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Overview

1.1 Introduction

The impact of sports nutrition on an athlete's performance has been well-established. Sports nutrition is an important part of the athlete's training and recovery regime. Sports nutrition serves two separate but important roles for the athlete. The first role of sports nutrition is to provide the fuel for how we participate in or train for athletic events. Macronutrients in the form of carbohydrates, proteins, and fats provide the athlete with the energy needed to fuel athletic training and competition, and the micronutrients consisting of vitamins and minerals are needed for their coenzyme and cofactor roles in assisting to fuel these activities. This role of sports nutrition is well-established and relatively stable across different age strata. Athletes of all ages and capabilities will need to use nutrition to fuel their athletic endeavors. The second role of nutrition for an athlete has more to do with recovery from exercise and the rebuilding of muscle tissues following exercise. This role is also well-established, but is more intricate and will require a more specialized approach where the athlete's individual nutritional needs to be able to recover and rebuild should be accounted for. The nutritional needs of an athlete will differ depending on the specific sport involved, the type of training, and some specific factors related to the individual athlete. The needs of a 55-year-old athlete to recover from a weight training session, for example, are not the same as the nutritional needs of an 18-year-old athlete doing the same activity, much like the nutritional needs of a male and female athlete in the same sport are not the same. This book will focus on the specific nutritional needs of athletes over the age of 35 as they seek to train and compete in sports. This group of athletes must balance

Sports Nutrition for Masters Athletes, First Edition. Peter G. Nickless.

their nutritional needs with ever-changing physiological characteristics that impact their ability to recover and perform in their chosen sport. It is through an understanding of the nutritional needs of an athlete for them to be able to train and compete in their sport, knowledge of the physiologic changes associated with the aging process, and the creation of nutrition and supplemental strategies to mitigate some of these effects that someone who works with older athletes can best be able to support their performance. These are the topics that this book seeks to address. The contents of this book will assist the nutritional professional looking to work with a master's athlete or the athlete themselves to optimize nutritional approaches to positively impact their athlete's performance while reducing the overall impact of these physiologic changes associated with aging.

1.2 Demographic Data

Athletic participation by older individuals is growing at a rapid pace. The 35+ age demographic is currently a rapidly growing segment of the population, as well as the competitive athletic market. Advances in nutrition, sports science, and healthcare have allowed athletes to train and perform at older ages than ever possible. Adding to this increased awareness of the impact of exercise and activity on longevity and mobility, we see an increase in athletic participation in this age group growing rapidly. The increase in athletic participation is fueled by the reduced attrition of younger athletes as they age, keeping them in the competition pool longer, and the increase in new athletes who take up a sport at an older age. In the sport of Olympic-style weightlifting, for example, we have seen a nearly threefold increase in the number of competitors at the masters (over 35 years old) age division national championship, with 244 athletes competing in 2015 to 718 athletes competing in 2019. The largest increase was seen in the number of female competitors, who went from 44.4% of all competitors to 58.7% [1]. This desire to train and compete in older age groups presents an interesting opportunity for those working with athletes. An older athletic population has some beneficial aspects: they tend to have both more time and money for training and nutrition. Both factors represent significant barriers to training and competition for younger athletes. Unfortunately, there is also an increase in the likelihood of injuries associated with their athletic participation. This is where the field of sports nutrition can have an impact [1, 2].

1.3 What Is Sports Nutrition?

Sports nutrition is a specialized focus area of the research and clinical field of nutrition. This field of study looks at the physiologic function of the human body in various exercise-related areas and the role that nutrients and hydration may have in impacting these processes. Sports nutrition is where the fields of physiology, exercise science, and human nutrition meet to impact athletic performance and recovery. The key objective of sports nutrition is to improve athletic performance and increase the longevity of the athlete in their sport. Although sports nutrition is often associated with high-level athletes like Olympians, professional bodybuilders, or professional athletes, this field of study is not reserved for elite athletes only but rather for anyone looking to improve their performance in their chosen athletic endeavor. Sports nutrition is focused on the nutrients needed to support the body's recovery and repair processes and is an extension of traditional nutrition. Many of the principles of sports nutrition match those for general health, but there are differences in the quantity and timing of nutrients. The nutrients needed by the athlete vary more in amount than the type compared to the needs of the general public, for the most part. Still, often, the need to meet the increased requirements of an athlete looking to perform their best makes dietary planning and supplementation more of a necessity.

1.4 Why Study Sports Nutrition?

Sports nutrition is an important field of study for athletes, nutritionists, coaches, and anybody interested in achieving optimal sports performance. The physical aspect of training represents an essential element of athletic performance. The athlete's training program today can significantly impact future performance, but this is not the only crucial factor the athlete needs to consider [3]. Other factors such as nutrition, rest, technique, equipment, or even psychological state will all play their role in an athlete's overall performance. For anybody working with athletes, addressing the nutritional plan must be considered an important element in performance and be treated as an essential factor in the athlete's performance plan. Sports nutrition can impact recovery from exercise, tissue rebuilding, the control of the inflammatory process and response, and can even impact the general health of the athlete. Therefore, anyone looking to achieve maximal performance

in an athletic event will need to factor an individualized nutritional strategy into their training regime. While primarily focused on athletes, the author would contend that the study of sports nutrition dives into the physiologic functions regarding the utilization of energy optimally by the body. Studying the material contained within this book will carry relevance to everyone, regardless of athletic capabilities.

1.5 What Is a Masters Athlete?

Athletes come in all shapes and sizes. This feature of athletics is what allows for so many people to compete because there is no standard "athlete" in regard to this aspect. We have small athletes who compete in events based on power-to-weight ratio, such as in sports like rock climbing. We have larger athletes competing in sports such as professional football, where absolute power and speed are more important, and every type of athlete in between. Athletes can also be found in differing sexes, each with unique nutritional requirements. Additionally, we find athletes in a wide spectrum of ages with youth sports, sometimes starting sports as early as three years old, all the way up to geriatric athletic participants. Sports will often stratify athlete competitions based on many of these categories. Sports, both at the local and national level, can carry age divisions such as youth, junior, senior, and masters athletes. In the sport of weightlifting, for example, youth athletes compete from 13 years old up to 17 years of age. Junior athletes will compete in their age group from 18 to 23 years old. The term senior athlete is typically associated with an athlete in the 24- to 34-year-old age group (this can get confusing as in the general population, the term senior is often associated with older adults). The term master's athlete is a designation given to athletes competing at the age of 35 and over. There are some variations in these age ranges in other sports, as individual sports organizations will vary in their competitive age categories, but generally, these categories will remain similar. The contents of this book will cover the physiologic and nutritional needs that will impact athletes of all ages but are specifically targeted at master's age group athletes 35 and over.

1.6 Why Focus on Masters Athletes?

There are numerous intelligent reasons to focus on a population like master's athletes, not the least of which is that they represent a large, growing sector of the athletic population. This population sector is growing but

has either been treated as an afterthought or marginalized by much of the community. Sports nutrition texts, for the most part, focus on athletes in their teens through their early 40s. There are chapters and articles focused on older athletes, but not many entire books. In the past 20 years, one of the largest growth sectors in athletic events and training has been in athletes ages 35 and up [1, 2]. This means that a significant portion of the athletic community often gets reduced to a chapter or section of a chapter in a traditional sports nutrition book. Unfortunately, these athletes do not recover the same way as younger athletes. These changes impact the athlete's recovery, rebuilding, and performance, which will lead to significantly differing nutritional requirements compared to the needs of a 17-year-old or even a 30-year-old athlete. While there are many similarities between athletes in all age ranges, there are also needs for fueling performance and recovery that are significantly different for older athletes. Differences in macro- and micronutrient needs, hydration requirements, and supplement recommendations necessitate a deeper focus on this athletic population. Accordingly, it is both the size of the master's athletic population combined with their specific nutritional needs that make this age demographic a segment of the athletic population that should be examined further. This book seeks to fill this gap by addressing the nutritional needs of older athletes as they seem to optimize their performance and recovery.

1.7 What Are the Nutrients Used by Athletes?

The link between nutrition and sports performance is well-established. While it is understood by many that nutrition is an important consideration for athletes, of all ages, the actual nutrients that the athlete will need and when they will need them are much less understood. This lack of knowledge can lead to miscommunication in the world of sports nutrition. This results in athletes not getting all the benefits of a well-designed nutritional strategy. One example of this is the general understanding that any athlete looking to put on muscle needs to eat protein. This is true in general but fails to consider the nutritional needs to digest the protein, the other macronutrients needed to help support muscle growth, and the nutrients that may help the athlete perform their training to the highest degree to allow for muscle growth. In this respect simply eating more protein is only one small piece of the sports nutrition strategy. The ubiquitous nature of supplementation in sports nutrition can amplify this concern. Sports supplementation is everywhere, and many supplement advertisements tend to advocate individual nutrients as the "key" to unlocking sports performance potential. Drinks,

shakes, bars, powders, and pills are marketed for their ability to potentially help the athlete to perform at their best, but it is less common to hear about the role of supplements as part of a well-designed nutritional strategy to improve performance. The reality is that the sports nutritional palate is diverse and must be examined collectively. This is not to say that there are no supplements that can directly impact performance, but rather, they must be taken within the context of a well-planned nutritional strategy. Therefore, any book focusing on the clinical application of nutrition for older athletes should first define the nutrients the athlete needs to be able to perform.

1.8 Macronutrients

The first classification of nutrients needed for optimal performance is the Macronutrients. Macronutrients provide the athlete energy from calories, including carbohydrates, lipids (or fats), and protein. This classification of nutrients carries the term "Macro" because they are needed in larger quantities. These nutrients make up the backbone of a sound nutritional plan. These nutrients can come to the diet from both plant and animal sources. Carbohydrates provide the body, among other things, with the energy needed to perform physical activities. Fiber is a specific carbohydrate category with crucial physiological functions, and is vital to the athlete's health, and plays an important role in blood sugar regulation but does not directly provide the body with energy for athletic performance. Lipids also have many roles among them: energy storage, the synthesis of hormones, the absorption and storage of fat-soluble vitamins, and aiding in nerve conduction, for example, through myelination. Proteins serve both structural and functional roles physiologically. Structurally, protein is needed for the growth and development of muscles and the recovery from exercise. Functionally, proteins can act as, among other things, enzymes needed to initiate physiologic reactions. Together, these nutrients comprise the majority of the diet and define the caloric make-up of the athlete's nutritional plan. We will explore each of these in more detail in Chapter 4.

1.9 Micronutrients

The next classification of nutrients we will discuss is the micronutrients. These nutrients are used by the body to support normal physiological functions along with the macronutrients. The term "micronutrients" is derived from the fact that they are needed in a lower volume for use in the body.

Micronutrients can be subdivided into vitamins, minerals, and elements. Many of these vitamins, minerals, and elements are essential to many physiologic processes and are required from the diet. This classification of nutrients does not contain any calories themselves or directly provide the body with energy. Still, they are important in their use as cofactors in the processes where the body derives energy from macronutrients, such as the biochemical process of glycolysis. All these micronutrients carry some function, and most are needed to some degree to assist the body in maintaining health and have roles in athletic performance, although the type and amount will differ for athletes, particularly masters athletes. This topic will be addressed in more detail in Chapter 5 of this book.

1.10 Hydration

Water is essential to maintaining physiological processes. Approximately 70% of the human body is made up of water. Water, whether from consumption or internal production, is important as both a reactant and byproduct of the body's chemical reactions. Accordingly, the balance of water in the body is a critical factor in supporting physiological functions and optimal athletic performance and recovery. There is a direct relationship between hydration and performance, and poor hydration is linked to decreased athletic performance [4]. This carries a particular relevance for the older athlete, who carries a greater risk for dehydration when compared to their younger counterparts. The assessment of hydration and the development of a hydration plan to fuel performance and prevent dehydration will be discussed further in Chapter 7.

1.11 Supplementation

The final element of a nutritional plan that will be discussed will be supplementation. Supplementation refers to the nutritional aids that are used to support the diet to correct any nutritional shortcomings or to enhance performance and recovery. The first of these items, correcting nutritional shortcomings, can also impact performance if the nutrient needed for supplementation is deficient. However, supplementing deficient nutrients does not always translate to improved performance beyond correcting the nutritional deficiency. The second role of a supplement can be those that are used to improve performance by adding specific nutrients that have a known benefit to athletes extending beyond the correction of a deficiency.

An example of this is caffeine, which can have the potential to improve athletic performance for the athlete but is not given to correct any deficiency. Issues with supplementation involve potential toxicities from their use and, more commonly, overuse. The quality and source of the supplement are also a concern, as the effects of the supplement may be limited or altered due to poor quality or adulterated products. Overall, supplementation can be an important element of the nutritional programming for a master's athlete. The topic of supplementation will be discussed in more depth in Chapter 10.

1.12 Overview: A Nutrient Approach to Diet

Now that we have discussed an overview of the nutritional elements that make up an athlete's performance plan, it is important to give a general overview of how to put it all together. This leads to the question of how we combine all these nutrients to develop a strong nutritional strategy for the athlete. While we will go deeper into this subject in Chapter 11, let us examine an overall structure for our approach. An important consideration in determining nutritional needs for athletes, regardless of age, is a hierarchical structure. This means those working with athletes need to look at the nutrient decisions in the context of how they relate to each other in order of importance from the most important to the least important. This allows the practitioner or coach to prioritize their approach and refine results as they go, with all other recommendations under consideration. If visualized, this structure should resemble a flow chart with the progress of the nutritional evaluation moving from the bottom to the top. The flow chart is a good way to think of it as the bottom is the starting point from which all other nutritional considerations start acting as a base or foundation. From there, we move up the chart, with each step building on the previous one. Nutritionally, we start with the most important nutritional factor and then work toward the overall goal. Moving further up the flow chart, we see further delineations that are less important, than the base, but still vital to hitting peak performance (Figure 1.1).

When working with athletes, I always recommend starting with a conversation about goals. It is important, when working with an athlete nutritionally, that we can determine what the athlete is looking to accomplish, both with the presenting proposed dietary changes and from their athletic career in general. For example, a sports nutritionist or anyone working with a sports nutrition client may have some ideas to improve an athlete's

performance. Based on their initial presentation and where the practitioner wants to see the athlete's career progress, however, this may not coincide with the athlete's goals. For example, if, despite the thoughts of the nutrition professional, the athlete is looking to optimize performance while dropping down a weight class, there is likely going to be an issue if the weight loss limits performance, as is the case with many sports. There may be a mismatch between the plans or ideas of the nutrition professional and the athlete, and we need to know from the start if that athlete can achieve maximal performance based on their goals. If there is a mismatch between the nutritional practitioner and the athlete's goals, adjustments should be made to accommodate the athlete's personal or performance goals. The athlete's goals will always be paramount to those of the nutrition professional and will need to be considered when determining any nutritional plans. Accordingly, every conversation about sports nutrition must clarify the athlete's goals. Once these goals are established, the coach or nutritional professional has a desired outcome to which the diet can be tailored.

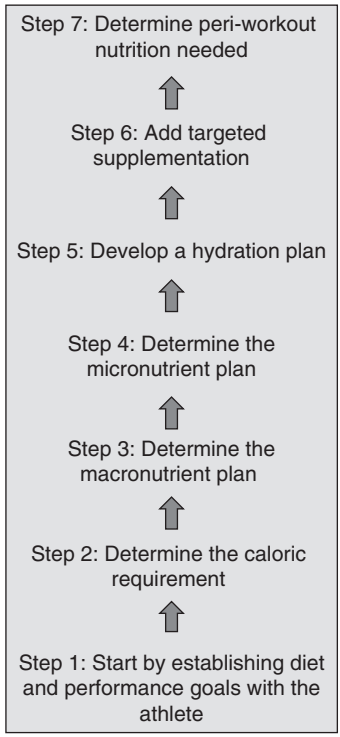

Figure 1.1 Hierarchy of the determination of nutritional needs.

Our next step up the flow chart is to look at the caloric requirements for the athlete to meet their goals. Recently, there has been some debate about whether calories should be the most important factor in sports nutrition, and some will focus straight away on the macronutrient needs. This would be a mistake as caloric requirements serve as an important base and starting point when examining the dietary needs of any athlete. It would be difficult, although not impossible, to accurately determine a macronutrient plan without knowing the intended overall calories the athlete will need. The caloric requirements of each athlete should be personalized and need to consider factors such as the age, the sex of the athlete, and the athlete's weight. The athlete's goals should also be considered when determining

caloric requirements as well. For example, if weight gain, weight loss, or weight maintenance are important, alterations from the base caloric requirement must be made to accommodate these goals.

After determining the caloric needs of the athlete, the next step is to determine the macronutrient breakdown in a manner that will enable the athlete to be able to fuel performance. There are several methods of determining the macronutrient distribution which remain to be discussed later in this book. Still, determining the macronutrient plan needs to start with an emphasis on the requirements and demands of the individual sport being trained for or contested. Each sport will have different physiologic demands and will determine the macronutrient ratios required to optimize performance. For example, an endurance-based athlete will not necessarily need the same number of grams of carbohydrates as a strength-based athlete, as the demands of long-duration endurance exercise demand a lot more fuel from carbohydrates to perform the activity.

After determining macronutrient requirements, the coach or nutrition professional should examine the micronutrient needs, which will differ for each athlete as the vitamin and mineral needs will alter somewhat through aging. After considering calories, macro, and micronutrients, the coach or nutritional professional should focus on hydration, as dehydration can lead to decreased athletic performance or even a potential injury. We consider supplementation only after considering all these previous factors. Supplementation is an important factor; not every athlete will need or should include supplementation. Supplementation should be personalized and have a performance or health-related purpose. This supplementation should be targeted and evidence-based to assist the athlete in achieving their athletic goals but should be secondary to dietary efforts. Finally, peri-workout nutrition should be planned both for training periods as well as during competition. Peri-workout nutrition is the food and supplements consumed before, during, or right after training or competition that are targeted at fueling performance and recovery. This could be considered to be the pinnacle of the chart as it takes the determination of all of the other elements prior to truly developing a solid peri-workout nutritional plan.

1.13 Conclusion

This book will be a clinical handbook for those who wish to work with older athletes or for the athletes themselves as they seek to find the method to best fuel optimal athletic performance. The reader, be they professional nutritionist, doctor, coach, or athlete, should be able to use the information

gained from reading this book to better assist athletes over the age of 35 to develop the nutritional strategy that will fuel optimal performance and recovery. The contents of this book represent the current state of nutritional information with a focus on clinical application. This means the author's goal is for the information presented to be used rather than simply learned. The information in this book is by no means a complete representation of the sports nutrition field overall nor a substitute for medical advice. Just as individuals come in all shapes and sizes, they also come with a variety of pre-existing conditions that must be considered by those working with them. The information gained in the book should be used to aid those working with athletes but not taken as a direct prescription.

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