

NUTRITIONAL PROBLEMS AND SOLUTIONS FOR PROTEIN DEFICIENCY ASSOCIATED WITH BARIATRIC SURGERY

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THE OBESITY EPIDEMIC

Pick up almost any periodical and you will find an article on the “obesity epidemic”. The morbidity, mortality, and socioeconomic costs of obesity are astronomical (1). The United States appears to have some of the most devastating numbers, only recently surpassed by Mexico. Changes in the nature of our work, leisure time activity, and changes in what and how much we eat are the most significant contributing factors to the explosion of obesity in the United States.

The “digital revolution” has Americans expending much less energy at work than in the past. Manual exercise at work has been replaced by sitting in front of a computer. Little or no exercise means fatter and sicker Americans. In fact, statistics show that approximately 65% of the population routinely sits instead of stands, drives instead of walks, and rides the elevator instead of taking the stairs, which puts those Americans at an increased risk for chronic diseases such as hypertension, coronary artery disease, and diabetes (2).

CONSEQUENCES OF OBESITY

Obesity is not only unpleasant because of struggles with body image, clothing, fitting into airplane seats, etc. It is also associated with a host of serious diseases, many of which can result in death, at worst, and definitely a reduced quality of life at best. Some of these diseases are diabetes, heart disease, sleep apnea, arthritis and its associated problems, depression and even some cancers (3).

WHO IS A CANDIDATE FOR BARIATRIC SURGERY

The vast majority of obese individuals have tried a multitude of methods including different weight loss diets, weight loss clinics, weight loss programs that are advertised nonstop on the media, as well as exercise. Unfortunately, although these methods work for many they do not work for everybody.

The people who have been unsuccessful trying everything yet still remain morbidly obese are candidates for weight loss surgery. They may already have developed or are at risk of developing many of the life-threatening diseases associated with morbid obesity which can result in many severe illnesses and even death (4, 5).



BMI-THE BODY MASS INDEX-A MEASURE OF OBESITY

Body mass index (BMI) is a measure of body fat based on height and weight that applies to adult men and women (6). Using the calculator in the above reference 6 from the National Institutes of Health is easy. Just put in your height and weight in the appropriate spot and you get a number.

Anything over 30 is considered obesity.

Bariatric weight loss surgery is typically considered for individuals with a BMI over 35 or 40 who have not been successful in losing weight by more conventional methods such as diet and exercise or at 35 for those who have already developed medical problems as a result of their obesity.

HOW DOES BARIATRIC SURGERY WORK

The simplest explanation is that the aim of bariatric surgery is to restrict the amount of food the body can take in or absorb. This is typically done by one several methods. One method is to decrease the size of the stomach, also called lap band surgery. Other methods bypass large sections of your intestines and reduce the amount of food you absorb.

DIABETES AND BARIATRIC SURGERY

An additional benefit for those patients with Type 2 diabetes is that many of them who underwent bariatric surgery were able to decrease or in some cases completely stop the insulin they were taking (13, 14).



NUTRITIONAL DEFICIENCIES FOLLOWING WEIGHT LOSS SURGERY

It would be great to think you could bypass a large portion of your intestines or decrease the size of your stomach, lose the weight, and not have to change your diet. Unfortunately, that is not the case. The nutrients we absorb such as protein and fats are necessary to carry on a full and healthy life.

The major macronutrient deficiency after weight loss surgery is protein malnutrition (7). There are also potential deficiencies in micronutrients such as essential minerals, water and fat soluble vitamins. Vitamins A, D, E, and K are fat soluble and thus we require some fat to absorb them. Since we need Vitamin D to absorb calcium, one concern is the relationship between vitamin D deficiency and the development of osteoporosis (thinning of the bones) (7).

Adequate calcium absorption is necessary to prevent the development of osteoporosis. The majority of calcium is absorbed in the small intestine of which large sections are frequently bypassed during bariatric surgical procedures. This can cause inadequate calcium absorption and result in osteoporosis or even hip fracture (8).

PROTEIN MALABSORPTION-THE MAIN CONCERN

- Lack of adequate protein absorption as a result of gastric banding or bypass surgery is a significant concern (7). This is because of the role protein plays in keeping us alive. Proteins created in our bodies carry out numerous functions we need to stay healthy and to even survive.
- The protein we consume and absorb is *the source of amino acids which serve as the building blocks for not only the tissues of the body but the various substances and entities that help maintain homeostasis and allow us to thrive physically and emotionally*
- *Growth of the tissues of the body such as muscles, tendons, bone, and organs, from the cellular level up* requires an adequate supply of protein. Our skeletal system is largely composed of a protein substance called *collagen* which contributes to ligaments, tendons, muscles, skin, teeth, and nails. (9, 10).
- *Hormones are for the most part protein substances* produced by a cell or a gland in one part of the body that send out messages that affect cells in other parts of the organism. Hormones have a regulatory function. They are secreted by

organs like the pancreas, pituitary gland, parathyroid glands, heart, stomach, liver, and kidneys (9). Hormones *maintain the body in homeostasis or balance* (9).

- *Proteins contribute to the formation of enzymes which are catalysts for chemical reactions in the body without which we could not survive* (9, 10).
- There are *13 blood clotting proteins (coagulation factors) found in the blood*. They are designated by Roman Numerals I through XIII. If one factor is missing blood clotting is affected (9, 10).
- *Antibodies are protein substances* which defend our body against viruses and bacteria. If we lack sufficient protein to produce these antibodies our immunologic response is poor and we are more susceptible to disease (9, 10).
- *Proteins also serve a “contractile” function in the body so that we are able to move about. Actin and myosin are proteins responsible for muscle contraction* (9, 10).
- Our *ability to maintain proper acid base balance within our body is due to the “buffering effect” of protein* (9, 10).
- *Hemoglobin is a protein in the blood that transports oxygen* throughout the body and thus enables cells to function normally. A deficiency of hemoglobin results in anemia which causes exercise intolerance and fatigue. Once hemoglobin reaches the muscles it is stored in another protein called *myoglobin* (9).



HOW MUCH PROTEIN DO WE NEED

The Recommended Dietary Allowance (RDA) for protein is 0.8 g/kg/ (or 2.2 lbs.) (11). This works out to approximately 58 to 63 grams per day for an average adult male.

The positive effects that protein provides with regard to satiety, muscle recovery, growth, and health in general cannot be overestimated. For this reason, your post-operative diet is critical to ensure adequate protein intake, and you will most likely consult with a bariatric dietitian.

CONCLUSION

Bariatric surgery has made many positive strides in improving patient health and reducing comorbidities associated with dangerous or life threatening obesity. The

availability of quality post-operative protein supplementation has been definitively shown to improve body composition by enhancing loss of body fat mass and reducing loss of lean body mass (12). This results in a happier and healthier patient population and an improved quality of life.

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