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The information in this manual is intended only for healthy men and women. People with health problems should not follow the suggestions without a physician's approval. Before beginning any exercise or dietary program, always consult with your doctor.

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EXERCISE

NUTRITION

The skill of empathizing can be honed by practicing *inner attention.* Focus on things you see, hear, touch and feel in real and imaginary circumstances. Observe your responses and how it feels to solve a problem, to complete everyday activities while past feelings in your daily life are remembered and reenacted mentally, and how those experiences affect the ability to judge and to reason. Did those feelings help or hinder?

Next, practice *external attention* by focusing on people and things around you. Imitate how others behave, their behavior toward exercise or eating, and how those people would respond to particular situations or exercise stimuli and what action they would take as a result.

Motivation

Motivation refers to the conscious or subconscious stimulus for action towards a desired goal provided by psychological or social factors; that which gives purpose or direction to behavior.[7] The direction refers to the goal to be achieved, often based on values, interests, and desires.

Motivation often is a reflection of the individual's personality and interests, and it can be enhanced if he or she is given the appropriate reward. But a strong motivation does not mean a long-lasting motivation. Millions of people each year are highly motivated to develop a fit body and to lose fat, only to succumb to a sense of failure, shame, and laziness; often upon comprehending how much effort it takes to develop such a body.

Since a person's interests and personality direct motivation, the method of exercise chosen likewise will affect motivation. Aerobic activity may appeal to one individual, whereas weight training may appeal to someone else. Even the application and tools or equipment used in an exercise environment can have a bearing on a person's motivation. Some people enjoy weight training, but they may have far less motivation toward using free weights than machines; and the quality of workmanship of the preferred tools can affect motivation further.

It is the level of motivation that largely will determine a person's ability to exercise hard and to sustain desire. Consequently, fitness professionals must realize that their ideals toward exercise may need to be altered when instructing and motivating clients. A person's ideals very well may reflect the "perfect" application of exercise, but if a client does not like those methods, that person will not be motivated to continue to exercise, or exercise as hard as is necessary to obtain his or her goals. Consequently, fitness professionals, as well as those exercising on their own, must discover the interests and motivations that constitute a person's psychological makeup, then prescribe an appropriate exercise program without compromising quality, safety, or a valid application of the fundamental principles (refer to either *Prescribed Exercise* or *Exercise Science: Theory & Practice*).

[7] *Oxford English Dictionary*.

Building motivation[8]

There are five guidelines to building motivation. Situations and personality characteristics in determining program adherence problems must be the first things considered. It is erroneous to suggest that a person "just does not care", or that he lacks motivation. Likewise, it may not be solely the fault of the program. In most instances more than one thing could be at fault. The program must produce enthusiasm so that the individual *can* feel motivated, and this might mean variety, offering periods of both demanding and not-so-demanding workouts, and the individual definitely should experience results.

In that regard, fitness professionals can increase client motivation if clients are allowed to help decide their training programs. A solution is to create various programs involving different exercises, combinations, and strategies that are appropriate for the individual, and while adhering to sound principles of safe and effective exercise. The client can then choose the direction, just as in selecting foods in a diet regimen, that can be changed later if and when necessary. However, many clients will not have any idea of what to choose or why, and so a general explanation of each program will be necessary and only simple decisions should be made by the clients to avoid confusion.

Second, people do have multiple motives to commence exercise, and why a person is interested in exercise should be understood since this data can help direct an exercise approach. Some people may want to be social with others, they may have low self-confidence, or they may need to increase muscular strength and size for a sport, there are many other reasons including general health improvement.[9] On the following page is a Motivational Questionnaire: trainees can rate the importance or reasons why he or she began exercise, or find reasons why they should continue to exercise. The questionnaire can be completed every 6-12 months, and the data analyzed and compared to provide feedback for enhancing motivation and to direct goals.

Competing motives also should be considered. A person may desire to exercise hard and to lose weight, but he may have other goals that require serious commitment, such as becoming a professional musician or studying full time to achieve his Ph.D. Competing motives can create a deep sense of psychological fatigue if a person focuses too much on too many things at one time. Doing so can have a bearing and influence on exercise quality and intensity. There is nothing inappropriate about a person who places greater importance on other activities or interests besides exercise, but goals need to be prioritized. Hence, it may not be realistic to want the best body possible if other goals have taken priority, since the mental and physical effort likely will not be available in order to achieve that goal.

[8] Adapted from *Foundations of Sport and Exercise Psychology*. pp. 65-70.

[9] I started weight training initially because I was self-conscious of my thin physique, besides being in awe of muscular bodybuilders; I wanted to be like them. Today, I still exercise for confidence, to look good, and I relish in the challenge of lifting more weight and improving my physique whenever possible. But, also, and at age 37 at the time of writing this book, I exercise for health reasons. Therefore, my motivation has altered somewhat over the years, and it will likely continue to change as I age.

Muscle Enhancement

This section deals with maximizing lean muscle tissue and is intended for the advanced trainee, since this caliber of individual has the most difficulty in producing further tissue change as a result of adaptation to exercise and nearing a genetic limit. Conversely, beginner and intermediate trainees need not be so stringent in exercise prescription and experimentation to experience regular progress since the strain of exercise remains relatively new and foreign. Regardless, many of the strategies contained herein can be applied to anyone desiring maximized muscle increases in the shortest time possible, including those undertaking a physique transformation (p. 68) and athletes.

Further, it must be realized that building lean muscle tissue is much different from exercising to increase strength, i.e., improved lifting skills relative to the exercises in question. Also, it is much different from pursuing general conditioning to "get in shape", such as performing calisthenics, swimming, jogging, or "light" weight training. The building of muscle takes careful deliberation and strategy, particularly if the goal is to reach one's potential. Although it is likely that most trainees can build some muscle mass from nearly any exercise program, rarely is it considered whether the program is the best possible relative to ability and tolerance. Consequently, if the goal is to maximize results, producing "some" change should not be viewed as ideal.

Demands of exercise

Performing the same exercises, in the same manner, under the same measure of demands seldom will be enough to sustain muscle mass, although the work may be quite vigorous – to momentary muscular failure. The body adapts, and it does so rapidly if not much in a program changes over time. Trainees who continue the same protocol for several months become neuromuscularly proficient at executing the same exercises under similar conditions. The body applies energy in the most productive manner possible and the entire process is controlled by the nervous system that dictates how much energy should be released to accomplish the task. This, in turn, affects the magnitude and speed of muscular contraction and will utilize the minimum of muscle fibers, i.e., only enough to get the job done.

As skills continue to improve (whereby the trainee slowly learns to generate more *overall* bodily tissue and activate more motorneurons to lift a weight), there is less *need* for the target muscles to sustain their size. This occurs partly since maintaining large muscles is not a survival priority and the body desires to keep muscles as small as possible to preserve life-sustaining energy – to be only as large as necessary in order to cope with the demands experienced. Hence, if the neurological system can sustain and coordinate an ever increasing (albeit slowly) amount of work better, muscles need not adapt to become larger, or even maintain what has been established previously.

Growth and strength do not always correlate

There is a difference between muscle strength and size, although both directly relate to one another. As a muscle becomes larger, it becomes stronger, since its larger cross sectional area produces more force. Likewise, as a muscle becomes stronger it can lift more weight, or it can lift the same weight for a longer period of time, a factor that increases metabolic overload *possibly* to stimulate further muscular increases.

Strength (lifting ability), however, can increase without size being stimulated. This particularly is evident with advanced trainees who have reached a genetic limit in muscle size, but who can continue to lift progressively heavier weights through sheer volition and adaptive coordination, viz., learning to integrate more muscles or muscle mass and to use better leverage to lift a weight.

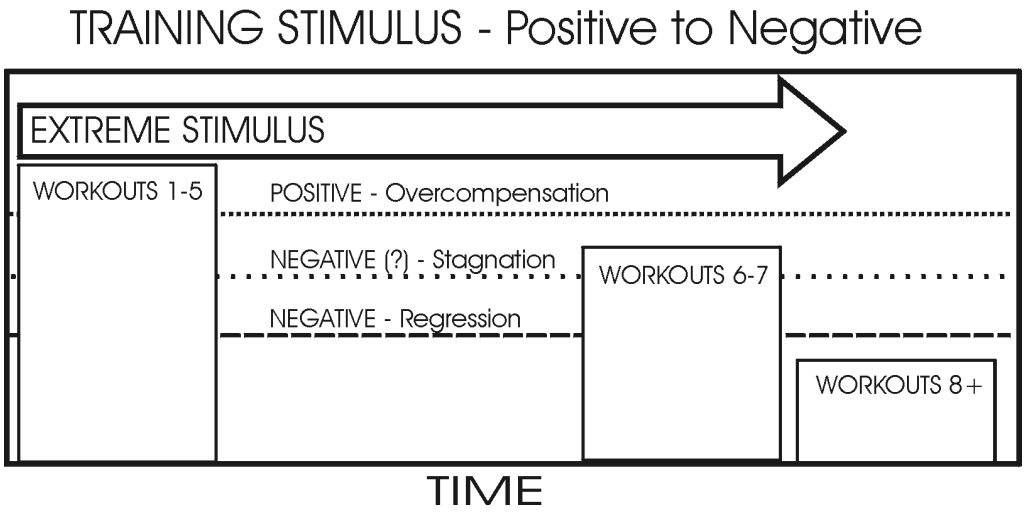
Moreover, from my observations over two decades, stimulating muscular growth requires a more "unusual" form of strain to progress toward a genetic peak: a strain beyond simple muscle overload with more weight or tension time while keeping other factors constant. It is like comparing an "irritation" to an "agitation". The muscles must be agitated and forced to grow, whereas an irritation may be enough to only sustain current development. This means that the body quickly adapts to exercise and an alteration in the mode of attack or strategy must be present to shift from irritation to agitation. For example, if calf raises are performed regularly for 12-15 repetitions of straight sets (no set variables), eventually it will be necessary to perform strip sets, forced reps, negatives, or perhaps a different rep range (one that reflects the individual's rate of fatigue) in order to shock the calves. A change in exercises also can help, although this direction has its limitations since only so many "good" or effective exercises exist.

Yet even with a new and challenging stimulus, the body quickly adapts within 4-5 workouts, leading to lack of improvement. This is not speculation or a hypothesis, but a phenomenon that can be observed by any advanced trainee. Now, considering that adaptation occurs so quickly with a change in program design, it should be obvious that growth retardation is inevitable if a program does not change at all.

However, if the strain of a new strategy is too demanding for too long, overtraining can take hold (see diagram below). In other words, the less demanding an exercise program, the longer it can be maintained without negative consequences. This premise logically follows from the theory of the General Adaptation Syndrome (see free GAS download in the articles section at www.IARTonline.ca), beginning with a general alarm reaction (shock), stage of resistance (adaptation/growth), then finally the stage of exhaustion (overtraining/atrophy from *too much* shock/agitation at the extreme for *too long*). Ironically, that which produces gains (unusual demands) can result in regression, and a fine balance must be established between stimulus and over-stimulus relative to the time factor.

(Even if the stimulus was not too extreme over the long-term, the fact remains that the body will adapt eventually, since the new program then becomes "typical". Adaptation to a new program would not mean necessarily that the trainee needs to increase the demands even more, but that the nature of the demands would need to change in order to challenge homeostasis once again.)

Hence, if the goal is to increase exercise demands to a level that disrupts homeostasis, thereby resulting in an increase in lean muscle mass, the importance of cycling training demands should be obvious. A muscle building strategy is analogous to an army attacking quickly and brutally, then retreating before opposing forces (systemic fatigue) retaliate. This pattern then should be repeated in a cyclic fashion relative and appropriate to the individual.



Adaptive coordination – strength without size

Introduction

Everyday movements are constrained to optimize metabolic economy, i.e. the capacity to convert chemical energy to mechanical work. This constraint occurs subconsciously since few people strive to make any task harder than it needs to be. Moreover, when unconstrained, people automatically select the least costly behaviors that satisfy the goal in question. Vacuuming, for example, may feel awkward and hard on the lower back, at first, until the individual learns to hold a new posture to accommodate the vacuum cleaner's dimensions and skillfully use momentum to push the vacuum cleaner's handle back and forth effectively. It is unlikely that anyone would bend forward ninety degrees with arms locked in a straight position and waddle back and forth in order to vacuum.

The more muscle tissue in use, the greater the expenditure of energy, including glycogen, oxygen, fatty acids, and amino acids. The magnitude of this expenditure results in a greater potential for tissue damage and oxidation, and more recovery time is required to replenish lost resources and to produce an adaptive response before muscles are capable of further exercise at near peak levels. Consequently, from an evolutionary and survivalist standpoint, it makes sense that the body *strives to conserve*.

The efficiency (work output per unit of energy cost) of muscular activity, via motor control that affects the least amount of muscle fibers, makes it possible for humans to sustain activities for long periods without refueling or tiring. Doing so reserves that much more energy for other biological functions, including recovery from demanding exercise.

Hence, the body conserves energy, and this is one of the central nervous system's (CNS) main objectives, by being able to produce increasingly greater work relative to an increase of acquired skill, i.e., a trainee learns to lift more through improved skill of movement rather than increasing tissue size. And more skill results in greater output at the same or less metabolic energy costs.

Skill can adapt and change as trainees implement greater poundages by utilizing better angles or changes in body positioning in order to maximize the ability to lift more with the least amount of muscle tissue (known as the *principle of least effort*). Consequently, muscle effort, metabolic energy expenditure, and total muscle activity will reduce as skill of movement improves. Therefore, it is possible to perform more work with less energy and fewer muscle fibers. This is likely why many trainees who undertake "consolidation" programs consisting of too few exercises, exercise choices, and total work volume slowly atrophy in muscle size although they continue to improve in lifting ability. Doing too little just does not provide enough reason for the body to sustain that which was developed from doing more (with all other factors remaining equal).

Hence, reducing muscle activity increases metabolic economy and movement accuracy. This means a greater burden on the nervous system (to instruct as few motor units and muscle fibers as possible and to establish the most cost efficient neurological pattern) while improving mechanical flow of body part positioning/involvement and coordination. This also means less need for muscle fiber activation within targeted muscles. Hence, the more frequently one practices a movement in the same manner, the more one minimizes energy cost and the more frequently and longer one can carry out the practice.

Practice has much to do with accuracy, a factor that includes proper positioning of body parts and coordinating the movement to shift strain fluently from muscle group to muscle group, thus maximizing energetics. Of equal relevancy is **intersegmental dynamics**, or the energy flow into and out of a segment (muscle). Also, the extent of how a segment is affected within the system is dependent further on how an adjoining muscle shifts strain to the segment, which then can alter the energy and directional flow within the segment. Moreover, work efficiency aims to remove internal work when a muscle unloads, or unloads to a point whereat the strain can be shifted to the bones, joints and larger muscle groups. Unfortunately, the shifting and reduction of strain reduces the stimulus necessary to produce an alarm reaction sufficient to enhance muscle size. Regardless, this *is* a goal of the CNS during physical exertion.

Muscles are, after all, machines and they work in the most economical manner possible, dependent on their intrinsic and extrinsic constraints, including physical and environmental factors, and the trainee's mental application to producing force. And it is these intrinsic and extrinsic factors that determine movement patterns and subsequent ability in performance goals. Hence, with continual practice, movement patterns are refined and internal mechanical work required to coordinate and control body parts and to produce force decreases (at least within reason and within certain limitations).

There even may exist a behavioral change in lifting skills whereby a trainee compromises energy expenditure for movement accuracy, or vice versa, until the two integrate. Often this is the case as a trainee learns a new exercise movement or lifting technique; he will utilize excess energy to perform a set until the "groove" or "flow" has been established. Then, far less energy is allocated to complete the same task next workout, but with a greater weight. The opposite may exist as a trainee exercises very sloppily, allowing stored energy torque and bouncing to dominate in order to handle more weight and to accommodate inadequate and current strength ability.

Often improvement in mechanics (sway, lean, torque, increased auxiliary body part involvement, more favorable positioning) occur and change slowly over time without the knowledge or awareness of the trainee. Fine motor skills improve gradually as tension in auxiliary body parts is increased, while changes in technique rectify the biochemical and biomechanical obstacles of energy and leverage limitations. Many trainees whose goal it is to lift progressively more weight avoid machine training, not because free weights are superior to build muscle or strength, but because it is more difficult to increase weights as a result of machines' restrictive training environment. Machines simply make it harder to alter body mechanics in order to improve leverage.

Also, most trainees prefer exercises that favor or compliment *their* mechanics, choosing movements that allow them to excel, as their short arms, legs, or other mechanical advantages permit them to lift increasingly heavier weights in a very economical manner. Complimentary exercise selection, however, is not ideal for maximizing muscle mass, but to maximize lifting proficiency, a direction which is ideal for strength athletes, such as powerlifters, but not bodybuilders focusing on building muscle.

Maximizing energy expenditure, via movement economy (the metabolic cost of actions), is a consequence of evolutionary adaptation. Consider the difficulty a baby has when first walking, and that continual practice eventually allows the child to walk with no difficulty and for long periods. Once the skills of running have been learned, the transition from a walking to a running pace becomes automatic, utilizing the least energy to move to and to accommodate the faster rhythm of movement and altered mechanical stride.

Reducing muscle activation to enhance skill and fluidity of movement is practical for sports, particularly those requiring great agility. Even powerlifting and Olympic lifting, as well as strongman competitors, necessitate the best cost/benefit ratio of generating the greatest force with the least energy – to discover the best leverage and mechanics.

But, as stated, reduced muscle activation is a state that must be avoided when attempting to maximize lean muscle mass. It must not be the goal of the bodybuilder. There certainly is nothing wrong with getting stronger, since it is a benefit of resistance exercise, but it must not be the sole objective or a means to an end when the focus is on muscle building. Strength will develop regardless (and as muscles grow), but becoming more proficient at the exercises implemented will not always yield additional muscle mass, particularly as the trainee becomes more experienced and accustomed to exercise.

Bodybuilders want their muscles to adapt by becoming larger, but they do not want their muscles to adapt to the stimulus that is responsible for the response. Once this level and type of adaptation has been reached, the program loses value, if the value or goal is to improve muscle mass. As addressed, that which the muscles can tolerate (an environment in which they can exist over the long term and have adapted to) is insufficient to produce change. It is a *new* environment, of *greater* or *different* demands, that results in muscle growth. Adding some weight to an exercise is not always a new environment, since the adapted level of lifting proficiency can often accommodate an overload of a few pounds of added weight.

As stated, maintaining the same program for too long encourages extreme adaptation, making the trainee more proficient with particular exercises, performed in a certain manner, without consequent muscular change. On this basis, it could be stated that trainees do not become stronger necessarily although they can lift more weight. Improvement in strength is the result of tissue *change*, such as the production of larger muscles, or improvement and maximization in neurological patterning. In effect, the architecture of tissues is modified, thereby causing alteration of producible forces. If a change occurs, there exists tissue adaptation. If a change does not occur, there exists **attunement**, or the (improved) harmonization of intrinsic and extrinsic factors that allow a trainee to lift more weight or for more reps/tension time. This could be the result of better coordination or tension/energy transfer rather than the establishment of a new or improved neurological pattern or an increase in lean tissue.

Muscle mass change is not, as a consequence, automatic if the potential change is based on the fact that more weight can be lifted. An increase in muscle may occur, and if so it will occur within hours or days of a workout, but an increase in muscle does not always happen or need to happen for the body to adapt to the use of heavier weights. The body prefers to fortify neurological functioning and mechanical ability or skill if it means it can limit muscle size and exist within similar or reduced metabolic boundaries.

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It should be noted that neurological efficiency is not something that should or can be avoided with bodybuilders. Obviously, there always will exist some measure of neurological efficiency, no matter how hard one tries to agitate the muscles in order to overcome muscle complacency. The idea is to reduce the role of body efficiency as much as possible in order to maximize lean muscle mass, thereby allowing strength to occur as an afterthought and to develop accordingly.

Unit Three

Nutrition Application

The Greatest Confusion of All

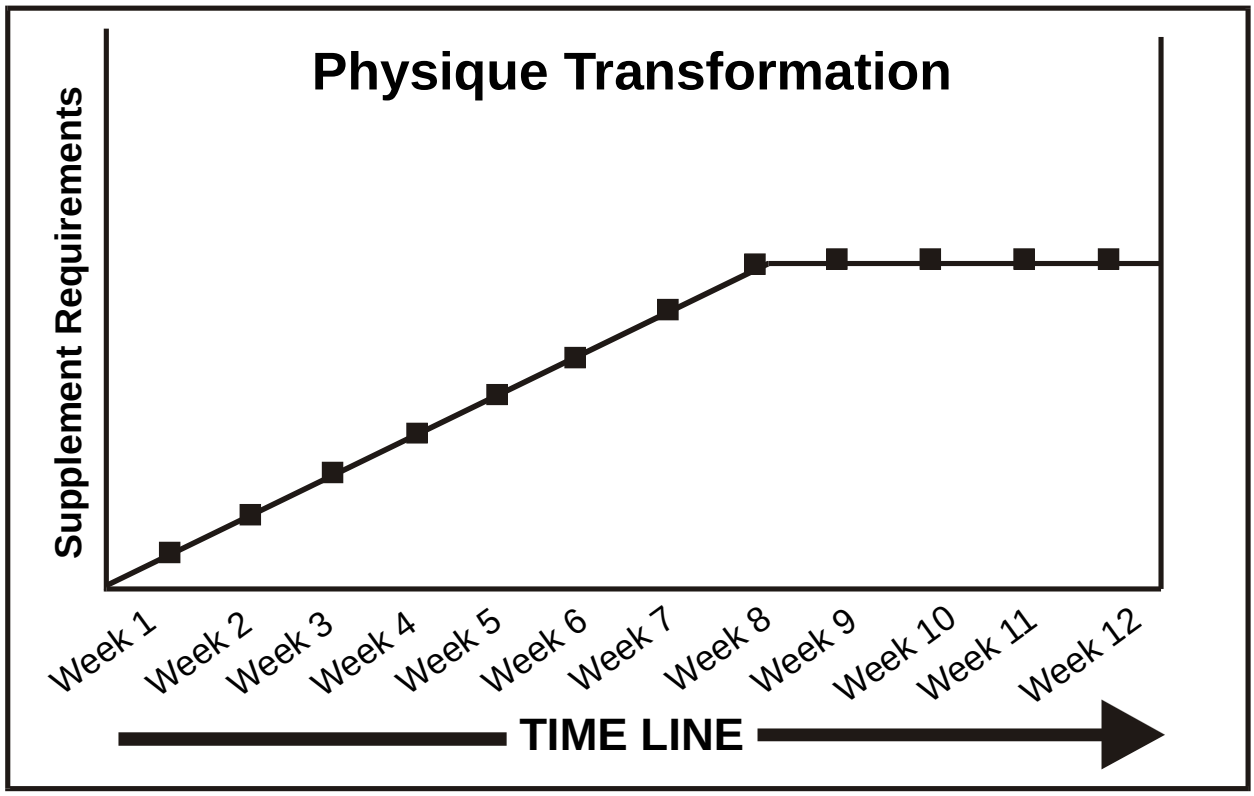
There is greater mysticism that surrounds nutrition than exercise. With exercise, it is ideal to perform what is necessary to produce an optimum response (in accordance to one's goals). With nutrition and supplementation, the guidelines vary in accordance to how well or poorly constructed is the exercise program. Then, the effects different foods, supplements and macronutrients have on an individual's system must be considered, and a host of other factors that complicate dietary requirements, and this makes it difficult to offer universal parameters in which to follow.

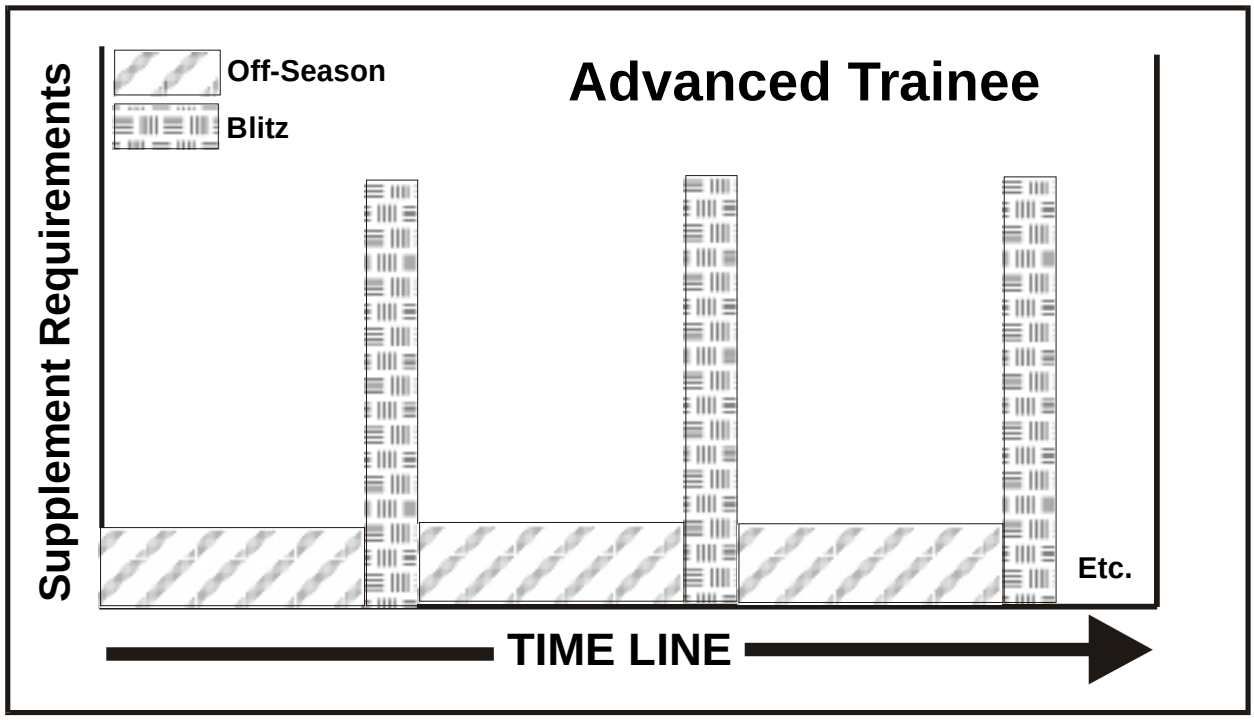
After I sifted through several books on nutrition and supplements, I discovered that in nearly every instance of dietary recommendations, reference was made to extremely hard workouts based on volume and frequency. For example, Study A would address how athletes might need branched-chain amino acids since their stores quickly depleted after several consecutive two-hour bouts of exercise. In Study B, involving marathon off-season running of 5-6 days a week, glutamine stores dropped significantly after four weeks, and this affected immune response; consequently, it might be in an athlete's best interest to supplement with 10-20 grams of glutamine daily.

The pattern should be obvious: If a trainee was deficient in vitamin C, consumption of vitamin C will improve his health. If a trainee is not deficient in vitamin C, mega-dosage consumption will do very little since his body has all the vitamin C it can handle and is required to perform bodily functions. This is not to suggest that government standards for vitamin C or other micronutrients are appropriate but, rather, that once a person reaches a threshold of optimum nutrient intake (whatever that may be), additional amounts are not beneficial. If is unlikely that the nutrient amounts, as dictated by most studies that involve athletes, are applicable if the reader follows the exercise guidelines in this book.

Moreover, several supplement manufacturers include additional ingredients to make their ingredient list look more extensive and beneficial. However, often the ingredients are in such low dosages that they offer no benefit or are incapable to produce a health or performance benefit. That, after all, is what athletes are after – a noticeable and perceivable benefit. Otherwise, why take supplements?

Excess nutrient consumption and mega-dosing the diet with various supplements may not always be harmful, but it can cause the body to adapt to those dosages and those supplements. The consequence is negation of any possible benefit to optimize physical condition when in need. An example is the use of creatine monohydrate in off-season, when exercise is easier. Trainees can handle off-season exercise of reduced demands and they can recover from those demands sufficiently. Therefore, there isn't a need to use the supplement at that time. Consequently, nutrition should be cycled similar to exercise, with the greatest requirements at the more extreme periods of exercise.


Physique Transformation
Supplement Requirements
Week 1
Week 2
Week 3
Week 4
Week 5
Week 6
Week 7
Week 8
Week 9
Week 10
Week 11
Week 12
TIME LINE


Off-Season
Blitz
Advanced Trainee
Supplement Requirements
Etc.
TIME LINE

Moreover, if a person trains PROPERLY, he should never approach overtraining and will never require the dosages that studies suggest endurance athletes need to battle chronic fatigue, and to meet energy demands. With short bouts of blitz hyper-training (i.e., physique transformations and advanced peak conditioning) supplements can definitely provide an edge in recovery and to build lean mass, but only at those times and not year round.

Within this chapter the reader will find logical dietary applications in accordance to needs, but without a diet provided per se. The right food choices, caloric intake, and supplement choices will be each person's responsibility (refer to *Nutrition Protocol*, available at www.iartonline.ca). Also included are supplement suggestions of what is appropriate in accordance to proper exercise guidelines, in that the reader will not be training for 2+ hours, 5-6 days a week. The guidelines are further based on my experience and knowledge, of what *appears* to be fact as opposed what some supplement manufacturers' *wish* to be fact. Do note that the recommended supplement dosages are not carved into stone. A particular measure of caffeine, for example, may affect one person much differently than someone else. Consequently, each person will need to experiment to determine what measure provides an appropriate effect.

Furthermore, each person must determine what supplements are worth taking based on their perceived effectiveness, safety, and ethical and legal consequences (e.g., most sports organizations have banned ephedrine). Effectiveness is relative to the Principle of Diminishing Returns; how much can one increase the dosage of a supplement before further benefit is no longer perceived. This is a factor that must be considered in both exercise and nutrition – how much is necessary to get the job done (to obtain a goal), and where is the cutoff point where further stimulation/nutrition produces no further result?

The use of creatine monohydrate as an example, this supplement does little for me unless I overreach my limits in a blitz cycle – and only then can I feel the effects of it helping to sustain my energy and to enhance recovery. This is because creatine and ATP stores are challenged by a volume and frequency increase in a blitz. Conversely, in the off-season, I train less frequently with less volume and I reserve some mental focus/arousal. Consequently, any attempt to raise creatine levels above that which easily accommodates off-season exercise requirements is illogical.

Also, the reader must bear in mind that any substance that affects living matter has the potential to be toxic if taken in excess. What can help us sustain optimum health can also cause us to become ill or cause disease e.g., taking 20 aspirin for a headache, or too many calories in the diet. Twenty aspirin do not work any better than 2-3 aspirin. And beyond 'x' calories to sustain weight or to promote growth, fat stores increase and place a burden on the heart and arteries. There seems to be plenty of supportive research on the benefits of certain supplements but with little data on long-term effects of over-consumption. That is why, primarily, supplements should be cycled when they are needed most or when they would produce the best benefit, and this means in *times of greatest stress and exercise demands.*

Further, there is the issue of who to trust and what to believe. It is difficult to endorse many supplements, regardless of what trainees contend (that includes bogus studies that do not account for some test subjects' genetics and motivation to produce superior results than in other test subjects), and in light of so much conflicting data.