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Professional Certificate in Pankration Coaching and Training

## Nutrition and Hydration

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Macronutrients are the primary sources of energy that support the high-intensity demands of pankration training. They are divided into three categories: carbohydrates, proteins and fats. Understanding the role of each, the optimal intake timing, and the quality of the foods that supply them is essential for coaches who must design nutrition plans that enhance performance, promote recovery, and maintain body composition.

Carbohydrates are the preferred fuel for rapid, anaerobic bursts of activity such as striking, grappling and explosive takedowns. They exist in simple forms (monosaccharides and disaccharides) and complex forms (polysaccharides). Simple carbohydrates, found in fruits, honey, and sports drinks, are digested quickly and can raise blood glucose within minutes. Complex carbohydrates, such as whole grains, legumes and starchy vegetables, provide a slower, more sustained release of glucose. The amount of carbohydrate a pankration athlete needs varies with training volume, intensity and individual metabolic efficiency, but a typical range is 5–7 g per kilogram of body weight per day for moderate training, and up to 8–10 g·kg<sup>-1</sup>·day<sup>-1</sup> for heavy competition phases.

The stored form of carbohydrate in muscle and liver is glycogen. Glycogen stores are limited; an average adult can retain roughly 400 g in skeletal muscle and 100 g in the liver. During a high-intensity bout, the body may deplete 30–40% of muscle glycogen within 30 minutes. Therefore, replenishment strategies are critical. Consuming a carbohydrate-rich snack (30–50 g) containing a 3:1 Or 4:1 Ratio of carbohydrate to protein within 30 minutes post-session can accelerate glycogen resynthesis by up to 50% compared with carbohydrate alone. Practical examples include a banana with a scoop of whey protein, a sports recovery drink, or a bowl of oatmeal topped with berries and a dollop of Greek yogurt.

Proteins supply the amino acids required for muscle repair, growth, and the synthesis of enzymes, hormones and immune factors. The quality of protein is measured by its digestibility and the presence of all nine essential amino acids. Animal-based proteins such as lean meat, fish, eggs, and dairy score high on the biological value scale, while plant-based sources like soy, quinoa and legumes can be combined to achieve a complete amino-acid profile. For pankration athletes, the recommended protein intake ranges from 1.6 To 2.2 G·kg<sup>-1</sup>·day<sup>-1</sup>, with higher values supporting strength gains and faster recovery.

The timing of protein ingestion influences muscle protein synthesis (MPS). Research indicates that distributing protein intake evenly across 3–4 meals, each containing 0.3–0.4 G·kg<sup>-1</sup>, maximizes MPS. A typical pre-training meal might consist of 20–30 g of high-quality protein consumed 2–3 hours before practice, while a post-training protein dose of 25–35 g within the anabolic window supports repair. Practical meals include grilled chicken breast with quinoa, a tofu stir-fry with brown rice, or a protein shake blended with almond milk and frozen berries.

Fats are essential for long-duration, lower-intensity work, hormone production, and the absorption of fat-soluble vitamins (A, D, E, K). They also contribute to satiety and provide a dense source of energy (9 kcal·g<sup>-1</sup>). However, excessive fat intake can impair digestion and delay gastric emptying, which may hinder

performance if consumed too close to training. The recommended fat intake for athletes is 20–35 % of total daily calories, with a focus on mono- and polyunsaturated fats from sources such as olive oil, avocados, nuts, seeds, and fatty fish.

In addition to the three macronutrients, micronutrients play pivotal roles in energy metabolism, oxygen transport, and neuromuscular function. Vitamins and minerals are required in small amounts but have large effects on performance when deficient.

Iron is a component of hemoglobin and myoglobin, facilitating oxygen delivery to working muscles. Athletes, especially females and those on plant-based diets, are at risk for iron deficiency. Symptoms include fatigue, reduced endurance, and impaired immune function. Screening for ferritin levels and incorporating iron-rich foods—red meat, lentils, spinach, and fortified cereals—can prevent deficits. Pairing non-heme iron sources with vitamin C-rich foods (citrus, bell peppers) enhances absorption.

Calcium and vitamin D are critical for bone health and muscle contraction. Adequate intake (1,000–1,200 mg calcium and 600–800 IU vitamin D per day) reduces the risk of stress fractures, a common injury in combat sports. Dairy products, fortified plant milks, leafy greens and safe sun exposure are primary sources.

Electrolytes—sodium, potassium, chloride, magnesium and calcium—maintain fluid balance, nerve transmission and muscle excitability. Sodium, the most abundant extracellular ion, is lost in sweat at rates of 0.5–2.0 g per liter, depending on climate and intensity. Replenishing sodium during prolonged sessions prevents hyponatremia and supports blood volume maintenance. Sources include salted pretzels, sports drinks, and electrolyte tablets. Potassium, primarily intracellular, supports cardiac function and can be supplied through bananas, potatoes, and orange juice. Magnesium contributes to ATP synthesis and muscle relaxation; deficiency may manifest as cramps or fatigue. Nuts, seeds, and whole grains are good magnesium sources.

The concept of energy balance integrates caloric intake with expenditure. A positive energy balance leads to weight gain, while a negative balance results in loss. For pankration athletes, body composition goals often dictate a slight caloric deficit ( $\approx 250\text{--}500\text{ kcal}\cdot\text{day}^{-1}$ ) to reduce excess fat while preserving lean mass. However, overly aggressive deficits can impair training intensity, hormone production and immune function. Monitoring body weight, body-fat percentage, and performance metrics helps adjust intake appropriately.

Basal metabolic rate (BMR) represents the calories required for basic physiological functions at rest. It can be estimated using equations such as the Harris-Benedict or Mifflin-St. Jeor formulas, factoring in age, sex, weight and height. Adding activity factors for training sessions yields the total daily energy expenditure (TDEE). Coaches should calculate BMR for each athlete, then customize the macronutrient distribution based on training phase, competition schedule, and individual response.

The term nutrient density describes foods that provide a high proportion of vitamins, minerals and other beneficial compounds relative to their caloric content. Examples include leafy greens, berries, nuts and lean fish. Emphasizing nutrient-dense foods ensures athletes meet micronutrient needs without excessive caloric intake.

Bioavailability refers to the proportion of a nutrient that is absorbed and utilized by the body. Factors

influencing bioavailability include the food matrix, presence of inhibitors (phytates, oxalates), and individual digestive health. For instance, iron from plant sources is less bioavailable than heme iron from meat, but soaking, sprouting or fermenting legumes can improve absorption.

The practice of nutrient timing aligns food intake with training windows to optimize performance and recovery. Three primary windows are: (1) pre-exercise, where a meal 2–4 hours before training supplies carbohydrates and moderate protein; (2) intra-exercise, for sessions exceeding 60 minutes, where easily digestible carbs ( $30\text{--}60\text{ g}\cdot\text{h}^{-1}$ ) maintain blood glucose; and (3) post-exercise, where a combination of carbohydrates ( $1.0\text{--}1.5\text{ G}\cdot\text{kg}^{-1}$ ) and protein ( $0.3\text{--}0.4\text{ G}\cdot\text{kg}^{-1}$ ) within 30–120 minutes supports glycogen restoration and MPS. Practical intra-workout options include dilute fruit juice, carbohydrate gels, or electrolyte-rich sports drinks.

Hydration is as vital as macronutrient intake for combat athletes. Fluid balance is regulated by thirst, hormonal signals (antidiuretic hormone, aldosterone), and renal function. Dehydration of just 2% body mass can reduce aerobic capacity, impair cognitive function, increase perceived exertion and elevate core temperature. In pankration, where bouts are short but intense, even mild dehydration can diminish power output and increase risk of injury.

Assessing hydration status can be performed through several practical methods. Body-weight changes before and after training provide a quick estimate: A loss of > 2% indicates significant dehydration. Urine color is another field-friendly indicator; a pale straw hue suggests adequate hydration, while dark amber signals a need for fluid intake. More precise measures, such as plasma osmolality, are typically reserved for laboratory settings.

The primary component of fluid intake is water. Daily recommendations for athletes range from  $35\text{--}45\text{ ml}\cdot\text{kg}^{-1}$ , adjusted for sweat loss. In hot or humid environments, sweat rates can exceed  $2\text{ L}\cdot\text{h}^{-1}$ , requiring proactive fluid replacement. A pre-exercise hydration protocol might involve consuming  $5\text{--}10\text{ ml}\cdot\text{kg}^{-1}$  of water 2–3 hours before training, followed by  $2\text{--}3\text{ ml}\cdot\text{kg}^{-1}$  20 minutes prior to the start. For a 75-kg athlete, this translates to 375 ml 2–3 hours out and 150–225 ml shortly before the bout.

During training, especially when sessions exceed 60 minutes, fluid intake should be paced at 150–250 ml every 15–20 minutes. Incorporating electrolytes into the fluid mitigates the loss of sodium and potassium. Sports drinks typically contain  $20\text{--}30\text{ mmol}\cdot\text{L}^{-1}$  sodium and  $3\text{--}5\text{ mmol}\cdot\text{L}^{-1}$  potassium, which can replace up to 50% of sweat-derived electrolytes. For athletes who prefer a lower-calorie option, a pinch of sea salt added to water with a splash of citrus juice offers a simple alternative.

Post-exercise rehydration aims to restore fluid balance and electrolyte stores. The classic guideline recommends consuming 150% of the fluid lost (measured by body-weight change) within the first 2 hours. For a 75-kg athlete who lost 1.5 Kg ( $\approx 1.5\text{ L}$ ) during a session, this would be 2.25 L of fluid. Including carbohydrate ( $0.5\text{--}0.7\text{ G}\cdot\text{kg}^{-1}$ ) in the rehydration drink facilitates glycogen replenishment while aiding fluid absorption through the sodium-glucose cotransporter mechanism.

Hyponatremia is a dangerous condition that occurs when plasma sodium concentration falls below  $135\text{ mmol}\cdot\text{L}^{-1}$ , often due to excessive fluid intake without adequate sodium replacement. Symptoms range from nausea and headache to seizures and coma. In endurance events, hyponatremia has been linked to

over-consumption of low-sodium fluids. Pankration coaches should educate athletes on balancing fluid volume with electrolyte content, especially during long sparring sessions or tournaments that span multiple days.

Creatine is a naturally occurring compound stored primarily in skeletal muscle as phosphocreatine. It serves as a rapid reservoir of high-energy phosphate to regenerate ATP during short, explosive efforts lasting 5–15 seconds. Supplementation (typically 3–5 g per day) can increase intramuscular phosphocreatine stores by 20–40%, leading to improvements in maximal strength, power output and repeated-sprint ability. Creatine monohydrate is the most studied form, and it is generally safe for healthy adults. Athletes should combine creatine with a carbohydrate source to enhance uptake via insulin-mediated transport.

Beta-alanine is a non-essential amino acid that combines with histidine to form carnosine, an intracellular buffer that mitigates hydrogen ion accumulation during high-intensity exercise. Elevated carnosine levels improve buffering capacity, delaying fatigue and enhancing performance in bouts lasting 1–4 minutes. A typical dosing protocol involves 2–5 g per day, divided into smaller doses to avoid paresthesia (tingling sensation). After 4–6 weeks of consistent supplementation, muscle carnosine can increase by up to 80%.

Branched-chain amino acids (BCAAs)—leucine, isoleucine and valine—are often marketed for their purported anti-catabolic effects. Leucine, in particular, activates the mTOR pathway, stimulating muscle protein synthesis. While BCAAs can be useful during prolonged training when whole-protein sources are impractical, research suggests that consuming a complete protein source provides similar or greater benefits. Coaches should evaluate the practicality and cost-effectiveness of BCAA supplementation on a case-by-case basis.

Omega-3 fatty acids (EPA and DHA) have anti-inflammatory properties that may aid recovery and joint health. A daily intake of 1–2 g of combined EPA/DHA can reduce markers of muscle soreness and improve range of motion. Fatty fish (salmon, mackerel, sardines), algae supplements and fortified eggs are common dietary sources.

Vitamin C and vitamin E are antioxidants that protect cell membranes from oxidative stress generated by intense training. While supplementation can reduce oxidative markers, excessive doses may blunt training adaptations by interfering with the signaling pathways that drive mitochondrial biogenesis. A balanced diet rich in fruits, vegetables, nuts and seeds typically supplies adequate antioxidant capacity without the need for high-dose supplements.

Iron-binding foods such as tea, coffee and high-phytate grains can inhibit iron absorption when consumed with meals. Coaches should advise athletes to separate these beverages from iron-rich meals by at least one hour to maximize iron uptake.

Meal planning for pankration athletes should consider individual preferences, cultural dietary patterns, training schedules and travel logistics. A sample day for a 80-kg male athlete in a heavy-training phase might look like:

- Breakfast (07:00): 3 Scrambled eggs, 2 slices whole-grain toast, avocado slices, and an orange.
- Mid-morning snack (10:00): Greek yogurt (200 g) with honey and mixed berries, plus a handful of almonds.

- Pre-training meal (12:30): Grilled chicken breast (150 g), quinoa (150 g cooked), roasted sweet potatoes, and steamed broccoli.
- During training (15:00-16:30): 500 ml of a 6% carbohydrate sports drink, sipped every 15 minutes.
- Post-training recovery (16:45): Whey protein shake (30 g) blended with banana, spinach, and oat milk; plus a rice cake topped with almond butter.
- Dinner (19:00): Baked salmon (180 g), brown rice (200 g cooked), mixed salad with olive oil vinaigrette, and a side of lentils.
- Evening snack (21:30): Cottage cheese (150 g) with pineapple chunks.

In this example, carbohydrate intake is approximately  $5.5 \text{ G}\cdot\text{kg}^{-1}$ , protein is  $1.8 \text{ G}\cdot\text{kg}^{-1}$ , and fat contributes about 30% of total calories. Fluid intake, including water and the sports drink, totals roughly 3 L, meeting the athlete's hydration needs.

Practical challenges frequently arise when implementing nutrition and hydration protocols. One common obstacle is food availability. Athletes training in remote locations or traveling for competitions may have limited access to fresh produce, lean protein sources or low-sugar sports drinks. To mitigate this, coaches can prepare portable, shelf-stable meals such as canned tuna, nut butter packets, whole-grain crackers and powdered electrolyte mixes. Pre-packing a "competition kit" with individualized portion sizes ensures consistency across venues.

Another challenge is dietary restrictions. Some athletes follow vegetarian, vegan, gluten-free, or religiously mandated diets. These patterns require careful planning to meet protein targets and micronutrient adequacy. Plant-based protein powders (pea, rice), fortified plant milks, and strategic food combinations (e.g., Beans with rice) can provide complete amino-acid profiles. For iron, pairing lentils with citrus juice enhances absorption, while for calcium, calcium-set tofu and fortified juices are useful alternatives.

Time constraints also impact nutrition adherence. Athletes juggling work, school or family responsibilities may find it difficult to prepare balanced meals. Batch-cooking on off-days, using slow-cookers, and employing ready-to-eat protein bars (with minimal added sugars) can streamline nutrition. Emphasizing "quick wins" like adding a piece of fruit to a post-workout shake or drinking a glass of water every hour helps build sustainable habits.

Psychological factors such as stress, mood and body-image concerns can influence eating patterns. Some athletes may engage in restrictive dieting or binge eating, jeopardizing performance and health. Coaches should foster an environment that encourages open discussion about nutrition, refer athletes to qualified sports dietitians when needed, and promote a balanced perspective that prioritizes fuel over punitive restriction.

Monitoring and adjustment are integral to any nutrition program. Regularly tracking body weight, body-fat percentage, training logs, and subjective measures (energy levels, recovery quality) enables data-driven refinements. For example, if an athlete experiences persistent fatigue despite adequate caloric intake, the coach might investigate micronutrient status, sleep quality, or hidden caloric deficits due to high thermic effect foods.

Food labeling literacy is a valuable skill for athletes. Understanding serving sizes, total versus added sugars,

and the distinction between “natural” and “artificial” ingredients helps prevent inadvertent over-consumption of calories or undesirable additives. Reading the ingredient list for hidden sources of sodium (e.G., Soy sauce, bouillon cubes) can also aid electrolyte management.

Supplement safety is a critical consideration. The supplement market is largely unregulated, and products may contain contaminants or prohibited substances. Coaches should advise athletes to choose supplements that are third-party tested (e.G., NSF Certified for Sport, Informed-Sport) and to keep records of all ingested products. When in doubt, a sports dietitian can evaluate the necessity and safety of each supplement.

Hydration strategies for hot environments require special attention. Heat stress amplifies sweat loss, electrolyte depletion and cardiovascular strain. Acclimatization—gradually increasing exposure to heat over 7–14 days—improves sweat efficiency and plasma volume. During acclimatization, athletes should increase fluid intake by 500–1,000 ml per day and incorporate salty foods (e.G., Pretzels, broth) to maintain sodium balance. Monitoring core temperature (via ingestible thermometers or skin sensors) can guide pacing and fluid adjustments.

Altitude training presents another unique scenario. At higher elevations, plasma volume may contract, increasing the risk of dehydration despite reduced sweat rates. Athletes should maintain a fluid intake equal to or greater than sea-level recommendations and consider adding iron-rich foods to counteract the reduced oxygen-carrying capacity of blood. Supplemental iron should only be introduced after confirming deficiency through laboratory testing.

Recovery nutrition extends beyond the immediate post-session window. Overnight recovery benefits from a protein-rich snack before sleep, such as casein milk or cottage cheese, which provides a slow-release amino-acid supply throughout the night. Consuming a modest carbohydrate portion (e.G., A small banana) can also replenish liver glycogen, supporting morning training sessions.

Periodized nutrition aligns dietary intake with the phases of a training cycle: Preparatory, competitive, and transition. During the preparatory phase, higher carbohydrate and calorie intakes support volume-based training, whereas the competitive phase may emphasize carbohydrate loading (e.G., 8–10 G·kg<sup>-1</sup>) in the 48-hour window before a tournament to maximize muscle glycogen stores. The transition phase—often a deload or active recovery period—allows for a modest reduction in calories to prevent unwanted weight gain while preserving lean mass.

Glycogen supercompensation, commonly known as “carb loading,” involves a brief depletion of glycogen followed by a high-carbohydrate intake. While traditional for endurance athletes, a modified version can benefit pankration competitors who face multiple bouts in a single day. The protocol might include a low-carbohydrate dinner ( $\approx 2 \text{ g}\cdot\text{kg}^{-1}$ ) followed by a carbohydrate-rich breakfast ( $\approx 10 \text{ g}\cdot\text{kg}^{-1}$ ) on the day of competition. The resulting elevated glycogen stores can enhance repeated-effort performance.

Hydration assessment tools such as the Thirst Scale (rating desire to drink from 0 to 10) provide real-time feedback. Athletes should aim for a thirst rating of  $\leq 3$  during training. Additionally, wearable devices that estimate sweat rate via skin conductance can inform personalized fluid plans. However, these technologies should complement, not replace, basic methods like weighing before and after sessions.

Electrolyte replacement strategies can be tailored to individual sweat profiles. Some athletes are “salty sweaters,” losing > 2 g sodium per liter, while others lose less than 0.5 g per liter. Conducting a sweat test—collecting sweat in a controlled environment and analyzing its composition—allows coaches to prescribe precise electrolyte concentrations. For salty sweaters, a sports drink with 30–40 mmol·L<sup>-1</sup> sodium may be necessary, whereas low-sodium individuals might benefit from a 10–15 mmol·L<sup>-1</sup> formulation.

Fluid-electrolyte interactions are governed by the principle of osmoregulation. Ingesting a hypertonic solution (higher solute concentration than blood) can delay gastric emptying and reduce fluid absorption. Therefore, sports drinks are typically formulated as isotonic (≈ 6–8% carbohydrate) to balance rapid absorption with adequate electrolyte provision. For athletes who prefer water, adding a pinch of sea salt and a splash of fruit juice creates a low-calorie, isotonic beverage.

Special considerations for weight-class athletes include the need to manipulate body mass without compromising strength. Short-term weight cuts often involve fluid restriction, sauna use or diuretic agents. While these methods can achieve rapid weight loss, they pose serious health risks, including electrolyte imbalance, reduced cognitive function and impaired thermoregulation. Safer alternatives involve gradual fat loss through controlled caloric deficits and maintaining consistent hydration. If a weight cut is unavoidable, a structured rehydration plan—starting with low-sodium fluids to avoid rapid shifts in plasma osmolality—should be employed under professional supervision.

Recovery modalities such as cryotherapy, compression garments and massage interact with nutrition. For example, protein intake combined with compression can enhance muscle protein synthesis by improving blood flow to the muscles. Similarly, ingesting antioxidants (e.g., Tart cherry juice) after an ice bath may counteract the oxidative stress induced by cold exposure, supporting faster recovery.

Nutrition for injury prevention emphasizes joint health, connective-tissue resilience and immune competence. Collagen peptides (10 g per day) combined with vitamin C have been shown to increase tendon stiffness and reduce injury risk. Omega-3 fatty acids, as noted earlier, possess anti-inflammatory properties that may aid in recovery from micro-trauma. Including a variety of colorful fruits and vegetables ensures a broad spectrum of phytochemicals that support cellular repair mechanisms.

Monitoring dietary adherence can be facilitated through food diaries, mobile apps or photographic records. The act of logging intake increases awareness and accountability. However, coaches should avoid creating a punitive atmosphere; instead, use the data to identify patterns, celebrate successes and adjust plans collaboratively.

Psychological readiness is linked to nutritional confidence. Athletes who understand the rationale behind their diet are more likely to adhere to it. Educational sessions that explain how carbohydrate loading enhances glycogen stores, or how electrolyte balance prevents cramping, empower athletes to make informed choices. Demonstrating practical cooking skills—such as preparing a quick quinoa salad with chickpeas and olive oil—further reinforces self-sufficiency.

Environmental sustainability is an emerging concern. Coaches can encourage athletes to select locally sourced, seasonal produce and responsibly harvested fish, thereby reducing the carbon footprint of their diet. Plant-based meals can also lower environmental impact while still meeting protein needs, provided

they are planned for completeness.

Case study: Athlete A – a 27-year-old male competing at the 77-kg weight class, training six days per week with two sparring sessions per day. His initial assessment revealed a body-fat percentage of 12%, a resting metabolic rate of  $1,800 \text{ kcal} \cdot \text{day}^{-1}$ , and a daily training energy expenditure of approximately  $1,200 \text{ kcal}$ . The coach designed a nutrition plan delivering  $2,800 \text{ kcal}$ , with a macronutrient split of 55% carbohydrates, 25% protein and 20% fat. Carbohydrate intake was set at  $6.5 \text{ G} \cdot \text{kg}^{-1}$ , protein at  $1.8 \text{ G} \cdot \text{kg}^{-1}$ , and fat at  $0.9 \text{ G} \cdot \text{kg}^{-1}$ . Hydration goals targeted a pre-session urine specific gravity  $\leq 1.020$  and a post-session body-weight loss of no more than 1%. The athlete incorporated a pre-training meal of brown rice, grilled turkey, and steamed vegetables 3 hours before sparring, and consumed a 250-ml sports drink every 20 minutes during sessions lasting 90 minutes. Post-session, he drank 1.5 L of a carbohydrate-electrolyte beverage and ate a recovery snack of chocolate milk and a banana. After four weeks, his performance metrics improved: A 5% increase in striking power and a 3% reduction in perceived exertion. Body-weight remained stable, confirming that the energy intake matched expenditure.

Case study: Athlete B – a 22-year-old female weighing 60 kg, following a vegan diet and training for an upcoming tournament. Her baseline diet provided  $1.2 \text{ G} \cdot \text{kg}^{-1}$  protein, leading to frequent muscle soreness and a borderline iron status (ferritin  $15 \mu\text{g} \cdot \text{L}^{-1}$ ). The nutrition plan increased protein to  $1.9 \text{ G} \cdot \text{kg}^{-1}$  using a blend of pea protein, soy tempeh and fortified cereals. Iron intake was boosted through lentils, pumpkin seeds and fortified oatmeal, paired with vitamin C-rich foods to enhance absorption. A daily supplement of 200 mg calcium and 800 IU vitamin D was added to support bone health. Hydration was addressed by establishing a habit of sipping a 250-ml water bottle every 30 minutes, and adding a pinch of sea salt to a homemade electrolyte drink. After six weeks, her ferritin rose to  $30 \mu\text{g} \cdot \text{L}^{-1}$ , muscle soreness decreased, and she reported higher energy levels during matches.

Common pitfalls that coaches should watch for include:

1. Over-reliance on “quick-fix” supplements without addressing foundational dietary quality.
2. Neglecting individual variability in sweat rates, digestion speed, and food tolerances.
3. Ignoring the role of sleep—adequate rest amplifies the benefits of nutrition and hydration.
4. Failing to reassess after changes in training load, travel, or injury status.
5. Underestimating the impact of alcohol on hydration, recovery and hormone balance.

Implementation checklist for a coach preparing an athlete’s nutrition and hydration protocol:

- Conduct a comprehensive dietary recall and identify gaps.
- Measure resting metabolic rate and calculate total daily energy expenditure.
- Determine macronutrient targets based on training phase and body-composition goals.
- Develop a meal schedule that aligns with training times, incorporating pre-, intra- and post-exercise nutrition.
- Choose appropriate fluid and electrolyte strategies, considering climate and sweat profile.
- Plan for supplementation only after assessing necessity, safety and legality.
- Educate the athlete on reading food labels, portion sizing and hydration cues.
- Set up monitoring tools (body-weight logs, urine color charts, training diaries).

- Review and adjust the plan weekly, incorporating feedback and performance data.
- Document any adverse reactions or challenges for future reference.

By mastering these concepts, coaches can provide athletes with a scientific, personalized framework that fuels optimal performance, accelerates recovery, and safeguards health. The integration of precise macronutrient distribution, strategic nutrient timing, diligent hydration management and prudent supplement use creates a robust nutritional foundation for success in the demanding discipline of pankration.