

10

Bulking Up

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In This Chapter

Benefits of Strength Training

Factors Determining
Muscle Mass

Victims of Bigorexia

Protein Requirements
for Strength Training

Other Nutritional Requirements

Dietary Considerations
for Bulking-Up

Key Points

- Proper and consistent strength training, adequate rest and a balanced diet will provide the lasting **edge** when it comes to building strength and muscle mass.
- Eating a wide variety of foods and matching energy intake with energy output will provide optimal nutrition for building muscle.
- All Warfighters require no more than 1 gram of protein per pound of body weight per day.
- Adequate amounts of fluids are vital to muscle metabolism and contractility.
- Spend money on “real” foods, **not** supplements and protein powders.

Military missions and training require strength. A strength training program enhances physical conditioning, builds functional strength and allows you to perform and complete strenuous missions. The appropriate strength training program combined with a well planned nutritional strategy can also help optimize performance and prevent musculoskeletal injuries. In this chapter, information on strength training and the unique dietary requirements for this training will be provided.

Benefits of Strength Training

Strength training should complement endurance training workouts. The specific benefits of strength training include:

- Increased muscle strength and endurance.
- Increased muscle fiber size.
- Increased ligament and tendon strength.
- Greater protection against “overuse” injury.

Because strength training makes you stronger, the risk of injuries that may accompany endurance training is reduced. Finally, strength training can make you faster at tasks requiring short bursts of activity.



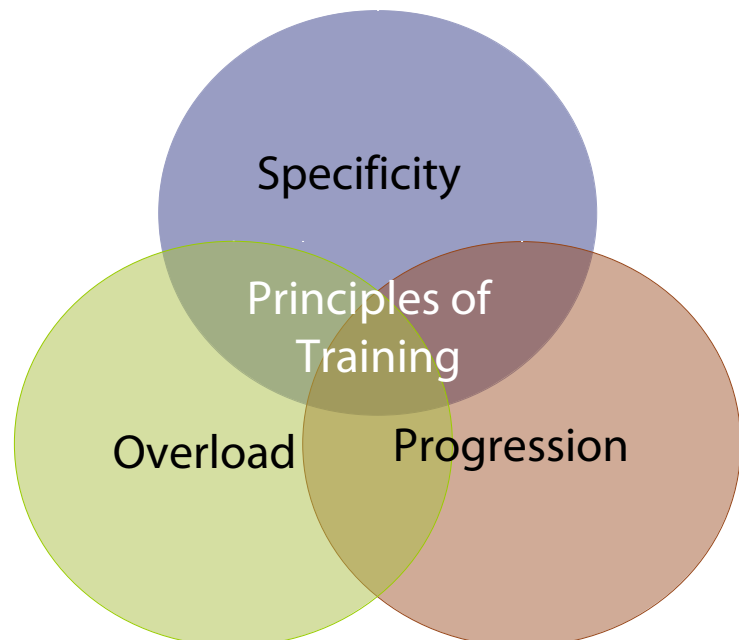
Factors Determining Muscle Mass

Skeletal muscle accounts for over 50% of body weight and is very important in terms of regulating metabolism. The mechanical and metabolic demands imposed on skeletal muscle require a constant “remodeling,” or breaking down and rebuilding of various muscle proteins that support muscle contraction (structural) and muscle metabolism (functional). This remodeling is critical to maintain and ensure muscle quality—if proteins were not constantly being broken down, damaged proteins would prevail. Various factors regulate the balance between breaking down and building up, as well as the quantity and quality, of proteins. Some factors, like genetics, are out of our control, but two major “controllable” factors that participate in regulating muscle “remodeling” are:

- **Exercise:** Resistance training increases muscle mass by promoting the turnover and re-build-up of structural proteins.
- **Nutritional Status:** Nutrients for muscle growth shift the balance from “breaking down” to “building up.”

Principles of Training

For functional fitness, the importance of specificity, overload and progression must be considered.



- **Specificity:** Demands placed on the body will dictate the type of adaptation that occurs.
- **Overload:** Increasing the intensity of training by increasing the number of sessions per week, performing more difficult exercises, adding



☀ Click here for more general information on strength training in PowerPoint.

weight or sets of exercise, and/or decreasing rest periods between exercise sets increases the load.

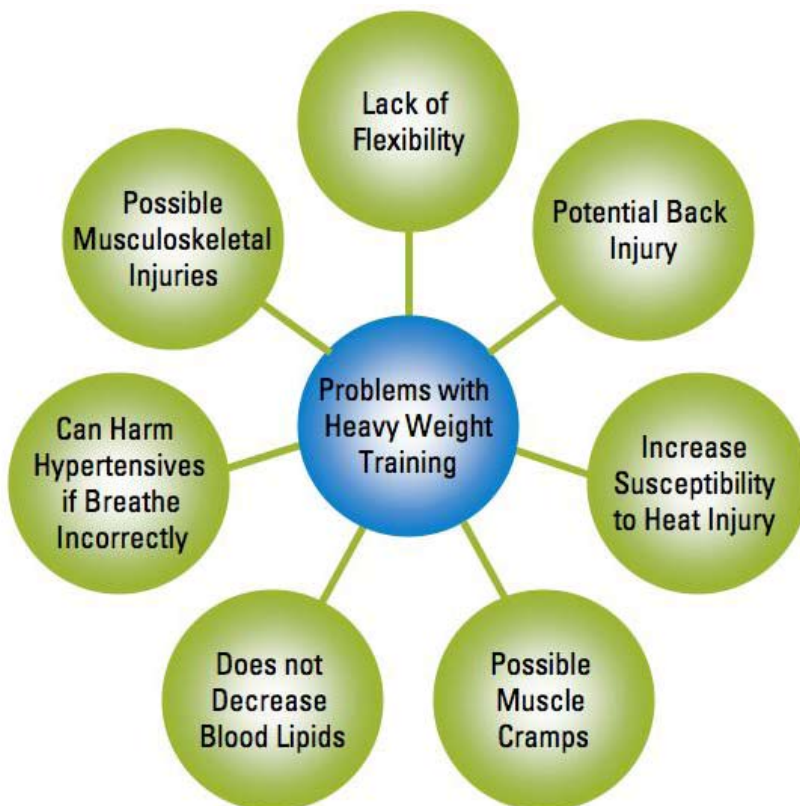
- **Progression:** Gradual increases in the load/intensity.

When these important principles are integrated into the physical training program, positive outcomes and fewer injuries can be expected. In addition, a 5–10 minute aerobic warm-up period is advised to increase blood flow to the muscles and get the motor neurons firing.

Once muscular strength is achieved, optimal muscular endurance should be pursued.

Lifting Pitfalls to Poor Performance

Although muscle strength and development are a part of a Warfighter's physical training, moderation is the key, and recommended for balancing strength and maintaining cardiovascular fitness. Heavy lifting is common for Warfighters because carrying and lifting heavy objects is important operationally; however, there are disadvantages to **only** lifting heavy weights.



Example:

Train 3 hrs each day and
take in 3,500 kcal/day

60% of energy from CHO =
 $3,500 \times 0.60 = 2,100$ kcal from CHO

Amount of CHO =
 $2,100 / 4$ kcal = 525 grams of CHO



The major pitfall is that heavy weight lifting can limit range of motion and strengthens **only** the muscles within that specific range.

Resistance and endurance exercise *must* be combined for injury prevention and performance optimization.

Range of Motion

Taking a muscle through its full range of motion is critical. Full-range of motion movements contract and strengthen the primary muscles you're working and stretch the opposing (antagonist) muscles. This contributes to both muscle strength and joint flexibility.

Weight training strengthens the muscle when it goes through the full range of motion.

It is important to remember that proper form and alignment are required when using any strength training equipment to maximize safety. Certified Strength and Conditioning Specialists (CSCS) are very useful for developing the appropriate functional lifting routines and tailoring a training program consistent with individual operational tempos.

Equipment Considerations

Resistance training programs should be individualized to meet specific training goals. To achieve training goals, the different types of strength training equipment must be considered. Free weights (dumbbells, barbells and kettle bells) and ground-based equipment, which are used in many military training sites, require more coordination because of requirements for muscular balance, control, and stabilization. Free weights mimic real life movements, in that there is no "fixed" range of motion. Multiple muscles work together in order to achieve form and technique.

In contrast to free weights, various weight machines, such as Nautilus, Cybex, LifeFitness and BodyMaster, can be used without a spotter, and correct form is achieved easily, which increases the safety factor. However, many machines do not take the muscles through the full range of motion. Machines for leg curls (hamstrings) and leg extensions (quadriceps) are ones that do allow a full range of motion.

Training Features of Free Weights

Offers numerous movement planes and hand positions.

Safety and ease of use.

Use of stabilizing muscles.

Fixed range of motion.

Mimics real life movement.

Rotational resistance.

Victims of Bigorexia

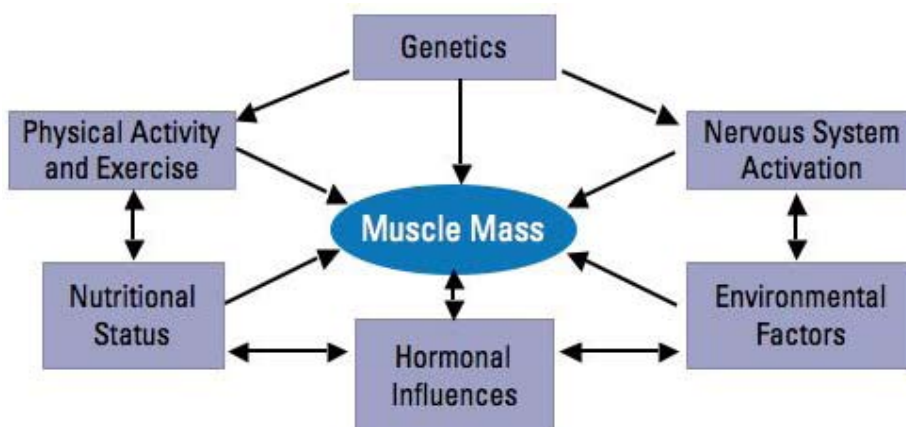
Bigorexia, or muscle dysmorphia, is an obsession about being muscular; it is the opposite of anorexia. Preoccupation with becoming more muscular may lead to exercising even when in pain or with an injury, being compulsive about training every day and refusing to take a day off, skipping social events for training, and/or refusing to go to restaurants, parties, or social gatherings that offer food in order to remain on a strict nutritional regimen. The bottom line is that victims of bigorexia are never accepting of their bodies: it is never muscular enough. Excessive training is not the only repercussion. Other symptoms of bigorexia are:

- Spending excessive amounts on supplements.
- Using steroids to increase muscle mass.
- Being unhappy with one's physique.

Protein Requirements for Strength Training

The protein needs of strength and endurance athletes are quite similar: 0.6–0.9 grams of protein per pound body weight each day will meet all Warfighters' daily protein requirements. However, many Warfighters believe that more protein is better. In fact, more may **compromise** the quality of the protein. Protein intakes above 1.6 grams per pound per day may inhibit muscle growth, increase loss of calcium, and compromise bone health. It is not the amount, but rather the quality of the protein and effectiveness of the strength training workout that determine muscle mass.

[Click to see how much you know about protein.](#)



The need for spotters when lifting very heavy free weights is important.

Protein intakes over 1.6 g/pound each day may compromise appropriate anabolic signals that promote muscle growth.

Table 10–1 provides an overview of calculating protein requirements and Table 10–2 presents the protein content of commonly eaten foods. Some foods with high quality proteins are:

- Chicken breast, 8 oz.
- Sirloin Steak, 8 oz.
- Subway Turkey Sub.
- Subway Roast Beef Sub.



Table 10–1. How to Calculate Protein Requirements

How Much Protein Do I Need?	
175 lbs x 0.9 grams =	158 grams
175 lbs x 0.6 grams =	105 grams
Body Weight x Requirement	Grams/Day
My Protein Requirements Are:	
_____ x 0.8 grams = _____	
_____ x 0.6 grams = _____	
Body Weight x Requirement	Grams/Day

Table 10–2. Examples of Where You Get Protein

Food Item	Protein (g)	Food Item	Protein (g)
Chicken Breast (8 oz)	72	Sirloin Steak (8 oz)	62
Subway Roast Beef Sub	41	Subway Turkey Sub	42
Vanilla Milkshake	9	Chili (8 oz bowl)	19
Egg McMuffin, 1	18	Sports Bar, 1	12
TOTAL	138	TOTAL	135

[Click here for a sample 1-Day menu with reasonable and excessive protein intakes.](#)

Most American diets provide more protein than shown in the example, since protein is also in milk, cheese, fish, and non-animal sources of foods

(whole grains, beans, and pasta). Most athletes also consume additional protein in commercially available sports bars, protein powders or carbohydrate/protein supplements.

Muscle is only 20% protein and the rest is water and minerals, lactic acid, urea and high-energy phosphates, so it is clear that eating a high protein diet in order to bulk up just doesn't add up!

Protein supplements, which provide excessive amounts of protein or selected amino acids, are discouraged. Although heavily advertised, and in some cases endorsed by celebrities, very high protein intakes from supplements are **not** needed to build muscle. A properly balanced diet can meet your protein needs very effectively.

Concerns with High Protein Intakes

The extra dietary protein must be broken down, which results in increased formation and excretion of the waste product, "urea." This additional waste increases fluid requirements, and places a considerable load on the liver and kidneys. In extreme cases, excessive protein intakes can result in kidney failure. In some individuals, high protein intakes can cause:

- Hypertension.
- Increased fluid needs.
- Diarrhea/abdominal cramps.
- Imbalance of the essential amino acids.

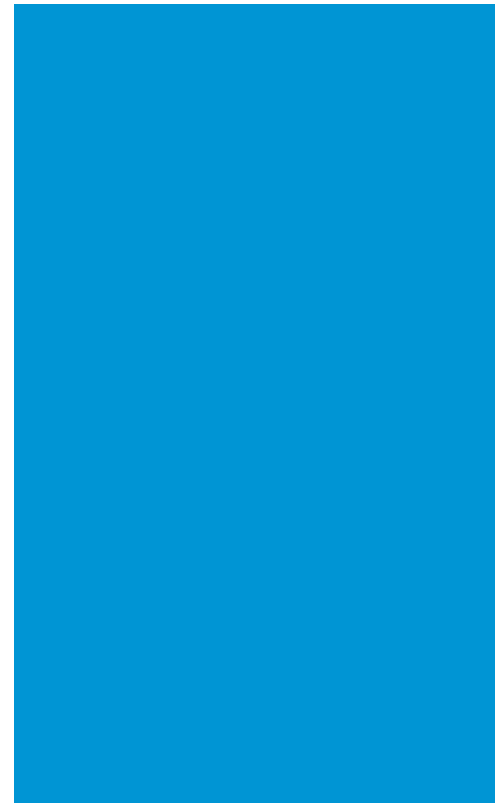
Other Nutritional Requirements

Carbohydrate Requirements

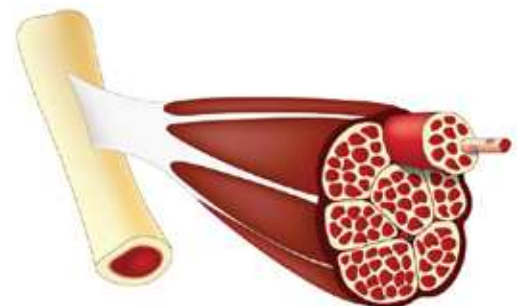
Strength training relies on glycogen stores for energy. Thus, carbohydrates (CHO) are very important.

50–70% of daily energy intake
should come from CHO.

The CHO recommendations for strength training are somewhat less than for endurance athletes, since the overall energy requirements of weight lifting are less. However, depending on the training schedule and aerobic workout duration, 2.5–4 grams of CHO per pound body weight per day may be needed. If only protein is eaten, the body must work hard



If 100 extra grams of protein were eaten every day for one week, muscle mass should increase by 7 pounds! *Clearly*, this is not the case.



Protein 20%
Water 75%
Inorganic Salts, Urea, Lactate 5%

to convert protein into glucose, which is required by the brain and muscles for fuel.

Carbohydrate is the primary fuel source for strength training.

Fat Requirements

A thorough discussion of fat was provided in [Chapter 3](#), but for fats in general, the recommendation is:

Less than 35% of your energy should come from fat.

Remember, less than 10% of the fat should come from saturated fat and the balance from mono- and poly-unsaturated fats.

[Click to determine the number of grams of CHO, protein and fat to meet your energy needs.](#)

Vitamins and Minerals

If you meet your daily energy needs from a variety of different foods, you should be able to meet your vitamin and mineral needs. See [Chapter 4](#) for information on food sources of various vitamins and minerals.

Dietary Considerations for Bulking-Up

The major stimulus for muscle growth and strength are weight training and appropriately timed, good nutrition. After weight training, nutrient dense energy sources are the single most important factor that affects muscle gain—you must have the energy to train effectively on a daily basis. All too often, Warfighters are exhausted by the long Friday workouts, due to not eating regularly and consistently over the week. Such dietary habits are not conducive to building muscle mass.

If nutrient intake is lacking as a result of poor meal planning and/or high operational tempo, skeletal muscle may be in a negative protein balance or a catabolic state. For optimal muscle remodeling and growth, the timing and type of nutrients are critical. Appropriate nutritional interventions immediately after the exercise and over the next 24 hours are essential for maintaining and promoting muscle mass.



Resistance training for muscle mass gains requires more focused attention on positive energy balance than protein intake.

Table 10–3. Nutritional Tips for Bulking-Up

Break for breakfast. Consume a hearty breakfast containing whole grains, fruit, and protein from lean meats and eggs, as well as low-fat dairy products.	
Graze frequently throughout the day. Keep a supply of healthy snacks to help replenish muscle glycogen.	
Don't go without food for more than 4 hours (if possible) to avoid glycogen depletion.	
Remember “CPF” meal planning: Eat at least 3 of the 5 food groups—a mixed meal containing CHO, protein and fat—for an optimal fueling strategy to maintain energy for strong and effective strength trainings. Some combinations are:	Fish, rice, and vegetables
	Cereal, milk, and fruit
	Turkey on whole grain bread with tomato, lettuce, and onion
	Low-fat yogurt, grape nuts and fruit
	Vegetable burrito (tortilla, vegetables and cheese)
Avoid amino acid supplementation and minimize protein powders —real foods are more nutrient-dense. Good food sources of proteins include:	Lean beef, lamb, and pork
	Low-fat dairy
	Fish
	Poultry
	Venison