blocks" – structural elements and for functional elements – food contains essential substances needed by the body to build or renew bones, muscles, internal organ tissues, as well as for brain function, skeletal-muscle system, immune system, reproductive system …
- To grow and maintain health.

Why do we drink?

- For body temperature regulation.
- Water dissolves nutrients, which can be then transported throughout the body.
- It allows toxins to be eliminated from the body.
- Maintaining electrolyte balance.

Why does a young athlete need special nutritional attention?

Nutrition is of paramount importance for young athletes due to the significant transformations their bodies undergo during development. As young athletes progress from childhood through adolescence and into adulthood, they experience numerous anatomical, physiological, and metabolic changes as a result of biological growth and maturation. Adolescence, in particular, is a critical window of substantial growth and physical development; this phase includes changes in body composition, metabolic and hormonal fluctuations, the maturation of organ systems, and the establishment of bodily stores, all of which can have lasting effects on long-term health.

From a nutritional standpoint, this period is crucial for forming an individual's lifelong attitudes and behaviors towards food, a factor of particular significance when considering the interplay between diet, physical activity, and body image. The energy and macronutrients consumed during childhood and adolescence directly influence growth and the development of fat-free mass (FFM). Furthermore, young athletes exhibit distinct metabolic characteristics compared to their adult counterparts. They often have a higher relative energy expenditure during physical activity. Their bodies also process and utilize fuels differently; for instance, children and adolescents tend to have higher rates of fat oxidation during submaximal exercise and may have lower endogenous glycogen storage capacity and reduced glycolytic capabilities, especially before puberty. These unique physiological and metabolic demands underscore the critical need for tailored nutritional strategies to support optimal growth, development, athletic performance, and overall health in young athletes.

ENERGY

Adequate energy intake during adolescence is crucial to meet the demands of individual growth and development, as well as the substrate requirements associated with general physical activity, training, and competition. However, precisely defining an adolescent's energy needs is challenging due to metabolic variability among individuals and methodological difficulties in accurately assessing both energy intake and expenditure.

When evaluating the energy requirements of adolescents, the energy needed for growth must be considered. This growth-related energy expenditure has two components: the energy deposited in newly forming tissues and the energy consumed for the synthesis of these tissues. The energy stored in growing tissues is relatively small, estimated at about 8.6 kJ per gram of daily weight gain. Measurements of Total Energy Expenditure (TEE) in adolescents suggest that energy changes linked to physical activity and/or training are likely to have a much greater impact on overall energy needs than those associated with growth. Nevertheless, it is important to note that adolescents have a higher resting metabolic rate (RMR) than adults, and standard predictive equations often underestimate RMR in adolescents compared to measured rates, with discrepancies up to 1255.2 kJ (300 kcal/day).

Low Energy Availability (LEA) is frequently observed in adolescents undergoing heavy training, with one study indicating that 17.9% of athletes had clinical LEA. LEA can lead to numerous adverse health outcomes, including delayed puberty, menstrual irregularities, poor bone health, short stature, the development of disordered eating behaviors, and an increased risk of injury. Furthermore, the effects of LEA may be more pronounced in females who are ≤ 14 years of gynecological age. Conversely, some athletes, particularly those in disciplines like throwing, may exhibit anthropometric characteristics consistent with potential excessive energy intake.

How do we get energy?

With food:
Energy is stored in the chemical bonds of nutrients, that are during our digestion broken down and the energy is released in the form of ATP. Because of structural differences of nutrients, they have different energy value:

- Fats: 9 kcal/g
- Proteins: 4 kcal/g
- Carbohydrates: 4 kcal/g
- Dietary fibre: 2 kcal/g

Through different metabolic processes all these nutrients are broken down and ATP (different amounts) is released. ATP is the only form which can be used for muscle contraction.

With the use/breakdown of body stores:

- ATP – CP,
- glycogen (muscle, liver),
- body fat,
- body proteins.

Energy expenditure - why do we need energy for?

1. Resting metabolic rate (RMR): energy required to sustain normal body functions and homeostasis in an awake individual under ambient thermoneutral conditions and during rest

2. Diet-induced thermogenesis (DIT): energy needed for digesting food

3. Growth: it is strongly influenced by age (decreasing with age)

4. Physical activity: exercise (planned) + daily movement

When are we talking about energy balance?

Energy balance is when the daily energy intake equals daily energy expenditure. In this state body energy stores remain same.

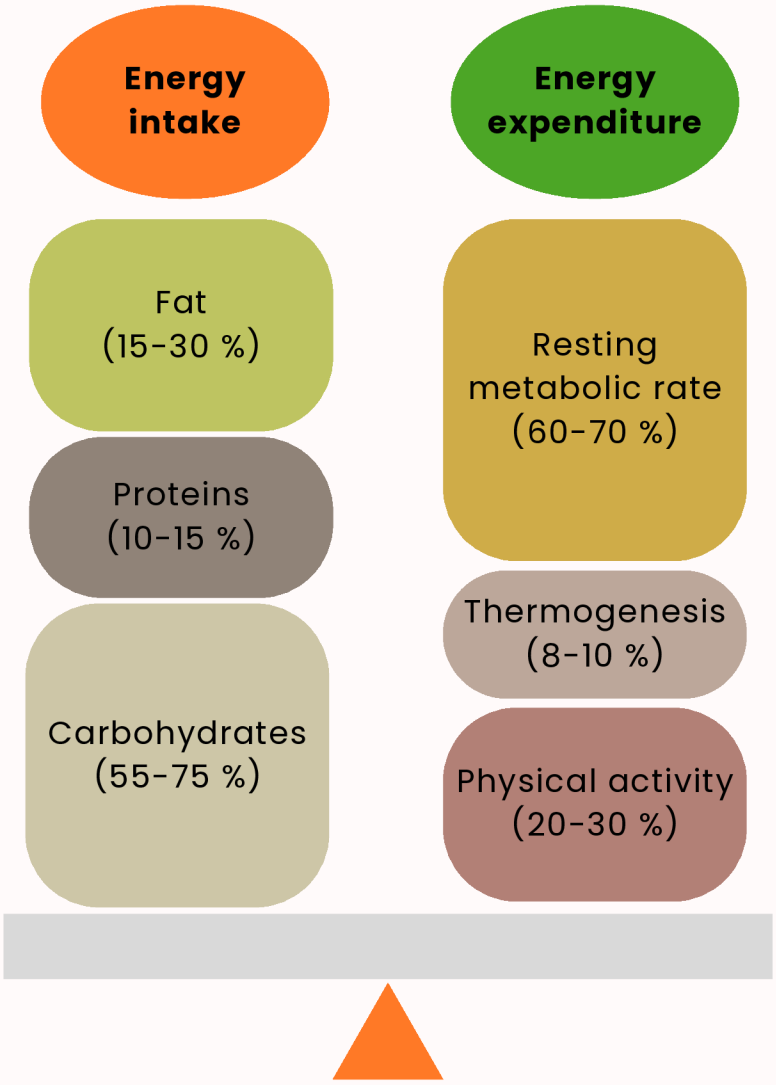


Figure 1: Energy balance

What is energy availability (EA)?

Energy availability (EA) is the amount of dietary energy available to sustain physiological function after subtracting the energetic cost of exercise. EA is expressed in terms of FFM (fat-free mass) rather than total body mass, resulting in the equation:

$$EnergyAvailability(kcal/kgFFM) = \frac{EnergyIntake - EnergyExpenditureDuringExercise}{FFM}$$

What happens if the energy intake is insufficient to support sport activity?

Low Energy Availability (LEA) is recognised as a key pathophysiological mechanism for the development of Relative Energy Deficiency in Sport (REDS). It occurs when an athlete has insufficient energy remaining after exercise to support the bodily functions necessary for optimal health and performance. This deficit triggers reserve metabolic pathways, utilizing muscle and fat as energy substrates, potentially leading to a loss of fat-free mass (FFM). LEA is currently defined as an energy availability below 125 kJ/kg FFM/day (or 30 kcal/kg FFM/day) and can result from insufficient dietary energy intake and/or increased exercise loads. LEA exists on a continuum, ranging from "adaptive LEA," where effects are benign, to "problematic LEA," which leads to health and performance issues.

Adaptable Low Energy Availability involves a decrease in the body's available energy that results in harmless, or benign, effects. These effects can include slight and temporary changes in various bodily biomarkers, which signify an intelligent, adaptive distribution of energy by the body and its physiological flexibility. In some instances, the circumstances leading to this reduced energy availability—such as carefully managed adjustments to body composition or planned periods of intense training or competition—may even yield immediate benefits for health or performance, for example, an improved relative VO2max. Typically, adaptable LEA is a temporary condition that has little to no lasting negative impact on an individual's long-term health, overall well-being, or athletic performance. It's also noted that various moderating factors can influence how these outcomes actually manifest.

Problematic Low Energy Availability arises from exposure to LEA that causes more significant and potentially lasting disruptions across various body systems. This condition often manifests with noticeable signs and/or symptoms and is considered a maladaptive, or harmful, response from the body. The specific attributes of problematic LEA exposure, such as its duration, intensity, and frequency, can differ based on the particular body system involved and the individual. These attributes can also be influenced by interactions with various moderating factors, which may intensify the negative effects on an individual's health, well-being, and performance.

So, think long-term and choose a right weight category that will allow you to eat enough energy for growth, development, health and performance. This is the privilege of weight categories; judoka can be different shape and they don't need to "fit all in the same box". Let your body develop and then find your optimal weight, where you can be strong, energetic, healthy, successful and happy.

What happens when there is excessive energy intake?

The excessive energy is needed for growth. Whether it is growing up as a child or for building muscles at any age. The energy left also after these needs, will be stored as body fat.

NUTRIENTS

The 6 essential nutrients:

1. Carbohydrates

2. Proteins

3. Fats

MACRONUTRIENTS

3. Water

5. Vitamins

6. Minerlas

7. Trace elements

MICRONUTRIENTS

Two general recommendations for a balanced and healthy diet are:

!! DO NOT EXCLUDE ANY ENTIRE FOOD GROUP !!
(EXCEPT IF CLINICALLY NECESSARY)

!! MINIMISE PROCESSED FOODS, FAST FOODS, FREE SUGARS AND SALT !!

CARBOHYDRATES

What are Carbohydrates?

Carbohydrates are the body's primary and most efficient source of energy. They are broken down into glucose, which is then used by the muscles and brain for fuel. Excess glucose is stored as glycogen in the liver and muscles, ready to be converted back into glucose when needed. The body has no mechanism for storing large amounts of carbohydrates for long periods. The body can store carbohydrates as glycogen in the muscles (300–400 g) and the liver (80–120 g). Additionally, there are 4–5 g of glucose in the blood, and that is it. The excessive carbohydrates are transformed and stored in the body as fat.

Role of carbohydrates for athletes:

- ***Providing immediate energy:***

They are the fastest fuel source for high-intensity activities typical in judo, such as explosive throws, quick movements, and sustained grappling.

- ***Fuelling the brain:***

The brain relies almost exclusively on glucose, ensuring mental alertness, focus, and quick decision-making during matches.

- ***Replenishing glycogen stores:***

After training, consuming carbohydrates is vital to refill muscle and liver glycogen, preparing the body for the next session. This is critical for sustained performance over days of training or a tournament.

- ***Preventing muscle breakdown:***

When carbohydrate stores are low, the body might start breaking down protein (muscle) for energy, which is counterproductive for muscle growth and recovery.

Types of carbohydrates:

- **Simple carbohydrates:**

These are sugars that are quickly digested and provide a rapid burst of energy. Examples include glucose, fructose (found in fruits), and sucrose (table sugar). While they offer quick energy, they can lead to rapid spikes and drops in blood sugar.

Fruits (apples, bananas, oranges), fruit juices, milk, honey, table sugar, processed snacks.

- **Complex carbohydrates:**

These are starches and fibers that are digested more slowly, providing a sustained release of energy. They are found in whole grains, vegetables, and legumes. They are generally preferred for athletes due to their steady energy supply and additional nutritional benefits.

Whole-grain bread, brown rice, whole-wheat pasta, oats, quinoa, potatoes, sweet potatoes, corn, peas, lentils, beans, chickpeas.

How much Carbohydrates (g) per kg of athlete's body mass?

Light	Low-intensity training periods (low-intensity or skill-based activities for less than 1 hour/day)	**3-5 g/kg**
Moderate	Moderate exercise program (e.g., 1 h/d)	**5-7 g/kg**
High	Elite endurance athletes exercising 1-3 h/d high-to-moderate intensity	**6-10 g/kg**
Very High	Extreme commitment (e.g., >4-5 h/d moderate to high-intensity exercise)	**8-12 g/kg**

When and how much for athletes?

Before Training/Competition  2-3 hours prior	Focus on ***complex carbohydrates*** to build up glycogen stores and provide sustained energy. **➜ Aim for 2-4g of carbohydrates per kg of body weight.**
During Training/Competition  if longer than 60-90 minutes	For prolonged sessions, ***simple carbohydrates*** can be beneficial for quick energy replenishment. **➜ Aim for 30-60g of carbohydrates per hour.**
After Training/Competition  within 30-60 minutes post-exercise	Crucial for replenishing glycogen stores and initiating recovery. Combine with protein. **➜ Aim for 1,2-1,5g of carbohydrates per kg of body weight.**

Quantity in individual foods (content per 100g of food):

- Dried fruits (e.g., Raisins, Dried Apricots, Dates) often 70-83 g
- Corn Flakes/cereals (dry) 70-84 g
- Uncooked rice around 75-80 g
- Flour (various types) 70-75 g
- Uncooked pasta 65-75 g
- Couscous (uncooked) 72-75 g
- Oats (dry/flakes) 66-67g
- French bread/baguette 55-58g
- Biscuits/crackers (plain, some varieties) 50-70g
- Sweetened canned fruits 25-67 g
- Cooked Pasta 30-35 g
- Bread (various types) 40-60 g
- Cooked white rice 28-30 g
- Cooked whole wheat rice 25-26 g
- Cooked chickpeas 27 g
- Sweet potatoes 20-25 g
- Potatoes (cooked/boiled) 15-20 g
- Bananas 23-27 g
- Lentils (cooked) 16-20 g
- Black beans (cooked) 14-21g
- Quinoa (cooked) 20 g
- Apples 15-20g
- Honey 80 g
- Blueberries 14 g
- Milk (dairy) 12 g
- Yoghurt (plain) 10-14g
- Starchy vegetables (corn, peas)12-15 g

DIETARY FIBRE

What is dietary fiber?

Dietary fiber is a type of carbohydrate that the body cannot digest. It passes through the digestive system relatively intact, playing a crucial role in maintaining digestive health.

Role of dietary fiber for athletes:

- ***Healthy digestion:***

Ensures regular bowel movements and prevents constipation, which is vital for comfort and optimal nutrient absorption.

- **Satiety and weight management:**

Helps athletes feel full and satisfied, which can be beneficial for managing appetite and maintaining a healthy body weight.

- **Blood sugar regulation:**

Soluble fiber can help stabilize blood sugar levels, preventing rapid spikes and crashes that could affect energy during training.

- **Gut microbiome health:**

Feeds beneficial gut bacteria, contributing to overall digestive health and potentially immune function.

Types of dietary fiber:

- **Soluble Fiber**

Dissolves in water to form a gel-like substance. It can help lower blood cholesterol and glucose levels. Found in oats, barley, nuts, seeds, beans, lentils, and some fruits and vegetables.

- **Insoluble Fiber**

Does not dissolve in water. It adds bulk to stool, helping food pass more quickly through the stomach and intestines. Found in whole-wheat flour, wheat bran, nuts, beans, and vegetables (e.g., green beans, potatoes).

Where to find them?

Whole-grain products (whole-wheat bread, brown rice, whole-wheat pasta, oats), fruits (apples, pears, berries), vegetables (broccoli, carrots, leafy greens), legumes (beans, lentils, chickpeas), nuts, and seeds.

How much Dietary Fiber (g) to consume?

Aim for **20–35 g of fiber per day**. Spread fiber intake throughout the day to avoid digestive issues.

When and how much for athletes?

Before Training/Competition	***Limit high-fibre foods*** immediately before intense training or competition, as they can cause gastrointestinal discomfort. **Except if you are training your gut.*
During Training/Competition	***Better not consumed.***
After Training/Competition	Can be included as part of a ***recovery meal***, but balance with other nutrients.

Quantity in individual foods (content per 100g of food):

- Wholegrain bread 6–8 g
- Black bread 5-6 g
- Tuberous and root vegetables (e.g. potatoes, carrots) 1- 2,5 g
- Leafy vegetables 2,5- 3,5 g
- Fruit 3 g
- Legumes 4- 7 g
- White bread 2,7 g
- Wheat bran 45 g
- Flaxseed 37 g
- Nuts 12-15 g
- Rye flakes 14 g
- Artichokes 12 g
- Pistachios 11 g
- Apple slices 11 g

PROTEINS

What are Proteins?

Proteins are large, complex molecules essential for the structure, function, and regulation of the body's tissues and organs. They are made up of smaller units called amino acids. There are essential amino acids (EAA) that the body needs to get from food, and non-essential amino acids (NEAA) that the body can synthesise on its own. EAA are: histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine. Different food sources have different amino acid compositions, which is why not all proteins found in food are equally useful for our bodies. More about protein quality a little later.

Role of proteins for athletes:

- ***Muscle repair and growth:***

Judo training causes micro-tears in muscle fibres. Proteins provide the amino acids needed to repair these tears and build new muscle tissue, leading to increased strength and power.

- ***Recovery:***

Adequate protein intake after exercise speeds up muscle recovery, reduces muscle soreness, and prepares the body for the next training session.

- ***Supporting immune function:***

Proteins are vital components of antibodies and other immune system cells, helping athletes stay healthy and avoid illness.

- ***Enzyme and hormone production:***

These are critical for countless bodily functions, including metabolism, energy production, and adaptation to training stress.

- ***Satiety:***

Protein helps you feel fuller for longer, which can be beneficial for managing body weight and composition.

Types of proteins:

- **Complete proteins:**

Contain all nine essential amino acids that the body cannot produce on its own. Found primarily in animal products.

Chicken, turkey, beef, pork, fish (salmon, tuna, cod), eggs, dairy products (milk, yogurt, cheese, cottage cheese).

- **Incomplete proteins:**

Lack one or more essential amino acids. Found in most plant-based foods. Vegetarians and vegans need to combine various incomplete protein sources to get all essential amino acids.
**can be combined for complete protein*

Lentils, beans, chickpeas, tofu, tempeh, quinoa, nuts, seeds, whole grains.

How much proteins to consume?

Young judokas typically need more protein than sedentary individuals. Aim for 1.2-1.7g of protein per kg of body weight spread throughout the day across meals and snacks.

IMPORTANT: Adequate protein distribution over the day.

Spread your protein intake throughout the day as evenly as possible. It contributes to protein synthesis.

Why is it even more important for children and adolescent? Because you are growing and developing 24/7 – your body constantly needs "building blocks". So, don't skip breakfast (even if your parents do) and don't even think about intermitted fasting! Rather help your body develop to its potential.

When and how much for athletes?

Before Training/Competition  2-4 hours prior	Include a ***moderate amount of protein*** (0,15-0,25g of protein per kg of body weight) to support satiety and provide amino acids for muscle readiness. Avoid excessive protein, as it can slow digestion.
During Training/Competition	***Generally, not recommended***, except sports drinks with EAA. Focus on carbohydrates for immediate energy.
After Training/Competition  within 30-60 minutes post-exercise	***Critical*** for muscle repair and growth. Aim for 0.25-0.3g of protein per kg of body mass (e.g., 15-25 g for most young athletes).

Quantity in individual foods (content per 100g of food):

- Chicken breast (skinless) 28-32 g
- Turkey breast (skinless) 27-30 g
- Lean beef (e.g., round) 25-28 g
- Pork leg (lean) 22-26 g
- Tuna (canned, in water) 23-28 g
- Salmon 20-25 g
- Cod 18-22 g
- Shrimp/Prawns 20-24 g
- Egg (whole, raw) 12-13 g
- Egg white (raw) 10-11 g
- Greek yoghurt (plain) 9-12 g (sometimes more)
- Cottage cheese (light/low-fat) 11-14 g
- Skyr 10-12 g
- Parmesan 35-40 g
- Edam/Gouda 23-27 g
- Milk (whole fat) 3-3.5 g
- Lentils (cooked) 8-10 g
- Chickpeas (cooked) 7-9 g
- Beans (cooked, various types) 7-10 g
- Soybeans (cooked) 15-18 g
- Tofu (firm) 10-17 g (depending on type)
- Edamame (cooked) 10-12 g
- Almonds 20-22 g
- Peanuts 4-26 g
- Peanut butter 22-28 g (depending on brand)
- Pumpkin seeds 25-30 g
- Chia seeds 16-21 g
- Sunflower seeds 20-23 g
- Quinoa (cooked) 4-5 g
- Oat flakes (dry) 12-15 g
- Seitan (wheat gluten) 20-25 g
- Wholegrain bread 8-12 g
- Spinach (cooked) 3-4 g
- Broccoli (cooked) 2-3 g
- Peas (cooked) 5-7 g

Quality

Ingested proteins are broken down through digestion to smaller peptides and amino acids, which are absorbed and can be used to rebuild our own proteins and structures (protein synthesis). For our protein synthesis, a specific ratio of amino acids is used. As similar as it is to the food protein amino acid composition, the better we can utilise them, the better food protein quality. For the evaluation of protein quality, the digestible indispensable amino acid score (DIAAS) is used. The DIAAS accounts for amino acid digestibility at the end of the small intestine, providing a measure of the amounts of amino acids absorbed by the body and the protein's contribution to human amino acid and nitrogen requirements.

Table 1: DIAAS (%) Scores for Various Food Sources

Food Source	DIAAS (%)	Protein Quality	Reference
Whole Milk Powder	143	High	FAO (2013)
Milk Protein Concentrate	118	High	FAO (2013)
Whole Milk	114	High	Philips (2017)
Egg – Hard Boiled	113	High	Philips (2017)
Beef	111	High	Ertl et al. (2017)
Whey Protein Isolate	109	High	FAO (2013)
Chicken Breast	108	High	Philips (2017)
Soy Protein Concentrate	98.5	Good	Philips (2017)
Whey Protein Concentrate	98.3	Good	Philips (2017)
Pea Protein	91.5	Good	Philips (2017)
Soy Protein	91.5	Good	Philips (2017)
Wheat	91.5	Good	Philips (2017)
Soy Protein Isolate	90	Good	Philips (2017)
Chickpeas	83	Good	Philips (2017)
Pea Protein Concentrate	82	Good	Philips (2017)
Mixed Diet: Wheat, Peas and Whole Milk Powder	82	Good	FAO (2013)
Peas – Cooked	58	Low	Philips (2017)
Rice – Cooked	59	Low	Philips (2017)
Rye	47.6	Low	Ertl et al. (2017)
Barley	47.2	Low	Ertl et al. (2017)
Wheat	40.2	Low	Ertl et al. (2017)
Almonds	40	Low	Philips (2017)
Rice Protein Concentrate	37	Low	Philips (2017)
Corn-Based Cereal	10	Low	Philips (2017)

FATS

What are Fats?

Fats (or lipids) are a concentrated source of energy, providing 9 calories per gram (compared to 4 calories per gram for carbohydrates and proteins). They are essential for many bodily functions, including hormone production, absorption of fat-soluble vitamins (A, D, E, K), insulation, and protection of organs.

Role of fats for athletes:

- ***Long-duration energy:***

While carbohydrates are primary for high-intensity bursts, fats are a significant fuel source for longer, less intense activities, helping to spare glycogen stores.

- ***Hormone production:***

Healthy fats are crucial for the production of hormones, including testosterone, which is important for muscle growth and recovery.

- ***Nutrient absorption:***

They enable the absorption of fat-soluble vitamins (A, D, E, K), which are vital for bone health, vision, and immune function.

- ***Reducing inflammation:***

Omega-3 fatty acids, a type of polyunsaturated fat, have anti-inflammatory properties that can aid in recovery and reduce muscle soreness after intense exercise.

- ***Overall health:***

They contribute to cell membrane integrity, nerve function, and brain health.

- ***Satiety:***

Satiety, lowering glycemic response of the meal.

Types of fats:

- **Unsaturated Fats:**

Found in plant-based foods and fish. They are beneficial for heart health and can reduce inflammation.

  - Monounsaturated Fats: Olive oil, avocado, nuts (almonds, cashews).
  - Polyunsaturated Fats: Sunflower oil, corn oil, flaxseed oil, walnuts, fatty fish (omega-3s).

Avocados, nuts (almonds, walnuts, peanuts), seeds (chia, flax, sunflower), olive oil, rapeseed oil, sunflower oil, fatty fish (salmon, mackerel, sardines).

- **Saturated Fats:**

Found primarily in animal products (meat, dairy) and some tropical oils (coconut oil, palm oil). Excessive intake can raise "bad" cholesterol levels.

Red meat, butter, cheese*, full-fat dairy*, some processed foods.

** Milk fat is in the form of fat globules surrounded by a complex membrane composed of polar lipids, specialised proteins, glycoproteins, and cholesterol. These are bioactive components that serve essential nutritional, immunological, neurological, and digestive functions. Milk fat globules release energy rapidly in the upper gastrointestinal tract and are therefore more easily digestible.*

- ***Trans Fats:***

Artificially created fats are found in some processed foods, baked goods, and fried items. They are generally considered unhealthy and should be avoided.

Fried foods, some margarines, and commercially baked goods (often labelled as "partially hydrogenated oil").

How much fats to consume?

1.5–2 g/kg/day

ATTENTION: There is a huge difference in fat content in meals just according to the preparation technique. Techniques that significantly increase fat content: frying, pan-frying. Techniques that do not increase fat content: cooking, steaming, air-frying. Hidden fats: ready-to-eat meals, meat products, plant-based products, sauces, spreads, dressings, …

When and how much for athletes?

Before Training/Competition	***Limit high-fat foods*** immediately before exercise, as they slow down digestion and can cause stomach upset. A small amount of healthy fats can be part of a balanced pre-workout meal 2-4 hours prior.
During Training/Competition	***Generally, not consumed*** during exercise.
After Training/Competition	Include a ***moderate amount of healthy fats*** as part of your ***recovery meal*** to support overall health and nutrient absorption.

Quantity in individual foods (content per 100g of food):

- White bread 1 g
- Cookies (homemade) 6 g
- Fatty beef 23 g
- Lean beef 3.5 g
- Chicken 2.5 g
- Smoked sausages 24.9 g
- Winter salami 45 g
- Butter 83 g
- Sour cream 14 g
- Sweet cream 30 g
- Chips 40 g
- Mayonnaise 80 g
- Hazelnuts 63.5 g
- Egg pasta 2 g
- Chocolate (eating/cooking) 20 g
- Apples 0.4 g
- Lettuce 0.3 g

MICRONUTRIENTS

What are Micronutrients?

Micronutrients are vitamins and minerals that the body needs in small quantities but are essential for almost all physiological functions, including energy production, immune function, bone health, and nerve function. They do not provide energy directly but enable the body to use the energy from macronutrients.

Role of micronutrients for athletes:

- ***Energy production:***

Vitamins B are vital coenzymes in the metabolic pathways that convert carbohydrates, fats, and proteins into usable energy (ATP).

- ***Immune system support:***

Vitamins C, D, and Zinc, among others, strengthen the immune system, helping athletes fight off infections and stay healthy to train consistently.

- ***Bone health:***

Calcium and Vitamin D are fundamental for building and maintaining strong bones, reducing the risk of stress fractures and injuries common in sports with impact.

- ***Muscle function:***

Electrolytes like potassium, sodium, calcium, and magnesium are crucial for proper muscle contraction, nerve impulses, and fluid balance, preventing cramps and ensuring optimal performance.

- ***Oxygen transport:***

Iron is a key component of haemoglobin, which carries oxygen in the blood to working muscles. Adequate iron levels are essential for endurance and preventing fatigue.

- ***Antioxidant protection:***

Vitamins C and E, along with selenium, act as antioxidants, protecting cells from damage caused by free radicals produced during intense exercise.

Vitamins

- **Fat-soluble vitamins:**

These vitamins dissolve in fat and are stored in the body's fatty tissues and liver. They can accumulate in the body, so excessive intake can be harmful.

They are absorbed along with fats in the diet.

- Vitamin A
- Vitamin D
- Vitamin E
- Vitamin K

- **Water-soluble vitamins:**

These vitamins dissolve in water and are not stored in the body in significant amounts. Any excess is typically excreted in urine.

- Vitamin C
- B Vitamins

VITAMIN A	
What it is?	Vitamin A is a fat-soluble vitamin crucial for vision, immune function, cell growth, and reproduction.
Role for Athletes	• **Vision:** Essential for good vision, especially in low light, which is important for perceiving opponents and surroundings during judo training and competition. • **Immune system**: Supports a healthy immune system and aids in resistance to infections. • **Cell growth and development:** important for the normal growth and development of tissues, including skin and mucous membranes, which act as the body's first line of defence. • **Skin health:** Contributes to healthy skin, which can be beneficial in preventing minor abrasions.
Where to find it?	• **Preformed Vitamin A (retinol):** Liver, fish oil, dairy products (milk, eggs, cheese). • **Provitamin A carotenoids (converted to Vitamin A in the body):** Carrots, sweet potatoes, spinach, broccoli, melons, apricots.

VITAMIN D	
What it is?	Vitamin D is unique because the body can synthesize it when exposed to sunlight, and it functions more like a hormone. It is crucial for the absorption of calcium and phosphorus.
Role for Athletes	• **Bone health:** Essential for strong and healthy bones, which is extremely important for judokas exposed to impacts and stresses. • **Immune system:** Supports a robust immune system, helping to prevent illness and allowing for consistent training. • **Muscle function:** Research suggests it can influence muscle strength and performance.
Where to find it?	• **Foods:** Fatty fish (salmon, mackerel, sardines), fish oil, mushrooms, fortified milk and cereals.
VITAMIN E	
What it is?	Vitamin E is a powerful fat-soluble antioxidant.
Role for Athletes	• **Antioxidant protection:** During intense exercise, the body's production of free radicals increases, which can damage cells. Vitamin E neutralizes these free radicals, protecting muscle cells from oxidative stress and aiding in faster recovery. • **Immune system:** Supports healthy immune system function. • **Skin and hair health:** Contributes to healthy skin and hair.
Where to find it?	• Nuts (almonds, peanuts, hazelnuts), seeds (sunflower seeds), vegetable oils (sunflower oil, olive oil), green leafy vegetables, avocado.
VITAMIN K	
What it is?	Vitamin K is a group of fat-soluble vitamins that are crucial for blood clotting and bone health. There are two main forms: K1 (phylloquinone), found in plants, and K2 (menaquinone), found in animal products and produced by intestinal bacteria.
Role for Athletes	• **Blood clotting:** It is essential for the synthesis of proteins responsible for blood clotting. This is extremely important for quickly stopping bleeding in case of cuts or bruises that can occur in judo. • **Bone health:** Plays a key role in bone mineralization and calcium regulation within bones, contributing to strong and resilient bones that are less prone to fractures.
Where to find it?	• **Vitamin K1:** Green leafy vegetables (spinach, kale, broccoli), vegetable oils. • **Vitamin K2:** Meat, eggs, dairy products (cheese), fermented foods (e.g., natto).

VITAMIN B (B1, B2, B3, B6, B12, Folate)	
What are they?	A group of eight water-soluble vitamins that play a key role in energy metabolism.
Role for Athletes	• **Energy metabolism:** They are essential for converting carbohydrates, proteins, and fats into energy (ATP) that muscles need to function. This means that without them, you cannot have enough "fuel" for training. • **Red blood cell production:** Especially Vitamin B12 and Folate are important for the formation of healthy red blood cells, which transport oxygen to the muscles. • **Nervous system:** Support healthy nervous system function, crucial for coordination and reflexes in judo.
Where to find it?	• **B1 (Thiamine):** Whole grains, pork, beans. • **B2 (Riboflavin):** Dairy products, eggs, leafy green vegetables. • **B3 (Niacin):** Lean meats, fish, legumes, nuts, whole grains. • **B6 (Pyridoxine):** Chicken, fish, potatoes, bananas. • **B12 (Cobalamin):** Only in animal sources: meat, fish, eggs, dairy products. Vegetarians/vegans must pay attention to intake. • **Folate:** Dark leafy green vegetables, legumes.
VITAMIN C	
What it is?	Vitamin C is a powerful water-soluble antioxidant.
Role for Athletes	• **Immune system:** Strengthens the immune system and helps fight infections, which is important as intense exercise can temporarily weaken immunity. • **Collagen formation:** Essential for the synthesis of collagen, an important protein in skin, bones, cartilage, and connective tissue (tendons, ligaments). This aids in wound healing and maintaining joint health. • **Iron absorption:** Enhances the absorption of non-heme iron from plant sources.
Where to find it?	• Fruits and vegetables, especially citrus fruits (oranges), berries, bell peppers, broccoli, kiwi.

Minerals

CALCIUM	
What is it?	The most abundant mineral in the human body, crucial for bones and teeth.
Role for Athletes	• **Bone health:** Essential for building and maintaining strong bones, which reduces the risk of fractures and stress injuries in judokas. • **Muscle contraction:** Participates in the contraction and relaxation of muscles. • **Neuromuscular function:** Crucial for the transmission of nerve signals that initiate muscle movement. • **Blood clotting:** Also important for the blood clotting process.
Where to find it?	• Dairy products (milk, yogurt, cheese, cottage cheese), fortified plant-based drinks (soy milk), dark leafy greens (kale), broccoli.
ZINC	
What it is?	An important mineral that participates in numerous enzymatic reactions in the body.
Role for Athletes	• **Immune system:** Crucial for a strong immune system, helping to fight infections and promote healing. • **Wound healing:** Essential for tissue repair and wound healing, important for potential injuries in judo. • **Growth and development:** Important for normal growth and development in young athletes. • **Carbohydrate metabolism:** Involved in the metabolism of carbohydrates and proteins.
Where to find it?	• Red meat, poultry, oysters and other seafood, beans, nuts, whole grains, dairy products.

IRON	
What it is?	A crucial mineral that is an essential component of hemoglobin in red blood cells and myoglobin in muscles.
Role for Athletes	• **Oxygen transport:** Essential for transporting oxygen from the lungs to working muscles. Low iron levels (anemia) cause fatigue and reduced performance. • **Energy production:** Involved in enzymes that are crucial for energy production. • **Immune system:** Supports healthy immune system function.
Where to find it?	• **Heme iron (better absorbed):** Red meat, poultry, fish. • **Non-heme iron (less absorbed):** Beans, lentils, spinach, fortified cereals, seeds. Non-heme iron absorption can be increased by consuming Vitamin C.
MAGNESIUM	
What it is?	A mineral involved in over 300 enzymatic reactions in the body.
Role for Athletes	• **Muscle function:** Crucial for muscle contraction and relaxation, helping to prevent muscle cramps. • **Energy metabolism:** Involved in the conversion of food into energy. • **Bone health:** Important for bone formation and maintaining bone density. • **Nerve function:** Supports normal nervous system function. • **Sleep and stress:** Can aid in relaxation and improve sleep quality, which is crucial for an athlete's recovery.
Where to find it?	• Leafy green vegetables (spinach), nuts (almonds, cashews), seeds, legumes, whole grains, avocado, and dark chocolate.
POTASSIUM	
What it is?	An electrolyte that is crucial for maintaining fluid balance in the body.
Role for Athletes	• **Fluid and electrolyte balance:** Together with sodium, it regulates fluid balance inside and outside cells, which is crucial for hydration and normal bodily function. • **Muscle contraction:** Participates in the transmission of nerve impulses and muscle contractions, including the heart muscle. • **Blood pressure:** Helps regulate blood pressure. • **Preventing cramps:** Adequate potassium intake in combination with other electrolytes can help prevent muscle cramps during and after exercise.
Where to find it?	• Fruits (bananas, oranges, avocado), vegetables (potatoes, spinach, broccoli), legumes, dairy products.

SODIUM AND CHLORIDE (SALT)	
What it is?	These are the main electrolytes crucial for regulating fluid balance and blood pressure. Chloride often accompanies sodium.
Role for Athletes	• **Fluid balance:** Together with potassium, they regulate fluid balance inside and outside cells, which is crucial for hydration. • **Nerve function:** Essential for the transmission of nerve impulses. • **Muscle contraction:** Participate in muscle contraction. • **Replacing sweat loss:** Athletes lose significant amounts of sodium through sweat during intense exercise and in hot environments, so replenishment is important to prevent dehydration and muscle cramps.
Where to find it?	• **Sodium:** Table salt, processed foods (snacks, soups, cured meats), bread. • **Chloride:** Together with sodium in salt, seaweed, some vegetables (tomatoes, celery).

WATER

Proper hydration is one of the most important, yet often overlooked, factors in athletic performance and the health of a young athlete. Water participates in numerous key bodily functions, including regulating body temperature, transporting nutrients, lubricating joints, muscle function (including the heart muscle), and cognitive functions. Dehydration, even mild (a loss of 1–2% of body mass), can significantly impair performance – reducing strength, speed, endurance, and coordination – and increase the risk of heat-related illnesses.

Fluid needs are highly individual and depend on many factors: age, sex, body mass, genetic predispositions, type, duration, and intensity of activity, weather conditions (heat, humidity), altitude, type of clothing, and individual sweating rate. Children may have different hydration needs and regulate fluid and salt loss differently than adults; children are considered dehydrated with a 1% fluid loss, while adults are considered dehydrated with a 2% loss.

Signs of dehydration: Thirst is a late sign of dehydration – when an athlete feels thirsty, the body is already in a fluid deficit. Therefore, we must not rely solely on the feeling of thirst. Other signs include:

- Dark yellow urine, infrequent urination, or small amounts of urine.
- Fatigue, decreased performance, headache, muscle cramps, dizziness, confusion, dry mouth, increased heart rate, and breathing. Proactive hydration strategies are therefore crucial. Educating young athletes about monitoring urine colour is a practical tool.

Electrolytes: Electrolytes (sodium, potassium, chloride, calcium, magnesium) are minerals that play a key role in maintaining fluid balance, muscle contractions, and nerve signal transmission. Sodium is the main electrolyte lost through sweat. During prolonged (>60 minutes), high-intensity exercise or exercise in hot conditions, sports drinks can be beneficial for replacing lost fluids, electrolytes, and providing carbohydrates. The amount of salt lost in sweat varies significantly among individuals (from 200 mg to 2000 mg per litre of sweat), so more individualised electrolyte replacement strategies may be needed for some athletes.

Water loss: urine, faces, skin, lungs (respiration).

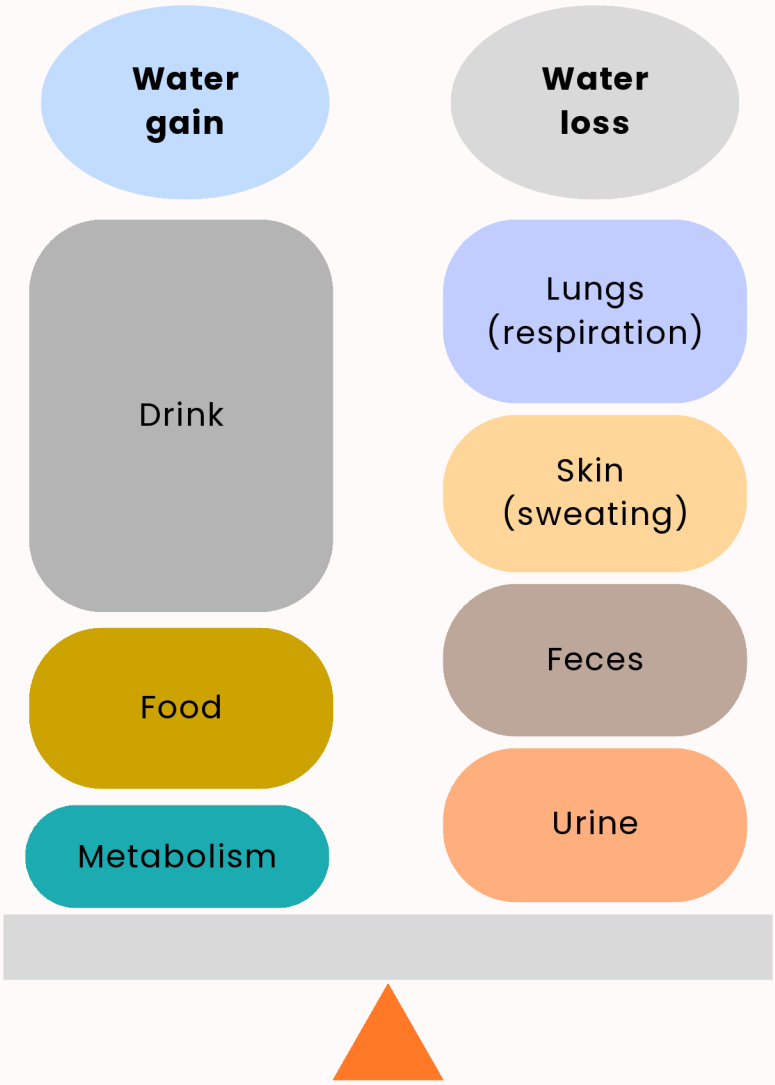


Figure 2: Water balance

How to recognise dehydration?

Darker urine, wrinkled, flushed skin, acute weight loss, feeling thirsty, dry mouth. It can also cause apathy, dizziness or lightheadedness, nausea, diarrhea (cold be also a cause for dehydration!), vomiting, heat sensations or chills, headache, gastrointestinal cramping, general discomfort.

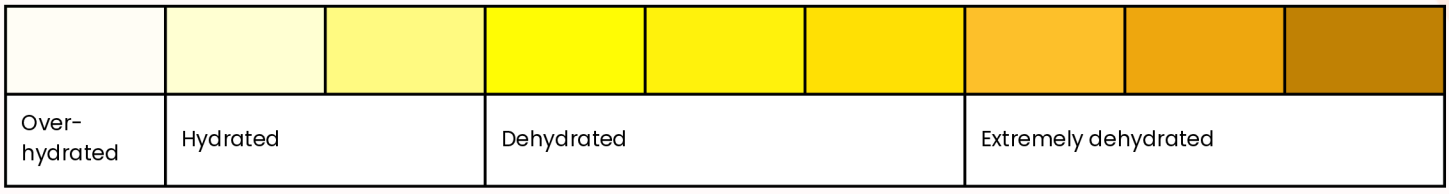


Figure 3: Urine colour according to hydration status

Can we drink too much water?

Yes, and it can lead to a severe condition – hyponatremia. Signs and symptoms of hyponatremia are: altered mental status, muscular twitching or weakness, apathy, dizziness lightheadedness, nausea or vomiting, acting "out of sorts", headache (progressive and serve), dyspnea, swelling of hands, feet or both, mood changes, disorientation or confusion, grand mal seizure or coma, acute weight gain.
There is a known rapid weight loss method of water loading. The underlying mechanism is

Children have less developed thermoregulation and are therefore more at risk of hypothermia in cold environments and hyperthermia in hot environments. They are less able to dissipate body heat to the subcutaneous tissue. As a result, they sweat less and have less salt in their sweat.
Cooling mechanism: redistribution of peripheral blood.

Proper hydration is paramount for athletes to maintain peak performance, prevent injuries, and optimise recovery. The type and amount of fluid an athlete should consume vary before, during, and after training, and the reasons behind these recommendations are rooted in human physiology.

Before Training

Primarily water, but for longer or more intense sessions, consider a sports drink or electrolyte-infused water.

Why:

- Starting hydrated: Entering a training session or competition well-hydrated is crucial for optimal performance. Even mild dehydration can negatively impact endurance, strength, power, and cognitive function.
- Preventing early fatigue: Water is vital for metabolic processes that produce energy. Being well-hydrated helps ensure muscles receive adequate oxygen and nutrients, delaying the onset of fatigue.
- Temperature regulation: Proper hydration supports efficient sweating, which is the body's natural cooling mechanism. This helps prevent overheating during exercise.

Recommendations:

- Drink 500-750 ml of water 2-3 hours before exercise.
- Consume an additional 200-300 ml of water or a sports drink 15-20 minutes before starting.

During Training

Water is sufficient for moderate-intensity workouts lasting less than 45-60 minutes, especially in cooler conditions. Sports drinks are recommended for high-intensity, prolonged exercise (over 45-60 minutes), especially in hot or humid environments. These drinks contain carbohydrates (for energy) and electrolytes (like sodium and potassium).

Why:

- Replacing fluid and electrolyte loss: During exercise, the body loses significant amounts of fluid and electrolytes through sweat. Replenishing these losses is vital to prevent dehydration, muscle cramps, and heat-related illnesses (like heat exhaustion or heat stroke).
- Maintaining energy levels: For longer durations, carbohydrates in sports drinks provide a readily available energy source, helping to sustain performance when glycogen stores start to deplete.
- Optimising muscle function: Electrolytes are essential for nerve impulses and muscle contractions. Maintaining their balance helps prevent muscle fatigue and cramping.
- Reducing perceived exertion: Staying hydrated can lower heart rate and reduce the perception of how hard the body is working.

Recommendations:

- Aim to consume 125-250 ml of fluid every 15-20 minutes.
- For sessions longer than 60 minutes or high sweat rates, opt for a sports drink with electrolytes and carbohydrates.

After Training

Water, hypotonic sports drinks, or even chocolate milk (for recovery).

Why:

- Rehydration: The primary goal is to replace all fluids lost during the exercise session. This is critical for overall recovery and preparing the body for the next workout.
- Electrolyte replacement: Continuing to replenish electrolytes ensures the body's fluid balance is restored and aids in muscle function.
- Glycogen replenishment: For intense or prolonged exercise, consuming carbohydrates post-workout helps to refill muscle glycogen stores, which were used as fuel during activity. Chocolate milk is often cited for its good blend of carbohydrates, protein, and electrolytes for recovery.
- Muscle repair: Protein intake post-exercise aids in muscle repair and growth, and adequate hydration supports the delivery of these nutrients to the muscles.

Recommendations:

- The general guideline is to drink 1,2-1,5l for every kilogram of body weight lost during exercise. Weighing yourself before and after a workout can help determine your individual sweat rate.
- Continue sipping fluids over the next few hours to ensure complete rehydration.
- Consider a recovery drink that combines fluid, electrolytes, carbohydrates, and protein, especially after very demanding sessions.

How to perform a sweat rate test

1. Pre-exercise weight (A):
Go to the bathroom and empty your bladder. Then, weigh yourself naked or in minimal, dry clothing. Record this weight accurately.

2. Record fluid intake (optional, but recommended for accuracy):
If you plan to drink during the exercise, measure the exact volume of all fluids you consume during the session. It's helpful to weigh your bottles before and after to determine the amount consumed (1 ml of water weighs approximately 1 gram).

3. Exercise session:
Perform your typical training session or an activity representative of your sport for a specific duration (e.g., 60 minutes, or 90 minutes for longer events). Maintain a consistent intensity. Note the exact duration of the exercise. Avoid urinating during the test period if possible, or accurately measure any urine volume if you do.

4. Post-exercise weight (B):
Immediately after exercise, towel yourself dry completely and weigh yourself again, wearing the same minimal clothing (or naked). Record this weight.

5. Calculate weight change (C):
Subtract your post-exercise weight (B) from your pre-exercise weight (A). This gives you the net weight loss from sweating.

- C=A-B

6. Calculate total fluid loss:
Add the weight lost (C) to the total fluid consumed during exercise. If you urinated, subtract the urine volume.

- Total Fluid Loss (ml or g) = Weight loss (g) + Fluid consumed (ml or g) - Urine Volume (ml or g)
- (Note: 1g of weight loss is roughly equivalent to 1ml of fluid loss.)

7. Calculate Sweat Rate:
Divide the total fluid loss by the duration of the exercise in hours.

- Sweat Rate (ml/hour or L/hour) = Total Fluid Loss / Exercise Duration (in hours)

Example:

Pre-exercise weight (A): 70.0 kg
Post-exercise weight (B): 69.0 kg

Fluid consumed during exercise: 500 ml

Exercise duration: 1 hour

1. Weight change (C) = 70.0 kg - 69.0 kg = 1.0 kg (or 1000 g / 1000 ml)
2. Total Fluid Loss = 1000 ml (from weight loss) + 500 ml (consumed) = 1500 ml
3. Sweat Rate = 1500 ml / 1 hour = 1500 ml/hour or 1.5 L/hour

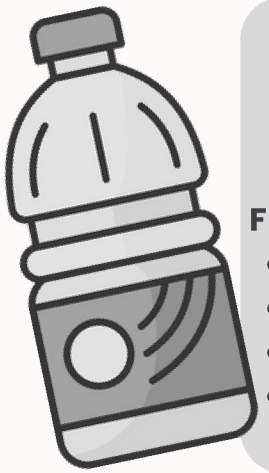
Considerations for Accuracy:

Perform the test multiple times under varying conditions (e.g., different temperatures, intensities) to get a comprehensive understanding of your sweat rate profile.

What are the best rehydration drinks?

- Oral rehydration solutions,
- Milk,
- Rehydration sports drinks with electrolytes.

!! BE CAREFUL WHEN CHOOSING A SPORTS DRINK - READ THE LABEL !!
CHOOSE ONE WITHOUT CAFFEINE AND AVOID ARTIFICIAL SWEETENERS.



How can you make your own sports drink at home?

For a 500 ml homemade sports drink just mix:

- 400 ml water,
- 100 ml 100% fruit juice (e.g. orange, apple, grape …),
- ⅛ tsp (a pinch) salt (~300 mg sodium),
- 1–2 tsp honey or sugar (10–15g carbohydrate).

READING THE LABELS

Reading food labels is a vital skill for young judokas to develop, as it empowers them to make informed choices about what they eat, directly impacting their performance, recovery, and overall health. Understanding food labels helps athletes avoid unhealthy ingredients and select foods that support their intense training demands. Here's why reading food labels is important and what young judokas should look for:

- Managing allergies and intolerances: This is the most critical reason for many. Labels clearly list ingredients and highlight common allergens. For someone with a severe allergy to nuts, dairy, or gluten, reading the label is a life-saving habit.
- Avoiding unwanted additives: You can check for artificial colours, preservatives, flavour enhancers, or artificial sweeteners that you may wish to avoid for health or personal reasons.
- Controlling sugar, salt and fat: Many packaged foods contain high levels of these. Labels help you monitor your intake of saturated fat, sodium (salt), and especially "hidden" sugars, which are linked to health issues like heart disease, high blood pressure, and type 2 diabetes.
- Understanding macronutrients: If you're managing your weight, building muscle, or controlling a health condition, the label tells you the amount of protein, carbohydrates, and fat per serving.
- Increasing fiber and vitamins: You can compare products to choose ones that are higher in beneficial nutrients like dietary fiber, vitamins, and minerals.
- Checking serving sizes: A snack might seem low in calories, but the package could contain 3 or 4 servings. The nutrition panel reveals the true caloric and nutritional cost if you eat the whole thing.
- Verifying health claims: A package might shout "Low Fat!" on the front, but the nutrition label on the back could show that it's loaded with sugar to compensate for taste. Claims like "All Natural" or "Light" can be misleading; the ingredients list and nutrition table tell the real story.

- Knowing the main ingredient: Ingredients are listed by weight, from most to least. If sugar is one of the first three ingredients in a cereal, you know it's more of a dessert than a healthy breakfast.
- Weight management: Accurately tracking your calorie intake is much easier when you use food labels.

In short, reading food labels transforms you from a passive consumer into an informed one. It empowers you to make conscious decisions that align with your health, your goals, and your values.

SPORT SPECIFICS - JUDO

DECISION TREE

What should we consider when choosing a weight category and nutrition plan for a young judoka?

- We take a long-term view.
- Priority now is to make a good base: get good eating habits, knowledge, and max. support training – progress, build muscle mass, support health, and minimise the chance of injury or developing eating disorders.
- At the same time, now is the time to become familiar with the later nutritional specifics of the sport (weight management for competitions).

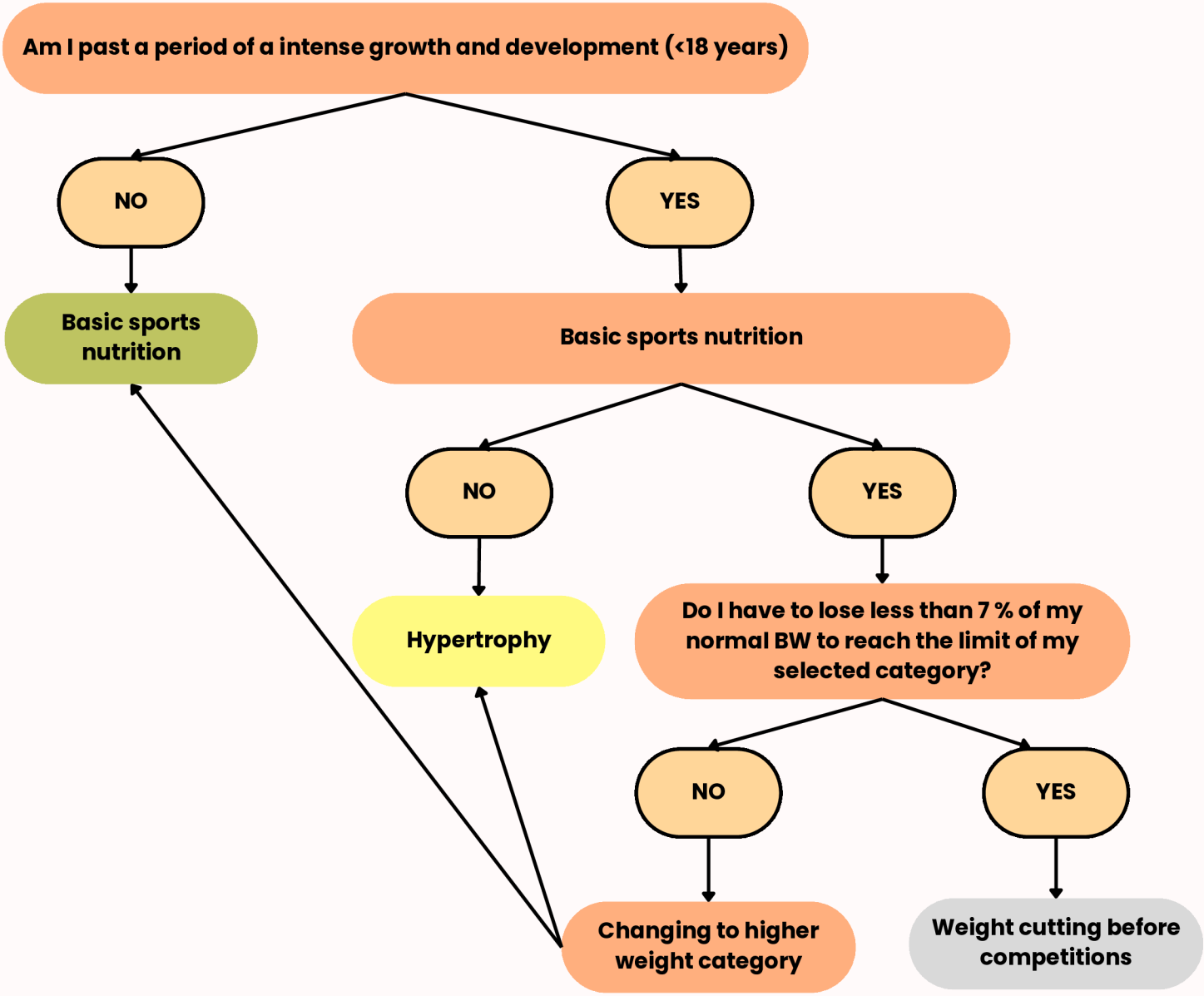


Figure 4: Decision tree

Why do you have to be past the period of intense growth and development?

1. Health risks.
2. It would reduce chances for long-term success. A study shows that the most successful, on average, started later in their career and have fewer adverse effects from weight cutting at seniors (Štangar, 2022).

➜ So, be smart, enjoy judo and leave weight cutting for later! About minor weight adjustments appropriate for young athletes, we will talk in chapter Weight Reduction.

Which parameters should be measured?

Body weight should be measured regularly to determine the suitable competition category, to have a pre-competition nutrition plan, and to plan a change to a higher weight category. However, be aware that BW and BMI are not good indicators of nutrition status. In the period of growth and development, it is normal that BW rises. We should still be cautious that the BW is increasing not exclusively because of body fat – that would mean that the energy intake is too high. So, body composition (fat-free mass, body fat, body water), not only BW, is essential.

If you experience any problems, unexplained symptoms like frequent illness, injury, or lack of energy, consider analysing blood (hemogram, ferritin, vitamin D). If there is a lack of a specific micronutrient, supplementation should be taken as directed by your doctor. If there are frequent bone fractures, it is advised to make a bone density measurement (DEXA).

THE COACH'S ETHICAL RESPONSIBILITY

In a weight-category sport like judo, the relationship between an athlete's body weight and their performance is undeniable. However, the manner in which this topic is handled by a coach is critically important and carries significant ethical weight. A coach's words can either build a resilient, healthy athlete or trigger a devastating spiral into disordered eating and mental illness. It is imperative that coaches understand the profound impact of their comments and adopt a health-first approach.

The danger of comments on weight and body image

An athlete, particularly a young one, views their coach as a figure of authority and a source of validation. When a coach makes casual, critical, or "motivational" comments about a judoka's weight, physique, or eating habits, the athlete often internalises these remarks not as constructive feedback but as a reflection of their self-worth. Inappropriate remarks such as *"You look a bit heavy," "You should skip dinner," or "Look at your opponent, they are much leaner,"* can be incredibly damaging. This type of communication can directly lead to:

- Shame and guilt: The athlete begins to associate food and their body with negative emotions.
- Poor body image: A distorted and critical perception of one's own body develops.
- Obsessive behaviours: The athlete may resort to unhealthy methods of weight control, such as extreme dieting, excessive exercise, or purging.
-

These consequences are the direct precursors to clinically significant eating disorders.

The direct path to an eating disorder

The pressure to "make weight" in judo already creates a high-risk environment. When a coach's inappropriate comments are added to this pressure, it can be the catalyst that pushes a vulnerable athlete from healthy discipline into a dangerous obsession. What the coach may see as a simple instruction to lose a kilogram can be interpreted by the athlete as a command to achieve that goal by any means necessary. This can initiate a cycle of disordered eating that quickly develops into a full-blown eating disorder. The long-term health consequences—including metabolic damage, cardiac problems, bone density loss, and severe psychological distress—can end an athlete's career and endanger their life.

The Crucial Rule: Do not initiate weight regulation with At-Risk Athletes

It is fundamentally irresponsible and dangerous to implement a weight management or weight-cutting plan for any athlete who is already exhibiting signs of an eating disorder or has a very poor body image and low self-esteem. Attempting to regulate the weight of such an individual accomplishes the following:

- It legitimizes the disorder: The coach's focus on weight validates the athlete's own unhealthy obsession, making them believe their destructive behaviours are justified and necessary for sporting success.
- It worsens the condition: A structured "diet" or "cut" provides a framework for the eating disorder to flourish, intensifying restrictive behaviours and deepening psychological distress.

The Non-Negotiable Prerequisite: Screening for Eating Disorders

Before any discussion about weight management is initiated, a formal screening for eating disorders and other psychological risk factors is not just recommended—it is essential.

- ***Who should screen?*** This screening must be conducted by a qualified professional, such as a sports psychologist, a clinical dietitian, or a medical doctor. It is outside the scope and expertise of a coach.
- ***What does it involve?*** Screening typically involves validated questionnaires and a clinical interview to assess an athlete's relationship with food, their body image, and their mental health.
- ***The Outcome:*** The results of the screening will determine if it is safe to proceed. If an athlete is identified as being at high risk or having an active eating disorder, the only appropriate next step is a referral for professional treatment, not a weight management plan.

A coach's primary duty is to the health and well-being of their athletes. In judo, this means shifting the focus from weight to performance metrics like strength, endurance, technical skill, and tactical intelligence. By fostering a positive team culture that values athletes as whole people, forbidding all negative talk about bodies and food, and collaborating with qualified health professionals, a coach can create an environment that builds champions not just on the mat, but in life.

JUDO SPECIFIC NUTRITION STRATEGY

Sports nutrition is an upgrade to a balanced diet with added focus on supporting the training demands of the body. Here, timing with appropriate nutrient composition of the meals around trainings and competitions is playing a key role. If for balanced diet we are looking the intake of nutrients on daily basis, here it is hourly.

Table 2: Nutrition strategy around trainings

	GOAL	HOW?	EXAMPLES
3-4 hours before	Fill glycogen stores, support health and performance	CHO, balanced nutritious meal	• pasta with tomato sauce and mozzarella • risotto with turkey and vegetables • cereal with milk or yoghurt • pancakes with jam and cottage cheese • chicken breast sandwich + fruit
1 hour before	Fill glycogen stores, hydration, gut comfort and support performance	CHO, low fat, low fibre, fluid	• bread with honey or jam • fruit • energy bar • sports drink • low-fat cake • energy gel • water/tea/sports drink
During traning	Hydration, energy, gut comfort	<1h: water >1h: water + CHO + electrolytes	• sports drinks • energy gel If there is a pause in between: • energy bar • tea with honey/sugar + salty low-fat crackers • fruit juice + pinch of salt, jelly sweets • fruit + drink with electrolytes
Within 1 hour after	Rehydration, regeneration	Fluid, electrolytes, CHO, protein, low fibre	• chocolate milk • fruit yoghurt/skyr • light cheese and ham sandwich • milk shake with fruit • steak/fish, grains or potatoes • eggs and bread • cottage cheese + banana/fruit • pancakes with cottage cheese and • jam/honey/fruit/raisins

Examples of meals with 100 g of carbohydrates and 15-20 g of proteins, appropriate as a meal before exercise:

OATMEAL WITH BANANA
70 g oats
250 g milk
1 medium size banana
1 tbs (20g) maple syrup

SPAGHETTI BOLOGNESE
100 g dried spaghetti / 240 g cooked spaghetti
80 g Bolognese sauce

BREAD WITH JAM, YOGHURT, COCOA
3 slices bread
2 tbs (40 g) jam
1 cup (150 g) yoghurt
200 ml cocoa

STRUKLJI
250 g struklji
165 g blueberry sauce (150 g blueberries + 15 g sugar)

Examples of meals with 50 g of carbohydrates and 25-30 g of proteins, appropriate as a meal after exercise:

SALMON WITH POTATOES AND VEGETABLES
100 g salmon
250 g potatoes
200 g vegetables

PROSCIUTTO-MOZZARELLA SANDWICH
100 g bread
30 g prosciutto
50 g mozzarella
2 slices of tomato basil

COTTAGE CHEESE CREPES WITH HONEY
3 crepes
100 g cottage cheese/curd
20 g honey
walnuts

HAM & EGGS
2 eggs
50 g ham
90 g bread
tomatoes

CHICKEN BREAST WITH RIZI BIZI
140 g chicken breast
200 g rice with peas and carrots

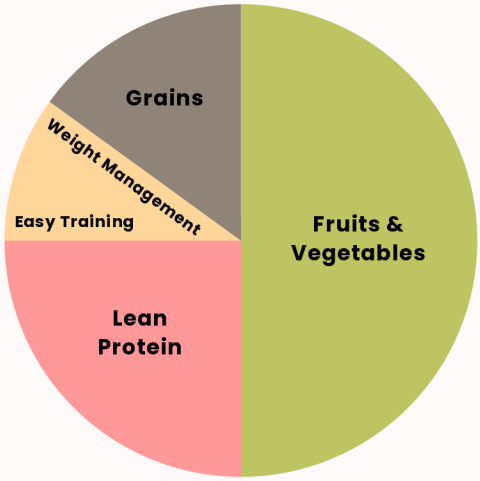
BALANCED MEAL, PORTION SIZE AND MEAL COMPOSITION/PROPORTIONS

There is no need to scale every piece of food on an athlete's plate to achieve a balanced diet with appropriate portion sizes. A good measure that everyone always has with him/her is a hand. On a balanced plate, there are:

- two fists (or ½ plate) of vegetables, fruits,
- a palm (or ¼ plate) of quality lean protein sources,
- one fist (or ¼ plate) of grains or starchy vegetables,
- half a finger (or one tablespoon) of cold-pressed oil.

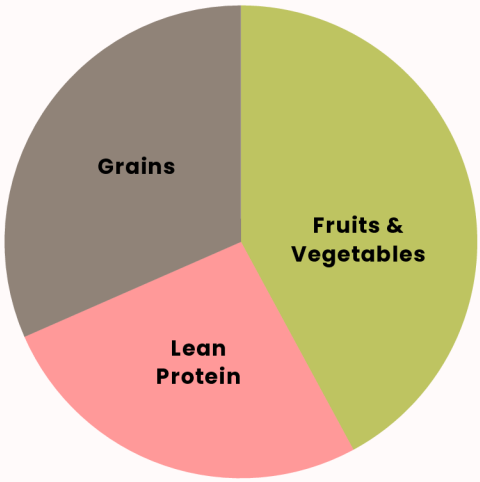
Food sources of individual groups are listed in previous chapters: Carbohydrates, Proteins and Fats.

➜ According to training intensity (cycle of training period), the CHO intake is the one to be mostly adjusted. Higher intensity means more CHO and therefore fewer vegetables, to avoid reaching a big volume. On days of hard training or a competition day, the proportion of CHO is around 50%.



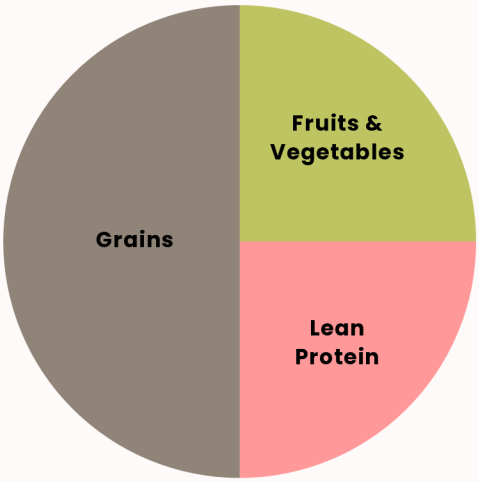
EASY TRAINING DAY / WEIGHT MANAGEMENT

+ FATS (1 teaspoon)
+ BEVERAGE
+ FLAVOR



MODERATE TRAINING DAY

+ FATS (1 teaspoon)
+ BEVERAGE
+ FLAVOR
+ FRUIT (side serving)



HARD TRAINING DAY

+ FATS (2 teaspoon)
+ BEVERAGE
+ FLAVOR
+ FRUIT (side serving)

Sometimes, it is still hard to compare the food eaten with these plates. Don't worry. If a young athlete follows the timing-recommended snacks around training and eats an approximately balanced plate for the main meals, he will automatically increase the energy, CHO and protein intake to the amount that the intensity/volume of the training demands.

Rule 80/20

It is ok to not follow the guidelines all the time 100 %. Being too strict can lead to eating disorders or it is just too hard that someone can lose joy. This is where the rule 80/20 comes in and helps good nutrition habits be also long-lasting. It says that 80 % of your time you should follow the guidelines – go for the optimal meal choice and 20 % of your time you can eat "food for your soul".

KEY POINTS FOR ATHLETES

- Be aware of the importance of the timing, when to eat and drink. Plan your meals and get ready for the next day – where, when and what you will eat. Ask your parents to help you prepare snacks to go.
- You have to know the rough nutrient composition of common foods *(see chapter Basics)*, so you will be able to make a good choice.
- Measure your weight regularly. Normally, the weight rises when you are still growing or building muscle mass. Adjust the weight category early enough not to compromise the body's needs for development.
- Tell the difficulties you are facing to your coach, parent and dietitian if available.
- Check urine colour. Make a sweat test.

KEY POINTS FOR COACHES

- Talk to the athlete about what current training requirements are.
- At training camps and competitions, ask in advance about the meals and food options, and adjust them if needed.
- Make a sweat test of athletes.
- Ask athletes frequently if they have eaten something before training and what, as well as if they have an after-training snack with them (except if they go directly to lunch/dinner).
- Do not make inappropriate remarks about an athlete's body, as it can be damaging to a young athlete.
- Carefully follow any symptoms from this Questionnaire to identify LEA. Be aware that athletes can lie to you about their food consumption.
    - LEAM – Questionnaire for Male Athletes
    - LEAF – Questionnaire for Female Athletes

KEY POINTS FOR PARENTS

- Help your child take appropriate snacks to school or other activities during the day.
- Ask about meals in school – what is/was on the menu, what will/did they eat?
- Help your child to drink enough – always have water on the table, bring a bottle on trips, etc. Teach them the habit of drinking water, not sweet drinks. Try to be a good example.
- Encourage them to eat breakfast also, if you are not eating it. You can explain to them that for them it is more important than for adults, because they are growing/developing all the time and they need constant nutrient intake to get the "building blocks" for bones, muscles, … Additionally, they need to get the fuel for training, school.
- If you don't have ideas what to cook, you can find many great recipes **HERE**.

Case-study 1:
Daily meal plan for 12-16-year-old judokas
Weight: under 40 kg

Scenario	Meal Plan	PROTEINS (g)	CARBO-HYDRATES (g)	FAT (g)	FIBER (g)	ENERGY (kcal)
School Day 1 (late) Training	• **Breakfast:** 50g oats, 150ml milk, tea • **Snack:** 80g bread, 40g ham, 20g mozzarella, ruccola • **Lunch:** 100g fish, 150g potatoes, 80g zucchini • **Snack:** 1 pancake with 15g jam **-TRAINING-** • **Dinner:** 80g pasta, 80g Bolognese, salad	75	240	60	20	2000
School Day 1 (early) Training	• **Breakfast:** 1 egg, 40g bread, 2 slices tomato, 100g yogurt • **Snack:** 100g curd, 80g fruits • **Lunch:** 100g chicken, 150g rice with peas and carrots **-TRAINING-** • **Snack:** 1 pancake with 70g cottage cheese, 5g honey, 5g walnuts • **Dinner:** 150g beef stew	80	230	60	20	2000
School Day, Footing & Afternoon Training	• **Snack:** 1 energy bar (~30g), 100g yoghurt **-FOOTING-** • **Breakfast:** 1 egg, 30g ham, 2 slices bread (50g), 150ml cocoa • **Snack:** 1 small apple, 200ml kefir • **Lunch:** wrap with 100g meat/fish/ shrimps and vegetables • **Snack:** 200ml sports drink with EAA **-TRAINING-** • **Dinner:** 300g stew with potatoes and vegetables, 1 small pudding	85	260	65	22	2100

Case-study 1:
Daily meal plan for 12-16-year-old judokas
Weight: under 40 kg

Scenario	Meal Plan	PROTEINS (g)	CARBO-HYDRATES (g)	FAT (g)	FIBER (g)	ENERGY (kcal)
Training Camp, 2 Trainings	• **Breakfast:** 1 slice bread (30g) + 15g cheese + 15g jam, tea **-TRAINING 1 (>90 min): sports drink-** • **Snack (Post-Training 1):** 200ml chocolate milk • **Lunch:** 100g chicken, 130g pasta, cooked vegetables • **Snack (Pre-Training 2):** 1 oat bar, 1 small orange **-TRAINING 2 (>90 min): sports drink-** • **Dinner:** Rice bowl: 100g cooked rice, 60g meat/fish, 1 egg, 80g colorful vegetables, light dressing	**115**	**335**	**63**	**22**	**2560**
School Day Rest Day	• **Breakfast:** 1 egg + 30g mushrooms, 40g bread • **Snack:** smoothie (150ml milk + 1 small banana/fruits/vegetables) • **Lunch:** 100g meat, 90g gnocchi, 100g vegetables • **Snack:** 100g yoghurt + 80g fruit • **Dinner:** salad with 60g chicken, 80g greens	**70**	**210**	**55**	**25**	**1800**

Case-study 2:
Daily meal plan for 12-16-year-old judokas
Weight: 41-50 kg

Scenario	Meal Plan	PROTEINS (g)	CARBO-HYDRATES (g)	FAT (g)	FIBER (g)	ENERGY (kcal)
School Day 1 (late) Training	• **Breakfast:** 60g oats, 200ml milk, tea • **Snack:** 100g bread, 50g ham, 30g mozzarella, ruccola • **Lunch:** 120g fish, 200g potatoes, 100g zucchini • **Snack:** 2 pancakes with 20g jam **-TRAINING-** • **Dinner:** 100g pasta, 100g Bolognese, salad	90	290	70	25	2200
School Day 1 (early) Training	• **Breakfast:** 2 eggs, 50g bread, 2 slices tomato, 150g yogurt • **Snack:** 150g curd, 100g fruits • **Lunch:** 120g chicken, 200g rice with peas and carrots **-TRAINING-** • **Snack:** 2 pancakes with 100g cottage cheese, 10g honey, 10g walnuts • **Dinner:** 200g beef stew	95	270	65	25	2200
School Day, Footing & Afternoon Training	• **Snack:** 1 energy bar (~30g), 150g yogurt **-FOOTING-** • **Breakfast:** 2 eggs, 40g ham, 2 slices bread (60g), 200ml cocoa • **Snack:** 1 medium apple, 250ml kefir • **Lunch:** wrap with 120g meat/fish/ shrimps and vegetables • **Snack:** 250ml sports drink with EAA **-TRAINING-** • **Dinner:** 400g stew with potatoes and vegetables, 1 pudding	100	300	75	27	2400

Case-study 2:
Daily meal plan for 12-16-year-old judokas
Weight: 41-50 kg

Scenario	Meal Plan	PROTEINS (g)	CARBO-HYDRATES (g)	FAT (g)	FIBER (g)	ENERGY (kcal)
Training Camp, 2 Trainings	• **Breakfast:** 1 slice bread (40g) + 20g cheese + 20g jam, tea **-TRAINING 1 (>90 min): sports drink-** • **Snack (Post-Training 1):** 250ml chocolate milk • **Lunch:** 120g chicken, 150g pasta, cooked vegetables • **Snack (Pre-Training 2):** 1 oat bar, 1 orange **-TRAINING 2 (>90 min): sports drink-** • **Dinner:** Rice bowl: 120g cooked rice, 80g meat/fish, 1 egg, 100g colourful vegetables, light dressing	**132**	**390**	**74**	**27**	**2920**
School Day Rest Day	• **Breakfast:** 2 eggs + 50g mushrooms, 50g bread • **Snack:** smoothie (200ml milk + 1 banana/fruits/vegetables) • **Lunch:** 120g meat, 115g gnocchi, 150g vegetables • **Snack:** 150g yogurt + 100g fruit • **Dinner:** salad with 80g chicken, 100g greens	**85**	**250**	**60**	**30**	**2000**

Case-study 3:
Daily meal plan for 12-16-year-old judokas
Weight: 51-60 kg

Scenario	Meal Plan	PROTEINS (g)	CARBO-HYDRATES (g)	FAT (g)	FIBER (g)	ENERGY (kcal)
School Day 1 (late) Training	• **Breakfast:** 70g oats, 250ml milk, tea • **Snack:** 120g bread, 60g ham, 40g mozzarella, ruccola • **Lunch:** 140g fish, 250g potatoes, 120g zucchini • **Snack:** 2 pancakes with 30g jam **-TRAINING-** • **Dinner:** 120g pasta, 120g Bolognese, salad	105	330	80	30	2500
School Day 1 (early) Training	• **Breakfast:** 3 eggs, 60g bread, 3 slices of tomato, 200g yoghurt • **Snack:** 200g curd, 120g fruits • **Lunch:** 150g chicken, rice with peas and carrots **-TRAINING-** • **Snack:** 2 pancakes with 130g cottage cheese, 15g honey, 15g walnuts • **Dinner:** 250g beef stew	110	310	75	30	2500
School Day, Footing & Afternoon Training	• **Snack:** 1 energy bar (~30g), 100g yoghurt **-FOOTING-** • **Breakfast:** 1 egg, 30g ham, 2 slices bread (50g), 150ml cocoa • **Snack:** 1 small apple, 200ml kefir • **Lunch:** wrap with 100g meat/fish/ shrimps and vegetables • **Snack:** 200ml sports drink with EAA **-TRAINING-** • **Dinner:** 300g stew with potatoes and vegetables, 1 small pudding	115	340	85	32	2700

Case-study 3:
Daily meal plan for 12-16-year-old judokas
Weight: 51-60 kg

Scenario	Meal Plan	PROTEINS (g)	CARBO-HYDRATES (g)	FAT (g)	FIBER (g)	ENERGY (kcal)
Training Camp, 2 Trainings	• **Breakfast:** 2 slices bread (60g) + 30g cheese + 25g jam, tea **-TRAINING 1 (>90 min): sports drink-** • **Snack (Post-Training 1):** 300ml chocolate milk • **Lunch:** 150g chicken, 180g pasta, cooked vegetables • **Snack (Pre-Training 2):** 1 oat bar, 1 large orange • **-TRAINING 2 (>90 min): sports drink-** • **Dinner:** Rice bowl: 150g cooked rice, 100g meat/fish, 1 egg, 120g colourful vegetables, light dressing	**154**	**450**	**85**	**32**	**3300**
School Day Rest Day	• **Breakfast:** 3 eggs + 70g mushrooms, 60g bread • **Snack:** smoothie (250ml milk + 1.5 bananas/fruits/vegetables) • **Lunch:** 150g meat, 145g gnocchi, 200g vegetables • **Snack:** 200g yogurt + 120g fruit • **Dinner:** salad with 100g chicken, 120g greens	**70**	**210**	**55**	**25**	**1800**

Case-study 4:
Daily meal plan for 12-16-year-old judokas
Weight: over 61 kg

Scenario	Meal Plan	PROTEINS (g)	CARBO-HYDRATES (g)	FAT (g)	FIBER (g)	ENERGY (kcal)
School Day 1 (late) Training	• **Breakfast:** 70g oats, 250ml milk, tea • **Snack:** 180g bread, 60g ham, 40g mozzarella, ruccola • **Lunch:** 140g fish, 300g potatoes, 180g zucchini • **Snack:** 4 pancakes with 30g jam **-TRAINING-** • **Dinner:** 180g pasta, 180g Bolognese, salad	120	379	92	35	2875
School Day 1 (early) Training	• **Breakfast:** 4 eggs, 60g bread, 4 slices of tomato, 250g yoghurt • **Snack:** 250g curd, 180g fruits • **Lunch:** 180g chicken, 300g rice with peas and carrots **-TRAINING-** • **Snack:** 4 pancakes with 130g cottage cheese, 15g honey, 15g walnuts • **Dinner:** 300g beef stew	126	356	86	35	2875
School Day, Footing & Afternoon Training	• **Snack:** 1 energy bar (~40g), 250g yoghurt **-FOOTING-** • **Breakfast:** 4 eggs, 50g ham, 4 slices bread (75g), 250ml cocoa • **Snack:** 1 large apple, 350ml kefir • **Lunch:** wrap with 140g meat/fish/ shrimps and vegetables • **Snack:** 350ml sports drink with EAA **-TRAINING-** • **Dinner:** 600g stew with potatoes and vegetables, 1 large pudding	132	390	97	37	3104

Case-study 4:
Daily meal plan for 12-16-year-old judokas
Weight: over 61 kg

Scenario	Meal Plan	PROTEINS (g)	CARBO-HYDRATES (g)	FAT (g)	FIBER (g)	ENERGY (kcal)
Training Camp, 2 Trainings	• **Breakfast:** 2 slices bread (80g) + 40g cheese + 30g jam, tea • **-TRAINING 1 (>90 min): sports drink-** • **Snack (Post-Training 1):** 350ml chocolate milk • **Lunch:** 180g chicken, 200g pasta, cooked vegetables • **Snack (Pre-Training 2):** 1 oat bar, 1 large orange • **-TRAINING 2 (>90 min): sports drink-** • **Dinner:** Rice bowl: 180g cooked rice, 120g meat/fish, 1 egg, 150g colourful vegetables, light dressing	**178**	**515**	**98**	**37**	**3670**
School Day Rest Day	• **Breakfast:** 4 eggs + 70g mushrooms, 60g bread • **Snack:** smoothie (250ml milk + 1.5 bananas/fruits/vegetables) • **Lunch:** 180g meat, 170g gnocchi, 250g vegetables • **Snack:** 250g yoghurt + 180g fruit • **Dinner:** salad with 130g chicken, 180g greens	**114**	**333**	**80**	**38**	**2645**

GAINING WEIGHT

For athletes looking to build muscle mass and increase body weight, a strategic and science-backed nutritional approach is paramount. The fundamental principle of gaining weight is to consume more calories than you expend consistently. This positive energy balance provides the necessary fuel for intense training and the building blocks for new muscle tissue. A moderate caloric surplus of 300 to 500 calories per day above your maintenance needs is recommended. This controlled increase helps to maximise lean muscle gain while minimising the accumulation of excess body fat. Protein is the cornerstone of muscle repair and growth.

Athletes aiming for hypertrophy should target a daily protein intake of 1.6 to 2.2 grams of protein per kilogram of body weight. To optimise muscle protein synthesis, it's not just the total amount of protein that matters, but also its distribution throughout the day. Aim to consume 20 to 40 grams of high-quality protein every 3 to 4 hours. This ensures a steady supply of amino acids to your muscles. Particular attention should be paid to the post-exercise window. Consuming a protein-rich meal or shake within two hours of finishing your workout can significantly enhance recovery and muscle building. Carbohydrates are the primary energy source for high-intensity training sessions. Adequate carbohydrate intake is crucial for replenishing muscle glycogen stores, which are depleted during strenuous exercise.

For strength-training athletes, a daily carbohydrate intake of 4 to 7 grams per kilogram of body weight is recommended. The timing of carbohydrate consumption is also essential. Consuming carbohydrates before your workout will ensure you have the energy to perform at your best. In contrast, post-exercise carbohydrate intake aids in recovery and replenishes glycogen stores, preparing you for your next training session. Dietary fats are essential for overall health and play a vital role in hormone production, including hormones that are crucial for muscle growth. Healthy fats should constitute 20% to 35% of your total daily calorie intake. Focus on incorporating unsaturated fats from sources such as avocados, nuts, seeds, and olive oil. While saturated and trans fats should be limited, a balanced intake of healthy fats is a critical component of a successful mass-gaining diet.

While total daily intake of macronutrients is key, strategic nutrient timing can provide an extra edge. As mentioned, consuming a combination of protein and carbohydrates around your workout window is highly beneficial.

- ***Pre-Workout:***

A meal or snack rich in carbohydrates with a moderate amount of protein 1 to 3 hours before training can provide sustained energy and protect muscle tissue.

- ***Post-Workout:***

A meal or shake containing both protein and carbohydrates within 2 hours of finishing your session will kickstart the recovery process, replenish glycogen, and stimulate muscle protein synthesis.

Practical Tips for Success

- ***Eat Frequently:***

To comfortably achieve a caloric surplus, aim for 4 to 6 meals and snacks throughout the day.

- ***Choose Nutrient-Dense Foods:***

Focus on whole, unprocessed foods to ensure you are getting a wide array of micronutrients in addition to your macronutrient targets.

- ***Stay Hydrated:***

Water is essential for numerous bodily functions, including nutrient transport and muscle function. Ensure you are consistently well-hydrated throughout the day.

- ***Listen to Your Body:***

Individual needs can vary. Monitor your progress, energy levels, and how you feel, and adjust your intake as needed. Consulting with a sports dietetitian can provide personalized guidance.

By implementing these evidence-based nutritional strategies, athletes can create an optimal environment for muscle growth, leading to successful and sustainable weight gain.

KEY POINTS FOR ATHLETES

- It is not about only eating more, plan your nutrition wise and be aware that protein intake has its upper limit for optimal muscle protein synthesis which is around 2,3 g/kg body weight.
- Talk to your coach and dietitian, if available, to make a training-nutrition plan optimal for your goal and current status.
- If available, check and measure your body composition, not only your weight.
- Do not use supplements with unreal promises. Many times, such supplements are either contaminated with WADA-prohibited substances or do not work as they present themselves to.

KEY POINTS FOR COACHES

- Explain to the athletes that the training programme will be adjusted for muscle gain, which requires appropriate nutrition support.
- Check/ask them if/what they had eaten before training and if they have a snack with them for after training.

KEY POINTS FOR PARENTS

- Understand the underlying goal of the current nutrition strategy for your child. This is the way you can support him without letting him harm his health. If you recognise some habits/patterns that seem unhealthy to you, talk to the coach and dietitian, if available.
- Help them plan their meals and prepare snacks to-go or ready meals at home when they come home from training.

Case study 1: Moving the category up before the period of growth and development is over

Last week, in the national championships, a male judoka lost 3% of his BW, the most until now, but he competed well, and in two weeks, there is another competition at a national level. Should he continue to compete in this category or move up for the upcoming competition? There are four more competitions before the summer holidays.

Move up. The weight is slowly growing, and it will become too much to reduce. Also, expecting he will grow a little more, the development has not finished yet, and the body needs energy and good nutrition to do it together to cover training demands. Also, the target competition is over, where the result was most important. So, it is a perfect time to move up, get to know the new category until the next important competition, or not worry about weight and not harm health. Because he is still growing, he should just continue with normal sports nutrition and compete on the next competition in new category. The body will require more food due to hunger. Take care to eat increased amounts of quality food, not to compensate the needs with sweets, fast-food, junk food, etc.

Case study 2: Moving the category up after the period of growth and development is over

Last season he competed in the -55 kg category. After summer holidays and some training camps, his weight grew to 58,5 kg. He is 16 years old, and apparently, he won't grow a lot more. The weight is still within the possible unharmful limits for weight cutting in seniors. What should he do? Start cutting weight with the help of a dietitian or move up?

Move up, because now is the time when he can build muscle. Check the body composition. Trainings adjusted to hypertrophy, increase the CHO and protein (leucine) consumption around trainings to reach a positive energy balance and sufficient protein intake. Recheck the body composition after a while. If there is excessive body fat, there are two options:

- He feels good in the current category and has good results. Stay there. With training, it can still reduce fat, build more muscles, or maintain current composition if that works well.
- If there are more chances in the lower category, he can reduce body fat (long process) to lower the weight to 5-6% above the category and then cut the weight (when already old enough – juniors, seniors)

WEIGHT REDUCTION

As already mentioned (see *Decision tree*), weight cutting (cca. 5-7 % of the normal BW in a short period before every competition) is not appropriate for young judoka. However, there are some harmless techniques to reduce approximately 2-3 % BW before competitions that can be used by younger athletes if needed. These are:

- ***Reduce main meals*** while keeping the snacks around training to provide adequate nutritional support for training.
- ***Reduce sweets, CHO*** (especially in the evening) ***and fat-rich foods***, but maintain high protein intake.
- ***Reduce fibre*** intake 3 days before weigh-in. It will reduce the bowel content, which can be even beneficial in avoiding stress diarrhoea.
- Five days before, ***reduce salt intake***.
- ***Add aerobic exercise*** without pre-meal/snack with CHO.

!! NO: dehydration, starvation !!

When an athlete is over the period of growth and development, after 18 years of age, they can reduce some BW on a long-term basis (not weight cutting) to reach a target optimal BW (up to 5-7% above category limit). The goal there is, of course, to reduce body fat, which can be achieved only over a long period. At the senior level, weight cutting, not extreme and with a good approach, can be beneficial for success.

In the period of energy deficiency, keeping protein intake high helps to maintain muscle mass (lower muscle protein breakdown).

KEY POINTS FOR ATHLETES

- ***10 days before competition:*** check your weight and decide on the appropriate category (see *Decision tree*) – if you will reduce 2-3 % of your body weight, do as follows:

    - ***7 days before competition:*** start reducing sweets, deserts, high-fat foods and carbohydrates (except before trainings).
    - ***5 days before competition:*** reduce salt intake, add aerobic exercise without a pre-workout meal with carbohydrates.
    - ***3 days before competition:*** reduce fibre intake (wholegrains, vegetables, …)
    - ***Morning before competition (weigh-in):*** Check your weight and see how much you can drink/eat for breakfast. Recommended: sports drinks, bars, gels/jellies, … If you are at the limit or only 100 g below, skip breakfast, don't drink, but just rinse your mouth and take quality foods and beverages with you (see *nutrition for competition case studies, p. 81-88*).

KEY POINTS FOR COACHES

- Check athletes' weight 10 days before competition and decide on the appropriate category (see *Decision tree*).
- Explain why it is the only reasonable option for them if they are in doubt. Speak about long-term vision.

KEY POINTS FOR PARENTS

- Understand the underlying goal of the current nutrition strategy for your child. This is the way you can support him without letting him harm his health. If you recognize some habits/patterns that seem unhealthy to you, talk to the coach and dietitian if available.

Case study:

Girl, 13 years old. Before national championships - the last competition of the season, she has 45 kg. Should she reduce her BW to her current weight category -44 kg or move up?

She can reduce her BW for 1 kg with an unharmful strategy, described in this chapter.

POST WEIGHT-IN AND COMPETITION NUTRITION

The main goals of post weigh-in recovery are:

- Rehydration;
- Glycogen restoration;
- Gut comfort.

What do we consider when choosing nutrition for competition?

- Only familiar foods and drinks;
- Low-fat, simple CHO, moderate protein;
- Hydration: liquid, electrolytes (or combining water with a salty, CHO-rich snack).

How to avoid/limit gastrointestinal symptoms and increase nutrient utilisation?

Train your gut! Our gut is very influenced by stress (physical and psychological), but also very adaptable, so you can train it to accept more nutrients around and during training and competition while remaining gut comfort. How?

➜ ***When recognising a situation when it would be good that you have a meal to support your activity, but you don't feel like eating or drinking anything, gradually force yourself to do it – little by little. Eat a little shorter before training or a larger amount. Your gut will adapt!***

As a result of a good nutrition strategy, our gut can adapt to better nutrient absorption and gut comfort when eating before training, and even our metabolism becomes more effective for nutrient utilisation, which leads to better performance.

Diarrhoea

Stress diarrhoea often occurs due to nervousness and physical exertion combined with increased food intake. How to react?

Table 3: Foods that help managing diarrhoea vs. foods that should be avoided when dealing with diarrhoea

CONSUME

- Oral rehydration salts (sipped)
- Rusks/crackers pretzel sticks
- Probiotics
- Activated charcoal
- Coca-Cola
- Overcooked rice
- Mashed banana
- White bread

AVOID

- Fruits (except for banana) and vegetables
- Sweet food (including honey)
- Fatty food
- Sweeteners
- Caffeine
- Dairy products
- Whole grains
- Nuts
- Seeds

KEY POINTS FOR ATHLETES

- Try the food for competition in advance before one intense training.

KEY POINTS FOR COACHES

- Speak with athletes before the competitions, also about food for competition.

KEY POINTS FOR PARENTS

- Try to prepare a sandwich/pasta at home rather than buy it, because ready-to-eat prepackaged food often contains a lot of fat.
- Understand the specifics of weight categories and ask for their weight before forcing them to eat breakfast.

Case study 1: Day before weigh-in and the competition

Training: HIIT (great sweat losses, explosiveness)

Night before (dinner):

- Meal type: Light, low-fiber, low-sodium, moderate-carb
- Example: Grilled chicken + white rice + cooked carrots (as much as the weight allows)

Hydration: ~300–500 ml water + electrolytes before bed *(avoid excess fluid to prevent bloat/weight gain).*

Case study 2: Competition day with morning weigh-in

Morning (pre-weigh-in):

- Fasted weigh-in (no breakfast beforehand)
- Optionally rinse mouth with water or chew gum for dryness

Post-weigh-in:

- Time left to compete: ~2–3 hours
- Goal: Refuel quickly with digestible energy and fluids

Meal 1 (within 15–30 min):

- Sports drink + banana + low-fibre bar or bread with honey

Meal 2 (1–1.5 hours before match):

- White bread sandwich with turkey + fruit juice
- 500–750 ml of fluid, a mix of water and an isotonic drink

Sodium & Electrolytes:

- Use slightly salted foods or oral rehydration powder
- Avoid greasy, fiber-rich, or hard-to-digest foods

Case study 3: Afternoon weigh-in the day before

Day of weigh-in:

- Light meals throughout the day (as much as the weight allows), low fibre, low bloat
- Avoid salty snacks and high-volume vegetables
- Low to moderate fluid intake: by sips

Pre-training snack before weigh-in:

- Rice cakes + a small amount of nut butter or banana or
- Sportas gel

Training:

- short before weigh-in to minimise time with the lowest weight, lowest hydration
- HIIT (great sweat losses, explosiveness)

Post-weigh-in meal:

- Goal: Start complete rehydration + glycogen replenishment
- Meal: Pasta with lean beef/tomato sauce + soft vegetables
- 750–1000 ml water with electrolytes (over 2–3 hours)

Dinner (light but full meal):

- Mashed potatoes + scrambled eggs + soft fruit
- Avoid fatty meats and fried food

Bedtime hydration:

- 300 ml of water or an oral rehydration drink

Morning of competition:

Breakfast (3–4h before match):

- Oatmeal + banana + honey + yogurt, tea

Snack (1h before):

- Low-fibre bar or soft fruit (e.g., ripe banana) or pudding

Hydration:

- 200–300 ml water or diluted juice or sports drink 60–30 min before competition

SUPPLEMENTS

FOOD FIRST, BUT NOT FOOD ONLY.

The right nutritional strategy - the timing and composition of ordinary food portions - plays a significant role! Be aware! You can't solve a bad nutrition strategy with supplements! However, sometimes some supplements are welcome because of their practicality, adapted composition, scarcity in plain food ... Many supplements on the market are unnecessary, ineffective or even harmful.

Why Do Athletes Use Supplements Anyway?

There are many reasons, and not all of them are about better performance. Athletes turn to supplements because:

- They want to prevent or correct a nutritional deficiency (like low iron) that could harm their health and performance.
- They need a convenient source of energy during a tough workout or competition.
- They believe supplements will give them a competitive edge.
- They want to speed up recovery, optimise their body composition, or reduce the risk of injury.
- And sometimes, the reason is simply that everyone else is using them, or because they get them for free from sponsors.

Not All Supplements Are Created Equal: What Are the Main Groups?

The International Olympic Committee (IOC) has categorised supplements to help athletes understand their role. To put it simply, we can divide them like this:

1. The "Proven helpers" for health and energy:

To Correct Deficiencies: This includes supplements like iron, calcium, and Vitamin D, but they should only be used when a doctor has confirmed a deficiency.
Sports Foods: These are products like sports drinks, gels, bars, and protein powders. Their purpose is to provide a practical source of energy and nutrients during or immediately after exercise. Their effectiveness is well-researched and proven.

2. The "Performance boosters" with proven effects:

This is a very small group of supplements that are scientifically proven to directly improve performance. Examples include caffeine, creatine, sodium bicarbonate, and beta-alanine. Despite the proof, using them requires careful planning and expert advice. They should be used in judoka older than 18 years old.

3. The large group of supplements with a big question mark:

This category includes a huge number of products that promise to support the immune system, improve recovery, ease muscle soreness, or help change body composition (e.g., probiotics, Vitamin C, omega-3s, green tea).

The key takeaway: For most of these supplements, there is no strong scientific evidence that they actually work as promised.

Your Strategy: Food First, Then Smart Consideration

Dietary supplements are exactly what their name says—a supplement to a balanced diet, not a replacement for it. They can play a small but sometimes important role in reaching your goals, but only if used correctly.

Before you take anything, ask yourself: ***Do I really need this?*** It takes a lot of effort and knowledge to figure out which product is right for you and how to include it in your diet. Most importantly, you need to be sure that the benefits outweigh the potential risks. That's why you should always ***consult with an expert before using any supplement***—talk to a doctor, a clinical dietitian, or a sports nutrition professional. Your health and long-term career are too important to leave to guesswork.

One of the biggest and most serious risks of using dietary supplements is the possibility of contamination with substances that are on the World Anti-Doping Agency (WADA) prohibited list. This can happen unintentionally, due to cross-contamination in manufacturing facilities where products with banned ingredients are also produced, or even intentionally, when manufacturers add undeclared stimulants or anabolic steroids to increase a product's effectiveness. Unlike food products, where every ingredient, including allergens like eggs, must be clearly listed on the label, such transparency is not always guaranteed with supplements, which leaves the athlete in a vulnerable position. The consequences for an athlete can be catastrophic, as the principle of strict liability holds them responsible for everything found in their system. A positive doping test, even if it results from the unintentional ingestion of a contaminated supplement, can lead to suspension, loss of medals, and the destruction of a sporting career.

Figure 5: Athlete Nutrition Strategy pyramid

Table 4: Report of supplements considered CS: Combat Sport; Yes/Not (Y/N) point out if there is specifically literature on combat sport (CS) or in Sport in general

Supplement	Dosage	Scientific rationale	CS	Sport
Creatine	50 mg/kg bodyweight for 6	Energy homeostasis	Y	Y
β-alanine	4–6g per day per 4 weeks	Lactate buffering, antioxidant	Y	Y
Protein powder	As needed	Completing protein intake	N	Y
BCAA	1g per kg 30–45 min before	Anticatabolic, fatigue managing	Y	Y
Caffeine	200–400 mg 20–40 min before	Focus, performance,	Y	Y
HMB	2–4g per day	Anabolic, anticatabolic,	Y	Y
Vitamin C	500–1000 mg per day in separate	Antioxidant, collagen synthesis,	N	Y
Vitamin D	1000–2000IU daily	Immune system support,	Y	Y
Vitamin B12	500-1000mcg daily	Cell regeneration, Hematopoiesis,	N	N
Bicarbonate	300 mg per Kg of body weight	Lactate and pH buffering	Y	Y
Polyphenols	100–200 mg daily	Antioxidant and anti-inflammatory	N	N
Ashwagandha	500-100 mg daily	Sleep and mood regulation	N	Y
Omega3 fatty acids	1g DHA + EPA per day	Antiinflammatory, injury recovery	N	Y
Joint support	400/400/200 mg per day	Tendon and ligament support	N	N
Nitrates	50–70 mg 1–2 h before work out	Oxigen transport, vascularization,	Y	Y
Glutamine	10 g per day	Immune system support, injury	N	Y

Table 5: Report of supplements considered CS: Combat Sport; Yes/Not (Y/N) point out if there is specifically literature on combat sport (CS) (adapted form Cannarto et al, 2022)

Supplement	**Dosage**	**Scientific rationale**	**CS**
Creatine	50 mg/kg bodyweight for 6	Energy homeostasis	Y
β-alanine	4–6g per day per 4 weeks	Lactate buffering, antioxidant	Y
Protein powder	As needed	Completing protein intake	N
BCAA	1g per kg 30–45 min before	Anticatabolic, fatigue managing	Y
Caffeine	200–400 mg 20–40 min before	Focus, performance,	Y
HMB	2–4g per day	Anabolic, anticatabolic,	Y
Vitamin C	500–1000 mg per day in separate	Antioxidant, collagen synthesis,	N
Vitamin D	1000–2000IU daily	Immune system support,	Y
Vitamin B12	500-1000mcg daily	Cell regeneration, Hematopoiesis,	N
Bicarbonate	300 mg per Kg of body weight	Lactate and pH buffering	Y
Polyphenols	100–200 mg daily	Antioxidant and anti-inflammatory	N
Ashwagandha	500-100 mg daily	Sleep and mood regulation	N
Omega3 fatty acids	1g DHA + EPA per day	Antiinflammatory, injury recovery	N
Joint support	400/400/200 mg per day	Tendon and ligament support	N
Nitrates	50–70 mg 1–2 h before work out	Oxigen transport, vascularization,	Y
Glutamine	10 g per day	Immune system support, injury	N

CONSLUSION

The path to becoming a successful athlete is a marathon, not a sprint. While hours of dedicated training build your technique and fighting spirit, the fuel you provide your body is the foundation upon which all your hard work stands. For a young judoka, this is doubly true. A smart nutrition strategy is not just about enhancing performance in the next competition; it's about supporting a crucial period of growth and development, ensuring you reach your full potential while protecting your long-term health.

Throughout this guide, we have explored the core principles of sports nutrition, from understanding the fundamental roles of energy, macronutrients, and hydration to the specifics of timing your meals around training. The "Food First" philosophy must be your guiding principle—a varied, balanced diet rich in carbohydrates for fuel, quality proteins for muscle repair, healthy fats for overall function, and essential micronutrients is non-negotiable. Supplements can play a small, strategic role, but they can never replace a poor diet, and their use requires caution and expert guidance to avoid risks like contamination.

Perhaps the most critical lesson for a young athlete is to adopt a long-term perspective. Prioritising your body's natural development over the short-term pressures of "making weight" is an investment in a longer, healthier, and ultimately more successful career. This journey is a team effort. The guidance of a responsible and informed coach who focuses on performance over physique, combined with the daily support of parents who help instil healthy habits, creates the environment where an athlete can truly thrive.

The knowledge you have gained from this book is your most powerful tool. Use it to listen to your body, to plan your meals with purpose, and to communicate openly with your support team. Your dedication on the mat, paired with an innovative and sustainable nutrition strategy, is the ultimate combination for building a champion—an athlete who is strong, resilient, and healthy for a lifetime of success, both in judo and in life.

PART 3

Experience of Elite Athletes
Example Stories

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ANDREJA LESKI
SLOVENIA

Andreja Leški won Olympic gold in the women's -63 kg category at the Paris 2024 Games, continuing Slovenia's remarkable tradition of Olympic success in this weight category.

With multiple World Championship silver medals (2021, 2023), she entered Paris as a top performer in her class.

ELITE ATHLETE STORIES
ANDREJA LESKI / SLO

During my sports career, I had to cut a lot of weight. At some points, it was really extreme and even dangerous, and it was always one of the hardest parts of being a judo athlete. I used unhealthy and intense weight-cutting methods often and regularly, but somehow this was seen as normal and expected by everyone around me. Many times before competitions, I felt huge pressure and did whatever it took to be the right weight on the scale.

Later, when I started competing at the senior level, I learned a lot about healthier balance and got some good advice that helped me realise how unhealthy and wrong my old way of cutting weight really was. I also started to understand how much this whole process was affecting me mentally. That pushed me to think about how I could make things easier for myself with a different approach. People outside of judo especially helped me see how extreme our habits in sport can be. And when my coaches gave me a bit more freedom to decide for myself, I completely changed the way I looked at food and how it influences my performance.

My main rule now is to never go into extremes. I try to keep a healthy and balanced diet all the time, even when I don't have competitions coming up. If I do need to cut a few kilos, I start early and do it step by step, making sure I still get enough nutrients and don't suffer at any point in the process.

The message I want to share with young athletes is: don't think too much about weight. Let your body tell you which category is the right one for you.

And to coaches and parents: try to think about the bigger picture and the long-term value of healthy habits, mental well-being, and the joy of training — because when you go into extreme weight cutting, you often lose all of that, and in the end, it usually just hurts you.

BARBARA MATIC
CROATIA

Barbara Matić claimed Olympic gold in the women's –70 kg category at Paris 2024, earning Croatia's first-ever Olympic judo medal and cementing her place as one of the sport's elite.

A two-time world champion (2021, 2022) and European champion (2024), she dominated her weight class entering the Games.

ELITE ATHLETE STORIES
BARBARA MATIC / CRO

Throughout my judo career, weight management has been one of the most challenging aspects. Competing in the -70 kg category meant that I had to stay within strict limits, even during long training periods or off-seasons. Especially in my junior years, I felt pressure to lose weight quickly before competitions, which sometimes led to extreme and unhealthy methods such as skipping meals or cutting water intake, just to make weight. It was stressful, both mentally and physically.

Over time, I realised that this approach wasn't sustainable or safe. The turning point came when I began working more closely with professionals who helped me understand the impact of proper nutrition and long-term weight regulation. My coaches, together with a qualified nutritionist, were instrumental in helping me change my mindset. They taught me that optimal performance doesn't come from drastic measures, but from consistency, planning, and respecting your body.

Today, I manage my weight in a much healthier way. I maintain a stable weight year-round by eating balanced meals, planning my diet well ahead of competitions, and adjusting my training accordingly. I no longer rely on last-minute weight cuts. I've learned to listen to my body, rest when needed, fuel it properly, and focus on gradual progress rather than quick fixes. Sleep, hydration, and mental well-being are just as important as physical training.

To young judokas: your health is the foundation of your career. Don't risk it for short-term results. There is always a smarter, safer way. Learn to prepare early and trust the process. To parents and coaches: please remember that long-term athlete development is more important than medals won at a young age. Support your athletes in making responsible choices and never encourage harmful practices.

As someone who has been through it all, the pressure, the mistakes, the learning, I can say with confidence: you can achieve great things without harming your body. Be safe, be strong.

ALICE BELLANDI
ITALY

Alice Bellandi achieved gold in the women's -78 kg category at the Paris 2024 Olympics.

After transitioning from –70 kg, she rose rapidly through world rankings and had previously earned bronze at the 2023 World Championships, silver at the 2024 World Championships and gold at the 2025 World Championships.

ELITE ATHLETE STORIES
ALICE BELLANDI / ITA

Honestly, I had hard problems with weight cut when I was competing for the Tokyo Olympics. It was personal pressure. In that stage of my life, I had problems with some coaches, and it was the COVID period. I was training alone. Doing alone when you are young, you don't know anything by yourself, I was doing it by myself. I was losing approximately 10-13 kg every competition. I had hormonal, mental health problems and other personal problems. I suffered from tachycardia, dehydration, skin problems, and my immune system was down.

When I changed the category after Tokyo, I finally found stability and peace with food, and changed all my team. I started to work with a nutritionist to increase my muscles. I changed coach and everything. Food is no longer the enemy but a partner in this journey.

I don't have any problems now with my metabolism. I eat healthy, I have free meals on the weekend, and they don't affect my body weight. I am in balance now. About habits… If you are a professional sportswoman, you should always speak with professionals, who can understand you.

I would say to young athletes and their parents that I don't recommend cutting weight a lot at a young age. You can have a lot of problems. You need to leave the body to grow. You can start to think about professional judo after the age of 18.

Parents and coaches have to take more care about the health of kids, athletes, rather than focusing on their results. Their judokas are, first of all, people/young people; they have to be healthy to become champions.

LITERATURE PART 1

Agel, J., Ransone, J., Dick, R., Oppliger, R., & Marshall, S. W. (2007). Descriptive epidemiology of collegiate men's wrestling injuries: National Collegiate Athletic Association Injury Surveillance System, 1988-1989 through 2003-2004. Journal of Athletic Training, 42(2), 303–310.

AIS. (2020). Making weight in weight category sports best practice guidelines for performance nutrition practitioners (1st ed.). Australian Sports Commission.

American College of Sports Medicine. (2018). ACSM's Guidelines For Exercise Testing And Prescription (10th editi). Wolters Kluwer/Lippincott Williams Wilkins Heal.

Artioli, G. G., GUALANO, B., FRANCHINI, E., SCAGLIUSI, F. B., TAKESIAN, M., FUCHS, M., & LANCHA, A. H. (2010). Prevalence, Magnitude, and Methods of Rapid Weight Loss among Judo Competitors. Medicine & Science in Sports & Exercise, 42(3), 436–442. https://doi.org/10.1249/MSS.0b013e3181ba8055

Artioli, G. G., Saunders, B., Iglesias, R. T., & Franchini, E. (2016). It is Time to Ban Rapid Weight Loss from Combat Sports. Sports Medicine, 46(11), 1579–1584. https://doi.org/10.1007/s40279-016-0541-x

Aslam, H., Marx, W., Rocks, T., Loughman, A., Chandrasekaran, V., Ruusunen, A., Dawson, S. L., West, M., Mullarkey, E., Pasco, J. A., & Jacka, F. N. (2020). The effects of dairy and dairy derivatives on the gut microbiota: a systematic literature review. Gut Microbes, 12(1), 1799533. https://doi.org/10.1080/19490976.2020.1799533

Aucouturier, J., Baker, J. S., & Duché, P. (2008). Fat and Carbohydrate Metabolism during Submaximal Exercise in Children. Sports Medicine, 38(3), 213–238. https://doi.org/10.2165/00007256-200838030-00003

Berkovich, B.-E., Eliakim, A., Nemet, D., Stark, A. H., & Sinai, T. (2016). Rapid Weight Loss Among Adolescents Participating In Competitive Judo. International Journal of Sport Nutrition and Exercise Metabolism, 26(3), 276–284. https://doi.org/10.1123/ijsnem.2015-0196

Bialowas, D., Laskowski, R., Franchini, E., & Kujach, S. (2023). Examining the effects of pre-competition rapid weight loss on hydration status and competition performance in elite judo athletes. Scientific Reports, 13(1), 14756. https://doi.org/10.1038/s41598-023-41872-1

Brito, C. J., Roas, A. F. C. M., Brito, I. S. S., Marins, J. C. B., Córdova, C., & Franchini, E. (2012). Methods of Body-Mass Reduction by Combat Sport Athletes. International Journal of Sport Nutrition and Exercise Metabolism, 22(2), 89–97. https://doi.org/10.1123/ijsnem.22.2.89

Burke, L. M., Slater, G. J., Matthews, J. J., Langan-Evans, C., & Horswill, C. A. (2021). ACSM Expert Consensus Statement on Weight Loss in Weight-Category Sports. Current Sports Medicine Reports, 20(4), 199–217. https://doi.org/10.1249/JSR.0000000000000831

Carl, R. L., Johnson, M. D., Martin, T. J., LaBella, C. R., Brooks, M. A., Diamond, A., Hennrikus, W., LaBotz, M., Logan, K., Loud, K. J., Moffatt, K. A., Nemeth, B., Pengel, B., & Peterson, A. (2017). Promotion of Healthy Weight-Control Practices in Young Athletes. Pediatrics, 140(3). https://doi.org/10.1542/peds.2017-1871

CDC. (1998). Hyperthermia and Dehydration-Related Deaths Associated With Intentional Rapid Weight Loss in Three Collegiate Wrestlers—North Carolina, Wisconsin, and Michigan, November-December 1997. JAMA, 279(11), 824. https://doi.org/10.1001/jama.279.11.824-JWR0318-3-1

Ceylan, B. (2024). Acute weight gain and hydration status of junior men judo athletes during a real competition. In H. Sertić, S. Čorak, & I. Segedi (Eds.), 7TH SCIENTIFIC AND PROFESSIONAL CONFERENCE "APPLICABLE RESEARCH IN JUDO (pp. 41–45). University of Zagreb Faculty of Kinesiology, Croatia.

Ceylan, B., Aydos, L., & Šimenko, J. (2022). Effect of Rapid Weight Loss on Hydration Status and Performance in Elite Judo Athletes. Biology, 11(4), 500. https://doi.org/10.3390/biology11040500

Ceylan, B., Kons, R. L., Detanico, D., & Šimenko, J. (2022). Acute Dehydration Impairs Performance and Physiological Responses in Highly Trained Judo Athletes. Biology, 11(6), 872. https://doi.org/10.3390/biology11060872

Connor, J., Germaine, M., Gibson, C., Clarke, P., & Egan, B. (2022). Effect of rapid weight loss incorporating hot salt water immersion on changes in body mass, blood markers, and indices of performance in male mixed martial arts athletes. European Journal of Applied Physiology, 122(10), 2243–2257. https://doi.org/10.1007/s00421-022-05000-7

Degoutte, F., Jouanel, P., Bègue, R. J., Colombier, M., Lac, G., Pequignot, J. M., & Filaire, E. (2006). Food Restriction, Performance, Biochemical, Psychological, and Endocrine Changes in Judo Athletes. International Journal of Sports Medicine, 27(1), 9–18. https://doi.org/10.1055/s-2005-837505

Falk, B., & Dotan, R. (2008). Children's thermoregulation during exercise in the heat — a revisit. Applied Physiology, Nutrition, and Metabolism, 33(2), 420–427. https://doi.org/10.1139/H07-185

Fernández-Elías, V. E., Ortega, J. F., Nelson, R. K., & Mora-Rodriguez, R. (2015). Relationship between muscle water and glycogen recovery after prolonged exercise in the heat in humans. European Journal of Applied Physiology, 115(9), 1919–1926. https://doi.org/10.1007/s00421-015-3175-z

Fitzpatrick, C. J., Freitas, D., O'Callaghan, T. F., O'Mahony, J. A., & Brodkorb, A. (2024). Variations in Bovine Milk Proteins and Processing Conditions and Their Effect on Protein Digestibility in Humans: A Review of In Vivo and In Vitro Studies. Foods, 13(22), 3683. https://doi.org/10.3390/foods13223683

Fortes, L. de S., Lira, H. A. A. da S., & Ferreira, M. E. C. (2017). EFEITO DA RÁPIDA PERDA DE MASSA CORPORAL NO DESEMPENHO DA TOMADA DE DECISÃO EM JUDOCAS. Journal of Physical Education, 28(1). https://doi.org/10.4025/jphyseduc.v28i1.2817

Fortes, L. S., Costa, B. D. V., Paes, P. P., Cyrino, E. S., Vianna, J. M., & Franchini, E. (2017). Effect of rapid weight loss on physical performance in judo athletes: is rapid weight loss a help for judokas with weight problems? International Journal of Performance Analysis in Sport, 17(5), 763–773. https://doi.org/10.1080/24748668.2017.1399323

Franchini, E., Brito, C. J., & Artioli, G. G. (2012). Weight loss in combat sports: physiological, psychological and performance effects. Journal of the International Society of Sports Nutrition, 9(1). https://doi.org/10.1186/1550-2783-9-52

Ftaiti, F., Grélot, L., Coudreuse, J. M., Nicol, C., & Coudreuse, J. M. (2001). Combined effect of heat stress, dehydration and exercise on neuromuscular function in humans. European Journal of Applied Physiology, 84(1–2), 87–94. https://doi.org/10.1007/s004210000339

García-Burgos, M., Moreno-Fernández, J., Alférez, M. J. M., Díaz-Castro, J., & López-Aliaga, I. (2020). New perspectives in fermented dairy products and their health relevance. Journal of Functional Foods, 72, 104059. https://doi.org/10.1016/j.jff.2020.104059

Golden, N. H., Abrams, S. A., Daniels, S. R., Abrams, S. A., Corkins, M. R., de Ferranti, S. D., Golden, N. H., Magge, S. N., & Schwarzenberg, S. J. (2014). Optimizing Bone Health in Children and Adolescents. Pediatrics, 134(4), e1229–e1243. https://doi.org/10.1542/peds.2014-2173

Gordon, Y., Souglis, A., & Andronikos, G. (2021). Effect of weight restriction strategies in judokas. Journal of Physical Education and Sport, 21(6), 3394–3404. https://doi.org/10.7752/jpes.2021.06460

Green, C. M., Petrou, M. J., Fogarty-Hover, M. L. S., & Rolf, C. G. (2007). Injuries among judokas during competition. Scandinavian Journal of Medicine & Science in Sports, 17(3), 205–210. https://doi.org/10.1111/j.1600-0838.2006.00552.x

Horswill, C. A., Hickner, R. C., Scott, J. R., Costill, D. L., & Gould, D. (1990). Weight loss, dietary carbohydrate modifications, and high intensity, physical performance. Medicine and Science in Sports and Exercise, 22(4), 470–476.

IJF. (2022). IJF Refereeing Rules update 2022-2024 (pp. 1–2).

Knuiman, P., Hopman, M. T. E., & Mensink, M. (2015). Glycogen availability and skeletal muscle adaptations with endurance and resistance exercise. Nutrition & Metabolism, 12(1), 59. https://doi.org/10.1186/s12986-015-0055-9

Kukovica, D., Burnik, S., Karpljuk, D., & Šimenko, J. (2023). Strategije zmanjševanja telesne mase pri slovenskih judoistih. Šport, 71(3/4), 136–141. http://www.dlib.si/details/URN:NBN:SI:doc-E8PON7M9

Lakicevic, N., Reale, R., D'Antona, G., Kondo, E., Sagayama, H., Bianco, A., & Drid, P. (2022). Disturbing Weight Cutting Behaviors in Young Combat Sports Athletes: A Cause for Concern. Frontiers in Nutrition, 9, 842262. https://doi.org/10.3389/fnut.2022.842262

Lakicevic, N., Roklicer, R., Bianco, A., Mani, D., Paoli, A., Trivic, T., Ostojic, S. M., Milovancev, A., Maksimovic, N., & Drid, P. (2020). Effects of Rapid Weight Loss on Judo Athletes: A Systematic Review. Nutrients, 12(5), 1220. https://doi.org/10.3390/nu12051220

Lakicevic, N., Thomas, E., Isacco, L., Tcymbal, A., Pettersson, S., Roklicer, R., Tubic, T., Paoli, A., Bianco, A., & Drid, P. (2024). Rapid weight loss and mood states in judo athletes: A systematic review. European Review of Applied Psychology, 74(4), 100933. https://doi.org/10.1016/j.erap.2023.100933

Lee, Y. Y., Erdogan, A., & Rao, S. S. C. (2014). How to Assess Regional and Whole Gut Transit Time With Wireless Motility Capsule. Journal of Neurogastroenterology and Motility, 20(2), 265–270. https://doi.org/10.5056/jnm.2014.20.2.265

Macedonio, M. A., & Dunford, Marie. (2009). The athlete's guide to making weight. Human Kinetics Publishers Inc.

Martínez-Aranda, L. M., Sanz-Matesanz, M., Orozco-Durán, G., González-Fernández, F. T., Rodríguez-García, L., & Guadalupe-Grau, A. (2023). Effects of Different Rapid Weight Loss Strategies and Percentages on Performance-Related Parameters in Combat Sports: An Updated Systematic Review. International Journal of Environmental Research and Public Health, 20(6), 5158. https://doi.org/10.3390/ijerph20065158

Maughan, R. J., & Shirreffs, S. M. (2019). Muscle Cramping During Exercise: Causes, Solutions, and Questions Remaining. Sports Medicine (Auckland, N.Z.), 49(Suppl 2), 115–124. https://doi.org/10.1007/s40279-019-01162-1

Mountjoy, M., Sundgot-Borgen, J. K., Burke, L. M., Ackerman, K. E., Blauwet, C., Constantini, N., Lebrun, C., Lundy, B., Melin, A. K., Meyer, N. L., Sherman, R. T., Tenforde, A. S., Klungland Torstveit, M., & Budgett, R. (2018). IOC consensus statement on relative energy deficiency in sport (RED-S): 2018 update. British Journal of Sports Medicine, 52(11), 687–697. https://doi.org/10.1136/bjsports-2018-099193

Naulleau, C., & Goulet, É. D. (2020). Effect Of Water-loading On Weight Cutting And Performance In Elite Judo Athletes. Medicine & Science in Sports & Exercise, 52(7S), 171–172. https://doi.org/10.1249/01.mss.0000675328.86187.37

Noakes, T. D. (2003). Overconsumption of fluids by athletes. BMJ, 327(7407), 113–114. https://doi.org/10.1136/bmj.327.7407.113

Pilch, W., Szyguła, Z., Palka, T., Pilch, P., Cison, T., Wiecha, S., & Tota, Ł. (2014). Comparison of physiological reactions and physiological strain in healthy men under heat stress in dry and steam heat saunas. Biology of Sport, 31(2), 145–149. https://doi.org/10.5604/20831862.1099045

Prouteau, S., Pelle, A., Collomp, K., Benhamou, L., & Courteix, D. (2006). Bone density in elite judoists and effects of weight cycling on bone metabolic balance. Medicine and Science in Sports and Exercise, 38(4), 694–700. https://doi.org/10.1249/01.mss.0000210207.55941.fb

Rauter, S., & Simenko, J. (2021). Morphological asymmetries profile and the difference between low-and high-performing road cyclists using 3d scanning. Biology, 10(11), 1199. https://doi.org/10.3390/biology10111199

Reale, R. (2018a). Acute Weight Management in Combat Sports: Pre Weigh-in Weight Loss, Post Weigh-in Recovery and Competition Nutrition Strategies. Sports Science Exchange, 29(183), 1–6.

Reale, R. (2018b). Acute weight management in combat sports: pre-weight-in weight loss, post weight-in recovery and competition nutrition strategies. Sports Science Exchange, 29(183), 1–6.

Reale, R., Slater, G., & Burke, L. M. (2017). Acute-Weight-Loss Strategies for Combat Sports and Applications to Olympic Success. International Journal of Sports Physiology and Performance, 12(2), 142–151. https://doi.org/10.1123/ijspp.2016-0211

Reale, R., Slater, G., Cox, G. R., Dunican, I. C., & Burke, L. M. (2018). The Effect of Water Loading on Acute Weight Loss Following Fluid Restriction in Combat Sports Athletes. International Journal of Sport Nutrition and Exercise Metabolism, 28(6), 565–573. https://doi.org/10.1123/ijsnem.2017-0183

Ricci, A. A., Evans, C., Stull, C., Peacock, C. A., French, D. N., Stout, J. R., Fukuda, D. H., La Bounty, P., Kalman, D., Galpin, A. J., Tartar, J., Johnson, S., Kreider, R. B., Kerksick, C. M., Campbell, B. I., Jeffery, A., Algieri, C., & Antonio, J. (2025). International society of sports nutrition position stand: nutrition and weight cut strategies for mixed martial arts and other combat sports. Journal of the International Society of Sports Nutrition, 22(1). https://doi.org/10.1080/15502783.2025.2467909

Roemmich, J. N., & Sinning, W. E. (1997). Weight loss and wrestling training: effects on growth-related hormones. Journal of Applied Physiology, 82(6), 1760–1764. https://doi.org/10.1152/jappl.1997.82.6.1760

Roklicer, R., Lakicevic, N., Stajer, V., Trivic, T., Bianco, A., Mani, D., Milosevic, Z., Maksimovic, N., Paoli, A., & Drid, P. (2020). The effects of rapid weight loss on skeletal muscle in judo athletes. Journal of Translational Medicine, 18(1), 142. https://doi.org/10.1186/s12967-020-02315-x

Sawyer, J. C., Wood, R. J., Davidson, P. W., Collins, S. M., Matthews, T. D., Gregory, S. M., & Paolone, V. J. (2013). Effects of a Short-Term Carbohydrate-Restricted Diet on Strength and Power Performance. Journal of Strength and Conditioning Research, 27(8), 2255–2262. https://doi.org/10.1519/JSC.0b013e31827da314

Silva, A. M., Fields, D. A., Heymsfield, S. B., & Sardinha, L. B. (2010). Body Composition and Power Changes in Elite Judo Athletes. International Journal of Sports Medicine, 31(10), 737–741. https://doi.org/10.1055/s-0030-1255115

Šimenko, J. (2016). Pomen športnih testiranj v judu. Slovenski Judo, 21(110), 21–23.

Štangar, M., Štangar, A., Shtyrba, V., Cigić, B., & Benedik, E. (2022). Rapid weight loss among elite-level judo athletes: methods and nutrition in relation to competition performance. Journal of the International Society of Sports Nutrition, 19(1), 380–396. https://doi.org/10.1080/15502783.2022.2099231

Stevens, J., Truesdale, K. P., McClain, J. E., & Cai, J. (2006). The definition of weight maintenance. International Journal of Obesity, 30(3), 391–399. https://doi.org/10.1038/sj.ijo.0803175

Suzuki, M., Nakaji, S., Umeda, T., Shimoyama, T., Mochida, N., Kojima, A., Mashiko, T., & Sugawara, K. (2003). Effects of weight reduction on neutrophil phagocytic activity and oxidative burst activity in female judoists. Luminescence, 18(4), 214–217. https://doi.org/10.1002/bio.727

Turan, I., Dedeli, O., Bor, S., & Ilter, T. (2015). Effects of a kefir supplement on symptoms, colonic transit, and bowel satisfaction score in patients with chronic constipation: A pilot study. The Turkish Journal of Gastroenterology, 25(6), 650–656. https://doi.org/10.5152/tjg.2014.6990

van Eijnatten, E. J. M., Roelofs, J. J. M., Camps, G., Huppertz, T., Lambers, T. T., & Smeets, P. A. M. (2024). Gastric coagulation and postprandial amino acid absorption of milk is affected by mineral composition: a randomized crossover trial. Food & Function, 15(6), 3098–3107. https://doi.org/10.1039/D3FO04063A

Wu, K.-L., Rayner, C. K., Chuah, S.-K., Chiu, K.-W., Lu, C.-C., & Chiu, Y.-C. (2011). Impact of Low-Residue Diet on Bowel Preparation for Colonoscopy. Diseases of the Colon & Rectum, 54(1), 107–112. https://doi.org/10.1007/DCR.0b013e3181fb1e52

Yoshida, E., Hayashida, H., Sakurai, T., & Kawasaki, K. (2024). Evidence of weight loss in junior female judo athletes affects their development. Frontiers in Sports and Active Living, 6. https://doi.org/10.3389/fspor.2024.1420856

Yoshioka, Y., Umeda, T., Nakaji, S., Kojima, A., Tanabe, M., Mochida, N., & Sugawara, K. (2006). Gender Differences in the Psychological Response to Weight Reduction in Judoists. International Journal of Sport Nutrition and Exercise Metabolism, 16(2), 187–198. https://doi.org/10.1123/ijsnem.16.2.187

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LITERATURE PART 2

Aerenhouts, D., Deriemaeker, P., Hebbelinck, M., & Clarys, P. (2011). Energy and macronutrient intake in adolescent sprint athletes: A follow-up study. Journal of Sports Sciences, 29(1), 73–82. https://doi.org/10.1080/02640414.2010.521946

American College of Sports Medicine, Sawka, M. N., Burke, L. M., Eichner, E. R., Maughan, R. J., Montain, S. J., & Stachenfeld, N. S. (2007). American College of Sports Medicine position stand: Exercise and fluid replacement. Medicine and Science in Sports and Exercise, 39(2), 377–390. https://doi.org/10.1249/mss.0b013e31802ca597

Aragon, A. A., & Schoenfeld, B. J. (2013). Nutrient timing revisited: is there a post-exercise anabolic window?. Journal of the International Society of Sports Nutrition, 10(1), 5. https://doi.org/10.1186/1550-2783-10-5

Areta, J. L., Burke, L. M., Ross, M. L., Camera, D. M., Broad, E. M., Jeacocke, N. A., Moore, D. R., Stellingwerff, T., Hawley, J. A., & Coffey, V. G. (2013). Timing and distribution of protein ingestion during prolonged recovery from resistance exercise alters myofibrillar protein synthesis. Journal of Physiology, 591(9), 2319–2331. https://doi.org/10.1113/jphysiol.2012.244897

Areta, J. L., Taylor, H. L., & Koehler, K. (2021). Low energy availability: history, definition and evidence of its endocrine, metabolic and physiological effects in prospective studies in females and males. European Journal of Applied Physiology, 121(1), 1–21. https://doi.org/10.1007/s00421-020-04516-0

Arthur-Cameselle, J. N., & Quatromoni, P. A. (2014). Eating disorders in collegiate female athletes: Factors that assist recovery. Eating Disorders, 22(1), 50–61. https://doi.org/10.1080/10640266.2014.857518

Arthur-Cameselle, J. N., Sossin, K., & Quatromoni, P. A. (2017). A qualitative analysis of factors related to eating disorder onset in female collegiate athletes and non-athletes. Eating Disorders, 25(3), 199–215. https://doi.org/10.1080/10640266.2016.1258940

Australian Institute of Sport. (2022). Iron deficiency best practice guidelines. Australian Sport Institute.
https://www.ais.gov.au/position_statements/best_practice_content/iron-deficiency2

Baker, L. B., Heaton, L. E., Nuccio, R. P., & Stein, K. W. (2014). Dietitian-observed macronutrient intakes of young skill and team-sport athletes: adequacy of pre, during, and postexercise nutrition. International Journal of Sport Nutrition and Exercise Metabolism, 24(2), 166–176. https://doi.org/10.1123/ijsnem.2013-0132

Baker, L. B., Barnes, K. A., Anderson, M. L., Passe, D. H., & Stofan, J. R. (2016). Normative data for regional sweat sodium concentration and whole-body sweating rate in athletes. Journal of Sports Sciences, 34(4), 358–368. https://doi.org/10.1080/02640414.2015.1055291

Bar, R. J., Cassin, S. E., & Dionne, M. M. (2016). Eating disorder prevention initiatives for athletes: A review. European Journal of Sport Science, 16(3), 325–335. https://doi.org/10.1080/17461391.2015.1013995

Barron, E., Cano Sokoloff, N., Maffazioli, G., Ackerman, K. E., Woolley, R., Holme, T. M., Anderson, E. J., & Misra, M. (2016). Diets high in fiber and vegetable protein are associated with low lumbar bone mineral density in young athletes with oligoamenorrhea. Journal of the Academy of Nutrition and Dietetics, 116(3), 481–489. https://doi.org/10.1016/j.jand.2015.10.022

Bartoszewska, M., Kamboj, M., & Patel, D. R. (2010). Vitamin D, muscle function, and exercise performance. Pediatric Clinics of North America, 57(3), 849–861. https://doi.org/10.1016/j.pcl.2010.03.008

Baylis, A., Cameron-Smith, D., & Burke, L. M. (2001). Inadvertent doping through supplement use by athletes: Assessment and management of the risk in Australia. International Journal of Sport Nutrition and Exercise Metabolism, 11(3), 365–383. https://doi.org/10.1123/ijsnem.11.3.365

Beals, K. A., & Mitchell, A. (2015). Recent recommendations and current controversies in sport. American Journal of Lifestyle Medicine, 9(4), 288–297. https://doi.org/10.1177/1559827613513410

Beaven, C. M., Maulder, P., Pooley, A., Kilduff, L., & Cook, C. (2013). Effects of caffeine and carbohydrate mouth rinses on repeated sprint performance. Applied Physiology, Nutrition, and Metabolism, 38(6), 633–637. https://doi.org/10.1139/apnm-2012-0333

Becker, C. B., McDaniel, L., Bull, S., Powell, M., & McIntyre, K. (2012). Can we reduce eating disorder risk factors in female college athletes? A randomized exploratory investigation of two peer-led interventions. Body Image, 9(1), 31–42. https://doi.org/10.1016/j.bodyim.2011.09.005

Benardot, D. (2013). Energy thermodynamics revisited: Energy intake strategies for optimizing athlete body composition and performance. Pensar en Movimiento, 11(2), 1-13.

Bergström, J., Hultman, E., & Roch-Norlund, A. E. (1972). Muscle glycogen synthetase in normal subjects. Basal values, effect of glycogen depletion by exercise and of a carbohydrate-rich diet following exercise. Scandinavian Journal of Clinical and Laboratory Investigation, 29(2), 231–236. https://doi.org/10.3109/00365517209081080

Betts, J. A., & Williams, C. (2010). Short-term recovery from prolonged exercise: exploring the potential for protein ingestion to accentuate the benefits of carbohydrate supplements. Sports Medicine, 40(11), 941–959. https://doi.org/10.2165/11536900-000000000-00000

Blomstrand, E., & Saltin, B. (1999). Effect of muscle glycogen on glucose, lactate and amino acid metabolism during exercise and recovery in human subjects. Journal of Physiology, 514(1), 293–302. https://doi.org/10.1111/j.1469-7793.1999.293af.x

Blumberg, J. B., Cena, H., Barr, S. I., Biesalski, H. K., Dagach, R. U., Delaney, B., Frei, B., Moreno González, M. I., Hwalla, N., Lategan-Potgieter, R., McNulty, H., van der Pols, J. C., Winichagoon, P., & Li, D. (2018). The use of multivitamin/multimineral supplements: A modified Delphi consensus panel report. Clinical Therapeutics, 40(4), 640–657. https://doi.org/10.1016/j.clinthera.2018.02.014

Bratland-Sanda, S., & Sundgot-Borgen, J. (2013). Eating disorders in athletes: overview of prevalence, risk factors and recommendations for prevention and treatment. European Journal of Sport Science, 13(5), 499–508. https://doi.org/10.1080/17461391.2012.740504

Braun, H., Koehler, K., Geyer, H., Kleiner, J., Mester, J., & Schanzer, W. (2009). Dietary supplement use among elite young German athletes. International Journal of Sport Nutrition and Exercise Metabolism, 19(1), 97–109. https://doi.org/10.1123/ijsnem.19.1.97

Brouns, F., Kovacs, E. M., & Senden, J. M. (1998). The effect of different rehydration drinks on post-exercise electrolyte excretion in trained athletes. International Journal of Sports Medicine, 19(1), 56–60. https://doi.org/10.1055/s-2007-971881

Buck, C. L., Wallman, K. E., Dawson, B., & Guelfi, K. J. (2013). Sodium phosphate as an ergogenic aid. Sports Medicine, 43(6), 425–435. https://doi.org/10.1007/s40279-013-0042-0

Burd, N. A., Tang, J. E., Moore, D. R., & Phillips, S. M. (2009). Exercise training and protein metabolism: influences of contraction, protein intake, and sex-based differences. Journal of Applied Physiology, 106(5), 1692–1701. https://doi.org/10.1152/japplphysiol.91351.2008

Burke, L. M., Hawley, J. A., Wong, S. H., & Jeukendrup, A. E. (2011). Carbohydrates for training and competition. Journal of Sports Sciences, 29(sup1), S17–S27. https://doi.org/10.1080/02640414.2011.585473

Burke, L. M., Ross, M. L., Garvican-Lewis, L. A., Welvaert, M., Heikura, I. A., Forbes, S. G., Mirtschin, J. G., Cato, L. E., Strobel, N., Sharma, A. P., & Hawley, J. A. (2017). Low carbohydrate, high fat diet impairs exercise economy and negates the performance benefit from intensified training in elite race walkers. Journal of Physiology, 595(9), 2785–2807. https://doi.org/10.1113/JP273230

Burke, L. M., Lundy, B., Fahrenholtz, I. L., & Melin, A. K. (2018). Pitfalls of conducting and interpreting estimates of energy availability in free-living athletes. International Journal of Sport Nutrition and Exercise Metabolism, 28(4), 350–363. https://doi.org/10.1123/ijsnem.2018-0142

Burke, L. M., Castell, L. M., Casa, D. J., Close, G. L., Costa, R., Desbrow, B., Halson, S. L., Lis, D. M., Melin, A. K., Peeling, P., Saunders, P. U., Slater, G. J., Sygo, J., Witard, O. C., Bermon, S., & Stellingwerff, T. (2019). International Association of Athletics Federations consensus statement 2019: Nutrition for athletics. International Journal of Sport Nutrition and Exercise Metabolism, 29(2), 73–84. https://doi.org/10.1123/ijsnem.2019-0065

Bussau, V. A., Fairchild, T. J., Rao, A., Steel, P., & Fournier, P. A. (2002). Carbohydrate loading in human muscle: an improved 1 day protocol. European Journal of Applied Physiology, 87(3), 290–295. https://doi.org/10.1007/s00421-002-0621-5

Byrne, S., & McLean, N. (2002). Elite athletes: effects of the pressure to be thin. Journal of Science and Medicine in Sport, 5(2), 80–94. https://doi.org/10.1016/s1440-2440(02)80029-9

Cannataro, R., Straface, N., & Cione, E. (2022). Nutritional supplements in combat sports: What we know and what we do. Human Nutrition & Metabolism, 29, 200155. https://doi.org/10.1016/j.hnm.2022.200155

Carter, J. M., Jeukendrup, A. E., & Jones, D. A. (2004). The effect of carbohydrate mouth rinse on 1-h cycle time trial performance. Medicine and Science in Sports and Exercise, 36(12), 2107–2111. https://doi.org/10.1249/01.mss.0000147585.65709.6f

Casa, D. J., Clarkson, P. M., & Roberts, W. O. (2005). American College of Sports Medicine roundtable on hydration and physical activity: consensus statements. Current Sports Medicine Reports, 4(3), 115–127. https://doi.org/10.1097/01.csmr.0000306194.67241.76

Casa, D. J., Cheuvront, S. N., Galloway, S. D., & Shirreffs, S. M. (2019). Fluid needs for training, competition, and recovery in track-and-field athletes. International Journal of Sport Nutrition and Exercise Metabolism, 29(2), 175–180. https://doi.org/10.1123/ijsnem.2018-037

Cermak, N. M., & van Loon, L. J. (2013). The use of carbohydrates during exercise as an ergogenic aid. Sports Medicine, 43(11), 1139–1155. https://doi.org/10.1007/s40279-013-0079-0

Chandra, R. K. (1997). Nutrition and the immune system: an introduction. American Journal of Clinical Nutrition, 66(2), 460S-463S. https://doi.org/10.1093/ajcn/66.2.460S

Cherian, K. S., Sainoji, A., Nagalla, B., & Yagnambhatt, V. R. (2018). Energy balance coexists with disproportionate macronutrient consumption across pretraining, during training, and posttraining among Indian junior soccer players. Pediatric Exercise Science, 30(4), 506–515. https://doi.org/10.1123/pes.2017-0276

Close, G. L., Leckey, J., Patterson, M., Bradley, W., Owens, D. J., Fraser, W. D., & Morton, J. P. (2013). The effects of vitamin D(3) supplementation on serum total 25[OH]D concentration and physical performance: a randomised dose-response study. British Journal of Sports Medicine, 47(11), 692–696. https://doi.org/10.1136/bjsports-2012-091735

Cobley, J. N., & Marrin, K. (2012). Vitamin E supplementation does not alter physiological performance at fixed blood lactate concentrations in trained runners. Journal of Sports Medicine and Physical Fitness, 52(1), 63–70.

Coker-Cranney, A., Watson, J. C., 2nd, Bernstein, M., Voelker, D. K., & Coakley, J. (2018). How far is too far? Understanding identity and overconformity in collegiate wrestlers. Qualitative Research in Sport, Exercise and Health, 10(1), 92–116. https://doi.org/10.1080/2159676X.2017.1372798

De Oliveira, E. P., & Burini, R. C. (2011). Food-dependent, exercise-induced gastrointestinal distress. Journal of the International Society of Sports Nutrition, 8, 12. https://doi.org/10.1186/1550-2783-8-12

de Onis, M., Onyango, A. W., Borghi, E., Siyam, A., Nishida, C., & Siekmann, J. (2007). Development of a WHO growth reference for school-aged children and adolescents. Bulletin of the World Health Organization, 85(9), 660–667. https://doi.org/10.2471/blt.07.043497

Deakin, V., Kerr, D., & Boushey, C. (2015). Dietary assessment of athletes: clinical and research perspectives. In L. M. Burke & V. Deakin (Eds.), Clinical sports nutrition (5th ed., pp. 27–51). McGraw-Hill.

DellaValle, D. M. (2013). Iron supplementation for female athletes: effects on iron status and performance outcomes. Current Sports Medicine Reports, 12(4), 234–239. https://doi.org/10.1249/JSR.0b013e31829a6f6b

Desbrow, B., McCormack, J., Burke, L. M., Cox, G. R., Fallon, K., Hislop, M., Logan, R., Marino, N., Sawyer, S. M., Shaw, G., Star, A., Vidgen, H., & Leveritt, M. (2014). Sports Dietitians Australia position statement: sports nutrition for the adolescent athlete. International Journal of Sport Nutrition and Exercise Metabolism, 24(5), 570–584. https://doi.org/10.1123/ijsnem.2014-0031

Desbrow, B., & Leveritt, M. (2015). Nutritional issues for young athletes: children and adolescents. In L. M. Burke & V. Deakin (Eds.), Clinical sports nutrition (5th ed., pp. 592-618). McGraw-Hill.

EFSA Panel on Dietetic Products, Nutrition and Allergies. (2010). Scientific opinion on dietary reference values for carbohydrates and dietary fibre. EFSA Journal, 8(3), 1462. https://doi.org/10.2903/j.efsa.2010.1462

EFSA Panel on Dietetic Products, Nutrition and Allergies. (2015). Scientific opinion on dietary reference values for calcium. EFSA Journal, 13(5), 4101. https://doi.org/10.2903/j.efsa.2015.4101

Erdman, K. A., Tunnicliffe, J., Lun, V. M., & Reimer, R. A. (2013). Eating patterns and composition of meals and snacks in elite Canadian athletes. International Journal of Sport Nutrition and Exercise Metabolism, 23(3), 210-219. https://doi.org/10.1123/ijsnem.23.3.210

Erlandson, M. C., Sherar, L. B., Mirwald, R. L., Maffulli, N., & Baxter-Jones, A. D. (2008). Growth and maturation of adolescent female gymnasts, swimmers, and tennis players. Medicine and Science in Sports and Exercise, 40(1), 34–42. https://doi.org/10.1249/mss.0b013e3181596678

Falk, B., & Dotan, R. (2008). Children's thermoregulation during exercise in the heat: A revisit. Applied Physiology, Nutrition, and Metabolism, 33(2), 420–427. https://doi.org/10.1139/H07-185

Fogelholm, M. (1994). Effects of bodyweight reduction on sports performance. Sports Medicine, 18(4), 249–267. https://doi.org/10.2165/00007256-199418040-00004

Franchini, E., Brito, C. J., & Artioli, G. G. (2012). Weight loss in combat sports: physiological, psychological and performance effects. Journal of the International Society of Sports Nutrition, 9(1), 52. https://doi.org/10.1186/1550-2783-9-52

Fry, A. C., Bloomer, R. J., Falvo, M. J., Moore, C. A., Schilling, B. K., & Weiss, L. W. (2006). Effect of a liquid multivitamin/mineral supplement on anaerobic exercise performance. Research in Sports Medicine, 14(1), 53–64. https://doi.org/10.1080/15438620500528323

Garthe, I., & Maughan, R. J. (2018). Athletes and supplements: Prevalence and perspectives. International Journal of Sport Nutrition and Exercise Metabolism, 28(2), 126-138. https://doi.org/10.1123/ijsnem.2017-0429

Hector, A. J., & Phillips, S. M. (2018). Protein recommendations for weight loss in elite athletes: A focus on body composition and performance. International Journal of Sport Nutrition and Exercise Metabolism, 28(2), 170–177. https://doi.org/10.1123/ijsnem.2017-0273

Heikkinen, A., Alaranta, A., Helenius, I., & Vasankari, T. (2011). Use of dietary supplements in Olympic athletes is decreasing: a follow-up study between 2002 and 2009. Journal of the International Society of Sports Nutrition, 8(1), 1. https://doi.org/10.1186/1550-2783-8-1

International Olympic Committee. (2011). IOC consensus statement on sports nutrition 2010. Journal of Sports Sciences, 29(sup1), S3-S4.

Jäger, R., Kerksick, C. M., Campbell, B. I., Cribb, P. J., Wells, S. D., Skwiat, T. M., Purpura, M., Ziegenfuss, T. N., Ferrando, A. A., Arent, S. M., Smith-Ryan, A. E., Stout, J. R., Arciero, P. J., Ormsbee, M. J., Taylor, L. W., Wilborn, C. D., Kalman, D. S., Kreider, R. B., Willoughby, D. S., Hoffman, J. R., Krzykowski, J. L., & Antonio, J. (2017). International Society of Sports Nutrition position stand: protein and exercise. Journal of the International Society of Sports Nutrition, 14, 20. https://doi.org/10.1186/s12970-017-0177-8

Januszko, P., & Lange, E. (2021). Nutrition, supplementation and weight reduction in combat sports: a review. AIMS Public Health, 8(3), 485-498. https://doi.org/10.3934/publichealth.2021038

Jeukendrup, A. E. (2003). High-carbohydrate versus high-fat diets in endurance sports. Sportmedizin und Sporttraumatologie, 51(1), 17-23.

Jeukendrup, A. E. (2013). The new carbohydrate intake recommendations. Nestle Nutrition Institute Workshop Series, 75, 63–71. https://doi.org/10.1159/000345820

Jeukendrup, A. E. (2017). Training the gut for athletes. Sports Medicine, 47(Suppl 1), 101–110. https://doi.org/10.1007/s40279-017-0690-6

Jeukendrup, A. E., Currell, K., Clarke, J., Cole, J., & Blannin, A. K. (2009). Effect of beverage glucose and sodium content on fluid delivery. Nutrition & Metabolism, 6, 9. https://doi.org/10.1186/1743-7075-6-9

Kerksick, C. M., Wilborn, C. D., Roberts, M. D., Smith-Ryan, A., Kleiner, S. M., Jäger, R., Collins, R., Cooke, M., Davis, J. N., Galvan, E., Greenwood, M., Lowery, L. M., Wildman, R., Antonio, J., & Kreider, R. B. (2018). ISSN exercise & sports nutrition review update: research & recommendations. Journal of the International Society of Sports Nutrition, 15(1), 38. https://doi.org/10.1186/s12970-018-0242-y

Kilpela, L. S., Blomquist, K., Verzijl, C., Wilfred, S., Beyl, R., & Becker, C. B. (2016). The body project 4 all: A pilot randomized controlled trial of a mixed-gender dissonance-based body image program. International Journal of Eating Disorders, 49(6), 591–602. https://doi.org/10.1002/eat.22562

Kim, J., Lee, N., Lee, J., Jung, S. S., Kang, S. K., & Yoon, J. D. (2013). Dietary supplementation of high-performance Korean and Japanese judoists. International Journal of Sport Nutrition and Exercise Metabolism, 23(2), 119–127. https://doi.org/10.1123/ijsnem.23.2.119

Klein, D. J., Eck, K. M., Walker, A. J., Pellegrino, J. K., & Freidenreich, D. J. (2021). Assessment of sport nutrition knowledge, dietary practices, and sources of nutrition information in NCAA division III collegiate athletes. Nutrients, 13(9), 2962. https://doi.org/10.3390/nu13092962

Knapik, J. J., Steelman, R. A., Hoedebecke, S. S., Austin, K. G., Farina, E. K., & Lieberman, H. R. (2016). Prevalence of dietary supplement use by athletes: systematic review and meta-analysis. Sports Medicine, 46(1), 103–123. https://doi.org/10.1007/s40279-015-0387-7

Knuttgen, H. G., & Komi, P. V. (2003). Basic considerations for exercise. In P. V. Komi (Ed.), Strength and power in sport (pp. 3-7). Blackwell Scientific Publications.

Kyle, U. G., Bosaeus, I., De Lorenzo, A. D., Deurenberg, P., Elia, M., Manuel Gómez, J., Heitmann, B. L., Kent-Smith, L., Melchior, J. C., Pirlich, M., Scharfetter, H., Schols, A. M. W. J., & Pichard, C. (2004). Bioelectrical impedance analysis-part II: utilization in clinical practice. Clinical Nutrition, 23(6), 1430-1453. https://doi.org/10.1016/j.clnu.2004.09.012

Lakicevic, N., Roklicer, R., Bianco, A., et al. (2020). Effects of rapid weight loss on judo athletes: a systematic review. Nutrients, 12(5), 1220. https://doi.org/10.3390/nu12051220

Leutholtz, B., & Kreider, R. (2001). Nutritional health. In T. Wilson & N. Temple (Eds.), Exercise and sport nutrition (pp. 207–239). Humana Press.

Ljungqvist, A., Jenoure, P. J., Engebretsen, L., Alonso, J. M., Bahr, R., Clough, A. F., De Bondt, G., Dvorak, J., Maloley, R., Matheson, G., Weeuwisse, W., Meijboom, E., Mountjoy, M., Pelliccia, A., Schwellnus, M., Sprumont, D., Schamasch, P., Gaurhier, J. B., Dubi, C., Stupp, H., & Thill, C. (2009). The International Olympic Committee (IOC) consensus statement on periodic health evaluation of elite athletes, March 2009. Clinical Journal of Sport Medicine, 19(5), 347–365. https://doi.org/10.1097/JSM.0b013e3181b7332c

Logue, D., Madigan, S. M., Delahunt, E., Heinen, M., Mc Donnel, S. J., & Corish, C. A. (2018). Low energy availability in athletes: a review of prevalence, dietary patterns, physiological health, and sports performance. Sports Medicine, 48(1), 73–96.

Logue, D. M., Madigan, S. M., Melin, A., Delahunt, E., Heinen, M., Donnell, S. J. M., & Corish, C. A. (2020). Low energy availability in athletes 2020: an updated narrative review of prevalence, risk, within-day energy balance, knowledge, and impact on sports performance. Nutrients, 12(3), 835. https://doi.org/10.3390/nu12030835

Loucks, A. B. (2004). Energy balance and body composition in sports and exercise. Journal of Sports Sciences, 22(1), 1-14.

Loucks, A. B., Kiens, B., & Wright, H. H. (2011). Energy availability in athletes. Journal of Sports Sciences, 29(sup1), S7-S15. https://doi.org/10.1080/02640414.2011.588958

Lundy, B., Torstveit, M. K., Stenqvist, T. B., Burke, L. M., Garthe, I., Slater, G. J., Ritz, C., & Melin, A. K. (2022). Screening for low energy availability in male athletes: attempted validation of LEAM-Q. Nutrients, 14(9), 1873. https://doi.org/10.3390/nu14091873

Martinsen, M., Bratland-Sanda, S., Eriksson, A. K., & Sundgot-Borgen, J. (2010). Dieting to win or to be thin? A study of dieting and disordered eating among adolescent elite athletes and non-athlete controls. British Journal of Sports Medicine, 44(1), 70–76. https://doi.org/10.1136/bjsm.2009.068668

Masoga, S., Maja, M. T., Matsepane, M. P., & Sethemane, S. C. (2022). Dietary practices of soccer athletes registered at the University of Limpopo, Limpopo Province, South Africa. Sport Sciences for Health, 18, 171–178. https://doi.org/10.1007/s11332-021-00790-3

Maughan, R. J., & Poole, D. C. (1981). The effects of a glycogen-loading regimen on the capacity to perform anaerobic exercise. European Journal of Applied Physiology and Occupational Physiology, 46(3), 211–219. https://doi.org/10.1007/BF00423397

Maughan, R. J., & Noakes, T. D. (1991). Fluid replacement and exercise stress. A brief review of studies on fluid replacement and some guidelines for the athlete. Sports Medicine, 12(1), 16–31. https://doi.org/10.2165/00007256-199112010-00003

Maughan, R. J., Greenhaff, P. L., Leiper, J. B., Ball, D., Lambert, C. P., & Gleeson, M. (1997). Diet composition and the performance of high-intensity exercise. Journal of Sports Sciences, 15(3), 265–275. https://doi.org/10.1080/026404197367272

Maughan, R. J., Depiesse, F., & Geyer, H. (2007). The use of dietary supplements by athletes. Journal of Sports Sciences, 25(sup1), 103-113. https://doi.org/10.1080/02640410701607395

Maughan, R. J., & Shirreffs, S. M. (2008). Development of individual hydration strategies for athletes. International Journal of Sport Nutrition and Exercise Metabolism, 18(5), 457–472. https://doi.org/10.1123/ijsnem.18.5.457

Maughan, R. J., Burke, L. M., Dvorak, J., Larson-Meyer, D. E., Peeling, P., Phillips, S. M., Rawson, E. S., Walsh, N. P., Garthe, I., Geyer, H., Meeusen, R., van Loon, L. J. C., Shirreffs, S. M., Spriet, L. L., Stuart, M., Vernec, A., Currell, K., Ali, V. M., Budgett, R. G. M., Ljungqvist, A., Mountjoy, M., Pitsiladis, Y. P., Soligard, T., Erdener, U., & Engebretsen, L. (2018). IOC consensus statement: dietary supplements and the high-performance athlete. British Journal of Sports Medicine, 52(7), 439–455.

Maheshwari, A., Mantry, H., Bagga, N., Frydrysiak-Brzozowska, A., Badarch, J., & Rahman, M. M. (2024). Milk Fat Globules: 2024 Updates. Newborn (Clarksville, Md.), 3(1), 19–37. https://doi.org/10.5005/jp-journals-11002-0085

Mazzulla, M., Volterman, K. A., Packer, J. E., Wooding, D. J., Brooks, J. C., Kato, H., & Moore, D. R. (2018). Whole-body net protein balance plateaus in response to increasing protein intakes during post-exercise recovery in adults and adolescents. Nutrition & Metabolism, 15, 62. https://doi.org/10.1186/s12986-018-0301-z

McCabe, M. P., Smyth, M. P., & Richardson, D. R. (2012). Current concept review: vitamin D and stress fractures. Foot & Ankle International, 33(6), 526–533. https://doi.org/10.3113/FAI.2012.0526

Melin, A. K., Heikura, I. A., Tenforde, A., & Mountjoy, M. (2019). Energy availability in athletics: health, performance, and physique. International Journal of Sport Nutrition and Exercise Metabolism, 29(2), 152–164. https://doi.org/10.1123/ijsnem.2018-0201

Meyer, F., Volterman, K. A., Timmons, B. W., & Wilk, B. (2012). Fluid balance and dehydration in the young athlete: assessment considerations and effects on health and performance. American Journal of Lifestyle Medicine, 6(6), 489–501.

Morrison, D., Hughes, J., Della Gatta, P. A., Mason, S., Lamon, S., Russell, A. P., & Wadley, G. D. (2015). Vitamin C and E supplementation prevents some of the cellular adaptations to endurance-training in humans. Free Radical Biology & Medicine, 89, 852–862. https://doi.org/10.1016/j.freeradbiomed.2015.10.412

Mountjoy, M., Sundgot-Borgen, J., Burke, L., Carter, S., Constantini, N., Lebrun, C., Meyer, N., Sherman, R., Steffen, K., Budgett, R., & Ljungqvist, A. (2014). The IOC consensus statement: beyond the female athlete triad - relative energy deficiency in sport (RED-S). British Journal of Sports Medicine, 48(7), 491–497. https://doi.org/10.1136/bjsports-2014-093502

Mountjoy, M., Sundgot-Borgen, J., Burke, L., Ackerman, K. E., Blauwet, C., Constantini, N., Lebrun, C., Lundy, B., Melin, A. K., Meyer, N. L. T., Sherman, R., Tenforde, A. S., Klungland Torstveit, M., & Budgett, R. (2018). International Olympic Committee (IOC) consensus statement on relative energy deficiency in sport (RED-S): 2018 Update. International Journal of Sport Nutrition and Exercise Metabolism, 28(4), 316–331. https://doi.org/10.1123/ijsnem.2018-0136

Mountjoy, M. L., Burke, L. M., Stellingwerff, T., & Sundgot-Borgen, J. (2018). Relative energy deficiency in sport: the tip of an iceberg. International Journal of Sport Nutrition and Exercise Metabolism, 28(4), 313-315. https://doi.org/10.1123/ijsnem.2018-0149

Mountjoy, M., Ackerman, K. E., Bailey, D. M., Burke, L. M., Constantini, N., Hackney, A. C., Heikura, I. A., Melin, A., Pensgaard, A. M., Stellingwerff, T., Sundgot-Borgen, J. K., Torstveit, M. K., Jacobsen, A. U., Verhagen, E., Budgett, R., Engebretsen, L., & Erdener, U. (2023). 2023 International Olympic Committee's (IOC) consensus statement on relative energy deficiency in sport (REDs). British Journal of Sports Medicine, 57(17), 1073–1097. https://doi.org/10.1136/bjsports-2023-106994

Ormsbee, M. J., Bach, C. W., & Baur, D. A. (2014). Pre-exercise nutrition: the role of macronutrients, modified starches and supplements on metabolism and endurance performance. Nutrients, 6(5), 1782–1808. https://doi.org/10.3390/nu6051782

Pasiakos, S. M., Margolis, L. M., Murphy, N. E., McClung, H. L., Martini, S., Gundersen, Y., Castellani, J. W., Karl, J. P., Teien, H. K., Madslien, E. H., Stenberg, P. H., Young, A. J., Montain, S. J., & McClung, J. P. (2016). Effects of exercise mode, energy, and macronutrient interventions on inflammation during military training. Physiological Reports, 4(11), e12820. https://doi.org/10.14814/phy2.12820

Paulsen, G., Cumming, K. T., Holden, G., Hallén, J., Rønnestad, B. R., Sveen, O., Skaug, A., Paur, I., Bastani, N. E., Østgaard, H. N., Buer, C., Midttun, M., Freuchen, F., Wiig, H., Ulseth, E. T., Garthe, I., Blomhoff, R., Benestad, H. B., & Raastad, T. (2014). Vitamin C and E supplementation hampers cellular adaptation to endurance training in humans: a double-blind, randomised, controlled trial. Journal of Physiology, 592(8), 1887–1901. https://doi.org/10.1113/jphysiol.2013.267419

Petrie, H. J., Stover, E. A., & Horswill, C. A. (2004). Nutritional concerns for the child and adolescent competitor. Nutrition, 20(7-8), 620–631. https://doi.org/10.1016/j.nut.2004.04.002

Pfeiffer, B., Stellingwerff, T., Zaltas, E., & Jeukendrup, A. E. (2010). Oxidation of solid versus liquid CHO sources during exercise. Medicine and Science in Sports and Exercise, 42(11), 2030–2037. https://doi.org/10.1249/MSS.0b013e3181e0efc9

Phillips, S. M., & Van Loon, L. J. (2011). Dietary protein for athletes: from requirements to optimum adaptation. Journal of Sports Sciences, 29(sup1), S29–S38. https://doi.org/10.1080/02640414.2011.619204

Phillips, S. M., Chevalier, S., & Leidy, H. J. (2016). Protein "requirements" beyond the RDA: implications for optimizing health. Applied Physiology, Nutrition, and Metabolism, 41(5), 565–572. https://doi.org/10.1139/apnm-2015-0550

Peklaj, E., Reščič, N., Kourošic Seljak, B., & Rotovnik Kozjek, N. (2023). New Epidemic of Malnutrition in Young Slovenian Athletes. Zdravstveno varstvo, 62(3), 121–128. https://doi.org/10.2478/sjph-2023-0017

Peklaj, E., Reščič, N., Koroušic Seljak, B., & Rotovnik Kozjek, N. (2022). Is RED-S in athletes just another face of malnutrition? Clinical nutrition ESPEN, 48, 298–307. https://doi.org/10.1016/j.clnesp.2022.01.031

Reale, R., Slater, G., & Burke, L. (2017a). Acute weight loss strategies for combat sports and applications to Olympic success. International Journal of Sports Physiology and Performance, 12(2), 142–151.

Reale, R., Slater, G., & Burke, L. M. (2017b). Individualised dietary strategies for Olympic combat sports: acute weight loss, recovery and competition nutrition. European Journal of Sport Science, 17(6), 727–740.

Reinhard, C., & Galloway, S. D. R. (2022). Carbohydrate intake practices and determinants of food choices during training in recreational, amateur, and professional endurance athletes: a survey analysis. Frontiers in Nutrition, 9, 862396. https://doi.org/10.3389/fnut.2022.862396

Rothschild, J. A., Kilding, A. E., & Plews, D. J. (2021). Pre-exercise nutrition habits and beliefs of endurance athletes vary by sex, competitive level, and diet. Journal of the American College of Nutrition, 40(6), 517–528. https://doi.org/10.1080/07315724.2020.1795950

Rotovnik Kozjek, N., Knap, B., & Mlakar Mastnak, D. (2016). Priročnik klinične športne prehrane. Olimpijski komite Slovenije.

Rotovnik Kozjek, N., Melzer, K., Carlsohn, A., & Soeters, P. B. (2019). Nutrition in sport. In L. Sobotka (Ed.), Basics in clinical nutrition (pp. 635-654). Galen.

Rowbottom, D. J. (2000). Periodization of training. In W. E. Garrett & D. T. Kirkendall (Eds.), Exercise and sport science (pp. 499-515). Lippincott Williams & Wilkins.

Sawka, M. N., Cheuvront, S. N., & Carter, R., 3rd. (2005). Human water needs. Nutrition Reviews, 63(6 Pt 2), S30–S39. https://doi.org/10.1111/j.1753-4887.2005.tb00152.x

Sawyer, S. M., Afifi, R. A., Bearinger, L. H., Blakemore, S. J., Dick, B., Ezeh, A. C., & Patton, G. C. (2012). Adolescence: A foundation for future health. The Lancet, 379(9826), 1630–1640. https://doi.org/10.1016/S0140-6736(12)60072-5

Schwellnus, M., Soligard, T., Alonso, J. M., Bahr, R., Clarsen, B., Dijkstra, H. P., Gabbett, T. J., Gleeson, M., Hägglund, M., Hutchinson, M. R., Janse Van Rensburg, C., Meeusen, R., Orchard, J. W., Pluim, B. M., Raftery, M., Budgett, R., & Engebretsen, L. (2016). How much is too much? (Part 2) International Olympic Committee consensus statement on load in sport and risk of illness. British Journal of Sports Medicine, 50(17), 1043–1052. https://doi.org/10.1136/bjsports-2016-096572

Sim, A., & Burns, S. F. (2021). Review: questionnaires as measures for low energy availability (LEA) and relative energy deficiency in sport (RED-S) in athletes. Journal of Eating Disorders, 9(1), 41. https://doi.org/10.1186/s40337-021-00396-7

Slater, G., & Phillips, S. M. (2011). Nutrition guidelines for strength sports: sprinting, weightlifting, throwing events, and bodybuilding. Journal of Sports Sciences, 29(sup1), S67–S77. https://doi.org/10.1080/02640414.2011.574722

Sobal, J., & Marquart, L. F. (1994). Vitamin/mineral supplement use among athletes: A review of the literature. International Journal of Sport Nutrition, 4(4), 320–334. https://doi.org/10.1123/ijsn.4.4.320

Stellingwerff, T., Maughan, R. J., & Burke, L. M. (2011). Nutrition for power sports: middle-distance running, track cycling, rowing, canoeing/kayaking, and swimming. Journal of Sports Sciences, 29(sup1), S79–S89. https://doi.org/10.1080/02640414.2011.589469

Štangar, M., Štangar, A., Shtyrba, V., Cigić, B., & Benedik, E. (2022). Rapid weight loss among elite-level judo athletes: methods and nutrition in relation to competition performance. Journal of the International Society of Sports Nutrition, 19(1), 380–396. https://doi.org/10.1080/15502783.2022.2099231

Sundgot-Borgen, J., Meyer, N. L., Lohman, T. G., Ackland, T. R., Maughan, R. J., Stewart, A. D., & Müller, W. (2013). How to minimise the health risks to athletes who compete in weight-sensitive sports review and position statement on behalf of the Ad Hoc Research Working Group on Body Composition, Health and Performance, under the auspices of the IOC Medical Commission. British Journal of Sports Medicine, 47(16), 1012–1022. https://doi.org/10.1136/bjsports-2013-092966

Timmons, B. W., Bar-Or, O., & Riddell, M. C. (2003). Oxidation rate of exogenous carbohydrate during exercise is higher in boys than in men. Journal of Applied Physiology, 94(1), 278–284. https://doi.org/10.1152/japplphysiol.00140.2002

Tomlinson, P. B., Joseph, C., & Angioi, M. (2015). Effects of vitamin D supplementation on upper and lower body muscle strength levels in healthy individuals. A systematic review with meta-analysis. Journal of Science and Medicine in Sport, 18(5), 575–580. https://doi.org/10.1016/j.jsams.2014.07.022

Torstveit, M. K., Ackerman, K. E., Constantini, N., Holtzman, B., Koehler, K., Mountjoy, M. L., Sundgot-Borgen, J., & Melin, A. (2023). Primary, secondary and tertiary prevention of Relative Energy Deficiency in Sport (REDs): a narrative review by a subgroup of the IOC consensus on REDs. British Journal of Sports Medicine, 57(17), 1119–1126. https://doi.org/10.1136/bjsports-2023-106932

Sundgot-Borgen, J., Meyer, N. L., Lohman, T. G., Ackland, T. R., Maughan, R. J., Stewart, A. D., & Müller, W. (2013). How to minimise the health risks to athletes who compete in weight-sensitive sports review and position statement on behalf of the Ad Hoc Research Working Group on Body Composition, Health and Performance, under the auspices of the IOC Medical Commission. British Journal of Sports Medicine, 47(16), 1012–1022. https://doi.org/10.1136/bjsports-2013-092966

Timmons, B. W., Bar-Or, O., & Riddell, M. C. (2003). Oxidation rate of exogenous carbohydrate during exercise is higher in boys than in men. Journal of Applied Physiology, 94(1), 278–284. https://doi.org/10.1152/japplphysiol.00140.2002

Tomlinson, P. B., Joseph, C., & Angioi, M. (2015). Effects of vitamin D supplementation on upper and lower body muscle strength levels in healthy individuals. A systematic review with meta-analysis. Journal of Science and Medicine in Sport, 18(5), 575–580. https://doi.org/10.1016/j.jsams.2014.07.022

Torstveit, M. K., Ackerman, K. E., Constantini, N., Holtzman, B., Koehler, K., Mountjoy, M. L., Sundgot-Borgen, J., & Melin, A. (2023). Primary, secondary and tertiary prevention of Relative Energy Deficiency in Sport (REDs): a narrative review by a subgroup of the IOC consensus on REDs. British Journal of Sports Medicine, 57(17), 1119–1126. https://doi.org/10.1136/bjsports-2023-106932

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