# Comprehensive Guidance and Analysis: Diet and Nutrition During Strength Training

Pinxi Wang *

Beijing No.8 High school, Beijing, 425199, China

* Corresponding Author Email: 2016123615@jou.edu.cn

**Abstract.** As health awareness gradually deepens into people's hearts, the number of fitness people is gradually increasing, and fitness has become a hotly discussed issue in society. However, the public still has misunderstandings about fitness and protein powder and other supplements. This paper include a comprehensive strength training instruction of diet. This article is going to focus on the right diet for strength training, and the right mix. First of all, the theoretical knowledge of the three nutrients and strength training is introduced, and then the focus is placed on the dietary ratio. Finally, answer some common misconceptions. These misconceptions are a major problem on social media and are about fitness supplements, fat loss and other issues. In today's China, most of the students are very weak in physical fitness, and people don't realize this problem. This paper is for people who want to understand strength training, hoping that more people can realize the advantages of strength training, and can scientifically carry out diet, making more people scientific strength training.

**Keywords:** Strength training; guidance; diet and nutrition.

## 1. Introduction

When reading some posts on the Internet, I always see people who have a poor understanding of their diet, resulting in their sports performance and athletic ability. This paper is hoping to figure out how to match diets for people with different needs. With the change of modern lifestyle, people's sedentary time has increased greatly [1]. According to the World Health Organization, physical inactivity has become the fourth leading risk factor for death globally. Long-term lack of exercise can reduce the function of tissues and organs by 30%. At least eight of the top ten cancers in China can be reduced by exercise. "Everyone, regardless of age or ability, can be physically active, and every form of activity is useful," the WHO says. The role of physical activity, including exercise, in promoting and improving health was reaffirmed.

Therefore, the need for a recipe that is easy to understand and reasonably professional is urgent. Based on the research and analysis of the three major nutrients, this paper will calculate the energy required by the human body, and consider the influence of strength training on different people in this process. This paper will make suggestions for improvement of existing recipes. The suggestion can provide more scientific reference opinions for scientific diet and correct understanding of fitness diet collocation in the future.

This paper calculated the amount of energy needed for each group of people and then created multiple recipes based on the diet required for strength training.

## 2. The Range of Strength Training

Some people think that as long as the weight is lifted (muscle work) is strength training, however, strength training needs to meet many conditions at the same time. What actually is strength training?

Strength training, also known as resistance training, is a form of exercise that is critical to overall health and fitness as well as athletic performance. Resistance training is often referred to as "weight training" or "weightlifting" or the term is more complex and less easy to understand. Adaptive resistance training. Resistance training adaptability can be roughly divided into slow adaptation and fast adaptation. The "rapid adaptation" response to resistance training occurs mainly in the nervous system, muscular system, and endocrine system. "Slow adaptation" to resistance training can be seen

in the muscle, skeletal, endocrine, cardiovascular and nervous systems. Body composition adaptation is also seen as a slow adaptation to resistance training.

First, the strength training required neural adaptation which means that when a force is applied to a muscle, signals are sent to activate muscle nerve cells. When a person performs strength training, the number and intensity of nerve signals transmitted to that muscle increases until the muscle is tired. Two neurological factors that control muscle strength are motor cell recruitment and rate coding. The former is simply the amount of muscle force produced by muscle contractions, while the latter is how many of these weights can be done. For example, when a bicep curl is performed with a 10 lb (4.5 kg) dumbbell, instead of a 50 lb (22.5 kg) dumbbell, there are fewer motor units in the biceps muscle that recruit nerve cells.

Second, strength training should activate the endocrine system. Strength training causes the pituitary gland to produce two main types of hormones that respond to strength training: proteins and protein-based steroid hormones. Growth hormone and insulin are the main protein hormones, testosterone and estrogen are the main steroid hormones (several hormones that are indispensable to help your muscles increase). The continuous increase in intensity of strength training, anabolic, catabolic proteins and the concentration of steroid hormones are inevitably related to the release. Growth hormone, testosterone and insulin are anabolic hormones that promote the growth and recovery of muscle tissue after resistance training. However, the same muscle-degrading hormones or catabolic hormones are released during and after resistance training.

## 3. The Three Nutrients

### 3.1. The Overall Introduction

"Human are what they eat", this is the thing that this article focused. As a result, food is crucial to people's appearance, especially one's strength. Food contains three major nutrients: protein, carbohydrate, and fats. The three nutrients are called the three nutrients because they are the main energy substances of the body, providing the body with the energy and nutrients it needs. And they have a large amount of demand, accounting for a significant proportion of the diet.

Carbohydrates can produce a lot of heat, providing the main source of energy for the human body; Protein is an important component of human tissues and organs, and participates in various biochemical reactions of the body; Fat is an important substance for storing energy, maintaining body temperature, protecting internal organs and so on.

According to the Consensus of Experts in the Medical Nutrition Treatment of Overweight/Obesity in China, the reasonable proportion of the three nutrients is: Carbohydrates accounted for 40% to 55%, of which as far as possible to reduce refined sugar and Tianweitang, increase whole grains and starch rich in dietary fiber; Fat accounted for 20%~30%; Protein accounts for 15% to 20% [2].

### 3.2. The Benefits to Strength

First, protein is the key to muscle growth, and increasing protein intake can effectively promote muscle growth and repair. During physical exercise or to combat physical stress, the body needs extra protein to replace the loss of phosphocreatine in muscle cells and to use it during tissue repair. Moderate intake of protein can accelerate the growth and recovery of muscle cells, thereby helping to build muscle [3]. For example, there was an experiment that is the Effect of timing of protein supplementation during 8-week resistance training on muscle building in 55 years old women. For 8 weeks of resistance training, under the condition of supplementation with the same dose of protein supplement, the effect of immediate supplementation after exercise is better than that of 30min supplementation after exercise to improve muscle mass and reduce muscle catabolism in women aged 55 to 65 years; Supplementation of protein supplements in resistance training for women aged 55 to 65 can improve muscle strength, regardless of the specific timing of supplementation.

Second, carbohydrates are very important for building muscle because they are one of the main sources of energy for humans' bodies. During exercise and training, people's muscles need quick

energy to support movement, and carbohydrates can provide this energy. In addition, carbohydrates help maintain blood sugar levels, prevent muscle breakdown, and promote the release of insulin, all of which contribute to muscle growth and repair.

Last, the impact of fat on fitness, improves muscle , in terms of their impact on fitness, unsaturated fats, like saturated fats, are able to increase skeletal muscle synthesis and metabolism, which in turn improves muscle strength. Additionally fat has a very key role in keeping humans' testosterone levels high. Foods rich in unsaturated fats. Provide energy to the body.

## 4. Quantity of Food

### 4.1. Calories for People

What can people do to get their bodies in the best shape for fitness?

If the human body is viewed as a system, then the human system must also follow the law of conservation of energy, so Calorie intake > calories burned, increase in total chemical energy in the body, weight gain. The total daily caloric expenditure is the sum of the basal metabolic rate, the thermic effect of food and the energy expenditure of physical activity.

**Table 1.** The calculation of BMR

| Gender | BMR (Kcal) | | Weight (kg) | | Height(cm) | | Age (year) |
|---|---|---|---|---|---|---|---|
| Male: | 66.5 | + | 13.8*weight | + | 5.0*height (cm) | - | 6.8 age (years) |
| Female: | 665.1 | + | 9.6*weight | + | 1.8*height (cm) | - | 4.7 age (years) |

In this way, as shown in table 1, people can calculate their BMR. And about energy expenditure from physical activity. This factor has more conditions of influence and needs to take into account the exercise situation of different people. It is generally accepted that total daily expenditure (TDEE) is basal metabolism multiplied by activity level, with the following values:

Sedentary or non-exercisers: 1.2 Mild; exercisers or exercising one to three days a week: 1.375; moderate exercisers or exercising three to five days a week: 1.55 (most fitness enthusiasts); vigorous exercisers or exercising six to seven days a week: 1.725; ultra-vigorous exercisers or physically active work or Train twice a day: 1.9. After this, it can be calculated that the product of BMR and energy expenditure from physical activity to know one's Total calorie expenditure per day [4].

Muscle building: Knowing the total daily consumption, under the condition of maintaining exercise, muscle builders can increase the daily calorie surplus by 250~750kcal on this basis to provide energy support for muscle growth.

Fat loss: People can also reduce the intake of 250-750kcal calories on the basis of 2650kcal in order to lose weight, and keep exercising, it is important to note that fat loss will inevitably cause muscle loss during the period, the caloric gap should not be too large, otherwise the loss of muscle loss is excessive, resulting in a decline in basal metabolism, the caloric gap will be getting smaller and smaller to enter the plateau period, once the exercise is interrupted or dietary excesses It will also cause a rebound.

### 4.2. Foods for Trainers Whose Age is 16-30 (Students or Youth)

For this group of people, who are in the sedentary category on a daily basis, their BMR should be multiplied by 1.2 to arrive at a total daily consumption. If people are strength training, then people should multiply by the corresponding coefficient. The factor this article recommend is 1.4. For each kilogram of body weight, they should eat 4 grams of carbohydrates, 1 gram of fat, and 1.8 grams of protein. What they lack is money and time, so this paper put together the following recipe. As shown in table 2, taking a high school trainer with a height of 180cm and a weight of 70kg as an example, his BMR is 1823kg, his TDEE is 2553.8kg, and his intake is 2600-2700KJ.

**Table2.** Diet of a high school trainer

| Breakfast | Lunch | Dinner | Extra meal | Total |
|---|---|---|---|---|
| 150g Whole wheat bread | 280g rice | 280g rice | 1 corn | 300g carb |
| 2 eggs | 150g lean meat | 150g lean meat | 25 nuts | 155g protein |
| 200ml milk | 25g nuts | 3 pieces cheese (60g) | 100g Whole wheat bread | 80g fats |
| 25g nuts | - | - | - | 2600 KJ |

### 4.3. Foods for Trainers Whose Age is 30-50

For those who are prone to gaining body fat, it is really difficult to avoid gaining body fat while gaining muscle mass. Step 1: Design two different eating plans, one for strength training days and one for rest days. This is because for people who are prone to gaining body fat, it is easy to gain body fat if they do not control their intake of carbohydrates and calories on days when they are not training. On strength training days, trainers can eat 2 grams of carbohydrates and 1 gram of protein per pound of body weight per day, and eat six meals per day. For a 200-pound bodybuilder, that's 400 grams of carbohydrates and 200 grams of protein per day.

## 5. Common Supplement Application for Strength Training

### 5.1. Creatine

Creatine can be understood as a stored energy source in trainers' bodies, which is synthesized about 1g per day and stored in the muscles. Creatine storage for people is like a big pool connected to two water pipes, and people take creatine through dietary supplements, which can increase the creatine reserve in your body, meaning that the water in the pool will be relatively more [5]. Short-term supplementation of creatine (e.g., 20 grams per day for 5-7 days) has been reported to typically increase total creatine content by 10-30% and phosphocreatine stores by 10-40% [6]. Short-term creatine supplementation has been reported to increase maximal power (5-15%), work done during maximal muscle contraction (5-15%), single-effort sprint performance (1%-5%), and repetitive sprint performance (5-15%). In addition, creatine supplementation during training has been reported to significantly improve strength, fat-free mass, and performance in predominantly high-intensity exercise tasks.

### 5.2. Preworkout

The benefit of taking a nitrogen pump is to effectively improve performance during anaerobic exercise (such as squats) or endurance exercise by increasing strength and delaying fatigue for a short period of time. Even though the composition of nitrogen pumps may vary, they all have the same purpose and are designed to maximize fitness results. The main components of the nitrogen pump are caffeine, creatine, β-alanine, BCAA branched chain amino acids, arginine and vitamins and other trace elements.

Caffeine: reduces fatigue, makes the nervous center excited, high concentration, improves maximum muscle strength and muscle endurance, and especially requires knee extension exercises (squats, hard pulls), can also improve aerobic performance, which is one of the most significant effects of nitrogen pumps.

Beta-alanine: It binds to histidine to form carnosine. Carnosine is an important "buffer" that helps trainers' bodies resist fatigue during exercise, thus delaying the development of fatigue during high-intensity exercise lasting 1 to 4 minutes, and allowing the body to train harder for longer.

Supplementation with alanine can also prevent metabolic acidosis after exercise, which can improve recovery status and allow the body to rest and recover faster than before and return to training.

# 6. Misunderstanding for Supplement

## 6.1. Protein Powders Have Hormones

Protein powder is not a hormone, it is a powdered protein, which can be understood as a powder that contains high protein. Therefore, as long as it is consumed within the prescribed quantitative range, it will not have any side effects, but it is beneficial for muscle growth [7].

Douglas et al. conducted a study and found that no exercise and simple supplementation of amino acids can stimulate the synthesis of muscle protein in young and old people. They tested 13 healthy adults, testing their blood levels of free amino acids and their rate of muscle synthesis after they ingested some essential amino acids. Within about 3 hours of taking in the necessary amino acids, [8] people can see a significant increase in the concentration of phenylalanine in the blood [9]. Without exercise, intake of amino acids can increase the synthesis rate of myofibrillar and sarcoplasmic proteins.

## 6.2. Losing Weight Requires Frantic Exercise

The purpose of aerobic exercise is to increase calorie expenditure. However, an hour of high-intensity aerobic training burns very few calories. Therefore, some people crazy exercise but cannot reduce because the day's calories belong to the surplus state. Weight loss to calculate the calories, using the formula to calculate their BMR and TDEE, subtract 300 calories on the basis of TDEE, which is a person to lose weight one day to consume calories. Once there is a heat deficit, according to the law of conservation of energy, weight will be lost. To sum up, a high-intensity cardio workout needs to be based on precise heat control [10].

# 7. Conclusion

This article think people need to be scientific about strength training. Start changing yourself in terms of diet. "Human are what they eat", what human eat, determines people's strength performance. Scientific diet is what this paper is about. First, calculate the daily calories required by each person using mathematical methods, followed by the proportion of nutrients, and finally specific to a certain number of specific foods. In addition, this paper also makes recommendations and answers misconceptions, because the purpose of this paper is to help sports people to eat scientifically.

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