AMERICAN MUSCLE & FITNESS

STRENGTH AND CONDITIONING

CERTIFICATION PROGRAM

TRAINER'S MANUAL

BY

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MANUAL

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INTRODUCTION

Welcome to the American Muscle and Fitness condensed Strength and Conditioning Trainer Certification Program. Strength & conditioning clients are defined as athletes who are training for specific improvements in their sports. Training athletes is more complex than training fitness clients and requires precise strategies for performance enhancement. Your job is to elicit motivation, dedication and hard work from the athlete while providing the best available training systems. **You should already be intimately familiar with the basics of exercise, because you have been weightlifting for a number of years yourself, to get the most out of this course.** It is designed to be combined with your own life experiences and continued ongoing study to be most beneficial to you. Many excellent reference books have been written on strength and conditioning concepts that will help continue your education. Contained within this manual are specific sports strength & conditioning concepts, routines and diets for you to apply to your clients' sports programs.

Note that bodybuilding training is not covered in this course. Bodybuilding is included in the AMFPT Personal Trainer & Master Trainer courses.

A coach's desire is that his team members would extend work outs to the off-season so that they would be ready for the next round of competition, but most athletes relax after the contests end and wait for next year's training camp. If they do train it is based on an outdated weightlifting handout that the coach found in a drawer, which means they are probably not lifting correctly or frequently enough to develop. Some athletes may not even understand the value of a proper strength & conditioning program and overtraining syndrome or injuries can result from their lack of good advice. Working with a certified Strength & Conditioning Trainer will provide the requisite guidance for maximizing the athlete's potential and win ratio on the playing field, while minimizing overtraining and injury potential.

In this modern era, coaches and athletes now realize that excelling at sports requires year-round dedication and commitment by the athlete, which necessitates additional work with you, the Strength & Conditioning Trainer. Training phases are categorized as off-season, pre-season, and in-season periods. **Randomized periodization based on Han Selye's General Adaptation to Stress (GAS) theory will be the overarching principle guiding your clients' training protocol.** A menu of training techniques will be outlined for each sport. In addition to proper exercise regimens, developing a strong work ethic and a positive mental attitude are factors that will lead to success for your clients. You will train them to improve physically while building intensity into their workouts. The material presented in this manual will introduce strategies for benefiting all of your athlete customers. Further topics introduced are muscle function, anatomy, rehabilitating injuries and overtraining.

YOUR ROLE AS TRAINER

Showing you how to achieve your athlete clients' sports goals safely and quickly is the primary purpose of this training manual. It is designed to take your Strength and Conditioning training expertise to a specific group; high school, college and professional athletes, and to give you ideas for expanding your services as a personal trainer to athletes with the best training information available. The standard training protocol contained here applies to any age group. Athletes can begin training with you in the 9th grade with a parent's consent, or you may decide to train 18 and older clients for liability reasons. Any client with a little motivation plus your guidance will improve.

The difference between athletes and the rest of the fitness population is that they require a more specifically focused, structured and intense training approach than the average keep-fit client. Emphasize to your clients that consistency is the key to excellence when it comes to training. Missed workouts are missed opportunities for winning, so condition your clients to train even when they don't feel like it (not if they are injured or ill), and to get back under the squat bar before they catch their breath. Their opponents on the field will not allow them rest before attacking again.

Although you are a fitness technician and will not be diagnosing injuries or illnesses, prescribing medicines, testing blood pressure or prescribing diets, you will be providing competent advice and safe instruction about standard tried and true exercise, diet and sports supplementation principles. You may also be applying specialized training approaches like plyometrics, or fresh, innovative training techniques to help your customers into the winner's circle. After studying this manual you should be able to recommend a precise exercise routine or diet for any athlete. The principles presented here will provide you with the right answers to apply to any client's program regardless of their sport.

A professional Strength and Conditioning trainer wears many hats. Always coach first, clients come to rely on him or her as a friend, confidant, psychologist, technician, problem solver, time manager, and businessperson. You are in business to make money and once you get started your current customers must become a constant source of referrals for new business. Your professionalism and your clients' excellent results will speak volumes about your expertise. When fans start to notice your client's win record, naturally the athlete will brag about the great trainer they have found and the wonderful job that you have been doing for them. Your business will grow quickly. Athlete clients tend to be more dedicated and loyal than mainstream clients are, so they will also relate any negative experiences. Your business can go down the drain in a hurry if word gets out that you're negative, overbearing or miss appointments, especially if you are training a group of clients in the same gym or on the same team. Always do the right thing, and be especially aware of your language and actions. **Never swear**, **curse or make statements that can be perceived as sexual harassment,** especially in today's litigation crazy world. Athletes that come to you may be very focused and accustomed to verbal abuse from coaches, but your job is to give them positive motivation, not negative. Put new clients at ease and never talk down to, or belittle anyone you train.

QUALITY OF CARE

As a Strength and Conditioning Trainer your customer's quality of care is of paramount importance. Never discuss steroids with your clients and never administer injections or medications, actions that are felonies. Athletes will generally demonstrate greater tolerance for exercise, and enthusiasm for hard work because of their sports background. While this is true, you must make injury prevention a priority. Athletes are well able to tolerate vigorous exercise after a brief break in period, and some of your sports clients may achieve or exceed their sports goals because of the guidance you provide. Pay attention and listen to feedback as your client exercises. If there is sudden unusual pain or a popping sound cease all exercise immediately and determine if medical attention is warranted. If an injury occurs, do not attempt to diagnose it. Recommend that a doctor diagnose the problem. On the other hand, delayed onset muscle soreness that occurs 24-48 hours after training is common and can be alleviated by a warm bath and over the counter anti-inflammatory agent like aspirin.

INSURANCE & LIABILITY

In order to determine an athlete client's readiness for physical exercise, it is especially important that they fill out a health questionnaire and waver before you train them (see below). You can make copies of the one below and have your clients fill it out. Just add their name and your name. The completed form should be kept in your files. Always protect yourself from any potential legal suit by purchasing a good insurance policy in case something does go wrong. The cost is $150 annually for a $1,000,000 policy. For insurance you can go to http://personaltrainerinsurance.com/ for more information and a policy. Let your insurance agent know that each customer fills out a waiver form and health questionnaire. Read the waiver to each client and go over it with him or her or it may not be considered valid in court if you ever have to go. Use common sense in every situation and if you think someone is going to cause a problem in the long run decline to take that person as a customer. There are plenty of people who will want to be trained by you and you won't have to explain to a potential new client about a negative rumor they heard. That would start your relationship off on the wrong foot. Remember that your athlete customers will quickly become lifelong friends.

FIRST AID & CPR

Another aspect of a Strength and Conditioning Trainer's responsibility is to take a CPR course and know basic first aid. If someone does have a cardiovascular accident, you may be able to help him (always call 911 in case of a medical emergency). It is recommend that you take a CPR class for your athlete client's benefit. You'll probably never have to use it. If a client develops a minor muscle strain or excessive soreness the recovery formula is RICE -- rest, ice, elevation and compression for the sore area. After completing this certification course, you will be able to train any athlete with confidence and in safety.

QUESTIONNAIRES

Below are questionnaires to help determine exactly what your athlete client's needs are so that you can dial in their training at the initial consultation. Some trainers also offer a fit test and health screening questionnaire at the first session and charge $60 for the complete check up. You may wish to include a similar service. After the first few weeks have the client fill out the follow up questionnaire. By then you should have seen a great improvement in their endurance and strength and you can make adjustments if necessary. If progress has not been rapid, suggest that the client increase the amount of sessions per week with you.

Here are the questionnaires that your athlete clients should fill out and sign. The first one should be filled out during your initial conversations with the customer. Read each question to the client and make sure they understand it. Have them tell you the answer verbally, then let them circle the appropriate answer.

The second assessment form should be used as a measuring stick after several weeks of training to determine whether or not you are meeting the client's expectations. Sometimes athletes may not feel comfortable telling you that they don't like some aspect of their training because they like you, but you may lose them if the issues are not addressed, and you will be unaware there is a problem until they suddenly stop showing up for sessions. That's the hard way to find out they are not happy, so use these assessment sheets and administer them frequently.

The feedback from questionnaires can help guide the direction of your training. Regularly benchmark the client's progress by testing limit or endurance strength and recording the statistics for comparison. If the athlete is ill or injured, suspend benchmarking until they are back up to 100%. If someone is not progressing, be flexible and either increase or decrease the volume or intensity. You can also shuffle exercises, pace and sequence.

READ THE PHYSICAL ACTIVITY QUESTIONNAIRE AND WAIVER FORM OUT LOUD TO THE CLIENT AS HE OR SHE FILLS IT OUT.

PHYSICAL ACTIVITY QUESTIONNAIRE FOR:_____

READ CAREFULLY AND CIRCLE YES OR NO IF IT APPLIES TO YOU.

YES NO 1. HAS YOUR DOCTOR EVER TOLD YOU HAVE HEART TROUBLE?

YES NO 2. DO YOU FREQUENTLY HAVE PAINS IN YOUR HEART OR CHEST?

YES NO 3. DO YOU OFTEN FEEL FAINT OR HAVE SPELLS OF DIZZINESS?

YES NO 4. HAS A DR. EVER SAID YOUR BLOOD PRESSURE WAS TOO HIGH?

YES NO 5. HAS YOUR DR. EVER TOLD YOU THAT YOU HAVE A JOINT OR BONE PROBLEM, LIKE ARTHRITIS, THAT CAN BE AGGRAVATED BY EXERCISE?

YES NO 6. DO YOU HAVE BACK OR NECK PROBLEMS?

YES NO 7. IS THERE A GOOD PHYSICAL OR PSYCHOLOGICAL REASON NOT MENTIONED HERE WHY YOU SHOULD NOT FOLLOW AN ACTIVITY PROGRAM IF YOU WANTED TO?

YES NO 8. ARE YOU OVER AGE 65 AND NOT ACCUSTOMED TO PHYSICAL EXERCISE?

IF YOU ANSWERED:

YES TO ONE OR MORE QUESTIONS:

If you haven't recently done so, consult with your doctor by phone or in person, before increasing your activity level! Tell him what questions you answered yes to on survey. After medical evaluation, seek advice from your doctor as to your suitability for: unrestricted physical activity, probably on a gradually increasing basis; restricted or supervised activity to suit your needs, at least initially. If your doctor is aware of the problem, put your initials and a note next to the question(s) you answered "yes" to, explaining why it is OK to proceed with caution.

NO TO ALL QUESTIONS:

If you answered accurately, you have reasonable assurance of your present suitability for: a graduated exercise program. If you have a temporary minor illness, like a cold, postpone increased activity.

WAIVER/RELEASE FORM

YOU AGREE TO THE TERMS OF THIS RELEASE FORM. TRAINING AND EXERCISE IS A STRENUOUS ACTIVITY. YOU, THE GUEST/CLIENT/MEMBER, ARE AWARE THAT YOU ARE ENGAGING IN PHYSICAL EXERCISE AND THAT THE USE OF EQUIPMENT, TRAINING AND INSTRUCTION, COULD CAUSE INJURY TO YOU. YOU ARE VOLUNTARILY PARTICIPATING IN THESE ACTIVITIES AND ASSUME ALL RISKS OF INJURY THAT MIGHT RESULT. YOU AGREE TO WAIVE ANY CLAIMS OR RIGHTS YOU MIGHT OTHERWISE HAVE TO SUE _____, OR ANY AGENT, EMPLOYEES OR INSTRUCTORS, OR _____, FOR INJURY TO YOU AS A RESULT OF THESE ACTIVITIES. IT IS ALWAYS ADVISABLE AND RECOMMENDED TO CONSULT YOUR PHYSICIAN BEFORE UNDERTAKING THIS OR ANY EXERCISE PROGRAM.

SIGNED (PARTICIPANT):_____DATE:_____

ADMINISTERED BY:

EVALUATION

You must perform a baseline evaluation test at the beginning of your client's strength and/or conditioning phase. On the performance report sheet keep record of initial strength levels in limit lifts, speed times, endurance activities, agility movements and any other relevant data that gauges your client's capability. You will be able to determine the client's maximum aptitude for each category so that you can benchmark those figures against your client's future tests, which should be scheduled every two weeks. You can apply information obtained from the initial test to help define areas to specialize on like skill, strength, speed or agility. Here is a form that you can use and modify when testing your clients. **Note that the performance tests will be different for endurance athletes who must avoid explosive movements, but will be doing long duration exercises and sets.** Their track time is the overall test indicator along with the high rep weightlifting routine.

Defining both the sport and the athlete position of function is required for creating a result producing training program that ascertains which muscle groups are used and the *type* of muscular contraction employed. Those are the primary requirements for selecting the correct training system to administer. Muscle contractions and movements are classified as either positive (raising a weight like throwing or swinging a baseball bat), negative (lowering a weight like wrestling) or isometric (pushing against an immovable object like a lineman). Note whether your client is an aerobic or anaerobic athlete and what muscle fiber type is relevant to his or her sport, fast or slow twitch. Assess the athlete's current strength and conditioning levels and goals, and set a timeline for competition dates that the client must prepare for. This will help you create a roadmap for the client's strength & conditioning program based on the information presented in this guide.

TRAINING ASSESSMENT FORM

Date: Training Goals:

By (Date):

Are you already on a sport training routine? (Circle One) Yes No Never trained

If so, please describe your current training routine including exercises, sets, reps, cardio work, hours per day and days per week:

What is your competition schedule? List all dates:

How much time can you devote to strength training each week?

_____ Hours _____Days

Are you willing to follow all instructions to the letter for 12-16 weeks in order to achieve your goals?

Did you know that proper nutrition and supplementation could be 80% responsible for athletic success? Yes No

What service do you expect from a strength and conditioning trainer?

PERFORMANCE REPORT ANALYSIS

FOR: _____Date: _____

Bench Press _____

Squat _____

Squat Thrust _____

10 Yard Dash Time _____

40 Yard Dash Time _____

100 Yard Dash Time _____

1 Mile Run Time _____

Cone Course _____

Side Step _____

ADDITIONAL TESTS:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

TRAINING REVIEW SHEET

Do you feel like you're getting the results you want from your training? Yes no

If not, what direction do you feel we should move in? (Example: more motivational talks, new exercises, etc.)

What do you like about your training program (example: pace, exercises etc.)?

What do you dislike about your training?

What would you like to change in your workout?

What do you wish to keep the same?

What areas do you feel you would like to focus on?

Do you prefer spontaneity or a routine that you can settle into?

List any "must" or "must not" do's:

What other service would you like from your strength and conditioning trainer?

Suggestions:

STRENGTH & CONDITIONING

Strength is the ability to apply maximum force to an object.

Conditioning is the ability to maintain maximum effort for the duration of the event.

The structured strength & conditioning training program should be implemented during the off season three months prior to the beginning of the regular season. If the client participates in a sport all year round, the athlete's program should take place during the three months preceding a major event.

Your clients' training routines will include sports specific resistance training, flexibility and core training for the abdominals, obliques & lower back along with sports nutrition and supplementation. Strength and speed sports training may also include SAQ (Speed, Agility and Quickness) drills, footwork, balance, hand eye coordination, and plyometrics. These techniques and routines will be outlined later.

Exercise initiates a ***stimulus response*** in the body. By stressing the muscular and nervous systems the body will adapt (during rest periods) by growing stronger and increasing its ability to withstand future stress (stimulus). The workload must progressively increase in order to continue the adaptation process (progressive resistance training).

You will be training three basic types of athletes: Strength Athletes, Endurance Athletes, and Precision Athletes (or a combination of all three modalities). The basic concepts that a strength and conditioning trainer should derive from this manual are:

1. The ability to determine whether the client requires Type A fast twitch muscle fiber explosive training, or Type B slow twitch muscle fiber & mitochondrial endurance training, or a combination.

2. An understanding of training methods for sports requiring explosive, forceful movements like sprinting, jumping, and throwing and the fast, explosive, brief resistance training that improves performance in those activities.

3. An understanding of training methods for sports requiring long distance or endurance athletic training (like distance running or a marathon) and rhythmic, light, high volume resistance training, which does not improve explosive athletic performance.

4. An understanding of Core Training (Abdominals/Obliques/Low Back).

5. Speed, Agility, Quickness (SAQ) and Plyometrics (Explosive Training).

6. An understanding of diet and supplementation for optimum performance and recovery.

STRENGTH & CONDITIONING THEORY

Here is a list of definitions that define the science of fitness, strength & conditioning.

Fitness, as defined by the lay person, is a combination of aerobic, strength, flexibility, and cardiovascular endurance that allows one to perform physical activity free from injury, well above sedentary levels. Fitness should also include excellent health, but does not, necessarily.

The general components of fitness are: 1.) Agility; 2.) Cardio vascular / cardio respiratory endurance; 3.) Dynamic balance; 4.) Explosive strength; 5.) Flexibility; 6.) Freedom from disease; 7.) Freedom from injury and stress; 8.) Limit strength; 9.) Local muscular endurance; 10.) Percent body fat; 11.) Preventative past lifestyle; 12.) Speed endurance; 13.) Starting strength; 14.) Static balance; 15.) Strength endurance; 16.) The mirror and before & after photos (most important for bodybuilders).

Strength is defined as one's capacity to apply maximum muscular force within structural, anatomical, physiological, biochemical, psychoneural, psychosocial, and environmental constraints.

Limit strength is the muscular force that in individual can apply to an object eccentrically, statically, or concentrically, over a given unit of time, or for a number of repetitions, usually one. An example is a one-rep maximum on the bench press.

Starting strength is one's capacity to enervate a muscle's cells all at once, immediately, such as in throwing.

The **six components of strength** that can be augmented through weight training are: 1.) Eccentric or deceleration strength; 2.) Transition or static strength; 3.) Pushing off or concentric strength; 4.) Speed strength; 5.) Limit or absolute strength; 6.) Maximum force applied to the object.

Agility is the ability to change physical direction of the body in a short period of time using explosive strength, dynamic balance, limit strength, and starting strength, like when a football player executes a play.

Flexibility is not as important as strength in a stretched position. Flexibility in athletics is more important than in every day situations.
Proprioceptive neuromuscular facilitation (PNF) is a form of resistance training that builds strength in a stretched position.

There are four technologies of *fitness equipment*: 1.) Constant resistance devices that keep the resistance on a muscle uniform throughout the range of motion (like a bench press machine); 2.) Variable resistance devices (like Nautilus machines) which vary the resistance through the range of motion; 3.) Accommodating resistance devices (like

Hydra Fitness and Life Fitness) that control the speed of contraction; 4.) Static resistance, or isometric, which contract the muscles without movement.

There are eight *fitness technologies*: 1.) Heavy weight resistance training; 2.) Light resistance machines like exercise bikes, rowers, and stair climbers; 3.) Psychological techniques like hypnosis or mental imagery; 4.) Therapeutic techniques like ice, heat, massage, ultra sound, and whirl pools; 5.) Medical support such as Chiropractors, drugs, and medical monitoring; 6.) Bio-mechanics or skill training; 7.) Diet; 8.) Supplements.

The causes of over training or over use syndrome is either too great a frequency, or too great an intensity or duration of exercise over a given period of time, to allow for systemic and/or localized recovery.

A pump in a muscle as experienced when blood is shunted away from the spleen and organs and toward working muscles during exercise, thus providing oxygen and nutrients, and removing waste products and carbon dioxide.

Lactic acid build up and connective tissue trauma cause post exercise muscle soreness. *Hydroxyproline* is an enzyme released from connective tissue that causes delayed onset muscle soreness (DOMS) from about 24 to 48 hours. It can be reduced by using a whirlpool or warm bath immediately after training, or through massage, or by over the counter anti-inflammatory agents. Easing into an exercise routine as a precaution reduces or eliminates delayed onset muscle soreness.

ADAPTATION TO STRESS

There is a way to coax your clients into peak condition that is based on scientific research. You are going to apply the 1930s Endocrinologist *Hans Selye's* **General Adaptation Syndrome (GAS)** system to your clients' training program to produce superior results for them than conventional strength & conditioning methods. Selye's theory established how the body passes through three universal stages during the physiological and psychological stress of exercise:

1. **Alarm Reaction** - the body prepares itself for fight or flight by secreting adrenal hormones and dilating blood vessels. Muscle soreness, sunburn and blisters are alarm reactions.

2. **Adaption Stage** - the body adapts to the stress by growing stronger. Suntan, calluses, added muscle size and strength result.

3. **Exhaustion Stage** - the individual becomes mentally/physically exhausted (overtrained) and must rest before resuming the cycle all over again. *Planned rest periods are generally unnecessary because clients will miss scheduled training sessions for many reasons, which builds automatic rest days into the system.*

A random training system based on Selye's adaptation principle that applies unique demands on the muscular and nervous system will cause an adaptive stimulus response, and improvement in strength and stamina. By varying the training sequence, exercises, style, volume, intensity, sets and repetitions, and lifting as heavy as possible (or as long as possible for endurance athletes) continuously, breakthroughs and new personal best lifts can become regular occurrences for your clients.

PERIODIZATION

While *periodization* is precise and is meant to produce a peak at competition time, it may be less beneficial than GAS training. Periodization theory is a linear or approach to training. It is a structured system of gradually increasing intensity and volume timed to peak during the sports season or on a major competition date. The system divides the year into periods of high and low volume and high and low intensity. This technique has been shown to increase muscle mass and reduce body fat, but a random zigzag approach based on GAS will work best for your clients. Randomized, continuously fluctuating GAS workouts welcome missed training, illnesses and minor injuries into the recovery stage of adaptation, which restarts the alarm, resistance and exhaustion cycle all over again. For example, if the bench press is 100 lb. today, next week it must be 110, and then 120 the following week, etc., which is impossible. You can see that linear improvements like those mandated by standard periodization systems are unrealistic and unsustainable over long periods. The macro phases of period training are: Building Muscle, Strength, Power or Endurance; Peaking during the Sports Season; Active Rest; Off-Season. GAS disregards those phases and instead dictates training up to a plateau, resting briefly, and resuming the cycle again for maximum gains.

THE MUSCULAR SYSTEM

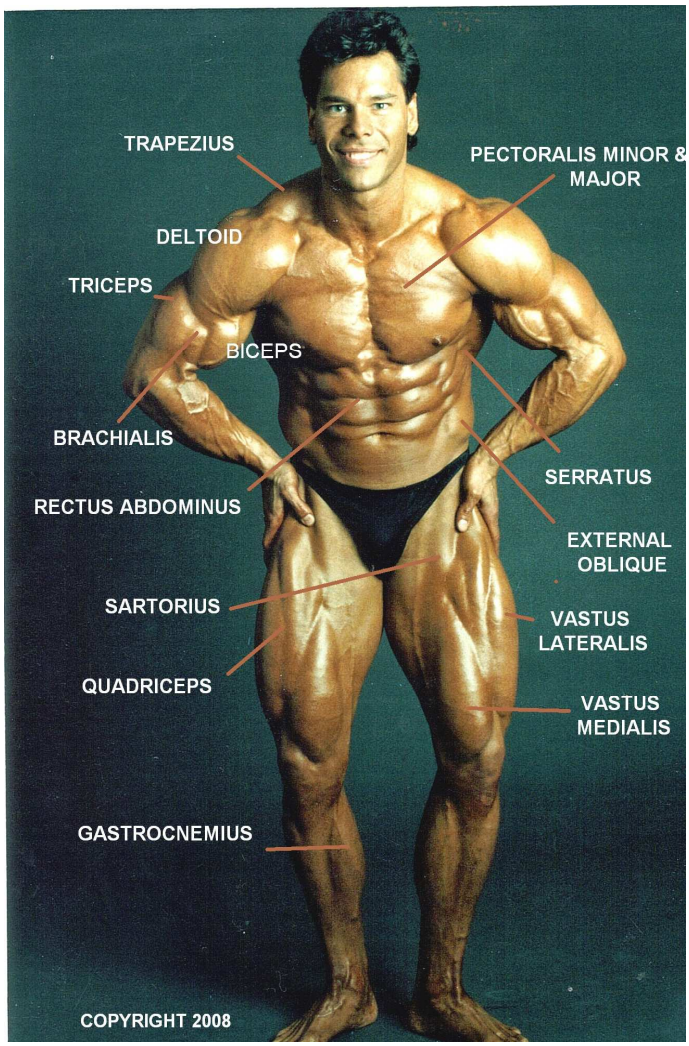
As a trainer, you will need to know the basic muscle groups and their functions. Here is a synopsis of the major muscle groups and how they work.

The muscles in the sides of the neck are called the sterno mastoids, which hold the head up and rotate it. In the front of the body, beneath the neck, there are the pectoralis major and minor commonly called pecs or chest. Their job is to push objects away from the body. The deltoids, which cap each arm and attach it to the shoulder joint, are a three-headed muscle with the anterior, lateral and posterior heads. The deltoids raise each arm to the side and overhead. Beneath that, on the front of the arm are the biceps (curl the arm) and on the back of the arm are the triceps (straighten the arm). The forearm is made up of the brachialis on the top and the extensor carpi on the bottom of the forearm that curls the hand up and down.

Below and behind the neck are the trapezius muscles or "traps." These are responsible for the shrug motion. Down the back below the traps, there is the Latisimus Dorsi that gives the back its V-shape. Other muscles included in the upper back are the rhomboids, Teres major and minor, sub-scapularis, super-spranatis and infra-spranatis that hold the arm and shoulder joint together and are involved in pulling things towards you from the front. They are generically referred to as the ***rotator cuff.*** Beneath those muscles are the spinal erectors or lumbar, located in the lower back. They keep us upright or bring one to the standing position after bending over. The gluteus maximus is the buttocks, used in extending our legs and standing straight. The biceps femorus are located under the glutes, commonly called hamstrings, which kick the heel up towards the buttocks. The gastrocnemeus and the soleus make up the calf muscles and allow us to stand on tiptoe and jump.

This short lesson should be enough to help you answer questions about what a particular exercise or muscle group does. Here is a rule to help you determine what muscles a machine or exercise works even if you have never used or seen the machine or exercise. Note that muscle fibers twitch, or shorten. This is called a ***concentric, or positive contraction*****,** which causes mogvement. ***Static contractions*** are isometrics, where a muscle or group of muscles pushes against an immovable force. The third type of contraction is ***eccentric, or negative contraction*****,** the controlled lowering of a weight. ***Remember the rule, muscles always pull on levers (bones) by shortening to cause movement, even when the exercise requires pushing a weight.***

Please study the following diagrams and memorize the major muscle groups mentioned above.


TRAPEZIUS
PECTORALIS MINOR & MAJOR
DELTOID
TRICEPS
BICEPS
BRACHIALIS
SERRATUS
RECTUS ABDOMINUS
EXTERNAL OBLIQUE
SARTORIUS
VASTUS LATERALIS
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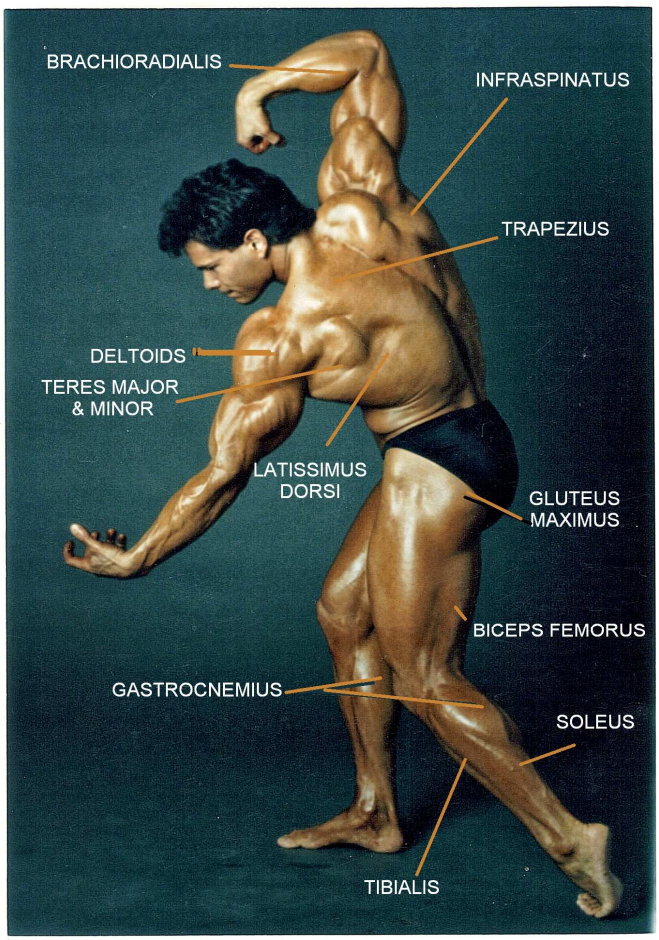
BRACHIORADIALIS
INFRASPINATUS
TRAPEZIUS
DELTOIDS
TERES MAJOR & MINOR
LATISSIMUS DORSI
GLUTEUS MAXIMUS
BICEPS FEMORUS
GASTROCNEMIUS
SOLEUS
TIBIALIS

MUSCLE STRUCTURE & FUNCTION

A striated muscle cell (smooth muscle cells do not have sarcomeres) that moves bones is actually a group of *sarcomeres* called *myofibrils*. Sarcomeres are protein combinations made up mostly of Myosin, & Actin, which form filaments that create a striated muscle. An average muscle cell has approximately 100,000 sarcomeres. The filaments slide across one another creating muscular contraction, using ATP (Adenosine triphosphate) as an energy source.

The Krebs (citric acid cycle) cycle of energy production (tricarboxylic acid [TCA] cycle) is the chemical reaction of the mitochondrion that produces energy muscles can use in the form of ATP. The Krebs cycle chemically converts carbohydrates, proteins, and fats into energy and muscular contraction. The byproduct of this process is carbon dioxide, heat and water. There is only a 10% difference in ATP levels from resting to exercising level. Tests performed on marathoners showed that there was adequate ATP left in the muscles at the end of a race so that physiologically the runner could continue to run, but psychologically the athlete was unable to continue. Correct training will condition physical and mental toughness so that the athlete will be capable of outperforming the competition.

MUSCLE FIBER TYPES

It is necessary to understand muscle fiber types in order to develop a routine for your athletes' goals. The three basic muscle fiber types are called ***fast*** (pennate), ***medium*** (bi-pennate) ***and slow twitch fibers*** (fusiform). Fast twitch provides explosive strength and has the greatest capacity for hypertrophy (i.e.: muscle growth). Intermediate twitch fibers allow medium speed contractions, usually in the twelve to twenty repetition ranges with a medium weight. Slow twitch, or endurance fibers, provide contractions during twenty rep plus exercises performed in rhythmic, continuous fashion while weight lifting. They make long term endurance and aerobic sessions possible. The slow and intermediate muscle cells have less capacity for growth than fast twitch. **Each type is laced throughout the muscle, and research has shown the ability of one type to transform into another type because of specific training.**

Fast twitch fibers are responsible for explosive movements such as sprinting, moving heavy weight, boxing, football etc. They will grow, or ***hypertrophy*****,** to a much higher degree than medium or slow twitch muscle fiber and will respond best to 70% of one rep maximum weight or above. Muscle cells can also split or divide, but they mainly enlarge. Heavy, explosive sets in the 1 - 12-repetition range builds strength.

Medium and slow twitch muscle fibers don't have the capacity for great size or strength increases that fast twitch muscle fibers do. Examples of athletes with a lot of slow twitch fibers are marathon runners, tri-athletes or endurance competitors like Tour De France cyclists. They are lean and defined, but not heavily muscled and additional body weight would be an impediment to their performance. Endurance athletes do not desire muscle mass, so avoid training fast twitch muscle fibers by using only light weights combined

with long duration sets for runners. Following is a profile for how to train for different goals.

Strength and conditioning trainers are concerned mainly with fast and slow twitch muscle fibers. **Muscle fibers can actually change from fast to slow twitch and back again, depending on training modality.** Bear that important point in mind as you develop exercise routines for your strength and endurance athletes. A football player should always train with heavy weights, explosively and briefly. A marathon runner should only train using light weights for longer sessions. A muscle builder would lift heavy weights for explosive, 30 minute workouts. An endurance routine for someone who doesn't require additional muscle mass, like a distance cyclist, requires extremely light, high repetition, long duration training for an hour or more.

Endurance, high rep training protocol will increase the number and size of mitochondria in the muscle cells, which are responsible for energy production. Educate your clients about the role of increased mitochondria for endurance. High rep exercise should be combined with endurance training on cardiovascular equipment such as the stationary bicycle for cyclists, or the treadmill for runners. Recommend the Stairmaster machine for strength athletes because its intensity level is high and will provide a terrific stamina building effect while stimulating fast twitch cells.

The overarching principle for athlete-training programs is apply light weight and high reps for endurance athletes, and heavy weight & low reps for strength athletes. You will have the strength client train to positive failure (until they cannot perform another rep) on each exercise or movement, while the endurance athlete will never train to positive failure, but only pump the weight over a long period.

SLOW TRAINING

Developing the ability of the athlete's central nervous system to rapidly fire motor neurons in muscle cells will build strength. Near heavy maximum weight training increases the ability to activate muscle motor neurons, which cause movement. **Slow cadence weight training is best applied to bodybuilders who wish to add muscle mass. There are no other athletic applications for the super slow training technique.** A slow weight-training cadence does not produce the necessary strength and conditioning required by other athletes. All the fibers of a given muscle must be activated if the goal is to increase muscle strength and size. Both fast-twitch and slow-twitch muscle fibers have some capacity to increase in size (slow twitch less than fast twitch fibers as previously noted), and any resistance training activates slow-twitch muscle fibers, but fast twitch muscle fibers are activated by heavy, near limit lifting, or at the end of a set when of slow muscle cell fatigue necessitates the recruitment of fast twitch muscle strands.

PNF STRETCHING

Proprioceptive neuromuscular facilitation (PNF) is a system of stretching muscles to maximize their flexibility that is often performed with a partner or trainer. It entails a sequence of contracting and relaxing muscles that are stretched against resistance. PNF works by applying manual force to a limb that is stretched back a far as possible while the athlete pushes back, resulting in simultaneous stretching and contraction of a muscle. It is a method for protecting against injuries by increasing flexibility, strength and range of motion. PNF prepares the **Golgi tendon organ** so that it will not fire in the fully stretched position.

The Golgi tendon organ is an organelle that is connected at the insertion of a muscle at one end and to the tendon at the other. Its function is to protect the muscle from an over stretching injury or tear. It may stop muscle contractions in overload situations like heavy weightlifting to safeguard the muscle and tendons from imminent damage. The Golgi organ will contract the muscle forcefully and painfully in the event of an over stretched condition. PNF is a method of conditioning the Golgi organ's automatic response so that the neurons will fire later, thus providing more flexibility and a greater range of motion for athletes.

Clients must always warm up before PNF or stretching. PNF sessions at the end of a workout are ideal way to utilize this technique. Stretches must be applied to a warm muscle, never cold.

To perform PNF stretches the client pushes back a stretched muscle against an immovable object or trainer's hand for 5 seconds, and then relaxes. A normal stretch is then continued for 30 seconds. Rest 30 seconds and repeat twice more. A common example most often seen during school practice sessions is when a coach or partner pushes back the extended, outstretched leg of the athlete, who is lying on his or her back on the ground. Each leg is stretched in turn while the athlete pushes back. That develops flexibility in the hamstrings, gluteus and spinal erectors. Administer each stretch 3 times. There are many excellent PNF instruction guides available on the Internet.

TRAINING SYSTEMS

The athlete customers that come to you will want a specific result, generally either to gain explosiveness or cardiovascular endurance for their sport. Some will want a combination of the two. Both types of training involve different techniques, exercises and equipment. Each system is outlined here.

To understand training systems your athlete clients will require an explanation of the most basic gym language and definitions. By definition, a ***rep*** or ***repetition*** is an exercise movement performed by lifting a weight from the start, or bottom of a movement, to the top, and back down again. A series of single repetitions done in quick succession and then terminated is called a ***set***. Exercise routines are traditionally comprised of combinations of sets and reps. Other variations of sets and reps include partial range reps, isometric (no movement) reps, and peak contraction (squeezing a muscle at the top) reps. Many of these elements can have a place in a well rounded athlete training regimen.

Sets can become more elaborate, also. A super set is when a trainee performs two sets for the same or different muscles without resting in between them. Tri-sets are three sets performed in a row with no rest. Circuit training is one ***giant set*** performed with no rest at all until the prescribed number of sets is complete. Most athletes will not require such extreme methods of training as tri-sets or giant sets, but utilizing a no-rest-between-sets pace will amplify cardiovascular endurance, which may be desirable.

It is good business to briefly explain sets and reps to your athlete customers because they may not be familiar with the concept, especially if they have never been in a weight room before. You should already be intimately familiar with the basics of exercise because you have been working out for a number of years yourself to get the most out of this course. The Strength and Conditioning trainer should be an inspiration and example to clients. It is hard, although not impossible, to get training clients if you are not in good shape yourself. Being out of shape doesn't help sell your services or showcase your abilities, although there are some excellent trainers who looked as though they have never set foot in a gym.

INTENSITY & VOLUME

Volume is the amount of work performed per unit of time. A long distance runner performs a high volume of relatively low intensity work over a period of several hours. **Intensity is an increase in the amount of weight lifted per unit of time.** A sprinter or powerlifter does a relatively tremendous amount of work in a brief period of time, which defines intensity. Low, medium and high intensity training regimens will be part of your athlete strength & conditioning program based on their sport, either explosive, endurance, precision or a combination of all three modalities. Both volume and intensity increase as the competition date nears.

Thirty to minutes of to intense exercise with a trainer is the correct amount of training time depending on the sport. Cardiologists now believe that it is the amount of ***calories*** expended during activity that determines the effectiveness of training on heart soundness and conditioning more than any other factor. Five hundred calories burned from and thirty minutes of quick weight training session is the optimum target for heart conditioning. One set of 50 to 100 repetitions for each of 5-10 exercises for endurance athletes and three sets of 1-12 repetitions for each of 3-5 exercises for explosive athletes are recommended for the best improvement in performance.

Clients can be encouraged to perform additional cardiovascular training like running or the Stairmaster before or after your training session, by themselves. More than thirty minutes will probably mean that the client is resting too long between sets, which is not useful for conditioning. Testosterone and growth hormone (muscle building hormones) levels drop and the cortisol (catabolic stress hormone) level rises after 30 minutes of weight training. You will have to manage each client and move him or her as quickly as possible, motivating them through the workout to take advantage of biochemistry. Remind them of their next appointment with a smile as they go. End every session on a positive note by telling them how well they did. Recap their workout and emphasize the high points or any breakthroughs they had.

If an athlete client desires to add more muscle and explosiveness, train them with progressively heavier weights over a period of months and years after breaking them in for two weeks. There is a class of proteins that protect muscle cells from the by-products of exertion, heat damage, formaldehyde, alcohol, and lactic acid. These are called, not surprisingly***, protector proteins***. They require about two weeks to fully develop after initiating training. During the break in period, the size and number of muscle, heart, and lung cell mitochondria are also increasing. That is why stamina and endurance increases rapidly after commencing training. It is also why muscular individuals are naturally leaner than those with little muscle tone are. Mitochondria convert chemical energy into muscular movement. There is a slight amount of muscular tension at all times in the muscles to maintain the body's 98-degree temperature.

THE AEROBIC vs. ANAEROBIC TRAINING EFFECT

Systole and Diastole are the upper and lower values on a blood pressure test, with normal values ranging from 60 to 80 Diastole to 90-139 Systole. It is a measure of the efficiency of the heart and circulatory system. The five components of cardiovascular endurance are: 1.) Heart rate; 2.) Stroke volume; 3.) Ejection fraction of the left ventricle; 4.) Maximum oxygen uptake; 5.) Gas exchange efficiency of the lungs. An ideal resting blood pressure reading is 125/70. Blood pressure rises during exertion and drops while resting.

There are two basic types of energy systems utilized by the body, Aerobic and Anaerobic. Each energy system produces Adenosine Triphosphate (ATP) which is used by the muscles to contract.

The Aerobic System can utilize carbohydrates, proteins or fat to supply an unlimited amount of ATP as long as oxygen is present. The Aerobic system provides medium to very long duration energy production with low to moderate power (less than 85% of maximum output). The by-product of this system is heat, water and carbon dioxide.

The Anaerobic System can only utilize carbohydrates for ATP production. This system does not use oxygen in the metabolization of its fuel source. The Anaerobic System provides short duration (45 - 70 seconds) and high power. The by-product of the metabolization of glucose (glycolysis) in this system is heat and lactic acid, the cause of muscle soreness immediately after exercise. Muscle soreness 24 to 48 hours after exercise is due to torn muscle fibers and connective tissue. Adequate warm-up and cool-down stretching exercises can reduce this type of soreness.

Aerobic capacity is the ability of the body to collect and transfer oxygen from the air through the lungs and blood to the working muscles. This is related to cardio-respiratory endurance and is referred to as Maximal Oxygen Consumption or VO2 max. Aerobic Capacity reduces at a rate of about 10% per decade after 30 years of age.

The Anaerobic Threshold is defined as that point where the body can no longer meet the oxygen demand and it's anaerobic metabolism is accelerated. This point varies on an individual basis and is dependent on fitness level. For healthy individuals, this occurs between 50% and 66% of their maximal working capacity. For athletes the threshold level may be lower. This would be equivalent to running faster than about half speed.

The lungs are where oxygen and carbon dioxide are exchanged. In the blood stream, oxygen is traded for carbon dioxide. Aerobic activity enhances heart strength. The result is a greater volume of blood per stroke. This is referred to as Stroke Volume or the amount of blood ejected from each ventricle of the heart during one stroke. Cardiac Output is a measure of the amount of blood pumped through each ventricle in one minute. Vital Capacity is the volume of air that can forcibly ejected from the lungs in a single expiration. Aerobic activity has a positive effect on vital capacity, stroke volume

and heart output. Note: arteries carry oxygen rich blood away from the heart and veins carry blood and carbon dioxide toward the heart.

AEROBIC & ANAEROBIC METABOLIC TRAINING

Aerobic and anaerobic metabolic training will condition the muscular system, heart and lungs for greater energy storage and usage. In the anaerobic energy cycle, *phosphagen* provides an immediate energy source for explosive or heavy contractions lasting a half-minute or less. Contractions from 30 to 90 seconds use *lactic acid* as the energy source. In the aerobic energy cycle, stored glycogen is reduced as an energy source and *fat* becomes the major contributor for continued muscular contraction. Explosive athletes must never take long duration aerobic workouts like jogs because they cause a reduction in strength and explosive ability, or detraining. Interval training that builds phosphagen and lactic acid tolerance also tends to spill over to increased aerobic metabolic capability. Although each type of energy substrate is available to the muscles at any given time, the duration and intensity level of the exercise switches the primary energy source available. Sport specific metabolic training is required for all athletes.

There is a way to mix slow and fast twitch training on the same body. If the athlete's lower body requires explosiveness, like a sprint cyclist, you can train those muscles with heavy weights to build power, and then train the upper body musculature with light weights aerobically to keep them small and light, or vice-versa, depending on the sport. Midsection muscles can be trained either way based on the load that the sport requires of them.

NUTRITION FOR ATHLETES

The foundation of athletic performance is the quality of food consumed. Just as a racecar requires high-octane fuel for top speed, the athlete requires high-octane food and supplements to drive their motor and rebuild muscle and glycogen stores. Athletes must be taught that peak performance depends on proper eating and supplementation.

Athletes must take a fish-oil supplement of at least 2500 mg per day. Fish oil contains EPA, which helps regulate insulin levels, and DHA, a brain builder. Fish oil supplements contain long-chain, omega-3 fatty acids that help fight cholesterol build up in the arteries. 2500 mg of flaxseed oil daily is also required.

By ensuring that adequate amounts of protein, carbohydrates, good fats and micro-nutrients are consumed, optimum performance at the event will be ensured. Nutrition is the most overlooked aspect of sports training by high school and college athletes. Your job is to educate your clients about proper eating and supplementation for maximizing their results. Outlined below are the basic components of eating and supplementing for peak athletic achievement. It may be valuable to enroll in the AMFPT Sports Nutritionist Course for a more complete analysis of sports nutrition requirements.

WATER SAFETY FIRST - HYDRATION

Water is the most important dietary component on an athlete's menu and must be available in copious amounts at all times when training your clients. If there is no drinking water handy, then the session must be postponed until some is available. Proper hydration is especially necessary for hot weather exercise. Water consumption while training or at a competition is essential for all athletes and exercisers. A two-percent or higher drop in body weight because of profuse sweating causes a corresponding drop in blood plasma volume, making the heart pump faster and reducing athletic performance. Since a gallon of water weighs 8 pounds, a 2% drop in weight for a 200-pound lineman is 4 pounds, or a half-gallon of H20, a serious reduction that can lead to clinical dehydration. **YOUR CLIENTS MUST CONSUME SEVERAL OUNCES OF COLD WATER OR GATORADE™ AT LEAST EVERY 10 MINUTES DURING TRAINING SESSIONS.**

A sports drink like Gatorade™ is recommended for athletes, especially track & field athletes or football players who train in high temperature environments, or for periods longer than one hour. Triathletes, Marathoners or other long endurance athletes require a beverage containing electrolytes (minerals, salt and potassium). Drinking only water will cause a reduction in blood serum electrolytes after about an hour of vigorous activity. Pickle juice is a popular beverage increasingly reached for by NFL players.

While caffeine is beneficial in enhancing athletic performance and weight loss, it is also a diuretic, which promotes fluid loss through urination, so sports drinks including caffeine should never be consumed during training or competitions.

SPORTS INDUCED WEIGHT LOSS

Football, soccer, basketball players and other athlete's whose sports require great energy expenditure during lengthy events may lose twenty pounds or more over the course of the season. This weight loss can adversely affect the athlete's performance if left unchecked. The only way to prevent dramatic undesired weight loss is to adjust calories, carbs, good fats and protein consumption upward in your client's diet during the sports season.

A carbohydrate - protein - fat intake ratio of 40/30/30 and one to two gallons of water daily are good starting points for your clients. By increasing protein and fat the energy level will be more consistent. Medium Chain Triglyceride (MCT oil) compounds are also effective for boosting calories and energy prior to training or competitions.

CARBOHYDRATE LOADING

Carbohydrate loading has been around for years as a way to boost endurance during a marathon and it works well for other endurance athletes, too. To best determine the effects carb loading has on the athlete, experiment with carbohydrate loading as part of their training before an actual meet. Marathoners, Triathletes, long-distance swimmers and cyclists may be able to improve their performance by forcing carbohydrates as glycogen into their muscles.

Carbohydrates are converted to sugar and stored as glycogen in your muscles and liver. Muscles store only enough glycogen enough to provide adequate energy reserves for normal training sessions and short distance running. After 90 minutes the muscles run out of stored glycogen and cause reduced performance. Carbohydrate loading is a way to boost performance beyond the 90 minute "wall." Too properly carb load, one week before the event cut down carb consumption to one-half of the total calorie intake. Increase the amount of protein and good fat to make up the calorie deficit. This is the carb depletion phase. Three days before the competition increase carbs to 70 percent of total daily calories (4 grams per pound of bodyweight) and reduce intake. Reduce training down to mild short pumping sessions to avoid carb depletion and stop training altogether two days before the contest.

Research has proven that taking a couple of days off and increasing carbohydrate intake three days before a competition will also load carbohydrates, probably because of the chronically carb depleted state that the athlete is already in. The athlete should continue taking carb drinks during the event.

FOOTBALL OR MASS DIET HANDOUT

To build mass & strength you need to eat at least 1 gram of protein for each pound of your desired body weight each day, almost force feeding the body nutrients. That means that if you want to weigh 200, and you now weigh 175, then you have to eat 200 grams of protein each day without reducing cabs or fats. Let's see what kind of menu would deliver the 200 figure. First, some rules. Eat once every three to three-and-a-half hours. It takes that long for the last meal to move out of the stomach. If you eat too soon, the food that you've already eaten will stop digesting, and the whole thing starts all over again. Food will actually remain in the intestines undigested for as long as two days.

7:00 AM: 7 eggs (50 g. protein), 4 slices of toast, large orange juice, multi-Vitamin/mineral tab, 5 desiccated liver, 3 amino acid tablets, 1000 mg fish oil, 1000 mg flaxseed oil, 1000 mcg B-12, 1000 mg C, digestive enzyme.

10:00 AM: Snack: 8-10 oz. cottage cheese or a protein drink. 5 desiccated liver and 3 amino acid tablets. If this meal is eaten before training, add a banana. Provides about 30-g. protein.

1:00 PM: 8 oz. chicken or steak, 2 baked potatoes or 1 cup pasta, salad or steamed vegetables, 3 liver, 3 amino acid tablets, 1000 mg fish oil, 1000 mg flaxseed oil, 1000 mcg B-12, 1000 mg C, digestive enzyme. Provides about 50-g. protein.

4:00 PM: Snack: Snack: 8-10 oz. cottage cheese or a protein drink. 3 liver and 3 amino acid tablets, 1000 mg fish oil, 1000 mg fish oil, 1000 mg flaxseed oil, 1000 mcg B-12, 1000 mg C, digestive enzyme. Provides about 30-g. protein.

7:00 PM: Supper: 8 oz. chicken or steak, 2 baked potatoes or 1 cup pasta, salad or steamed vegetables, 5 desiccated liver, 3 amino acid tablets, 1000 mg fish oil, 1000 mg flaxseed oil, 1000 mcg B-12, 1000 mg C, digestive enzyme. Provides about 50-g. protein.

10:00 PM: 5 egg whites & 1 yolk. This menu allows about 200 grams of protein, about 80 grams of fat, and about 350 grams of carbohydrate. Total calories are approximately 4500.

If the meal is eaten prior to a training session or event, add a banana & apple.

PRE- WORKOUT MEAL & SUPPLEMENTS

Prior to training the client must prepare by eating the proper nutrients. This meal can also be consumed before a sporting event.

Pre workout supplements and meal 1-½ hours before training: 5 eggs, 2 slices bread, 8 oz. milk, 1 banana, 1 apple.

Supplements: 1 Multivitamin-mineral, 1000 mg. C, 1000-mg fish oil, 1000-mg flaxseed oil, 400 iu. vitamin E, 1000 mg. time release niacin, 1000 mcg. B-12, and ten 50 grain desiccated liver tablets required prior to workout. Client must stay hydrated with Gatorade or other electrolyte replenishment drink.

Runners and distance athletes add 2 slices or bread or 8 oz. pasta. Carb loading can also be initiated prior to events (see above).

POST-WORKOUT MEAL & SUPPLEMENTS

Protein shake mixed with 1 banana, 1-pint milk, and strawberries.

Supplements: 1000 mg vitamin C, 10 50 grain desiccated liver tablets, 1000 mg fish oil, 1000 mg flaxseed oil, 1000 mg. time release niacin.

Additional meals are protein and carbohydrate based foodstuffs 3 times daily choosing items like steak, eggs, chicken, fish, tofu, pasta, bread, rice, potatoes, yams. Each serving should be approximately the size of your hand. Add salads, fruits and vegetables for balance and fiber content.

ATHLETE SUPPLEMENT LIST

1. **Whey or Egg Protein Powder** - one or two scoops 3 times per day between meals for protein replenishment.

2. **Multivitamin/mineral** - one tablet daily for good health. Everyone should be taking a multi-Vitamin/mineral anti-oxidant supplement, especially hard training athletes. Find it at a local health food store or search online for a quality brand.

3. **Desiccated Liver tablets** - ten-50 grain tablets 1 hour before training for endurance. Before steroids, athletes used liver tabs to build muscle & endurance. They still work. To locate a source online, do a search on *desiccated liver*.

4. **Flaxseed Oil** - 2000 mg. 3 times per day with meals for good fat.

5. **Fish Oil** - 2000 mg. 3 times per day with meals for good fat.

6. **B-12** - 1000 mcg with meals 3 times daily for energy.

7. **C** - 1000 mg with meals 3 times daily for recovery.

Studies have shown that fat burning is increased for up to eight hours after high resistance training with weights, so greater protein, carbohydrate, good fat, supplement and increased calorie intake is mandatory for athletes.

CONDITIONING MEANS CARDIO TRAINING

A steady state aerobic component of training to develop cardiovascular endurance can be accomplished by running, cardio machines like the Stairmaster, and by stepping up the pace at which one-weight trains. Interval training is recommended for power athletes, which means to vary the intensity up and down over 30 minutes.

The goal for athlete cardiovascular conditioning is to keep the heart rate at about 70% of the maximum heart rate for at least 30 minutes to an hour, 3 times weekly. The formula for figuring out maximum heart rate is 220 minus age. If a client is 50 years old, the maximum heart rate is 170 beats per minute. 70% of 200 is 140, so 140 beats per minute is the minimum athlete-training zone.

To determine if the client is in the zone:

Have them do the exercise routine or cardio machine for five minutes.

Stop and take the pulse in the wrist. **Never use the neck, a piece of fat may become loose and cause a stroke or the client may pass out.**

Count the beats for 10 seconds and multiply the number by 6.

Target heart rate chart:
20 years: 100-150 beats per minute
25 years: 98-146 beats per minute
30 years: 95-142 beats per minute
35 years: 93-138 beats per minute
40 years: 90-135 beats per minute
45 years: 88-131 beats per minute
50 years: 85-127 beats per minute
55 years: 83-123 beats per minute
60 years: 80-120 beats per minute
65 years: 78-116 beats per minute
70 years: 75-113 beats per minute

Never take the pulse by pressing on the neck-always use the wrist. You may dislodge a piece of fat and cause a stroke when using the neck as a pulse point or the client may pass out.

The elliptical machines and Stairmasters are terrific conditioning tools for strength and stamina athletes. The best way to keep clients excited about training is to rotate track or treadmill sprints with the elliptical machine and Stairmasters if you have access to them. Distance athletes will only be able to use the treadmill or outdoor running for long periods. Running on sand, grass or a running track will be milder stress on the lower back, knees and hips than running on pavement.

COMPOUND TRAINING

Compound, or complex training combines plyometrics and weight training and in the same training session. It also means to train more than one muscle group with an exercise. A client could combine a strength exercise like squats with an explosive movement like squat-jumps. A good sports foundation is necessary to move up to the intensity level of plyometrics. By applying functional sports training, which trains muscle groups with exercises that mimic sports movements like plyometrics, you can improve athletic performance by enhancing strength and explosiveness.

FREE WEIGHTS

Free weights are ballistic (free falling) objects and better mimic actual sports movements. Free weights are a good choice for sports that require throwing, sprinting, jumping or hard physical contact. Machines can be useful for training muscle groups that free weights do not work correctly, like leg curls, calf raises, cable movements and pulldowns. They are also useful for training non-contact endurance athletes, and for rehab.

BEGINNER, INTERMEDIATE & ADVANCED CLASSIFICATION

You will be training novice, intermediate and advanced athletes. The first several training sessions should be evaluation testing strictly designed for the athlete. You will retest at regular intervals of two weeks to gauge improvement. Since the actual training program is specific to a particular sport and/or position, the workouts must be adapted to accommodate your client and his or her experience level. Improvements to their SAQ will come through applying structured agility drills, plyometrics, interval training and strength training to their programs. Endurance athletes will benefit from high volume weightlifting.

Novice athletes, who have no experience in the weight room, or with sports strength and conditioning, must be taught the basics of technique and form when lifting. Participants in explosive power sports like football, basketball, or volleyball must learn proper lifting techniques in multi-joint exercises like the squat, power clean, snatch, and bench press to prevent injuries.

Intermediate athletes are generally experienced college level individuals attempting to refine their skills. They should already understand strength & conditioning, speed & agility, footwork & balance, plyometrics, nutrition and proper training and lifting techniques. You can jump right in at their maximum level after initial testing.

Advanced athletes are elite amateur or professional athletes that must continually improve or lose their position, so they will already have a team of medical personnel, coaches and specialists. You will do well to break into the elite athlete realm of clientele, but you must do your best to add value to their performance, because at their highly developed level only small percentage improvements will be possible. They have a background in sports strength and conditioning, and want to employ the most effective program to remain at peak levels. You will need to understand their current strength-training program and modify it based on the principles presented in this manual to

produce maximum results. **Innovation will be your best ally when training elite athletes.**

TRAINING STRATEGIES

Do not mix slow and fast twitch training, although if the athlete's lower body requires explosiveness, like a sprint cyclist, you can train those muscles explosively with low reps and heavy weights, while training the upper body musculature aerobically with high reps and easy weights to keep them small and light. Midsection muscles can be trained using low or high reps depending on the sport.

Here is a list of requirements for developing various sports training programs.

SWIMMING
A. Sprinting
Explosive training, plyometrics
Low Reps, Free-weights, overall body training

B. Distance
Duration training, high repetition
High Reps, Free-weights & machines, overall body training

RUNNING
A. Sprinting
Explosive training, plyometrics
Low Reps, Free-weights & machines, lower body & core training, minimum upper body

B. Distance
Duration training, high repetition
High Reps, Free-weights & machines, lower body & core training, minimum upper body

CYCLING
Sprinting
Explosive training, plyometrics, minimum upper body
Distance
Duration training, high repetition, minimum upper body

SOCCER
Sprinting
Conditioning - Interval Training, wind sprints, minimum upper body
Low Reps, Free-weights, lower body focus, minimum upper body

FOOTBALL
Sprinting
Explosive training, plyometrics
Conditioning - Interval Training, wind sprints, Stairmaster

Low Reps, Free-weights, lower & upper body & core training

WRESTLING
Sprinting
Explosive training, plyometrics
Low Reps, Free-weights & machines, lower & upper body & core training

HOCKEY
Sprinting
Explosive training, plyometrics
Low Reps, Free-weights & machines, lower & upper body & core training, exercises must mimic the action of the hockey stick swing. Hockey will also require balance and footwork drills and skill training on ice by the coaching staff.

GOLF
Fast upper body exercise execution with medium weight training
10 Reps, Free-weights & machines, light lower & upper body & core training, exercises must mimic the action of a golf swing. Golf does not require SAQ training.

SKILL SPORT TRAINING

The absolute chief method for improving a sports skill is repetition. The action must be repeated hundreds of times in practice for improvements to be manifested on the golf green. Skill training and hand-eye coordination drills are usually already a part of a skill athlete's training regimen and must be continued, encouraged and honed. Whenever you train a skill sport athlete like those involved in golf, tennis, bowling, archery, fencing, etc., select exercises and range of motion drills that mimic the action of the sport.

For example, golfers should take a light dumbbell and go through the entire golf swing range of motion for three sets of 12 reps. Golfers also require core abdominal, oblique & lower back strength and flexibility. A great exercise for the trunk and lower back is to have them sit under the pulldown bar with a medium weight and with arms straight overhead, grip so that the plates are not touching, grasp the handles and twist the arms from side to side for three sets of ten reps per side. Then have them lean back until the upper body is parallel to the floor and return for ten reps. Abdominal training and a full stretching routine must be added at the end of each workout because of the twisting involved in swinging a club, which traumatizes the lower back and intra-vertebral disks.

BALANCE

Balance is a component of many sports actions, whether the action is strength, speed, or skill. Balance workouts outside of training camp are easy, fun activities that can be incorporated in the client's time recreation time away from you. Kinesthetic awareness is a perception of where your mass and center of gravity are in relation to your limbs on the playing field. Catch is one of the best ways to develop hand-eye coordination. Balance can be refined by using a balance board and playing catch with various types and sizes of

balls (especially footballs) while balancing on the board, or one leg. Steadying on one foot on tiptoe and reaching down to a toe touch is another terrific balance builder. Even runners can use these methods to help avoid a sprained ankle from running on uneven surfaces. Balance training is a fun part of the strength & conditioning trainer's job.

Balance is the ability to regulate controlled variations in the body's center of gravity while maintaining control. Balance is the single most important component of athletic ability because it underlies all movement whether, that movement is dominated by strength, speed, flexibility, or stamina. Because athletes are constantly moving, it is vital to develop balance not from a stationary standpoint, but while the body is in motion.

SPEED

In physics, speed is defined as increasing velocity up to the maximal physical limit. Acceleration the amount of time it takes to reach limit velocity. In sports there is a physical and psychological component to speed and acceleration.

Maximum velocity or speed in sports is the highest number of meters per second an athlete can travel. Both are determined by the length and frequency of the step, or stride. Length is the measurement between steps and frequency is steps per second.

Footwork training will add speed and increase stride length. Speed athletes can maximize stride length and frequency by improving running technique. One complex method is to film the runner on a treadmill and then analyze, frame by frame, the tendencies and mistakes being made and correct them. Since you may not have access to that kind of technology, emphasize relaxing the upper body and fists when running, and minimizing extraneous body and arm movement to your clients.

An additional component of speed that needs to be considered is speed endurance. Improving speed endurance will prevent an athlete from reduced performance at the end of a game, or when approaching the finish line. For some sports, acceleration may be more desirable than absolute speed. A running back must be agile and posses the acceleration to hit a gap in the line, which requires zigzagging, reversing and cutting in and out. Agility is the ability to accelerate, decelerate, and quickly change direction while maintaining optimum body control. Quickness is the athlete's ability to transition on the field instantly from left to right, or front to back. Quickness is also determined by the ability of the nervous system to produce lightning speed muscle fiber contractions and relaxation cycles. Quickness is a fast, explosive start and acceleration during sprinting, or muscles initiating a new movement, or a rapid change of direction. Agility drills and plyometrics build quickness. Interval training augments end-game endurance conditioning.

PSYCHING UP

Research has proven shown that psyching up before a lift like the bench press, or event like the shot put can increase force production by 10% or more. Getting psyched-up works and a proven method many trainers employ is to exclaim positive phrases urging trainees on, like, "You've got this weight," or "Come on, one more rep," or "You can do

it," etc. Loud music is another tool you can employ to coax the most out of your client's workouts. Play loud rock music or encourage them to bring their iPod to the gym. Increased effort during weight lifting equals better athletic performance.

HIP FLEXOR TRAINING

University of Florida researchers found that strengthening the hip flexors lead to improvement in speed and agility by as much as 12%! Most training routines do not isolate abductor & adductors. The advantage is that **by adding 3 sets of 10 reps on the hip abductor-adductor (inner & outer thigh) machine to your strength and agility clients' training protocol 2 or 3 times weekly, they will gain an edge over their competition.**

WEIGHT TRAINING FOR SPECIFIC SPORTS

Focused weight-training routines for individual sports are outlined below. Each sport requires different training techniques. Compound or multi-joint exercises are the basis of strength building for explosive sports. The exercises that mimic actual sport movement are best choices. A strong midsection is a good place to start improving performance.

TRAINING ROUTINES

For those athlete clients attempting to add strength and muscle mass, lift heavy and keep the sets at 3-5 and the repetitions to 1-12 per set. If the athlete does not wish to add mass, reduce to 3 sets of 1-2 repetitions for each exercise will enhance strength without building a lot of mass. Remember: ***Endurance routines are long duration, high volume, light weight and low intensity, while strength building routines are heavier weight, explosive, low to medium volume systems that employ a progressively heavier training load.*** Here are some tried and proven routines to meet any needs that your athlete trainees may have.

KEEP A CLIPBOARD AND RECORD EACH EXERCISE SESSION MAKING NOTES ABOUT PERFORMANCE, BREAKTHROUGHS, MOOD, DIET, INJURY, ILLNESSES OR SETBACKS.

CORE TRAINING

The Core is the abdominals, obliques and lower back. Any Sit Up, Crunch, or Leg Raise activates the abdominal muscles from top to bottom. The only part of the midsection that you can isolate beside the abs is the obliques on the sides. The routine below are for core strength. ***None of your clients should ever do standing, weighted side bends because of the compression injury risk that they pose to the intervertebral discs of the lower back.***

HERE IS A CORE STRENGTHENING ROUTINE THAT WILL DEVELOP A STRONG MID-SECTION FOR YOUR CLIENT. CORE TRAINING CAN BE UTILIZED 3-5 DAYS WEEKLY.

CORE ROUTINE A

CRUNCHES - 3 sets of 25 reps

SIDE LEG RAISES - 3 sets of 25 reps per side

HYPEREXTENSIONS - 3 sets of 25 reps

REVERSE CRUNCHES -3 sets of 25 reps

CORE ROUTINE B

ROPE CRUNCHES - 3 sets of 25 reps

SIDE ROPE CRUNCHES - 3 sets of 25 reps per side

PULLBACKS - 3 sets of 25 reps

AB MACHINE CRUNCH -3 sets of 25 reps

CORE ROUTINE FOR STRENGTH ATHLETES

ROPE CRUNCHES - 3 sets of 12 reps

SIDE ROPE CRUNCHES - 3 sets of 12 reps per side

PULLBACKS - 3 sets of 12 reps

AB MACHINE CRUNCH -3 sets of 12 reps

Lower back stretching should be performed at the end of each session.

ENDURANCE TRAINING

Athlete endurance training involves cardiovascular training on the track & treadmill and circuit training with a moderate resistance. The primary focus for endurance training should always be adequate carbohydrate intake and a high calorie diet with supplements. Distance athletes must start with an ultra light, short, low intensity workload of 20 reps or higher, so that you can fully assess their strength level and tolerance for weightlifting. The first session should be no more than ten minutes of actual exercise to prevent delayed onset muscle soreness, which would hinder track work. Explain to them that you are going to start off very easy and gradually increase the training volume over the first few weeks.

Endurance, high rep training will increase the number and size of mitochondria in the muscle cells, which are responsible for energy production. You can educate your clients about the role of increased mitochondria for endurance. High rep exercise should be combined with endurance training on cardiovascular equipment such as the stationary bicycle for cyclists or the treadmill for runners. Recommend the Stairmaster and elliptical machines for strength athletes because their intensity level is high and will provide a terrific cardiovascular endurance building effect.

ROUTINE FOR DISTANCE RUNNERS & ENDURANCE ATHLETES

All these exercises must be performed with light, easy weight. The pace should be easy and as the athlete gains strength the reps can be increased to a maximum of 100. Cadence is 1 second up and 1 second down.

EVERY OTHER DAY 2 OR 3 SESSIONS WEEKLY

1. **TWISTING CRUNCHES - one set of 100 reps**
2. **SHOULDER SHRUGS - one set of 100 reps**
3. **LEG EXTENSIONS - (one or two legs at a time) one set of 100 reps**
4. **LEG CURL - (one or two legs at a time) one set of 100 reps**
5. **CURLS - one set of 100 reps**
6. **BENCH-PRESS - one set of 100 reps**
7. **STANDING CALF RAISE - one set of 100 reps**
8. **STANDING LEG KICKBACKS - one set of 100 reps**

9. PULLDOWNS - one set of 100 reps

10. TRICEPS PUSHDOWNS - one set of 100 reps

11. OVERHEAD PRESSES - one set of 100 reps

STETCHING SERIES FOR: CALVES, LOWER BACK & HAMSTRINGS

TRY TO MOVE RAPIDLY FROM ONE EXERCISE TO THE NEXT WITH AS LITTLE REST AS POSSIBLE. SETS ARE NOT TAKEN TO FAILURE. A HIGH CARBOHYDRATE MEAL SHOULD BE CONSUMED SUBSEQUENT TO TRAINING TO FORCE GLYCOGEN BACK INTO THE MUSCLES.

TRAINING MUST BE REDUCED AS THE MEET APPROACHES AND STOPPED ONE WEEK BEFORE AN EVENT TO PREVENT INJURY AND OVERTRAINING.

GOLF ROUTINE

Train 2- 3 alternating days weekly off season, 1-2 days per week during season with 1 second up, 1 second down cadence on all exercises unless otherwise noted. Rest 1 minute between sets.

Brisk Walking on Treadmill - 30 Minutes

1. **Twisting Abdominal Crunch - 3 sets of 30 reps**
2. **Lying Side Leg Raises - 3 sets of 30 reps per side**
3. **Hyperextensions - 3 sets of 12 reps**
4. **Low Back Stretch (pull knees together into chest while lying on back) - 3 Minutes**
5. **Top End Lunges - 3 sets of 12 reps per side**
6. **Standing Calf Raises - 3 sets of 12 reps**
7. **Straight Arm Pushdowns - 3 sets of 12 reps**
8. **Low Cable Crossovers or Decline Flyes - 3 sets of 30 reps**
9. **Front Pulldowns - 3 sets of 12 reps**
10. **Side Dumbbell or Cable Raise - 3 sets of 12 reps**
11. **Golf Dumbbell Swing - 3 sets of 12 reps**
12. **Crunch to Failure and Low Back Stretch (pull knees together into chest while lying on back) - 3 Minutes**

TENNIS AND GOLF WARM UP STRETCHES

Here are a series of activities that enhance flexibility in the arms and upper body.

BEFORE PRACTICE OR A TOURNAMENT:

JOG & CIRCLE THE ARMS - 20 reps.

SIDE STEP & CROSS THE ARM - 20 reps

CROSS STEP - 20 reps

STANDING KNEE HUG LUNGE - 20 reps

STRAIGHT LEG MARCH - 20 reps

LATERAL LUNGE - 20 reps

TRUNK TWIST - 20 reps

BACKWARDS WALK -10 reps

ARM HUGS - 10 reps

TENNIS ROUTINE

Tennis players sprint and use explosive strikes with the racket. Interval and low rep exercises are recommended. Train three alternate days per week off-season, 1-2 days per week during season. All exercises (except crunches) performed explosively up and controlled down. 1 second up, 1 second down cadence on all exercises unless otherwise noted. Rest 30 seconds to 1 minute between sets.

DAY 1

15 minute warm up on stair master

SQUATS - 3 sets of 10, 8, 5

DUMBBELL BENCH PRESS - 3 sets of 10, 8, 5

PULLDOWNS - 3 sets of 10, 8, 5

CRUNCHES - 3 sets of 25

DAY 2 -5 minute warm up on stationary bike

LEG PRESS - 3 sets of 10, 8, 5

INCLINE DUMBBELL PRESS - 3 sets of 10, 8, 5

ROWING - 3 sets of 10, 8, 5

CRUNCHES - 3 sets of 25

DAY 3 -5 minute warm up on stationary bike

SQUAT MACHINE - 3 sets of 10, 8, 5

DECLINE DUMBELL BENCH PRESS - 3 sets of 10, 8, 5

PULLUPS - 3 sets of 10

CRUNCHES - 3 sets of 25

Every 3-4 workouts switch to 3 sets of 1 rep (except crunches) per exercise

FINISH EACH SESSION WITH 3 SETS OF 10 ON THE ABDUCTOR-ADDUCTOR WHEN AVAILABLE AND A FULL UPPER & LOWER BODY STRETCHING ROUTINE

STRENGTH TRAINING

NFL Style strength & conditioning training works well for most explosive athletes and must be incorporated with supplementation and diet for optimum results. Because of the intense nature of off-season workouts a medical clearance must be kept on file for each client.

During the season strength workout intensity and frequency must be reduced to once to twice weekly and a rest period of two days after each meet is recommended for optimum recovery. Athletes tend to lose weight during the active sports season and food intake must be adjusted upward to compensate if it is undesirable to lose weight. Wrestlers, on the other hand, may find it beneficial to drop down to a lower a weight class.

Soccer players and sprint cyclists do not require upper body strength and size, so upper body exercises should be 20 or more repetitions per set with an easy weight, and those sets should not be taken to failure.

Since football is so intense, emphasis on recovery methods like whirlpool baths and chiropractic adjustments must be utilized for recuperation and career longevity. Muscle mass, strength and stamina is of paramount importance, so high intensity, heavy weightlifting is essential to football players.

Strength routines A & B can be applied to football players, basketball players, hockey players, gymnasts and decathletes. Plyometrics can also be included. Use agility drills when the sport requires agility

STRENGTH TRAINING PROGRAM A

Weightlifting three alternate days per week performing five sets and pyramiding weight. All movements performed explosively with good form. Rest one minute between sets.

Pre workout supplements and meal 1 ½ hours before training: 4 eggs, 2 slices bread, 8 oz. milk, two bananas.

Supplements: 1 Mutivitamin-mineral, 1000 mg. C, 1000 mg fish oil, 400 iu. E, 1000 mg. time release niacin, 1000 mcg. B-12, and ten 50 grain desiccated liver tablets required prior to workout. Client must stay hydrated with Gatorade or other electrolyte replenishment drink.

Day 1

SQUATS - 10, 8, 8, 5, 5

BENCH PRESS - 10, 8, 8, 5, 5 - Build up to 225-lb. bench press for 5 sets to failure every other week

CHIN-UPS - 5 sets to failure (offsets compression of the spine by placing it in traction). Pulldowns may be substituted.

DAY 2

LEG PRESS PRESS - 10, 8, 8, 5,5

BENT OVER ROW - 10, 8, 8, 5,5

INCLINE BENCH PRESS - 10, 8, 8, 5,5

DAY 3

ONE LEG PRESS PRESS - 10, 8, 8, 5,5

POWER CLEAN & PRESS - 10, 8, 8, 5,5

DUMB BELL BENCH PRESS - 10, 8, 8, 5,5

FINISH EACH SESSION WITH 3 SETS OF 10 ON THE ABDUCTOR-ADDUCTOR WHEN AVAILABLE AND A FULL UPPER & LOWER BODY STRETCHING ROUTINE

Post-workout nutrition

Protein shake mixed with 1 banana, 1 pint milk, strawberries. Supplements: 1000 mg vitamin C, 10 50 grain desiccated liver tablets, 1000 mg fish oil, 1000 mg. time release niacin.

STRENGTH TRAINING ROUTINE B

Train three alternate days per week off-season, 1-2 days per week during season. All exercises (except crunches) performed explosively up and controlled down. 1 second up, 1 second down cadence on all exercises unless otherwise noted. Rest 30 seconds to 1 minute between sets. Same nutrition plan as routine A.

DAY 1

15 minute warm up on stair master

SQUATS - 3 sets of 10, 8, 5

DUMBBELL BENCH PRESS - 3 sets of 10, 8, 5

PULLDOWNS - 3 sets of 10, 8, 5

CRUNCHES - 3 sets of 25

DAY 2 -5 minute warm up on stationary bike

LEG PRESS - 3 sets of 10, 8, 5

INCLINE DUMBBELL PRESS - 3 sets of 10, 8, 5

ROWING - 3 sets of 10, 8, 5

CRUNCHES - 3 sets of 25

DAY 3 -5 minute warm up on stationary bike

SQUAT MACHINE - 3 sets of 10, 8, 5

DECLINE DUMBELL BENCH PRESS - 3 sets of 10, 8, 5

PULLUPS - 3 sets of 10

CRUNCHES - 3 sets of 25

Every 3-4 workouts switch to 3 sets of 1 rep (except crunches) per exercise

FINISH EACH SESSION WITH 3 SETS OF 10 ON THE ABDUCTOR-ADDUCTOR WHEN AVAILABLE AND A FULL UPPER & LOWER BODY STRETCHING ROUTINE

WRESTLING TRAINING ROUTINE A

Train three alternate days per week during the off season, 1-2 days per week during the season. All exercises (except crunches) performed explosively up and controlled down. 1 second up, 1 second down cadence on all exercises unless otherwise noted. Rest 30 seconds to 1 minute between sets.

DAY 1 - 5 minute warm up on stationary bike

SQUATS - 3 sets of 10, 8, 5

DUMBBELL BENCH PRESS - 3 sets of 10, 8, 5

PULLDOWNS - 3 sets of 10, 8, 5

CRUNCHES - 3 sets of 25

DAY 2 -5 minute warm up on stationary bike

DEADLIFT - 3 sets of 10, 8, 5

INCLINE DUMBBELL PRESS - 3 sets of 10, 8, 5

ROWING - 3 sets of 10, 8, 5

CRUNCHES - 3 sets of 25

DAY 3 -5 minute warm up on stationary bike

SQUAT MACHINE - 3 sets of 10, 8, 5

CLEAN & PRESS - 3 sets of 10, 8, 5

PULLUPS - 3 sets of 10

CRUNCHES - 3 sets of 25

FINISH EACH SESSION WITH 3 SETS OF 10 ON THE ABDUCTOR-ADDUCTOR WHEN AVAILABLE AND A FULL UPPER & LOWER BODY STRETCHING ROUTINE

WRESTLING TRAINING ROUTINE B

Train three alternate days per week during the off season, 1-2 days per week during the season. All exercises (except crunches) performed explosively up and controlled down. 1 second up, 1 second down cadence on all exercises unless otherwise noted. Rest 1 minute between sets.

DAY 1 - 5 minute warm up on stationary bike

WHILE HOLDING THE BARBELL FOR 3 MINUTES STRAIGHT, DO EACH OF THE FOLLOWING FOR 10 REPETITIONS:

SQUATS
CALF RAISE
GOOD MORNING
SHOULDER PRESS
BENT OVER ROW
CURLS
BENCH PRESS
CLOSE GRIP BENCH PRESS

Repeat 3 times

Finish with 100 crunches and stretching

DAY 2 -5 minute warm up on stationary bike

WHILE HOLDING TWO DUMBBELLS FOR 3 MINUTES STRAIGHT, DO EACH OF THE FOLLOWING FOR 10 REPETITIONS:

LUNGES
CALF RAISE
STIFF LEGED DEADLIFT
UPRIGHT ROW
BENT OVER ROW
CURLS
BENCH PRESS
TRICEPS EXTENSION
SHRUGS

Repeat 3 times

FINISH WITH 100 CRUNCHES AND 3 SETS OF 10 ON THE ABDUCTOR-ADDUCTOR WHEN AVAILABLE, AND A FULL UPPER & LOWER BODY STRETCHING ROUTINE

DISTANCE SWIMMER TRAINING ROUTINE

Train three alternate days per week during the off season, 1-2 days per week during season. All exercises (except crunches) performed controlled up and controlled down. 1 second up, 1 second down cadence on all exercises unless otherwise noted. Rest 30 seconds to 1 minute between sets. Stretch after each session.

DAY 1 -5 minute warm up on stationary bike

SQUATS - 3 sets of 20

DUMBBELL BENCH PRESS - 3 sets of 20

PULLDOWNS - 3 sets of 20

CRUNCHES - 3 sets of 25

DAY 2 -5 minute warm up on stationary bike

LEG PRESS - 3 sets of 20

INCLINE DUMBBELL PRESS - 3 sets of 20

ROWING - 3 sets of 20

CRUNCHES - 3 sets of 25

DAY 3 -5 minute warm up on stationary bike

SQUAT MACHINE - 3 sets of 20

DECLINE DUMBELL BENCH PRESS - 3 sets of 20

PULLUPS - 3 sets to failure

CRUNCHES - 3 sets of 25

FINISH EACH SESSION WITH 3 SETS OF 20 ON THE ABDUCTOR-ADDUCTOR WHEN AVAILABLE AND A FULL UPPER & LOWER BODY STRETCHING ROUTINE

KARATE, BOXING & MARTIAL ARTS ROUTINE

Do one series of 10 repetitions done explosively on each movement moving from one to the next with no rest. Perform 1-3 Circuits. Builds explosiveness, but not bulk.

SIDE-TO-SIDE CRUNCH - While standing touch the elbow to the opposite raised knee and alternate left to right. 10 reps each side.

FRONT TO BACK STANDING CRUNCH - 10 reps of standing forward and back bends. Be careful not to overarch backward.

BOB AND WEAVE - 10 half squats alternating left to right that cause dynamic sustained contraction of the quadriceps.

SIDE STEP - 10 reps each side. Step to the side.

FRONT STEP - BACK STEP - Slide the lead foot forward and then rear foot. Now slide the rear foot backward and then the front. 10 reps each side.

BOXER SHUFFLE - Shift body to right foot forward, left foot forward or center. 10 reps each.

ALTERNATE KNEE RAISE - Supporting leg is kept slightly bent as the knee raise exercise is performed with the other leg. Raise the knee so that the thigh is parallel to the floor and the lower leg straight down. Keep the flat. 10 reps per side.

STRAIGHT PUNCH - 10 reps per side punching straight out.

JAB - 10 short alternating punches with arms into the side.

UPPER CUT - Punch upward for 10 reps each side.

FRONT KICK - Raise the knee keeping the thigh parallel to the floor and lower leg perpendicular to the floor. Extend the knee pointing the toes. 10 reps per side.

SIDE KICK - Raise the knee keeping the thigh parallel to the floor and lower leg perpendicular to the floor. Kick outward to the side. Extend the knee and the side of the foot outward. 10 reps per side.

TOP END SQUAT - 1 set to failure.

STANDING CALF RAISE - 1 set to failure.

PUSHUPS & CHINUPS- 1 set each to failure.

Full upper & lower body stretching routine after each session

CARDIO & AGILITY CONDITIONING FOR EXPLOSIVE SPORTS

Interval Training

Interval Training is fluctuating the intensity of the workout from low to medium to high and back again. Many cardio machines have interval programs, which are especially useful for athletes, because they mimic playing conditions. The warm up and cool down should be a low intensity and the work period high intensity. Here are agility, conditioning and plyometrics routines that include interval elements. The sequence or exercise order may be varied.

Pre workout supplements and meal 1-½ hours before training: 4-6 eggs, 2 slices bread, 8 oz. milk, apple, banana.

Supplements: 1 Mutivitamin-mineral, 1000 mg. C, 2000 mg flaxseed oil, 2000 mg fish oil, 800 iu. E, 1000 mg. time release niacin, 1000 mcg. B-12, and ten 50 grain desiccated liver tablets required prior to workout. Client must stay hydrated with Gatorade or other electrolyte replenishment drink.

Schedule conditioning drills two or three alternate days per week performing explosive movements. Rest one minute between events. Warm up with a 10-minute run and 1 set of 50 crunches. Drill on non-weightlifting days for all strength athletes.

SAQ CONDITIONING & AGILITY DRILLS

10 - 20 - 30 - 40 YARD SPRINTS - 1 SERIES EACH (STUDIES SHOW THAT SPRINTING ELEVATES TESTOSTERONE LEVELS)

20 & 60 YARD SHUTTLE - 1 SERIES

BROAD JUMP - 3 SERIES

3-CONE DRILL - 1 SERIES

VERTICAL JUMP - 3 SETS

SIDE STEP - 1 SERIES

SQUAT THRUST - 20 REPS

STOMACH CRUNCHES - 100 (COOL DOWN)

FINISH WITH FULL UPPER & LOWER BODY STRETCHING ROUTINE AFTER EACH SESSION

PLYOMETRICS ROUTINE

Perform twice weekly on non-weight training days. Plyometrics movements develop explosive power and speed & strength for all strength athletes.

15 minute warm up on stair master (if available)

1. **JUMPS-IN-PLACE 3 sets - 3 sets of 10**
2. **STANDING JUMPS - 3 sets of 10**
3. **BOUNDING - 3 sets of 10**
4. **SIDE TO SIDE JUMP - 3 sets of 10**
5. **DEPTH JUMPS - 3 sets of 10**
6. **BALLISTIC PUSHUPS - 3 sets of 10**
7. **MEDICINE BALL CATCHES & THROWS - 3 sets of 10 (cool down)**
8. **FULL STRETCHING ROUTINE - UPPER & LOWER BODY**

INJURIES AND OVERTRAINING

Overtraining, which is most common in American athletes, occurs when an athlete uses excessive training volume or intensity (or both), which leads to chronic fatigue and decreases athletic output. Occasionally you will have athletes that don't seem to be reacting positively to your training protocol, which is usually an indication of overtraining syndrome. This condition may be the result of lack of sufficient rest time between training sessions and a lack of sleep, or inadequate diet. To break out of the performance slump you must analyze the athlete's diet, supplementation, sleep and training patterns. Determine if a brief rest period is warranted. You can attempt changing the exercises and sequence, step up the cadence of the reps, or introduce isometrics. This alteration may be enough to shock the body into responding again. If the client has been using the Stairmaster each session, place him or her on the elliptical machine and vice-versa. Switch the routine around until you get results. Flexibility is the key to breaking through training plateaus.

A lack of sufficient rest or recovery can precipitate overtraining syndrome, defined by a plateau or even a reversal in athletic production. Overtraining caused by too much training volume or intensity can be overcome after several days of complete rest, although rest periods for athletes in endurance sports may require a few weeks of relaxation. A diet deficient in nutrients and calories will also lead to diminished output. Dietary problems are the easiest kind to spot and fix. If they are not taking in adequate calories they may require a meal replacement drink. Note that sports drinks like Gatorade do not contain vitamins and minerals that have been lost through perspiration and vitamin supplements are crucial to success.

If an athlete is still not making progress after a rest period, check diet, protein levels and supplementation. The lack of results is almost always related to diet or rest patterns rather than training when all other factors are optimal. Stress how important diet and rest is to each client and make sure they follow through every day with responsible eating and eight hours of sleep per day even when you are not around to monitor them.

TRAINING AROUND AN INJURY

If an athlete has a minor injury is otherwise limited in his or her capacity to exercise at a peak level, you will have to be innovative in your approach to his or her training. The individual may not be able to grasp a bar, run, or may have limited range of motion on exercise movements.

Once the client has received the go ahead from the medical staff, an innovative training method is to use your hands as resistance on your client's injured limb by employing a variety of techniques, including isometrics. Get their permission first before you start pushing and pulling on them. Don't work them too hard the first few sessions. Try to make them the client comfortable with you and the movements. Experiment with static

reps, partial range training, low reps, and apply resistance anywhere feasible. Mimic nautilus machine pullovers, curls, side dumbbell raises, rowing, bench presses, shoulder presses, hammer curls, flyes, and shoulder shrugs, as if you were the machine. You both may be surprised at how much you can do together.

Manipulation training works especially well if a short range of motion limits a limb. Stretching and gradually increasing range of motion drills will bring about dramatic increases in his or her ability to perform every day movements with relative ease. Several months of strength training may cause strength and range of motion to return to normal pre-injury levels. Increased muscle mass, and in many cases total recovery are the result when combining strength training with a professional physical therapy regimen.

INITIAL TRAINING SESSIONS

All athletes should consult with their doctor before starting any exercise program. Once you have had the client fill out the health questionnaire, waiver, training assessment form and performed the evaluation performance report analysis, it's time to train them. Where do you begin? You will use the performance report as a gauge. The athlete's first few actual workouts as your client will begin with low intensity and short duration so that you can observe them and so that the protector proteins can develop. You'll know exactly where you need to go with that individual's training and how much activity they can tolerate if you just pay close attention to their response to those initial training sessions. The first workout should be a toned down, abbreviated version of one of the routines from this manual.

Start out with one set of each exercise with a light to medium weight, depending on the client's preexisting fitness level. If they are already exercising, you will be able to step right in with a good targeted sports training program and only a minor weight and exercise adjustment may be necessary. This initial meeting should last no more than thirty minutes. If the client has been working out regularly, collect feedback by asking them what they usually do and develop their training protocol based on their preferences and capabilities.

Observe your client's physiology during the initial session and continually ask for their feedback about how they feel. Ask if they are dizzy, short of breath, etc., especially if they are overweight. Notice if their face turns pasty or gray, or if they appear ready to pass out, which can easily happen to an unconditioned athlete. Better to err on the side of caution. If there is a problem, cease all activity immediately and seek medical attention. Keep notes about what happened, what you were doing, your response and any other observations and statements made by the client. You will need that information for the paramedics and insurance report (if required).

SPOTTING

It is important to be concerned with correctly spotting your clients. A ruling in a court case from the Superior Court of New Jersey mandated that spotters are liable for injuries sustained to weightlifters, even if the injury occurs because of equipment lying around on the floor. In this case, a spotter was sued for negligence after a person was injured by a weight *lying next to the bench*.

The defendant (spotter) volunteered to spot the plaintiff during weight training. When the plaintiff (weightlifter) put his dumbbells on the floor, his left index finger was smashed when the weight in his left hand came into contact with a weight on the floor. The plaintiff provided expert testimony to the court citing various standards of care, including those from the National Strength and Conditioning Association, that says: ***It is a spotter's obligation to examine the area around the weightlifter to ensure other objects, including other free weights, are not within the area of activity.***

The defendant filed a motion for a summary judgment saying that he should not be held liable to the injured lifter. The motion was denied. The court ruled in favor of the plaintiff and decided that, "a reasonable jury could conclude, “The defendant voluntarily assumed a duty by 'spotting' for the plaintiff. Incorporated in that duty of care is the obligation to ensure the area around the weight bench was clear of any hazards."

By ruling this way, the court mandated that spotters have an obligation to inspect around the area where weight-training activities occur to determine if there are weights or objects in the area that could cause injury. Even volunteer spotters may have liability under certain circumstances and that a person who assumes a duty to another needs to ensure that duty will be adequately performed. Those who provide spotting even as volunteers should become familiar with the obligations imposed upon spotters by written standards of care and guidelines pertaining to the activities. The best way to see how to spot correctly is to observe others training in the gym and to look at exercise photos in books and magazines. Exercise videos are also a good source of spotting pointers.

Usually an experienced client will tell you how they want you to spot them. Your job is to keep them from getting injured by the weight. The general rule for spotting on a specific exercise is that you provide just enough lift to keep the weight moving -- don't let it stall. If it gets stuck keep it going up smoothly. When spotting someone doing squats, you may have to put your arms under their arms and around the front to lightly stabilize them and help lift if they stall. **Never spot squatters from the hips or waist or they may bend at the waist and fall forward with the weight bar rolling dangerously over their neck and head.** Keep the training area clear of unused weights and equipment.

TECHNIQUE and FORM

Exercise technique is performing an exercise exactly as it was designed. You have an obligation to teach clients correct exercise form that will not cause injury. Throwing weights around in a sloppy manner, which is bad form, will not *build* much muscle, but may *tear* a muscle. The key to progress is to maintain a standard lifting count. A lift rate of 1-2 seconds up and a controlled lowering for 1-2 seconds is the baseline cadence for all athletic training repetitions. Heavier loads tend to rise more slowly, but still within fast twitch parameters.

A variety of sets and repetitions will produce better results than the same sets and reps all the time because muscles and the nervous system adapt to new and unusual stresses by increasing in strength, size and aerobic capability (GAS). Athletes who tend to settle into a routine and may want to use only one system. In that case, simply align with their preferences while letting them know that other systems are available, too. If a weight is obviously too heavy, lighten it. Sometimes clients will try to lift more than they are capable of for their ego’s sake. You must advise them that proper form with a slightly lighter weight will yield greater benefits.

Certain exercises may cause injuries and damage to joints over a prolonged period of months and years. Particularly traumatic exercises are upright rows, behind the neck

presses and pull downs, full range pullovers, full sit ups, Roman chair sit ups or leg raises, **side bends**, deadlifts and full range stiff legged deadlifts. Avoid these exercises for the sake of athlete client longevity. Hyperextensions where the body is extended up past parallel to the floor are also injurious and should never be performed past parallel. Dumbbell flyes with excessive weight may wrench the client's arms down too quickly and dislocate the shoulder or tear a muscle. **Always spot clients from their wrists when they do flyes, not the elbow.**

SUMMARY

The overarching message of this manual should be that you don't want to train a marathon runner the same way that you train a powerlifter, wrestler, soccer player, basketball player or football player. A marathon runner or tri-athlete must not add additional body weight and must employ high rep, pumping, non-failure training. A powerlifter, wrestler or football player will by nature wish to add more strength and lean muscle mass and must use heavy, explosive training to failure.

Another goal for you as a Strength & Conditioning trainer is to time the training peak for the sports season while protecting the athlete from injury. A rule to remember as you establish yourself as a Strength & Conditioning trainer and build a steady client base is to always put the welfare of the athlete ahead of your idea that clients must always train hard during their workout, no matter what, so you don't injure them. If the client is slightly injured or experiencing a low energy day, ease up on the intensity and analyze rest and diet patterns. You want clients to confide in you when they have breached their discipline.

You are going to be able to make positive, life changing improvements in your athlete clients' lives. There is nothing so rewarding as seeing someone win a championship because of the help you have provided. Just use common sense. Don't put yourself into a compromising situation by promising more than you can deliver. Make the client realize that he or she is the person responsible for the results, and you are only there to coach and help them. If you work together as a team, the benefits of training will accrue.

You now have tools you need for filling athlete client needs. Athlete routines may be light weight, low volume, low intensity, or heavy weight, low or high volume with heavy weights, or a combination. You now have routines for athlete clients that will produce results for them, and they are flexible enough to meet special needs that athletes may have. You are helping clients overcome areas of under-performance by building them up. You can share in the triumph when your client is raising a trophy while perched on top of the winner's podium!

I can't wait to hear from you about how your new business is doing!

God bless.

Gregory Ladd, President
American Muscle & Fitness

AMFPT FINAL EXAM

You can mail your answers, name and mailing address to American Muscle & Fitness, 102 Benedict Road, Pittsford, NY 14534 when you finish the exam and it will be corrected quickly. You'll be notified by mail how you did. **Please do not copy sections from the manual and submit them as your exam essay answers** because it is automatic failure. In addition to having thorough and correct length essay answers, you must get all multiple choice answers correct to receive an "A." Each wrong multiple choice answer drops your score one full letter grade. Four answers wrong equals automatic failure. The essay answers are there to provide you with three practical scripts that can help you in your training business. They are not tricky or created with the goal of failing anyone.

Your essays must be in your own words. Short quotes are usually used only to back up statements or conclusions that you make in your essay. You may quote from ***any*** source as long as you use footnotes, or clearly cite the source, and as long as your essays are not made up entirely of quotes, graphs and routines taken from other sources. You can make reference to the different handouts that your clients would receive from the manuals by name. **Each essay answer must be at least 300 words** in length. An "A" or higher score will be noted on your letter of recommendation.

Good luck!

Gregory Ladd, President

Place an "x" next to the correct multiple choice answer.

1. What must athletes sign before starting training?
1. A health questionnaire and waiver
2. A personal training questionnaire
3. A Personal Training exam
4. All of the above

2. Athletes should consult with their _____ before starting any exercise program.
1. spouse
2. children
3. doctor
4. lawyer

3. The V-shaped muscles of the back are:
1. Pectorals major and minor
2. Quadriceps
3. Latisimus Dorsi
4. Biceps

4. The chest muscles are the:
1. Triceps
2. Teres major and minor
3. Rhomboids
4. Pectorals major and minor

5. The biceps:
1. Curl the forearm up
2. Pull the arm down to the side
3. Raise the arm
4. Draw the rib cage to the hips

6. To stand on tiptoe the muscles used are the_____.
1. quadriceps
2. hamstring
3. gastrocnemeus
4. glutes

7. Muscles always _____ to cause motion.
1. Push on levers
2. Pull on levers
3. Bend
4. Straighten

8. What are the three basic muscle fiber types?
1. Fast, medium, slow
2. Super, supercilious, noncilius
3. Cornea, patella fumorate
4. Sharp, medium, dull

9. A strength athlete's exercise routine should be_____.
1. high intensity/interval
2. high volume/long endurance
3. low volume/ low intensity
4. None of the above

10. If a weight your client is using is obviously too heavy, _____.
1. quit the workout
2. lighten it
3. increase it
4. cheat

11. For endurance athletes, the stationary bike and treadmill are better choices than the stair climber and elliptical trainer are because they are_____.
1. High intensity
2. Low intensity

3. Automatic
4. Manual

12. Athletes want to be _____during a training session.
1. abused
2. badmouthed
3. motivated
4. cursed at

13. A trainer should find out the athlete's _____history before training him or her.
1. health
2. driving
3. address
4. work

14. Slow twitch muscles are trained with _____weight.
1. light
2. heavy
3. Both of the above
4. None of the above

15. Volume, when applied to training, means_____.
1. amount
2. size
3. sound
4. loudness

16. For improved athletic performance of any kind, which is the best method?
1. Diet
2. Diet and exercise
3. Exercise
4. Cardio

17. The best response to training based on the GAS principle is provided by_____.
1. using the same exercises all the time
2. using different exercises every workout
3. using only machines
4. using only free weights

18. When taking someone's pulse you should never use the_____.
1. wrist
2. neck
3. chest

4. stethoscope

19. A _____ is an exercise movement where you lift a weight from the start, or bottom of a movement, to the top, and back down again.
1. set
2. super set
3. circuit
4. repetition

20. As a Strength and Conditioning Trainer, your customer's quality of _____ is of paramount importance.
1. care
2. outfit
3. gym
4. home

ESSAY QUESTIONS

For each question write at least a 300 word essay based on the manual reading material outlining the routines, sets, exercises and schedule you would recommend for the client. Assume each client is in good health. Check your grammar and spelling. Exam answers may be e-mailed to exams@amfpt.com. **Your essays must be in your own words. Please do not copy sections from the manual and submit them as your exam essay answers**.

1. What is the best way to train a strength athlete like a football player? Outline how would you train a strength athlete client over a period of six months. Assume that the client had no experience with structured exercise and was healthy and wanted to gain explosive strength & muscle. Be sure to include all exercises, equipment (if any) sets, reps, days per week, days of the week and rest periods. 300 word minimum.

2. What is the best way to train an endurance athlete like a distance runner? Outline how would you train an endurance athlete client over a period of six months. Assume that the client had no experience with structured exercise, was healthy and wanted to gain endurance without bulk. Be sure to include all exercises, equipment (if any) sets, reps, days per week, days of the week and rest periods. 300 word minimum.

3. What is the best way to train a precision athlete like a golfer? Outline how would you train a precision athlete client over a period of six months. Assume that the client had no experience with structured exercise and was healthy and wanted to gain explosive strength & muscle. Be sure to include all exercises, equipment (if any) sets, reps, days per week, days of the week and rest periods. 300 word minimum.

E-mail your exam to amfpt@aol.com. You can also mail your exam to:

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