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The Muscle Trap: Supplement Use by Men

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Men are a popular target for supplement marketing — and the marketing often works.

“Muscular dysmorphia” is a growing phenomenon in young males. Usually “body dysmorphic disorder” is associated with females who think they don’t “measure up” to media ideals and feel pressure to be excessively thin like fashion models and celebrities. Normally developed males with muscular dysmorphia feel physically inadequate when compared with the popularized hyper-muscular male physiques of professional athletes, male models, body builders, etc.

It can lead young males, especially, to become compulsive about building muscle. Seeking to alter their body composition or improve their athletic performance, they may spend many hours in the gym and/or experiment with supplements and other substances. It is not unusual for them to try costly and exotic supplements without concern for their safety. They are exceedingly vulnerable to quackery and unscrupulous marketing. Even legitimate nutritional supplements can be misused — the “more is better” attitude can lead to over-use, with negative consequences.

Use of supplements is not confined to athletes, of course. Many people seeking improved health or weight loss may feel that it requires too much effort or time to make lifestyle changes. They become apathetic or look for the “magic bullet,” which makes them easy prey for marketers who offer easy weight loss, fat burning, increased muscle mass, improved energy levels, or better health — all from consuming their specialized pills or powders.

Also, some people are prompted to use supplements due to recently diagnosed medical conditions such as cancer, heart disease, or prostate enlargement. The response varies by gender, however. In one study, women diagnosed with cancer were more than twice as likely to take a new supplement as men. Other studies found that men with prostate cancer were more likely to use supplements if they were white or Asian, more educated,

had a lower BMI, and/or generally pursued healthful behaviors. The most commonly taken supplements appear to be multiple vitamins, antioxidant mixtures, or single supplements of vitamins A, C, D, E or zinc. Older men diagnosed with cancer were less likely than younger men to take a new supplement. Men with a stronger desire for personal control or “internal locus of control” were more likely to use a new supplement. Men with prostate cancer were half as likely to take a new supplement than those with colorectal cancer (Patterson, *et al.*, 2003).

When examining the supplement buying habits of men, as compared to those of women, several differences surface. In general, women tend to purchase more vitamin and mineral supplements, while men lean towards those that supposedly build muscle, improve athletic performance, or reduce the risk of prostate cancer. One study of herbal and specialty supplement use indicated that the most common purchases by men aged 50 to 76 were glucosamine, chondroitin, saw palmetto, garlic pills, and ginkgo biloba (Gunther, 2004). This study also noted that users of specialty supplements tend to be better educated, consume a diet lower in fat, consume more fruits and vegetables, consume less alcohol, are closer to a normal body weight, are more active, and do not smoke.

Male athletes have varying patterns of supplement use but tend to use them more than the general population. Supplement use may start in early adolescence. Interestingly, athletes with better eating habits may be more likely to use supplements, but often these are vitamin/mineral supplements rather than so-called ergogenic aids (performance and body composition enhancers).

In a study of supplement use by men and women in a gymnasium setting, men were much more likely to use protein supplements (61 to 34 percent), creatine (47 to 7 percent), ephedrine products (26 to 13 percent), androstenedione (18 to 3 percent), and anabolic steroids (5 to 0 percent) than women (Kanayama, 2001). The men taking anabolic steroids were more likely to take other supplements. Close to 71 percent of NCAA athletes reportedly take a multiple vitamin.

A study by Krumbach *et al.*, identified a number of reasons male collegiate athletes take supplements, see list below (Krumbach, 1999).

Reasons Male Collegiate Athletes Take Supplements

Results in decreasing order of prevalence were:

- **to increase athletic performance (43 percent)**
- **to increase muscle mass (36 percent),**
- **recommended by family member or friend (31 percent)**
- **to feel better or increase energy (29 percent)**
- **recommended by coach or trainer (25 percent)**
- **to prevent disease (24 percent)**
- **recommended by a nutrition counselor (22 percent)**
- **because of inadequate diet (18 percent)**
- **to decrease illness (14 percent)**
- **recommended by a physician or pharmacist (5 percent)**

When examining where athletes get most of their information about supplements, one study reported as high as 69 percent use popular magazines as a primary media source (Sheppard, 2000). According to the American Council on Science and Health, some popular magazines are improving the quality of the nutrition information they provide, but many of the publications on men's health and fitness supply less credible information. Other media sources often used are the internet and television. A study of NCAA Division 1 athletes reported that 40 percent use supplement information from athletic trainers, 24 percent from strength coaches, and 14 percent from dietitians (Burns, *et al.*, 2004). Recommendations from a friend or family member rank high on the list as a reason for taking a particular supplement. In contrast, university classes and nutritionists were the primary source for women (Jacobson, 2001).

The study by Krumbach *et al.* also identified supplement use by sport. The percent of athletes in each sport taking supplements are listed below.

Supplement Use by Sport
<ul style="list-style-type: none"> • tennis (83 percent) • gymnastics (81 percent) • track and field (71 percent) • baseball (64 percent) • swimming/diving (67 percent) • cross country (58 percent) • football (52 percent) • yell squad/dance team (45 percent) • wrestling (29 percent) • golf (27 percent) • basketball (20 percent)

Surveys indicate that many people believe items from supplement and health food stores are safe and adequately tested. Many athletes that take supplements have not investigated the ingredients, true benefits, or potential risks of the supplements they are taking. Some are unaware as to whether the supplements they are taking contain a substance banned by a major athletic organization, such as the National Collegiate Athletic Association (NCAA) or World Anti-Doping Agency (WADA). Surveys indicate a lot of misunderstanding and misinformation regarding nutrients and supplements by athletes.

Supplements can be divided into several categories — nutritional supplements, weight gain supplements, weight loss aids, and ergogenic aids.

Nutritional supplements can include vitamins, minerals, phytonutrients, antioxidants, and some herbal products. The goal of these is to protect against disease, improve energy levels, improve overall body functions, improve healing, or protect the body from damage. With the newest Dietary Reference Intakes (DRI), the establishment of the Upper Tolerable Limits (UL) implies that there is a range of safe use for most vitamins and minerals. Users should be made aware that more is not better in most cases.

The labels of most weight gain supplements lead us to believe that they contain all the nutrients needed for health. Reminding clients that real foods contain a much broader spectrum of nutritive substances than can be found in man-made products is a hard sell. Additionally, the cost of these powders can break the bank account.

Persons wishing to gain weight should focus instead on eating frequently, eating larger portions, and consuming a variety of calorie- and nutrient-dense foods.

Weight-loss products usually contain an assortment of substances. Until fairly recently, ephedrine/ephedra was a popular ingredient for this purpose. The FDA has since banned the inclusion of this substance (As a central nervous system stimulant, it can cause rapid, irregular heart beat, increased blood pressure, and constriction of blood vessels). In its place are other stimulants that supposedly increase energy levels and metabolism. Some of these on their own are relatively benign for most people, but in combination with other stimulants and for persons with certain medical conditions, they could be hazardous. The bottom line for any long-term weight loss goal is a change in lifestyle habits relative to food intake and physical activity.

Ergogenic aids rise and fall in popularity. Good research studies tend to lag behind their use because the market will allow sales before substances are adequately tested for efficacy and safety. Even if there is a slight chance that a substance will improve performance, many athletes will buy it despite any potential risk.

Unfortunately, athletes and males in particular are brainwashed to believe that the only way to reach their goals is with the help of supplements. They are blinded by the advertised benefits in large print on the label, and fail to read the warnings in small print. Interesting, however, there is now a segment of competitive body builders that pride themselves on achieving amazing physical changes and strength without the use of any supplements or ergogenic aids, even caffeine.

Some of the more popular supplements chosen by males are:

- **Individual amino acids**, such as arginine, glutamine, alanine, and branched chain amino acids (BCAA). Some athletes consume these in an attempt to trigger an increase in growth hormone production, spare muscle glycogen and protein, improve the immune system, and increase insulin. Arginine can possibly stimulate growth hormone but there is great inter-individual variability in the response due to training status, gender, age, diet, etc. In most cases, a benefit occurs at high doses that cause unwanted GI symptoms. Research indicates, however, that in general there is insufficient evidence supporting an increase in growth hormone production from the use of amino acids.

Glutamine and BCAA have shown benefit for the immune system in times of stress, but a supplement may not be needed beyond a healthy diet. They may also be anticatabolic. The total protein in these supplements is much less than what can be consumed in an average serving of a protein food. Taking individual amino acids can also create imbalances and less efficient body performance. Products containing these are not as palatable as real foods and tend to be very expensive.

- **Androstenediol/androstenedione** do not appear to significantly increase muscle strength or size, or increase lean body mass. Both have the potential for unwanted side effects.

- **Beta-hydroxy-beta-methylbutyrate (HMB)** is a derivative of the amino acid leucine. It has been used as an anticatabolic agent to enhance recovery from exercise. Research results differ on its effect on strength and body composition; most show no benefit. Studies suggest that there may be more benefit to untrained rather than trained individuals, but more studies are needed. Long-term side effects are unknown.

- **Bitter orange** (*Citrus aurantium*) contains synephrine, an alpha-adrenergic agonist, which is often used to replace ephedrine in a supplement. It does not appear to cause a significant increase in RMR or heart rate but may cause an increase in blood pressure (less than ephedrine). Intake may be more problematic when combined with other stimulants. No benefit has been shown relative to weight loss.

- **Bovine colostrum** has shown slight benefit to athletes under certain sports conditions, possibly due to enhanced recovery, but more studies need to be done. One study showed it improved spring performance but there was no change in body composition or endurance performance (Hofman, *et al.*, 2002).

- **Caffeine** may help performance when used in high doses by highly trained endurance athletes, possibly due to the release of free fatty acids in the blood which can then be used for fuel. Lower doses or use by less elite athletes will probably show no benefit. It does not appear to benefit power or speed athletes. Possible side effects include a diuretic effect and GI distress.

In addition to coffee, tea and cola, athletes may use guarana (*Paullinia spp.*) and kola nut as caffeine sources. These are synergistic with ephedrine, and are often found in combination in energy or weight loss supplements. Green tea is synergistic with ephedrine and also has antioxidant properties.

- **Chromium picolinate** supplementation appears to assist with blood glucose control in deficient individuals. Studies on athletes show no benefit to performance or body composition. High doses can be toxic.

- **Coenzyme Q10** acts as an antioxidant and is also part of the respiratory chain. Although there may be some minor benefit in some heart disease-related issues, there does not appear to be any benefit to athletes. ••<A supplement may be helpful if the individual is taking medications that lower blood levels (as in statin drugs).>•• Possible side effect of excessive intake is epigastric distress.

- **Conjugated linoleic acid (CLA)** has shown a decrease in body fat and increase in lean muscle mass in animals, but most human studies show no benefit to body composition or energy. Experienced resistance-trained athletes show no ergogenic effect from supplementation. Possible side effects include GI distress and fatigue.

- **Creatine** is a metabolite of arginine. Athletes tend to view creatine as a safe supplement, since it is part of a natural body energy system. Potential benefit is dependent upon age, level of training, type of sport, diet, and dose. Studies indicate it may help performance in short, stop/start activities, but not in endurance activities. Surveys indicate widespread use of this supplement, particularly by males, for the purpose of increasing strength and muscle size. Concern arises from the lack of research regarding long-term use and the practice of overdosing by some athletes. Creatine use by adolescents is similar to that at the collegiate level. This is a concern since there is almost no research that has been done on this younger population.

There are also few studies of creatine used in combination with other substances. The majority of studies suggest it has the potential to increase strength when used with resistance training, especially when combined with a carbohydrate and protein source. A combination that showed possible benefit in one study was alpha lipoic acid, sucrose, and creatine (Burke, 2003).

There is generally weight gain with creatine use which can be attributed to gains in muscle mass and/or fluid retention. In some cases, the weight gain can counter the possible benefit to performance. A recent retrospective study showed no adverse health effects from creatine (Schilling, 2001), nor did a study on football players (Mayhew, 2002). Anecdotal evidence suggests some muscle cramping and GI issues as possible side effects.

- **DHEA** has shown no benefit to healthy athletes. Side effects are unknown but may be androgenic.

- **“Designer steroids”** are actually a form of anabolic steroid that may be missed in traditional drug testing. These may be sold separately or in combination with other supplements.

- **Ephedrine/ephedra** has shown some weight loss potential when combined with caffeine, but this also increases the risk of side effects including death, as noted above.

- **Ginseng** has been tried as an anabolic substance in both resistance training and aerobic exercise, but research does not support this function.

- **Glucosamine sulfate** (a structural component of connective tissue) and chondroitin are two substances being used by those with osteoarthritis. Anecdotal evidence shows some benefit but the Arthritis Foundation is not yet recommending use for this purpose. Glucosamine may reduce pain, improve joint function, and possibly slow degeneration in some individuals. Chondroitin used alone may not be as effective as when coupled with glucosamine. Possible side effects are GI symptoms, drowsiness, headache, and rash.

- **Glycerol** is sometimes used for hyperhydration when athletes are exercising for long periods of time in a hot environment with minimal access to fluids. It allows the body to retain higher than normal fluid levels but does not improve athletic performance. Possible side effects include headache, blurred vision, feelings of stiffness, and may have a laxative effect. It is contraindicated for individuals with diabetes, high blood pressure, congestive heart failure, and renal disease.

- **Human growth hormone** can increase muscle and decrease body fat, but has numerous negative side effects.

- **L-carnitine** is part of a natural body system involving fat transport in the cells. It is made in the body from two amino acids. There is evidence that it may stimulate lipid metabolism and assist in recovery from exercise stress (Karlic and Lohninger, 2004). It is questioned whether dietary L-carnitine is adequate or a supplement is required for the proposed benefit. Possible side effects include diarrhea and fishy breath. The DL-carnitine form can cause muscle weakness.

- **Lycopene** is an antioxidant that has been promoted as reducing the risk of prostate cancer but more clinical trials need to be done. It may also help with exercise-induced asthma.

- **Medium chain triglycerides (MCT oil)** have limited benefit for increased energy and can cause stomach cramping and diarrhea.

- **Protein powders.** Many males believe that more protein means more muscle. They are not aware that excess calories in the form of protein can add unwanted body fat. As in the Atkins Diet, high intake of animal protein is dehydrating, despite high intakes of fluid, which counters athletic performance. Protein from food sources will generally provide a broader range of nutrients than a made-made supplement and are also less expensive.

- **Quercetin** is an antioxidant found naturally in foods such as onions and other vegetables, apples, and wine. It may be used as an aspirin substitute in combination supplements.

- **Ribose** is part of a natural body energy system. Most studies show no benefit in aerobic or endurance activities, or body composition. No side effects known.

- **Saw Palmetto** is an herb advertised to reduce the risk of benign prostatic hyperplasia. It can improve urinary symptoms. Due to lack of standardization of herbal products, however, it is difficult to test its efficacy. Side effects are rare.

- **Sodium bicarbonate** Studies indicate mixed results but suggest it might be helpful in short-term activities (such as sprinting), and may offset fatigue with some high intensity aerobic exercise (such as cycling for an hour)(McNaughton, *et al.*, 1999). Possible side effects include nausea, diarrhea, vomiting.

- **Sports bars and gels** can be fuel extenders and should be used as such and not as a meal replacement. They add calories and carbohydrates but minimal nutrients. As with any supplement used around athletic competition, they should be tested for tolerance outside of the competitive arena.

- **Testosterone precursors, prohormones** (including androstenedione, adrostenediol and DHEA) are another popular ergogenic aid. The concern with these substances is that there is potential for altered estrogen and androgen levels as well as a negative effect on HDL. Credible studies have not shown any performance benefit.

- **Vanadium** has only been studied minimally. Preliminary studies indicate it may enhance insulin action and increase glucose uptake, but does not appear to change body composition. Possible side effects include abdominal pain, loss of appetite, and GI symptoms.

- **Vitamin C** and other antioxidants have been supplemented in an attempt to reduce free radical damage due to exercise. Controversy continues in this debate. It can also help with iron uptake for female athletes at risk for anemia when consumed at the same meal as plant-sources of iron.

- **Whey protein**, used primarily by males, may actually have benefits, according to recent studies (Ha and Zemel, 2003). As a protein source, it contains a high percentage of branched chain amino acids (BCAA) – 26 percent. It's high level of leucine suggests that it may assist in the synthesis of skeletal protein. The amino acid profile is very similar to that of skeletal muscle. Whey is absorbed more quickly than casein, and is also a source of certain immunonutrients that protect the body from infection. Some studies have shown whey protein from milk consumption to be equivocal to the supplemental form.

- **Yohimbine** acts as a stimulant (an alpha-adrenergic receptor antagonist). It can be found in some weight loss products and body building supplements but has a questionable safety. There is also no evidence that it contributes to weight loss.

Research has not supported omega 3-fatty acids, lecithin, and MCT oil as ergogenic aids. The efficacy of an ergogenic aid and its safety depend on the dose, the sport or type of activity, the age or hormonal status of the individual, and the timing of intake. Much more research is necessary, and until research results in tightened regulations, harm from over- or misuse of supplements is a real concern.

Quality and Safety

One of the main concerns about supplement use is the lack of control over the quality of the product. With lack of regulation, supplements may be contaminated by other substances, may not contain the stated amount of the active ingredient, lack standardization of the active ingredient, and may not do what the label claims. Some cases of inadvertent blood doping have occurred due to contaminated combination supplements.

As compared to food sources, with supplements it is easy to take an excessive amount that can cause imbalances or be dangerous. Supplements do not provide the broad spectrum of nutrients provided by healthy foods. Due to the relatively recent use of many supplements, they may have undergone minimal testing to date. Few have been tested in various age categories, by both genders, with varying doses, in combination with other substances, and in different health and fitness situations.

Nutritional supplements may be warranted in the case of known nutrient deficiencies such as in the case of anemia (iron) or for some vegetarians (vitamin B₁₂).

Nutrition counselors should strongly encourage clients to advise their health care professional(s) about any supplements or herbal products they are taking, as some may be contraindicated for certain medical conditions or medications. Users should be alerted to the fact that there may be potential health concerns when certain combinations of supplements are consumed.

The Message

In order to elevate nutrition counselors as a credible resource relative to supplement use, nutrition counselors should seek out what is being advertised in the supplement market. Popular magazines (especially fitness, health, and men's magazines), supplement stores or pharmacies, and internet advertisers of supplements are good places to get ideas. We should also make a habit of obtaining updated information on popular supplements from the research as it becomes available.

Since males are less likely to pursue information from health professionals, nutrition counselors should be more proactive towards males relative to information on supplement use and positive lifestyle changes. This could mean providing written information or speaking engagements for fitness centers, work sites, sports organization meetings, or other meetings where there are a high percentage of males in attendance. For men, interest in sports, fitness, and competitiveness can be used for health promotion.

Also, men's interest in their health changes throughout the life stages and with the onset of acute medical conditions. This means they be more receptive to taking action for their health are different times, so information should be targeted towards all age groups. It also means the information should be geared towards prevention and treatment.

In working with athletes, it is important to keep abreast of the substances banned by various athletic organizations (see Resource list). Steps are also being taken by the FDA and FTC to tighten control over misleading supplement claims.

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Web Resources

- www.acsh.org (American Council on Science and Health – ranks quality of nutrition information in popular magazines)
- <http://ods.od.nih.gov.html> (National Institutes of Health)
- www.consumerlab.com (information on recalls, safety warnings)
- www.naturaldatabase.com (comprehensive information on supplements - effectiveness, safety, etc.)
- www.quackwatch.com (information on bogus products, scams)
- www.supplementwatch.com (information on supplement regulations, problems)
- www.ncaa.org (NCAA banned substance list)
- www.wada-ame.org (World Anti-Doping Agency banned substance list)
- www.usantidoping.org (U.S. Anti-Doping Agency banned substance list)

Examination for MUS08

1. What is the term used to describe the situation where men are driven to increase body size and lean muscle mass for body image purposes?
 - a. anorexia nervosa
 - b. bulimia nervosa
 - c. binge eating disorder
 - d. muscular dysmorphia
2. Where do most males get nutrition information?
 - a. books
 - b. research
 - c. trainers
 - d. nutrition counselors
3. What characteristic is not associated with increased use of specialty supplements?
 - a. smoking
 - b. lower fat diet
 - c. higher intake of fruits and vegetables
 - d. limited intake of alcohol
4. Why might females be less likely to consume ergogenic aids?
 - a. concerned about potential weight gain
 - b. not as interested in gaining large amounts of muscle mass
 - c. more concerned about safety than ergogenic effect
 - d. all of the above
5. What is a potential benefit from the use of whey protein?
 - a. faster absorption than casein
 - b. high percentage of BCAA
 - c. benefits to the immune system
 - d. all of the above
6. What is the possible concern for creatine use?
 - a. lack of long-term studies
 - b. addiction
 - c. liver damage
 - d. ketoacidosis
7. Which of the following supplements appears to be relatively safe and provides possible benefit to performance?
 - a. ephedrine
 - b. creatine
 - c. androstenedione
 - d. DHEA
8. Which two substances are used by men in hope of benefiting the prostate?
 - a. ribose and glutamine
 - b. glucosamine and chondroitin
 - c. lycopene and saw palmetto
 - d. androstenedione and DHEA
9. What do these substances have in common – ephedra, kola nut, green tea, guarana?
 - a. all are recommended supplements
 - b. all improve the immune system
 - c. all are stimulants
 - d. all are banned by the NCAA
10. What is the name of the agency that regulates banned substances for athletes in international competition?
 - a. FDA
 - b. FTC
 - c. NCAA
 - d. WADA

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