Praise for Ori Hofmekler and *The Warrior Diet*

"Nothing tugs at your purse strings like the promise of a fat-burning miracle, but let's face it: the weight-loss industry is $35 billion fat, and sometimes it seems that the only thing getting thinner is our wallets. Well, we've had it. We've spent the entire year searching, researching, tasting and testing so you don't have to waste precious time or money. We're so convinced that we've found 2002's 25 best (the fastest, easiest, cheapest and most effective) get-fit solutions, that we are awarding them a prize…FIRST'S first annual Slimmys for weight-loss excellence.

When it comes to diets, we weed the godsends from the gimmicks and give you the very best every issue. But our pick for best of the best? The Slimmy goes to…*The Warrior Diet.*" **—First For Women Magazine, December, 2002**

"Women everywhere are raving about the super-effective "warrior" diet—eating lightly during the day, feasting after dark and losing weight at record speeds."— **Woman's World, November, 2002**

"An original, distinctive, and highly satisfying diet plan, *The Warrior Diet* is meant especially for those who pursue an active lifestyle."— **Midwest Book Review**

"In my quest for a lean, muscular body, I have seen practically every diet and suffered through most of them. It is also my business to help others with their fat loss programs. I am supremely skeptical of any eating plan or "diet" book that can't tell me how and why it works in simple language. Ori Hofmekler's *The Warrior Diet* does just this, with a logical, readable approach that provides grounding for his claims and never asks the reader to take a leap of faith. *The Warrior Diet* can be a very valuable weapon in the personal arsenal of any woman."**—DC Maxwell, 2-time Women's Brazilian Jiu-Jitsu World Champion, Co-Owner, Maxercise Sports/Fitness Training Center and Relson Gracie Jiu-Jitsu Academy East**

"I refuse to graze all day, I have better things to do. I choose *The Warrior Diet.*"
—Pavel Tsatsouline, author of *Power to the People!* and *The Russian Kettlebell Challenge*

"In a era of decadence, where wants and desires are virtually limitless, Ori's vision recalls an age of warriors, where success meant survival and survival was the only option. A diet of the utmost challenge from which users will reap tremendous benefits."**—John Davies, Olympic and professional sports strength/speed coach**

"*The Warrior Diet* certainly defies so-called modern nutritional and training dogmas. Having met Ori on several occasions, I can certainly attest that he is the living proof that his system works. He maintains a ripped muscular body year round despite juggling extreme workloads and family life. His take on supplementation is refreshing as he promotes an integrated and timed approach. *The Warrior Diet* is a must read for the nutrition and training enthusiast who wishes to expand his horizons."**—Charles Poliquin, author of The Poliquin Principles and Modern Trends in Strength Training, Three-Time Olympic Strength Coach**

"Ori Hofmekler has his finger on a deep, ancient and very visceral pulse—one that too many of us have all but forgotten. Part warrior-athlete, part philosopher-romantic, Ori not only reminds us what this innate, instinctive rhythm is all about, he also shows us how to detect and rekindle it in our own bodies. His program challenges and guides each of us to fully reclaim for ourselves the strength, sinew, energy and spirit that humans have always been meant to possess." **—Pilar Gerasimo, Editor in Chief, Experience Life Magazine**

"I think of myself as a modern-day warrior; businessman, family man and competitive athlete. In the 2 years that I have been following *The Warrior Diet*, I have enjoyed the predators' advantage of freedom from the necessity of frequent feedings. I also benefit from the competitive edge of being a fat burning machine. My 12-year-old son, who is also a competitive athlete, has naturally gravitated towards *The Warrior Diet.* He is growing up lean, strong and healthy, unlike many of his peers, many of whom, even in this land of plenty, are overweight and frequently sick. Thank you, Ori, for writing *The Warrior Diet.*" **—Stephen Maxwell, Ms., 2-time Brazilian Jiu-Jitsu World Champion, Co-Owner, Maxercise Sports/Fitness Training Center and Relson Gracie Jiu-Jitsu Academy East**

"Ori and I became friends and colleagues in 1997 when he so graciously took me under his wing as a writer for *Penthouse* magazine and *Mind and Muscle Power*.

When I received *The Warrior Diet* in the mail I nearly burst with pride. Not only because my dear friend had finally reached his particular goal of helping others be the best they can be physically, but because I had a small role in the creation of the book. Ori enlisted my help in researching topics such as the benefits of fasting, the perfect protein, and glycogen loading. I believe in Ori's concepts because I trust him wholeheartedly and because I helped uncover the scientific data that proves them. I also live by *The Warrior Diet*, although not to the extreme that Ori does. My body continues to get tighter and more toned in all of the right places...and people marvel at my eating practices.

Read *The Warrior Diet* with an open mind. Digest the information at your own pace. Assimilate the knowledge to make it fit into your current lifestyle. You will be amazed at how much more productive and energetic you will be. Be a warrior in your own right. Your body will thank you for it."**—Laura Moore, Science writer, Penthouse magazine, IronMan magazine, Body of the Month for IronMan, Sept 2001, Radio Talk Show Host The Health Nuts, author of Sex Heals**

"Despite its name, *The Warrior Diet* isn't about leading a Spartan lifestyle, although it is about improving quality of life. With a uniquely compelling approach, the book guides you towards the body you want by re-awakening primal instinct and biofeedback—the things that have allowed us to evolve this far.

"Ironically, in a comfortable world of overindulgence, your survival may still be determined by natural selection. If this is the case, *The Warrior Diet* will be the only tool you'll need."**—Brian Batcheldor, science writer/researcher, National Coach, British Powerlifting Team**

"At a certain age, I began to notice a change in my pre-competition training. The intense physical stress I put my body under started to leave me feeling burnt out after my workouts. I also suffered from frequent sugar crashes due to my Hypoglycemia.

I would become irritated, light-headed and physically weak. I often became angry after training and I could not explain why. I was having a difficult time trying to figure out what and when to eat. This became a serious problem. Competing on an international level, proper diet and training are the bare necessities for peak performance.

After meeting Ori he advised me on what and when to eat. Once I modified my diet my energy levels changed immediately. I was able to work harder through out my workouts. I no longer felt total fatigue after training. Ori and I are of one mind when it comes to functional training. In Martial Arts you must train every aspect of movement in order to perform well. Ori's advice had a direct effect on the way I trained for my two international titles this year.

The information in *The Warrior Diet* will help you achieve the next level in training for the 21st century. It is the physical training along with the diet that will make a lasting impact on your life. I am deeply grateful for Ori's advice and the friendship we have established over the years." **—Sifu John R. Salgado, World Champion, Chinese Wrestling and Taiji Push Hands**

Maximum Muscle

Minimum Fat

Ori Hofmekler
Author of *The Warrior Diet*
With Marc Salzman

Maximum Muscle

Minimum Fat

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Introduction

A Revolutionary Way of Looking at Maximum Muscle and Minimum Fat

The Renaissance culture that flourished in fifteenth- and sixteenth-century Italy idealized the classic muscular body, defined in part by Michelangelo and Leonardo da Vinci. These two great artists attempted to define the ideal human body proportions through drawing and sculpture. The last 60 years, however, have marked dramatic changes in the way men and women regard their bodies. We are now living in a new renaissance of bodybuilding, and more people than ever are dieting and exercising, striving to build bodies that are hard and lean.

The goal of achieving a lean and muscular body began long before the time of da Vinci and Michelangelo. Bodybuilding and the admiration of physical power are depicted in ancient Assyrian, Philistine, Minoic, Greek, and Roman art. Physical power was perceived as a primal male virtue required for protecting one's family and defeating or dominating other males.

According to anthropologist Desmond Morris, women are attracted to hard and muscular men with the potential to become strong husbands and protectors of their children. But nowadays, women's desire to look hard and lean is almost as great as men's. Without delving more deeply into the anthropological definition of "lean 'n' mean," the question is: Why do you want to build muscle and lose fat? Obviously the most common answers are that a hard and lean body:

- Is sexually attractive
- Improves strength
- Earns admiration

Many people, and perhaps most, want to gain muscle and lose fat primarily because they believe that a body with big muscles and low body fat looks great. Although that is certainly true, strength is also important. However, for many men, particularly bodybuilders, looks come first, and health and performance come second. Nothing is wrong with a passionate desire to look big and hard. But big muscles do not guarantee maximum power, and a lean look isn't always a sign of health, especially in women.

The purposes of this book are to present the hard-core truths about muscle gain and fat loss and to present a revolutionary, scientific way of looking at human performance. Science is about predictions based on fact. Life is about surprises. This book is about both.

- Part I -

The Biological Switches That Trigger Muscle Gain and Fat Loss

1

TURNING ON THE ANABOLIC SWITCH

A Revolutionary Dietary Cycle That Triggers Maximum Anabolic Impact

Can you turn on your anabolic switch like you can flip on a light switch? Can you really trigger the body's instinct to build muscle? For that matter, is there truly an instinct to build muscle? The answer to all these questions is a short and simple yes! There is indeed an anabolic switch that can be turned on when the body is in survival mode. As you're about to read, the anabolic switch that stimulates muscular development is installed within you. All you need to do is learn how to turn it on. What you're about to read here is revolutionary. It may very well go against anything you've known before. But take this information any way you wish. In truth, it simply works.

There is much confusion today about the meaning of *anabolism* and *catabolism*. Bodybuilders commonly believe that *anabolic* means good and *catabolic* means bad. But nothing is further from the truth. To understand what really puts the body into a maximum anabolic state, let's first briefly shed some light on these anabolic and catabolic forces that regulate our lives.

ANABOLISM AND CATABOLISM

Your life, biologically speaking, is defined by your metabolism. The process of turning matter into energy and energy back into matter is what makes a living creature superior to any mechanical machine. Your body is programmed to recreate itself every minute of your life. Substances in the form of air, food, water, carbon dioxide, and waste are constantly moving in and out of your body. The process in which material is built is called anabolism, and the process in which material is broken down and removed from the body is called catabolism. It is the balance between the anabolic and catabolic forces that regulates your body fat, muscle mass, rate of aging, and overall health. Both anabolism and catabolism are critical to your survival and, as you'll learn shortly, anabolism and catabolism work together, activating and potentiating each other.

NEGATIVE FEEDBACK CONTROL

Like many other forces that are necessary to sustain life, anabolic and catabolic processes are naturally regulated in your body through a mechanism of negative feedback. Negative feedback is a most efficient biological process that maintains the balance between two opposing forces. Many, if not most, of the body's life functions, such as the regulation of blood sugar, the stabilization of blood pressure, the assimilation of nutrients, and the activation of hormone synthesis are based on negative feedback control.

Most life processes occur in cycles. The body maintains homeostasis through a negative feedback control system that cycles continually between antagonistic forces which have their own, set duration. The anabolic and catabolic processes regulate each other through these numerous negative-feedback loops. Hormone levels, cellular energy levels, and overall nutritional states are all factors that dictate whether your body builds and repairs tissue or whether it destroys, recycles, burns, or removes material. Simply stated:

Anabolism is stimulated by catabolic activity.

Catabolism is stimulated by anabolic activity.

Resistance training is actually a catabolic activity that tears muscle fibers. This catabolic activity triggers an anabolic process by which the body repairs and builds stronger muscle that can handle more stress (resistance) through adaptation.

Unfortunately, just the opposite may occur when a person maximizes his or her athletic skills. Trained bodybuilders and powerlifters who have reached a peak of muscle development are the ones most likely to reach a plateau or a stagnation point after which they fail to gain more muscle or strength. Many athletes feel that they are getting weaker in spite of adhering to a diet and exercise routine. What they don't realize is that at a peak anabolic state, the body's catabolic activity increases as if it is trying to shrink the body down to its normal size. However, an athlete can activate a most powerful anabolic state by following a special dietary cycle that induces a temporary catabolic state, thus prohibiting the body from reaching a stagnation point.

HOW TO REALIZE MAXIMUM GROWTH POTENTIAL

To maximize growth, you must activate the hormones that stimulate growth. This hormonal stimulation is actually the switch that turns on the anabolic process, and the switch gets flipped whenever you fast or undereat. Fasting or undereating sends a starvationlike signal that the body perceives as catabolic. To compensate for the missing food and to protect itself from metabolic breakdown, the body does whatever it can to boost its anabolic activities. It significantly increases protein assimilation to ensure maximum protein utilization from minimal food.

At the cellular level, a most powerful cellular factor is activated during fasting or undereating. This cellular factor is called cyclic AMP (cAMP). Among its numerous jobs, cAMP activates anabolic-stimulating hormones that are secreted by the region of the brain called the hypothalamus and by the pituitary glands. (The pituitary gland is a pea-sized structure located at the base of the brain.) Additionally, recent research shows a dramatic increase in insulinlike growth factor 1 (IGF_1) receptors in muscle cell membranes during fasting or undereating. This increase is probably a primal biological compensation mechanism that ensures human survival during periods of starvation. In fact, recent

studies on growth hormone reveal a positive correlation between hunger and stimulation of the growth hormone.

Ancient peoples cycled between periods of undereating, when food was scarce, and periods of overeating, when food was abundant. Over eons of evolution, the human body adapted to withstand periods of undereating and overeating. When you undereat, you trigger a primal biological force that helps your body adapt to food deprivation and better survive in times of hardship. To take advantage of this powerful dietary cycle and to avoid metabolic decline and muscle breakdown, you should always fully control undereating and should never exceed more than 18 hours of undereating.

HOW TO TURN GROWTH POTENTIAL INTO MUSCLE GAIN

Undereating, overeating, and exercise all force your body to activate and reactivate anabolic states, in which the body is being pushed to repair, build, rejuvenate, and improve itself. During undereating and exercise, the body triggers, or potentiates, an anabolic state while maximizing its growth activities through nutritional replenishment and rest. Cycles of undereating and overeating can last between one and seven days per week. This method of eating forces the body to detoxify. Liver detoxification is critical for the proper production of the steroid hormone and for the proper utilization of food for energy and maximum growth.

Length of Undereating

Undereating on a Daily Basis

Undereating on a daily basis should last for 20 hours followed by four hours of nourishment from a main meal. Longer undereating periods can last up to two days. During this time, individuals consume fewer calories than they expend (negative energy balance).

Length of Undereating (continued)

"Undereating" is a relative term. What is considered undereating for some people may be considered overeating for others. For undereating to have its maximum effect on your body, eat in a controlled way where you regulate the amount of food and the length of undereating period according to your specific needs.

According to Mark Mattson, Chief of the Laboratory of Neurosciences at the National Institute on Aging in Baltimore, Maryland, studies on mice revealed that feeding cycles of fasting one day followed by overeating the next day could be effective enough to help improve survival capabilities such as resistance to stress, protection against insulin resistance, improved brain power, and increased lifespan. Dr. Mattson and his colleagues are currently planning human studies on similar feeding cycles (i.e., 20 hours of fasting followed by four hours of feeding.)

Nevertheless, it's important to note that athletes and bodybuilders should try to incorporate small recovery meals during the undereating phase to avoid muscle breakdown and to maximize growth.

When incorporating the above feeding cycle, use common sense. If you wish to practice undereating as part of your daily routine, the principle is very simple: Eat one main meal a day, preferably at night. Use your instinct rather than obsessively check exact times, count calories, or restrict macronutrients. Those who wish to incorporate undereating for longer than one day should simply try to maintain a negative energy balance in which more energy is expended than consumed. However, it is important to maintain full nourishment, including all essential nutrients and sufficient amounts of protein to avoid muscle waste and overall metabolic decline.

Exercise on an Empty Stomach

Exercising on an empty stomach before you have eaten a meal, is a most effective way to accelerate the activation of an anabolic state while forcing the body to burn fat and inhibit fat gain. People who exercise first thing in the morning or at any other time on an empty stomach are putting themselves in a winning situation. To maximize the impact of exercising on an empty stomach, you should have a recovery meal following the workout that supplies all the right nutrients needed for the anabolic state.

Undereating

Undereating is a relative term. It generally means eating less than you usually do.

For the purpose of activating growth potential, *undereating* means minimizing your food consumption to mainly low-glycemic fruits and vegetables or their juices.

For the purpose of muscle gain, you can consume a small amount of protein. While undereating, you can have coffee, tea, or unsweetened hot chocolate. However, to avoid an insulin spike that might inhibit the activation of desirable growth-stimulating cellular factors, at no time during this phase should you eat processed carbohydrates or sugar. To be effective, the undereating phase should last between 10 and 16 hours. But to avoid metabolic decline and muscle waste, you should never undereat for longer than 18 hours. If you exercise during the day, you should have a recovery meal after each workout to inhibit protein breakdown and increase anabolic activity in the worked muscles.

Overeating

Like undereating, *overeating* is a relative term. What one person considers overeating may be normal eating to another. What overeating really means is eating more than you usually do. Regardless of how much you eat, you should always choose foods from all the food groups: proteins, fats, and carbohydrates.

Start with protein and veggies, the nutrients your body needs most, and then add carbs. Make sure you eat whole and complete protein foods such as meat, eggs, fish, dairy, or vegetarian combinations such as rice and beans, to supply your body with all the essential amino acids.

Include essential oils such as flaxseed, primrose oil, or fish oils that are rich in omega-3 and omega-6 fatty acids. Essential fatty acids (EFAs) are critical for all life functions, including cell growth, cell membrane formation, and hormone synthesis. Periodic overeating signals your body to accelerate its metabolic rate to burn all those mega-calories you're consuming. Over time, periodic cycles of undereating and overeating may help boost your metabolism so you'll be able to eat even more food, further accelerate growth, and still not gain fat.

The Great Pump—
The Day After Competition

Professional bodybuilders know about The Great Pump they often get the day after a competition.

The term "muscle pump" means a postexercise swelling of muscles and veins that gives the body a full, muscular, and more defined look.

The Great Pump (continued)

Many bodybuilders who go through a grueling calorie- or carb-restrictive diet before competition actually sacrifice muscle mass to look lean and defined on stage. But to their surprise, it is the day after the competition when they really look their best. The reason is that, during a low-calorie, low-carb, precompetition diet, the body actually goes through a prolonged catabolic-like undereating phase.

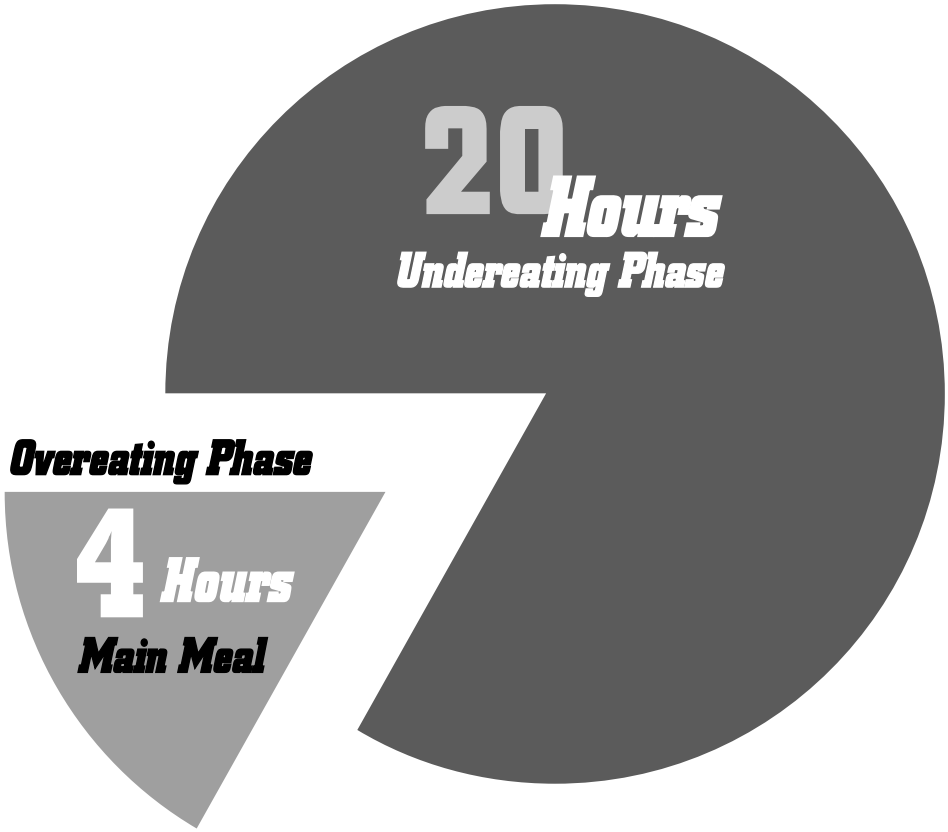
As noted, during the undereating phase, the body is being stimulated to activate growth potential that is finally occurring right after the competition, when bodybuilders allow themselves to eat to their heart's content. It is the pre- and post-competition cycle (i.e., undereating followed by overeating) that forces the body to reach a maximum anabolic state, and that's exactly what happens the day after competition. Champion bodybuilders know this, and some do a light carb-loading before competing to avoid looking flat and to get maximum muscle pump.

Feeding Cycle

Example of Daily Undereating

Memory Aid:

"24 Hours in a Day"



2

Muscle Gain and Fat Loss at the Cellular Level

To gain muscle and lose fat effectively, you need to understand the basic principles of growth and fat burning. The most basic, self-contained unit of life in your body is the cell, where everything begins. Growth and fat burning depend on the body's ability to activate certain cellular factors that induce protein synthesis and fat breakdown. A nearly endless number of cellular and systemic events are required for the repair, synthesis, and buildup of tissue, besides turning adipose fat (i.e., fat tissues) into energy.

Cyclic AMP

If someone told you that there is a miracle pill that forces the body to build muscle and burn fat, you might think it sounds too good to be true. What if you learned that your body already has this miracle pill built in? Your body is preprogrammed with an inner mechanism that, once activated, can stimulate growth potential while simultaneously burning fat.

When you fast, exercise, or undergo intense stress, you activate an inner cellular process that forces the synthesis of growth-stimulating hormones. The process also forces your body to dig into its cells and turn glycogen reserves and fat storage into energy. And, as if this weren't enough, it also simultaneously inhibits fat gain. The mechanism that regulates these actions is induced by a cellular factor, a nucleotide called cyclic AMP (cAMP).

Cyclic AMP's growth-stimulating impact was discussed in the previous chapter. Nevertheless, it's important to understand the way cAMP generates its anabolic and fat-burning actions. When activated, cAMP catalyzes a chain of cellular events that activate enzymes responsible for protein synthesis and energy production. A cascade of phosphorylation (i.e., adding phosphorus to enzymes) events by kinase enzymes amplify the cAMP actions that break glycogen reserves in the liver and induce lipolysis (fat burning) in fat cells. It also promotes events associated with growth functions—in particular, the release of hormones that stimulate the synthesis of anabolic hormones such as growth hormone and steroid hormones.

The Biological Benefits of Stress and Hunger

There is a biological correlation between hunger, stress, and survival. It is very likely that hunger, danger, and physical stress trigger a survival-like mechanism. During survival mode, cellular factor cAMP is activated, thereby increasing energy production and inducing growth stimulation. These cAMP actions help improve reactions to stress as well as protect against injuries and overall metabolic decline. Biologically, cAMP helps support human survival during times of physical and nutritional stress.

A threshold time is needed for the activation of this cellular process. This threshold time depends on factors such as nutritional state, duration of undereating, and intensity of stress applied (undereating or exercise). Undereating combined with exercise likely shortens the threshold time.

Cyclic AMP is activated by the stress and fat-burning hormones adrenaline and glucagon. Once activated, adrenal receptors stimulate the enzyme adenylate cyclase to synthesize cAMP from the energy molecule ATP. Undereating or exercising that often induces a feeling of hunger and stress puts the body in fight-or-flight mode. In this mode, adrenal and

glucagon hormones activate compounds called G proteins, which increase cellular cAMP levels.

G proteins are involved in protein synthesis. They mediate the actions of receptors involved in the sensation of taste and smell, light detection, and the growth of nerves.

To sum up, the entire process by which cAMP is synthesized, from the first step of hormonal binding to the final activation of cAMP, is critical for the regulation of basic reactions to stress. cAMP helps improve overall survival capabilities through wiring the senses, increasing alertness, and improving energy utilization.

cAMP—The Missing Link

Eating full meals inhibits cAMP. Evidently, most modern diets do not sufficiently stimulate the production of cAMP. This fat-burning, growth-stimulating cellular factor can be chronically inhibited by poor eating habits, such as eating too many meals or ingesting too many carbs during the day. Inhibited cAMP could very well be the reason for the current epidemic of obesity, weight gain, stubborn fat gain, and diseases related to premature aging.

Can You Gain Muscle Without Gaining Fat?

Whether or not a person can gain muscle mass without gaining fat is a controversial question. For many bodybuilders and athletes, the prospect of gaining muscle mass without gaining fat seems too good to be true. Professional bodybuilders often fluctuate between 20 and 50 pounds of weight on- and off-season. Off-season, they desperately try to gain weight (i.e., muscle and fat), while on-season they try to shed excess body fat and achieve lean muscle gains. However, there are downsides to this method. First, gaining fat during the off-season may cause the formation of stubborn fat tissue. Thus, it may become increasingly difficult in future seasons to lose fat and reach maximum definition. Second, the on-season, which consists of about four to six months of a reduced-calorie, low-carb diet, may adversely affect thyroid hormone functions and slow the basal metabolic rate.

Such a long and grueling diet can also adversely affect steroid hormone synthesis. Bodybuilders may lose overall muscle mass together with body fat, and this can make them look flat on stage. Some bodybuilders are aware of these on- and off-season diet-related setbacks, so they try to avoid significant weight fluctuations by staying lean all year round.

Nevertheless, the notion of gaining muscle, with the inevitable consequence of gaining fat, is still deeply rooted, and rightly so. Under normal dietary routines that involve many meals throughout the day, gaining the undesirable fat while gaining muscle is indeed inevitable. Such diets, which also incorporate long periods of off-season overfeeding and long periods of on-season undereating, are probably missing the biological principles upon which the body can effectively build muscle while losing fat.

Partitioning

The human body is not built efficiently enough to go through long periods of induced overfeeding or induced underfeeding without adverse side effects. On the other hand, short periods of controlled undereating and overeating are likely to activate the cellular forces that help make simultaneous muscle gain and fat loss possible. In fact, some powerful anabolic agents, such as growth hormone, deliver their action by diverting fat fuel energy into protein synthesis. This process of using fat energy to build muscle is called partitioning.

CYCLIC GMP

To take advantage of growth potential, you must activate another cellular factor that can finalize the growth impact and effectively facilitate muscle gain. When you eat a full meal after fasting or exercising, you activate an inner mechanism that helps your body recuperate from induced stress. Your body replenishes empty energy reserves and nourishes starving tissue with lost nutrients. It also builds and repairs damaged tissue and utilizes new cell membranes.

All these actions are regulated by a cellular factor called cyclic GMP (cGMP). cGMP is insulin dependent and is therefore instantly activated

when you consume carbohydrates. cGMP, which is activated when blood sugar level rises, appears to reverse the cellular actions of cAMP. However, cGMP completes and enhances the initial stimulating actions of cAMP. Overall, this cellular factor, with its nourishing effect, finalizes steroid hormone actions, growth hormone, and insulinlike growth factor 1, thereby establishing a maximum anabolic state.

cGMP—Enhancing Thyroid Actions

The thyroid hormone has a steroidlike activity. It plays a critical role in regulating energy production, body heat, steroid activity, and fat burning. cGMP maximizes thyroid hormone utilization. To be fully effective, the thyroid hormone must be converted from T_4 into its most active form, T_3. This conversion from T_4 to T_3 is catalyzed by a high level of cellular ATP that signals the body that "plenty of energy is available." cGMP's signal of high cellular energy boosts thyroid actions and helps protect the body from a metabolic decline.

One of the main reasons for a metabolic decline is an inactive thyroid. The thyroid hormone can deactivate itself by reversing its active T_3 form into a reverse T_3 (rT_3), an inactive form. Reverse T_3 is formed when not enough cellular energy is available over a prolonged period. This reverses the order of the rings in the iodine atoms in the thyroid hormones molecule and creates a mirrorlike image of T_3 called reverse T_3 (rT_3). rT_3 is not easily detected by a routine blood test. Nevertheless, its potentially adverse effect on muscle gain, fat loss, and overall metabolism can be devastating.

People who endure long periods of crash or low-carb diets often suffer from impaired thyroid function, with symptoms such as sensitivity to cold (especially cold hands), low body temperature, dry skin, loss of hair, sluggish metabolism, and overall fatigue. When properly activated, cGMP helps optimize thyroid functions, ensuring optimum energy utilization for all life functions.

cGMP and Potency

cGMP might be regarded as a sex-stimulating cellular factor. In fact, the drug Viagra works on the principle of inhibiting cellular cGMP reuptake.

cGMP, with its insulin-related actions, promotes the production of nitric oxide (NO). NO, a metabolite of the amino acid arginine, is a natural compound that regulates blood pressure and circulation. As a vasodilator, NO is critical for the male erection. NO and cGMP are responsible for the unrestricted flow of blood into the erectile chamber of the penis. It is cGMP that helps induce a high level of local NO production.

Sexual arousal is a unique event in which both cGMP and cAMP are activated simultaneously. While cGMP dilates the blood vessels to ensure proper blood flow, cAMP constricts blood vessels to trap the blood in the erectile chamber, which helps maintain a full, steady, stiff erection. The activation of the enzyme phosphorylase diesterase (PDE), which deactivates cAMP, ends an erection, thus allowing the blood to flow out of the erectile chambers.

Overall, cGMP is critical for potency and virility. Men who chronically undereat may be able to live longer but may have to live life with a diminished libido and an inability to perform.

Chronic Activation of cGMP

Chronic activation of cGMP, caused by eating too many meals or by ingesting frequent carbs during the day, chronically inhibits cAMP and counteracts its biological benefits. Under cGMP regulatory actions, enzymes that catalyze glycogen and fat-storage breakdown are inactivated through diphosphorylation reactions. Thus, cGMP inhibits fat burning while generally enhancing fat deposits.

Chronic elevation of cGMP upsets the body's biological balance; more material (i.e., fat and toxins) is deposited than is removed. The inability to detoxify compromises liver functions, further accelerating the accumulation of metabolic waste toxins and fat in body tissue. This vicious cycle often results in excessive weight gain, sluggish metabolism, chronic craving for sweets, insulin resistance, general fatigue, and aging.

THE COMBUSTION ENGINE PRINCIPLE

The body's metabolism is based on the same principles upon which a combustion engine operates. The constant shift between antagonistic cellular forces activates and deactivates actions that move the metabolic pistons up and down, like those of a combustion engine in motion.

Cycling between cellular factors cAMP and cGMP maximizes your metabolic efficiency. cAMP and cGMP polarize the direction in which cellular actions occur. This polarization is crucial for all constantly evolving metabolic actions, from burning matter into energy, to depositing material and replenishing energy.

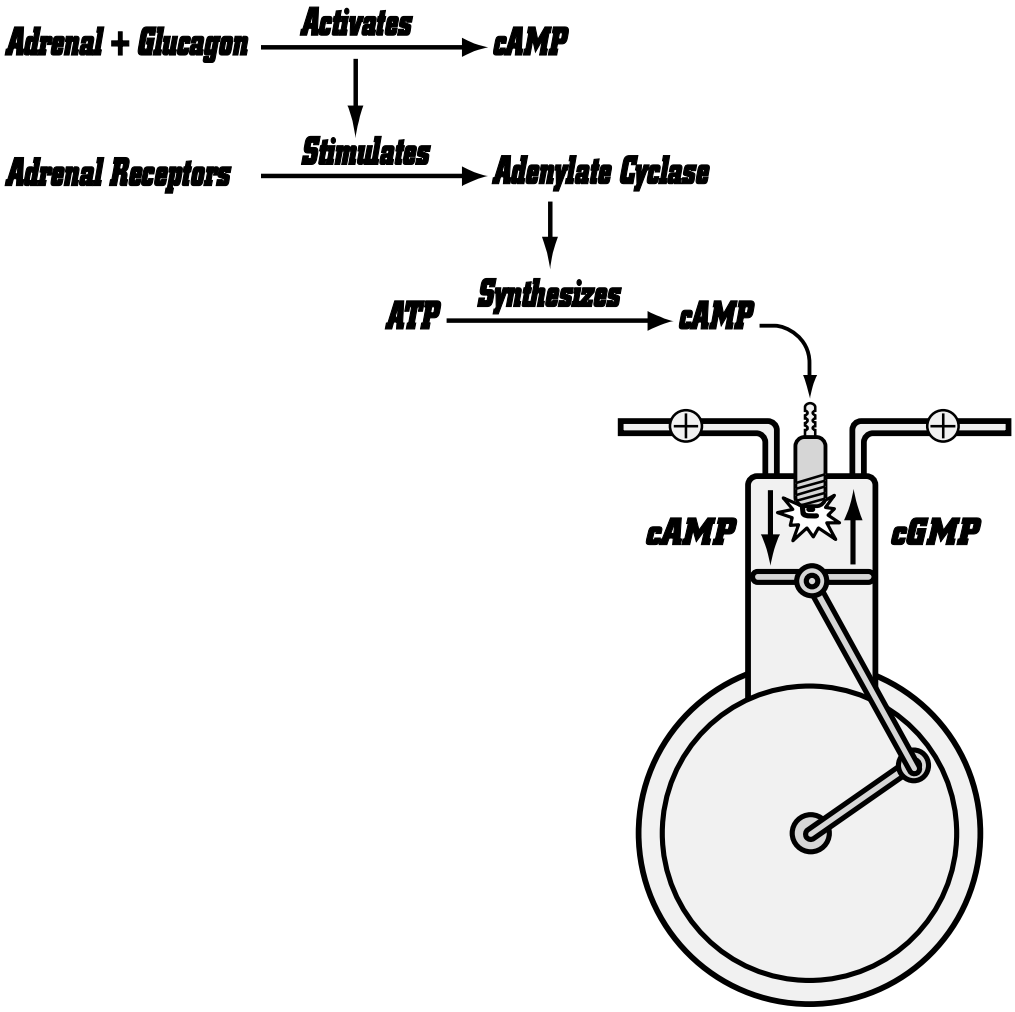
Like a combustion engine based on the principle of high and low pressure, your biological engine is based on opposing forces that move your metabolic pistons. When one piston is up, the other piston is down. Cycling between these cellular forces, such as through undereating and overeating, puts the spin on your charging wheels.

Any action you perform chronically may turn off your biological engine. Chronic activation of one cellular factor chronically deactivates its opposing factor. As noted, most current diets chronically deactivate cAMP while chronically inducing cGMP. That is why undereating, with its cAMP-related activation, is so critical for initially charging your metabolism. cAMP stimulates growth and induces maximum fat burning.

This high-pressure adrenal-related cellular factor later spins the metabolic wheel into a lower-pressure insulin-related, relaxationlike cellular factor, cGMP. cGMP facilitates growth and replenishes empty energy reserves, thus spinning the metabolic wheel back into cAMP to regenerate maximum energy production while stimulating growth, and so forth. Cyclic AMP and cyclic GMP are cellular factors that, while being cycled, together create a combustionlike charging impact that maximizes energy production, overall growth, and rejuvenation.

Combustion Engine Principle

Cycling Between cAMP and cGMP



- Part II -

Muscle Gain

The adoration of the muscular body may well be a built-in archetypal human attraction to physical power as a means of survival. To ancient Roman athletes and warriors, muscle gain for maximum performance often meant the difference between life and death. In contrast, the modern desire for muscle gain for maximum performance is not as easy to understand.

The main goal of modern bodybuilding is to increase muscle mass and definition, whereas performance and health are secondary goals. As a result, a new ideal human body has been created. This new body image and size have nothing to do with biological function. Surprisingly, a typical modern bodybuilder may perform poorly in a real-life situation that demands high endurance, speed, and agility.

In ancient times, the purpose of bodybuilding was to build a powerful body. Nowadays, however, building muscles with maximum performance capabilities means readapting old-fashioned notions about training. In this chapter, we will discuss the most important biological factors involved in improving body composition to maximize performance. Bodybuilders and athletes will find practical advice about how to apply the information.

Some of the material in this chapter may seem rather technical, but it is my wish to present the facts behind the principles of muscle gain and fat loss so as not to disappoint readers who thirst for a full understanding of how the amazing human body works. In this chapter are clear summaries and conclusions that will make the information easy to digest.

GROWTH: THE PRODUCT OF OPPOSING FORCES

Growth occurs as a result of an array of biological events that lead to cellular activities such as transcription and protein synthesis. Like many other biological functions, growth can either heal or kill. On the positive side, the anabolic process of creating new cells is critical for tissue repair, the replacement of old and dead cells, and the buildup of muscle fibers via adaptation to applied physical stress. Growth is a tightly controlled process that facilitates the development of a human being from an early embryonic stage to a fully mature adult.

On the negative side, uncontrolled growth can lead to cancer and death. Ironically, the most powerful growth stimulants that help keep people young and vigorous could also be the most dangerous to human life under certain circumstances.

Many processes can stimulate growth. However, for every process that induces growth, there is an opposing force that inhibits growth. As noted previously, the human body is regulated by negative feedback mechanisms that are based on a balance between two opposing forces. Most of the recent knowledge about growth and its biological regulation in the body is derived from current cancer research.

Most cancer drugs, if not all, act as growth inhibitors. In fact, all anti-inflammatory drugs, including nonsteriodical anti-inflammatory drugs (NSAIDs) such as aspirin or ibuprofen, and blood pressure drugs such as beta blockers, are also inhibitors of hormones and enzymes that stimulate growth. When we try to answer the question *What makes a muscle grow naturally without the use of anabolic drugs?*, the answer is anything but simple.

As you'll soon see, the new science of muscle gain is a topic that may seem controversial or even politically incorrect. Substances often considered to be most adverse to one's health might in fact be the most powerful growth-promoting agents. However, the opposite may also be true: What is regarded as the healthiest and the most beneficial might inhibit growth and even promote fat gain.

Even more confusing is the fact that certain anabolic agents might turn out to be catabolic, while some catabolic agents might be extremely anabolic. In the upcoming chapters, we'll cover the most prominent growth-regulating factors, including steroid hormones, fatty acids and their anabolic actions, peptide-stimulating hormones, insulin, growth hormone, growth factors, and also substances and factors that inhibit growth. Finally, understanding the biological principles behind these complex processes will help create a clearer picture of what really makes a muscle grow.

Last, but not least, is the impact of exercise. Exercise can profoundly encourage muscle gain or can retard muscular development and performance. Proper cycling of exercise, rest, and diet are necessary for maximizing quality muscle gain. Special exercises are needed to effectively transform muscle into super muscle tissue with superior strength, speed, and endurance capabilities.

3

STEROID HORMONES

Steroids are some of the most intriguing of all hormones. Unlike other anabolic or fat-burning hormones, steroids are a group of hormones with diverse and sometimes contradictory actions. In general, the main function of steroid hormones is to develop and maintain a mature and vigorous body. Anabolic steroid hormones are regarded as the most potent libido enhancers and muscle builders. Nevertheless, all steroid hormones, including stress hormones and mineralocorticoids, work together to regulate the body's reactions to stress, to build tissue, and to improve survival capabilities.

Muscle gain and fat loss are only part of a whole steroidal impact on the body. Oftentimes, people can't gain muscle or lose fat because of certain hormonal imbalances or deficiencies. This chapter discusses steroid hormone actions and their practical application to overall muscle gain.

UNIQUE STEROIDAL ACTIONS

Steroid hormones control your shape, your vigor, and your strength. These powerful hormones regulate multiple life functions, including

responses to stress, tissue repair, muscular development, and the overall rate of aging.

What characterizes steroid hormones is that, with the exception of retinoic acid, all of them are derived from cholesterol.

Steroid hormones have a long-lasting impact on the body. Anabolic steroid actions can last for hours or days, making them the most effective anabolic agents. However, as steady and potent as they are, the impact of anabolic steroids is not immediate. In fact, the final anabolic effects of steroid hormones on the body occur in a delayed fashion.

Let's briefly cover the most important factors necessary for triggering steroid actions.

Converting Cholesterol Into Steroid Hormones

The conversion of cholesterol (27 carbon atoms) to steroid hormones involves the rate-limiting cleavage of a six-carbon residue from cholesterol to produce the steroid hormone pregnenolone. Pregnenolone is "the mother of all steroid hormones," which include progesterone, aldosterone, testosterone, estrogen, and cortisol.

Steroid Hormone Synthesis

The switch that turns on steroid hormone synthesis is cellular factor cAMP. cAMP and its related enzyme protein kinase A induce steroid-stimulating hormone release from the pituitary gland. These peptide-stimulating hormones signal the gonads and adrenal glands to synthesize steroid hormones.

Note that steroid hormone synthesis could be inhibited by high cholesterol levels. Steroid production involves cholesterol synthesis in the mitochondria. High plasma cholesterol levels inhibit cholesterol synthesis

and therefore may suppress steroid hormone production. The most effective factors promoting anabolic steroid activity to reach a maximum anabolic state are cellular factor cAMP, low serum cholesterol, and high mitochondrial capacity.

Undereating and Exercise Stimulate Steroid Hormone Synthesis

Steroidal activity can be enhanced by fasting, undereating, and exercise, all of which are cAMP inducers. Here is how this process works:

- cAMP induces steroid hormone synthesis. The activity of all steroid-producing enzymes (desmolase) is closely affected by this principle factor.

- cAMP catalyzes an enzyme that increases available cholesterol concentration, the substrate to steroid hormone synthesis. cAMP also increases the activity of steroid-producing enzymes by binding to specific genes that increase levels of these enzymes and therefore enhance steroid hormone synthesis.

Peptide-Stimulating Hormones and Their Specific Steroid Hormone Targets

- Leutenizing Hormone (LH) ‡ Progesterone and Testosterone
- Adrenocorticotropic Hormone (ACTH) ‡ Cortisol + Androgens
- Follicle-Stimulating Hormone (FSH) ‡ Estradiol
- Angiotensin ‡ Aldosterone

High Mitochondrial Capacity for Proper Steroidal Impact

High mitochondrial capacity increases fat utilization and thereby helps promote steroid hormone synthesis. The first critical stage of steroid hormone synthesis involves the conversion of cholesterol into pregnenolone in the mitochondria of steroid-producing cells. The enzyme system that catalyzes the cleavage reactions that lead to steroid hormone synthesis is called desmolase (P-450, SCC).

Mitochondrial damage caused by toxicity, aging, and lack of antioxidants can lead to lower mitochondrial capacity, which may result in steroid hormone decline, loss of muscle mass, general weakness, and overall metabolic decline.

Dietary Fat and Cholesterol Level Effect on Steroid Hormones

As noted, cholesterol negatively regulates steroid hormone synthesis. Thus, when cytosolic cholesterol is depleted, cholesterol synthesis is stimulated, and so is its conversion to the steroid hormone pregnenolone, which moves to the cytosol for further processing. Conversely, a high cellular cholesterol level tends to inhibit cholesterol production, thus decreasing steroid hormone synthesis.

Consumption of fats and carbs should then be intelligently designed as to ensure proper utilization and to prevent insulin resistance as well as accumulation of lipids that may impair steroid hormone synthesis and muscle gain.

Prolonged low-fat, low-calorie diets may suppress steroid actions because of a lack of dietary fat and energy needed for steroid production. In fact, in healthy individuals, high-fat meals can help promote steroid production as long as calorie supply is sufficient.

When eating in moderation is considered healthiest, it may seem wrong to advise people to overeat. Nevertheless, overeating may be the most effective way to support steroidal actions, enhance libido, and maximize growth potential.

High Energy Turnover Enhances Steroid Production

Steroid hormone production depends on the rate of energy production. High energy turnover is a metabolic state that involves high energy expenditure. High energy turnover forces the body to mobilize fat with its cholesterol carrier through the blood to the muscles and liver—where it converts to energy in the mitochondria, thus depleting cellular cholesterol levels while enhancing steroid hormone production.

Exercise methods that will help develop muscle fibers with high mitochondrial capacity will naturally increase the potential for high energy turnover. This improves fat utilization and optimizes cholesterol levels, thereby helping to sustain peak steroidal activity.

HOW TO TAKE ADVANTAGE OF STEROID HORMONE'S ANABOLIC ACTIONS

Sex hormones—particularly male androgens—are considered the most anabolic hormones. Sex hormones have a most profound impact on the body, defining gender, body composition, virility, and tissue regeneration. Testosterone and estrogen have become more familiar in the general population than perhaps any other hormones except adrenaline. Nevertheless, there is still much confusion about the biological functions of testosterone and estrogen. What is clear, however, is that both hormone levels decline with age, leading to loss of muscle and bone mass, fat gain, overall metabolic decline, and increased vulnerability to disease.

Males and females produce both hormones. Testosterone, the male hormone, plays a critical role in women's bodies, and vice versa. The female hormone, estrogen, is necessary for the regulation of critical metabolic actions in men's bodies. Sex steroid hormones can convert from one to another. Of special interest to us is the conversion of testosterone into estrogen. This process, discussed later in the chapter, can cause feminization of the male body, including stubborn fat gain, declining testosterone levels, loss of muscle mass, and impaired physical and sexual performance.

Taking advantage of steroid hormone anabolic actions requires more than just an increase in their levels. In fact, too high a level of testosterone may adversely affect its anabolic actions. To manipulate anabolic steroid hormones to work for you, you should try to understand how they are synthesized and regulated in your body.

Regulating Anabolic Steroid Levels

The body regulates steroid hormone levels via a tight control mechanism. Any artificial interference with this control mechanism may adversely affect steroidal anabolic actions.

The most important anabolic steroid hormones are androgens, including testosterone. The biosynthesis of these hormones is constantly regulated through a tight negative feedback control. Gonadal-stimulating hormones such as luteinizing hormone (LH) or gonadotropin releasing hormone (GNRH), which are secreted by the pituitary and hypothalamus glands, respectively, are directly affected by levels of circulating sex hormones.

A high level of androgen inhibits LH secretion, while low levels of testosterone and other androgens signal the hypothalamus to elevate GNRH. This, in turn, increases the pituitary gland's secretion of LH, a peptide hormone that binds to gonadal tissue and stimulates male sex hormone production.

As you can see, chronic elevation of androgens through drugs or precursor pills may adversely affect the body's natural hormonal regulation mechanism, shutting down its ability to produce these hormones on its own. People who take androgen boosters or drugs without medical supervision should be careful to cycle and monitor the amount and intervals so as to prevent a steroidal decline.

Testosterone and DHT for Maximum Anabolic Impact

The most anabolic steroid hormones are male androgens. Many people suffer from low levels of androgens because of wrong diet, drug abuse,

or overtraining. Understanding the basic biological processes that involve anabolic steroid production may help protect one from hormonal decline and maintain maximum anabolic impact.

Testosterone is regarded as the most anabolic male steroid hormone. "Big T," however, isn't as big as it seems. In fact, some researchers consider testosterone to be a prohormone because of its relatively weak actions compared to other androgens, in particular DHT.

Testosterone is responsible for many critical functions, the most predominant of which is defining and developing male characteristic features, including sexual maturation and fertility. However, testosterone anabolic actions and its related sexual desire and aggression are significantly affected by other androgens, some of which are as potent as testosterone, or even more so.

Gonadals contain an enzyme that enables androgens to be converted to testosterone, and further into DHT. DHT is the most potent male steroid hormone. In fact, its actions are 10 times stronger than those of testosterone.

Any medication, drug, or substance that inhibits the conversion of testosterone into DHT (such as prostate and hair loss–related drugs) may adversely affect steroid-related anabolic actions on muscle tissue and may decrease libido and impair sexual performance. Overall, testosterone and DHT play a critical role in growth, potency, and fertility.

Very low protein diets, prolonged fasting, and crash diets may cause a decrease in plasma globulins. A decline of gonadal steroid-binding globulins may adversely affect all anabolic steroid actions, notwithstanding sexual desire and potency.

HOW TESTOSTERONE AND DHT ARE PRODUCED

In males, LH binds to leyding cells, which stimulate testosterone production. Testosterone is mobilized to the plasma and also carried to sertoli cells by a special protein carrier—the androgen-binding protein (ABP). In sertoli cells, testosterone is converted to DHT. Both T and DHT are carried in the plasma by a specific gonadal steroid-binding globulin (GSBG) until they reach their target. In a number of target tissues, testosterone can convert to DHT.

AROMATIZING— THE BODYBUILDING NIGHTMARE

Conversion of Testosterone to Estrogen

Aromatizing is currently considered one of the most horrific nightmares of bodybuilding. The conversion of testosterone to estrogen via aromatizing is a natural, age-related symptom. However, its effects on young adults today are staggering.

To avoid overexpression of the aromatase enzyme, it is important to understand what triggers its actions. The aromatase enzyme is responsible for many undesirable estrogen-related actions that cause adverse feminization of men. However, the same enzyme plays a critical role in the female body, likely supporting optimal estrogen levels.

In females, LH binds to the cells of the ovary, where it stimulates the synthesis of androstendione and testosterone. Only then, an additional enzyme complex called aromatase finally converts androgens into estrogens. Aromatase is a complex endoplasmic reticulum enzyme that is also produced by adipose fat tissue.

Certain conditions, such as overly high levels of androgens, a congested liver, or high body fat, may lead to the overexpression of the aromatase

enzyme, resulting in the feminization of men, stubborn fat gain (usually around the belly and chest), and a decline in anabolic androgen level, a condition that eventually inhibits muscle growth.

Liver detoxification and a reduction in body fat are probably the most beneficial methods for encouraging antiaromatase activity. Both can help maximize steroid hormone utilization and their anabolic actions.

Some antiaromatase drugs are available, but these have severe side effects, including liver toxicity. The effectiveness of natural antiaromatase treatments, in either herbal or nutritional supplement form, has not been proven. Nevertheless, some experts believe that certain herbs, such as stinging nettle and flaxseed lignan fiber, may exhibit some antiaromatase properties. More research is needed for more conclusive evidence of their effectiveness.

SUMMARY— ANABOLIC STEROID ACTIONS

Gonadal anabolic steroid hormone synthesis occurs during fasting and exercise via the activation of cellular factor cAMP and its related actions. High cholesterol levels tend to decrease steroid hormone synthesis. High body fat and a high level of androgens coupled with a stressed liver may increase aromatase activity (i.e., convert testosterone to estrogen), thus adversely affecting testosterone-related anabolic and sexual impact. Low-protein diets, low-fat, low-calorie, and crash diets may suppress steroid hormone levels. High-fat, high-calorie meals may help promote steroidal actions.

THE COCKTAIL HORMONE IMPACT

Steroids act together, somewhat like a well-mixed cocktail of hormones. Derived from the gonadals and the adrenal glands, they indirectly enhance or inhibit each other's actions. The adrenal cortex produces three classes of steroid hormones that play important roles in the anabolic process leading to muscle gain.

Some of the adrenal hormones, such as cortisol and aldosterone, are generally considered to be the "bad guys" by bodybuilders and athletes. However, as you'll soon see, there are no good or bad steroids.

In fact, the only "bad guy" is a chronically induced substance. When anything occurs chronically, the body loses its own ability to naturally control the complex of forces that keep it alive and well. Each force—whether a cellular factor or an enzyme—regulates or mediates critical life functions. Once chronically inhibited or chronically activated, a biological process can lead to a metabolic catastrophe with severe consequences that compromise the body's ability to function.

ADRENAL STEROID FUNCTIONS

As noted previously, adrenal steroids play a critical role in regulating stress-related reactions, including reactions to physical stress. As you'll see, all adrenal hormones help the body survive in tough stressful conditions such as physical danger, lack of food, injuries, and the need to endure extreme physical strain.

The three classes of adrenal steroids are glucocorticoids, mineralocorticoids, and androgens:

1. *Glucocorticoids* primarily regulate stress-related anti-inflammatory reactions,

2. *Mineralocorticoids* regulates the body's level of sodium and potassium, and

3. *Androgens* regulate the same anabolic and sexual actions as gonadal male steroid hormones.

The adrenal cortex consists of three main regions or zones. Each region produces its own distinct steroid hormones and has its own enzyme balance that, once activated, dictates specific steroid hormone production. Interestingly, the same adrenal zones that produce anabolic androgens can also synthesize cortisol.

The fact that cortisol and androgens are secreted by the same gland zone may relate to a survival-like mechanism that regulates these two

antagonistic forces to prevent the overexpression of each. Biologically, both anabolic androgens and cortisol play important roles in recuperation, preventing muscle waste and enhancing tissue repair.

HOW TO TAKE ADVANTAGE OF THE CORTISOL WAVE

Reach Maximum Anabolic Potential During Exercise

In theory, stress hormones inhibit muscle gain. However, in life, things appear quite different. In fact, stress and muscle gain go hand in hand, such as during exercise. The level of the stress hormone cortisol rises and falls in a wavelike manner during exercise. Taking advantage of the cortisol wave via special exercise intervals may help induce a peak anabolic potential.

This is how it works: Cortisol production is stimulated by the hypothalamic stress-related hormone adrenocorticoscopic hormone (ACTH). ACTH is a stimulating hormone that is secreted during stress or fasting. ACTH plays a major role in regulating a negative feedback loop that controls circulating levels of cortisol. Elevated levels of cortisol would decrease circulating levels of corticotrophin-releasing hormone (the hormone that regulates ACTH), thus decreasing ACTH and cortisol level. That negative control loop is probably what keeps the cortisol level from skyrocketing during physical stress and gives it a wavelike characteristic.

Both cortisol and androgen levels are elevated during exercise. Nonetheless, the adrenal gland is not a main source of androgen production. In fact, overall androgen levels can increase, probably because of an increase in both gonadals and adrenal androgens. For maximum anabolic impact, it's important to keep androgen levels high and cortisol levels low.

Undereating coupled with exercise increases levels of both androgens and cortisol. However, because of the cortisol wave, there is a threshold

time by which cortisol levels decrease. This temporary decrease in cortisol level may create a hormonal balance that favors androgen to cortisol and thereby helps increase anabolic potential. Therefore, duration of exercise intervals is most important in defining whether the exercise-related stress will induce an anabolic or a catabolic state.

To take advantage of the cortisol wave, try to incorporate a few minutes of intense preworkout sets (either resistance exercise or sprint intervals). These intense warmup sets may help activate the cortisol wave, inducing a sharp rise and fall in cortisol levels, thereby giving the body the threshold time it needs to induce a temporary low cortisol level and to establish maximum anabolic potential for the upcoming workout set.

Supersets and Forced Sets

Supersets and forced sets can help induce the maximum anabolic state. Long resistance supersets that take between 1 and 3 minutes followed by a forced set (a set that is forced immediately after the completion of an intense, pre-exhausting set) will most likely grant the amount of time needed to complete a full cortisol wave. This method allows the cortisol level to drop within the time range of the superset and the forced repetition. Simply put, long and grueling intense sets can increase one's chance of establishing better anabolic potential.

How to Take Advantage of the Second and Third Cortisol Waves During Workouts

To fully manipulate steroids actions, you should try to take advantage of the second and third cortisol waves during exercise. You can do this in a couple of ways:

- Keep your workout short. After intense warmup sets, do one giant superset, then move on to the next exercise. Do the same routine again, but shorten your warmup sets. Incorporate three exercises per workout.

- Take short rest intervals between sets. Long rests between sets may give the body enough time to reestablish a high cortisol level towards

the next set. On the other hand, short rest periods between sets may continue to lower cortisol levels because of an already elevated cortisol. A high cortisol level marks an upcoming cortisol decline. A low cortisol level marks an upcoming cortisol increase. Therefore, when incorporating short rests between sets with a relatively high cortisol level, take advantage of the upcoming cortisol decline towards the next exercise set.

As absurd as it may sound, it is the high levels of cortisol that help establish maximum upcoming anabolic potential. In fact, intense endurance training has a profoundly relaxing effect on the body because of the nature of the cortisol wave. For that matter, any exercise can help reduce stress if it is done properly. A trained body can cope with stress better than a sedentary one can. Through adaptation, the body may get tougher by shortening cortisol waves and avoiding high cortisol fluctuations that are associated with panic reactions and impaired performance.

Overall, adrenal steroids help the body survive under stressful conditions. Manipulating the cortisol wave to work for you is one way to take advantage of your survival mechanism to get tougher and stronger.

ALDOSTERONE FOR SURVIVAL AND MUSCLE TONING

Aldosterone is an adrenal mineralocorticoid hormone that regulates ion mineral balance and blood pressure via sodium and potassium pumps. Aldosterone is often regarded as a "bad guy" because of its presumed adverse effects on blood pressure and water retention. It is activated by the hormone angiotensin, derived from the actions of the kidney on the liver.

Aldosterone actions probably helped human beings survive during times of salt deficiencies. Salt, once considered a precious commodity, was often unobtainable. Through many years of evolution, the human body has adapted primarily to food that was minimally processed and had a significantly high ratio of potassium to sodium. Potassium, a natural diuretic mineral, activates aldosterone and also helps remove water from the tissues, thus alleviating edema and water retention.

Looking at how the human body is biologically equipped to better survive under conditions of physical hardship and food deprivation, one might conclude that an inner wisdom is deeply embedded into basic human nature. Physical stress such as exercise, as well as enduring periods of undereating, would likely activate a most powerful inner mechanism that forces the body to improve itself to adapt to nutritional stress and hardship. Periodically restricting sodium and eating high-potassium foods would naturally activate the mineralocorticoid aldosterone and its related actions.

Aldosterone, which is responsible for the reaccumulation of sodium, might indirectly help induce a preliminary anabolic potential in which cell membranes are alkalized via sodium pump. When activated, the sodium pump, or as it's also called—the sodium channel—increases sodium ions in the cell, a process necessary for muscle contractions as well as other metabolic functions, including cellular growth.

The ancient Greeks regarded salt as a substance that boosts physical power. Aldosterone is a weak steroid, and diets that are overly salty and deficient in potassium chronically deactivate this hormone. Long periods of sodium restriction can reactivate aldosterone but may eventually lead to water retention and elevated blood pressure when sodium is reintroduced. Conversely, loading the body with potassium by eating potassium-rich foods such as avocadoes, tomatoes, potatoes, and veggies naturally helps activate aldosterone, staving off undesirable water retention and its related blood-pressure fluctuations.

Aldosterone induces electrical change in muscle cells by allowing an increase in cellular sodium. This process may help induce muscular action potential with higher overall muscle tone. (Muscle action potential is discussed in more depth in Chapter 8, "Super Muscle.")

Complete nutrition and sufficient calories are a must for proper steroid hormonal activity. Chapter 4 covers the anabolic actions of dietary fatty acids and the crucial role they play in regulating steroidogenesis (steroid hormone synthesis). The chapter also offers practical advice about how to take advantage of ingesting dietary fats to induce a maximum anabolic state.

Steroid Receptors Super Actions (cont.)

The steroid hormone receptors belong to the steroid and thyroid hormone receptors superfamily of proteins that include receptors for steroid hormones, thyroid hormones, vitamin D, and vitamin A (retinoic acid).

When activated, steroid hormone receptors bind to specific nucleotide sequences in the DNA, referred to as hormone response elements (HREs). HREs could have either activating or repressing actions on their target genes. Most important, several receptors are included to interact with other transcriptional mediators. For instance, retinoic acid X receptors (RXRs) have been shown to enhance the DNA binding of thyroid hormone receptors, which have a high affinity for increasing energy production and lowering cholesterol, thus enhancing steroid hormone synthesis.

Recent research has uncovered evidence of interactions between the steroid response element RXRs with another superfamily of protein-activated receptors—peroxisome proliferated activated receptors (PPARs). PPARs are currently of special interest in scientific research regarding future medicinal use as a cure for diabetes, reducing blood lipids and cholesterol.

When activated, certain PPAR groups such as PPARa or PPARg can help increase insulin sensitivity and alter the composition of adipose fat tissue. The interaction of PPARs with steroidal receptors elements to form heterodimers, which affect insulin receptors and fat tissue composition, lead to the conclusion that steroid hormone interactions go far beyond their traditional perceived functions as growth, sex, and stress regulators. The steroid hormone receptor-related nucleotic activity interacts with other hormones' nucleic sites to induce a powerful biological impact on fat burning, antiaging, and protection from metabolic decline.

Summary: Steroid Hormones—Anabolic Impact

- Activation of cellular factor cAMP via undereating and exercising increases steroid hormone synthesis in steroid hormone–producing cells.

- Maintaining low cholesterol levels helps optimize steroid hormone production.

- Antiaromatase actions—Liver detoxification, fat loss, and maintaining normal levels of androgens (avoiding chronic overspiking androgen level via supplement or drugs) all help prevent overexpression of the aromatase enzyme (conversion of testosterone to estrogen).

- Eating high-potassium food activates aldosterone, with its probable survival-related primal muscle-toning potential.

- High energy turnover—Periodic cycles of exercise and undereating help enhance fat and cholesterol reduction, thus increasing steroid hormone activity.

- Incorporating intense warmup sets, intense and long supersets, and forced sets in workout routines with short rest intervals between sets may help take advantage of the cortisol wave, thereby establishing better anabolic potential during exercise as well as improving overall reactions to stress.

- Complete nutrition and sufficient calories are critically important for proper steroidal activity.

- Chronic calorie restrictions, low-fat and low-carb diets may suppress steroid production and thereby adversely effect libido, physical performance, and overall growth.

4

Using Dietary Fats for Maximum Growth

Anabolic Actions of Fatty Acids

Fatty acids have a profound effect on muscle gain and fat loss. Fat is the building block of all cell membranes. It is a precursor for all steroid hormones and some neurotransmitters. Fat is also a preferred fuel for skeletal muscles. Most importantly, certain fatty acids can generate a hormonelike effect on the body, regulating anabolic and catabolic actions. This chapter covers the anabolic actions of essential fatty acids (EFAs).

Whether one gains or wastes muscle depends somewhat on the proinflammatory and anti-inflammatory actions of EFAs. Dietary fat composition can affect the direction of many metabolic actions, including muscle gain and fat loss. Although fatty acids have earned a reputation as being either good or bad, those value judgments are sometimes misleading, particularly with regard to muscle gain and fat loss. The question of what is "good" and what is "bad" needs to be readdressed.

GOOD FATS, BAD FATS

Every drama plays the good guys against the bad guys. We see the drama play out in politics, in history, and in our everyday lives. Our ideas about what is good and what is bad change according to the times in which we live and in the individual circumstances of our lives. What is considered good now may be considered bad later, and vice versa.

The notion that there are good fats that can heal and bad fats that can kill fires the imagination: We thrill to the idea of a dramatic struggle between the forces of good fats and evil fats. Who will be the ultimate victor?, we wonder. Because of our uncertainty, and even our fear, around the issue of good fats versus bad fats, many of us have developed phobias about fat and attempt to avoid them altogether. Meat consumption has declined significantly, and sales of low-fat foods have reached record highs.

Beliefs about the biological actions of fatty acids as being good or bad seem to have originated from a disease point of view. Because heart and blood pressure diseases are always associated with inflammation and pain, any anti-inflammatory substance has been considered to be solely beneficial, whereas any proinflammatory agent has been considered harmful and bad. However, life is not a disease process, and human beings need not approach their daily diets as an exercise in daily health-crisis management. The fact that something is considered beneficial to the body does not mean that it is always good, and vice versa.

FOOD FOR SEX AND MUSCLES

Although nowadays meat and cheese are often regarded as the most fattening and dangerous foods, these same foods were once regarded as the great strength builders. Ancient Greeks and Spartans considered meat to be the food of warriors. Some anthropologists have suggested that the human body hasn't changed much since the Stone Age. If that is true, then modern human beings are still biologically designed to benefit from a hunter-gatherer diet that includes meat and fat.

Meat, eggs, and dairy foods can indeed help enhance vigor and potency. On the other hand, the meatless vegetarian diet—and in particular, the

vegan diet—may help protect against cardiovascular disease. Nevertheless, a vegetarian diet may also adversely affect libido and virility and may even compromise both athletic and sexual performance. Meat, eggs, and dairy foods contain something that affects sexual potency. This certain something also plays a critical role in numerous biological functions, including muscle gain and fat loss. This something is the so-called bad fat.

FAT AND SURVIVAL

In muscle growth and fat burning, fat plays a complex role that may involve the human capability to cope with stress. The ability to adapt to stress and hardship kept early humans alive during difficult physical conditions that included physical threats, the fear response, and famine. This survival mechanism is partially regulated by the actions of certain fatty components called essential fatty acids (EFAs). The word essential means that EFAs cannot be produced by the body and therefore must be obtained from a dietary source.

PROSTAGLANDINS AND GROWTH

To deliver their actions, EFAs must first convert into their active, hormonelike derivatives called prostaglandins (PGs). EFAs produce pro- and anti-inflammatory prostaglandins. Prostaglandins are divided into three major groups: PG Series 1 and 3 prostaglandins, which are mostly anti-inflammatory and therefore considered good; and PG Series 2 prostaglandins, which are mostly proinflammatory and therefore considered bad.

Ironically, it is the allegedly bad prostaglandins that are most active in our first reactions to stress. The proinflammatory prostaglandins help protect the body from physical stress and injury by activating an instant immune response and by establishing growth stimulation for tissue repair and improved muscle composition for better survival.

Anti- and Proinflammatory Prostaglandins

Anti-inflammatory	Series 1	DGLA derived
Anti-inflammatory	Series 3	EPA DHA
Inflammatory	Series 2	Arachidonic acid (DGLA derived)

GROWTH-STIMULATING EFA

The essential fatty acid that triggers proinflammatory growth-stimulating actions is called arachidonic acid (AA). Arachidonic acid is an omega-6 long-chain polyunsaturated fatty acid found abundantly in meat, egg yolk, and dairy. AA is considered the "worst" of all the bad guys. Nutrition experts warn of AA's dangerous effects by linking it with cardiovascular disease and cancer. When overexpressed, AA may indeed increase the risk of cancer, but so do all of the most potent anabolic agents, including growth hormone and testosterone.

ARACHIDONIC ACID'S STIMULATING EFFECT ON STEROID HORMONES

Arachidonic acid stimulates the production of steroid hormone through a special regulatory protein called steroidogenic acute regulatory protein (StAR). This protein plays a critical role in stimulating steroid biosynthesis. Its main action involves facilitating the transfer of cholesterol to the inner mitochondrial membrane, thus accelerating steroid hormone synthesis.

GROWTH-INHIBITING EFAS

Both essential fatty acids—omega-3 and omega-6—are considered essential and beneficial. Nevertheless, omega-3 EFA is featured as the current favorite in diet books. Fish oil rich in the omega-3 fatty acids EPA and DHA is one of the most popular nutritional products sold in health food stores and pharmacies. Omega-3 EFA is actively involved in critical biological functions, including improving cognitive functions, alleviating pain and inflammation, lowering blood pressure and cholesterol, improving insulin sensitivity, and inhibiting tumor formation. However, as beneficial as EFAs are, one may wonder if they are as good as they seem.

By the 1930s, scientists had discovered that certain prostaglandins that reduce pain and inflammation also inhibit the mobilization of fatty acids from adipose tissue for energy. In other words, certain anti-inflammatory prostaglandins that are considered good prostaglandins may suppress the body's ability to burn fat. Obviously, this is not good news for people who want to improve their body composition.

Additionally, omega-3 fatty acids may inhibit adrenal actions. Adrenal hormones activate cellular factor cAMP, which is necessary for all cellular anabolic-stimulating actions and fat burning. Moreover, both adrenal hormones and arachidonic acid are somehow involved in the stimulation of steroid hormones actions necessary for muscle gain and overall recuperation. That adrenal AA-related process may be interrupted by the actions of omega-3 EFAs. Omega-3 fatty acids work as beta-blockers, blocking the beta-adrenoreceptors similarly to the way beta-blocker drugs work. Omega-3 EFAs can help lower cardiac stress and reduce blood pressure.

However, the pharmacological effect of omega-3 oils may be to inhibit growth and fat burning. All beta-blocker drugs may also cause side effects, including decreased libido and impaired sexual performance.

AA ADRENAL GROWTH IMPACT

Adrenal hormones play a critical role in regulating reactions to stress. Recent cancer research reveals the important regulatory role of beta adrenoreceptors in the activation and release of AA. Experiments conducted at the College of Veterinary Medicine at the University of Tennessee, Knoxville revealed that adrenergic agonists caused the release of AA and stimulated DNA synthesis, while beta-blockers such as COX inhibitors or LOX inhibitors blocked this growth-stimulating effect.

It is reasonable to assume that there is a strong survival mechanism that involves proinflammatory growth-stimulating agents that can help the body recuperate from stress-related catabolic crises and get even tougher and stronger by building new tissue. This survival-related reaction to stress involves all anabolic agents, including steroids, prostaglandins, cytokines, adrenal hormones, cellular factor cAMP, and growth hormone. People who take anti-inflammatory drugs or painkillers such as beta-blockers or COX inhibitors should be aware that these drugs significantly affect growth.

EFA BALANCE FOR MAXIMUM PERFORMANCE

Omega-3 and omega-6 EFAs regulate one another's actions. In fact, pro- and anti-inflammatory prostaglandins help maintain healthy metabolic processes that involve an inflammatory immediate response to stress, such as during exercise, followed by an anti-inflammatory secondary stage response that reduces inflammation and facilitates final recuperation processes that include tissue repair and muscle development.

Both inflammatory and anti-inflammatory prostaglandins are beneficial, and both are critical for optimal health. As we previously stated, the alleged bad guys may help you reach maximum growth

potential, whereas the alleged good guys may help you take advantage of the initial growth potential to finally facilitate anabolic actions that include tissue recuperation, repair, and development.

Once in balance, dietary EFAs are likely to grant beneficial prostaglandins activity. However, an imbalance or deficiency of EFAs can lead to chronic overexpression of one EFA over the other. Dietary EFA imbalance can adversely cause chronic overactivity of either pro- or anti-inflammatory prostaglandins, a condition that is potentially extremely destructive and may lead to chronic disease or an overall metabolic breakdown.

EFA RATIOS FOR REDUCING INFLAMMATION, SENSITIZING INSULIN, AND GAINING MUSCLE

Maintaining the proper balance between dietary omega-6 and omega-3 EFAs is of the utmost importance in reducing inflammation, sensitizing insulin, and gaining muscle.

CELL MEMBRANE INTEGRITY FOR MAXIMUM PERFORMANCE

Essential fatty acids are the building blocks of cell membranes. The cell membrane is a barrier characterized by highly selective permeability. It is involved in the process of energy transformation and cellular communication through special membrane receptors that are sensitive to external stimuli. The cell membrane consists of a double layer of phospholipids containing both omega-6 and omega-3 fatty acids, including AA, DHA, and EPA. These long-chain polyunsaturated fatty acids contribute to the flexibility of the cell's membrane. Flexibility of cell membranes is critical for proper receptor binding, ionic flow, and overall regulation of energy production and growth. EFA deficiencies or EFA imbalance can lead to impaired cellular metabolism that may adversely manifest itself as insulin insensitivity, fat gain, and cessation of growth.

As a rule, people who suffer from acute or chronic inflammation resulting from disease, injury, or postexercise reaction should increase their consumption of omega-3 oil. Omega-3 EFAs are found abundantly in flaxseed oil, hemp oil, and fish oil. The same advice applies to people who suffer from insulin resistance. Omega-3 may help improve insulin sensitivity. Individuals who suffer from inflammation or insulin resistance may benefit from keeping a dietary ratio of 1:1 omega-6 to omega-3 fatty acid.

People interested in maximizing growth should employ a ratio that is much higher in omega-6 fatty acid than in omega-3 fatty acid. A ratio of 5:1 omega-6 to omega-3 may be best for athletes and bodybuilders.

A different EFA ratio may be required for effective muscle gain. For muscle gain, meat is still the choice of warriors! Regardless of what you might have heard about the dangers of eating meat, including high cholesterol and bad fats, meat was and still is the food of choice for overall potency and muscle power. The so-called bad fat in meat is partially responsible for its potent anabolic properties. Foods rich in arachidonic acids (AA), such as eggs and dairy products, should therefore also be considered most beneficial for the purpose of muscle gain.

If you are a "meat-and-potatoes" type, you should take advantage of the pro-anabolic high ratio of AA consumption. However, to prevent the overexpression of AA-derived prostaglandins that may lead to chronic inflammation and result in overall muscle waste, be sure to cycle between days of foods rich in AA, such as meat, eggs, or dairy, and days of foods rich in omega-3, such as fish and seafood. Always bear in mind that animal-derived foods are very low in omega-3 EFAs and that supplementing animal-based diets with omega-3 oils is highly recommended. Above all else, be sure to apply this information according to your specific needs.

"BAD" FATS CAN HELP BUILD MUSCLE

Arachidonic Acid's Profound Growth Impact

This section details the anabolic actions of arachidonic acid (AA) and may be of particular help to athletes and bodybuilders. The practical advice in this section may help maximize the anabolic effects of exercise.

AA is the dominant prostaglandin precursor. AA-derived prostaglandins are generally more active than prostaglandins derived from other essential fatty acids (EFAs). AA-derived prostaglandins generate their complex actions on numerous cellular processes that activate special growth-mediating proteins, including heat shock proteins, mitogen-activated protein kinases, and enzymes that eventually stimulate anabolic steroid hormones and growth actions on exercising muscles.

This complex of actions, mediated by AA, helps maintain muscle protein integrity during exposure to exercise-related stress and heat, and facilitates anabolic actions that help improve muscle composition and increase muscle mass.

Arachidonic Acid Improves Muscle Reaction to Stress

Stress stimuli, such as that induced during exercise or a physical injury, increases arachidonic acid release from the cell membrane through phosphorylation of the cytosolic enzyme phospholipase A2. This enzymatic activation is induced by stress-activated protein kinases (SAPKs). These SAPKs are activated during inflammatory processes by cytokines (which are AA derivatives), phospholipids, polysaccharides, and stress stimuli such as heat and free radicals (mostly considered "bad guys"). Generally, SAPK is a growth inhibitor that is likely to balance other stress-related growth-stimulating agents. However, SAPK 2 helps induce phosphorylation and activation of heat-shock protein 27, a fact that may play an important role in the mechanism that repairs damaged muscle tissues and thereby helps cell survival and muscular maintenance under stress.

Anti-Inflammatory Drugs May Inhibit Growth

Arachidonic acid arises from gamma linoleic acid, an essential omega-6 lipid. The AA is then metabolized to become part of the cell membrane lipids, especially phosphatidylinositol. AA is released from the cell

membrane as free AA by the enzyme phospholipase A2. This enzyme is activated by a variety of external stimuli, including adrenaline, and is inhibited by corticosteroid hormones and anti-inflammatory drugs. This inhibitory effect of cortisol on AA release may partly explain cortisol's suppressive effect on muscle gain.

The enzymes that synthesize prostaglandins from AA are called COX 1 and 2. Anti-inflammatory drugs such as aspirin and other nonsteroidal anti-inflammatory drugs (NSAIDs) are all COX inhibitors. Anti-inflammatory drugs, including over-the-counter NSAIDs, have been known to inhibit AA anabolic actions. Athletes and bodybuilders who take anti-inflammatory drugs and painkillers should be aware of their probable inhibitory effect on muscle gain.

Arachidonic Acid Can Either Save or Waste You

The oxidative conversion of arachidonic acid into its related active prostaglandins occurs in the endoplasmic reticulum of the cell membrane by the prostaglandins synthase complex enzymes that include COX 1 and 2. Arachidonic acid plays a critical role in survival under stress or physical trauma. Under normal circumstances, AA-related inflammatory response has a protective and beneficial function.

The release of AA increases the actions of inflammatory mediators such as cytokines, interleukins, and tumor necrosis factor, which has a strong immunoprotective impact on the body and helps suppress bacterial or viral infections while enhancing overall detection of sick and damaged cells.

Scientists conducting recent studies at the Biotechnology Center and Department of Experimental Biomedical Sciences University in Padova, Italy, found that during inflammation, activated macrophages secrete certain growth factors like cytokines that positively affect muscle growth. However, when the inflammatory response becomes chronic or exaggerated, it can give rise to diseases such as rheumatoid arthritis, Crohn's disease, or heart disease. If untreated, chronic inflammation can also lead to overall muscle wasting.

Arachidonic Acid, Exercise, and Growth

Inflammation is a natural defense reaction to physical stress or injury. Inflammatory reactions are often associated with catabolic processes that involve wasting of tissues such as of muscles and bones. Oftentimes, during stress-related catabolic tissue degradation, the body attempts to compensate by activating the most powerful growth-stimulating agents such as cellular factor cyclic AMP (cAMP) and the release of arachidonic acid with its related active proanabolic prostaglandins and cytokines.

That is what happens during intense exercise: Intense resistance or intense explosive and speed-related training are in fact catabolic activities that initially tear muscle fiber and connective tissue. The activation of proinflammatory prostaglandins and cytokines combined with adrenaline and its cAMP-related anabolic hormonal stimulation, gives the body the necessary arsenal to recuperate and to build stronger muscle and bones, thus preparing the body to handle further stress more efficiently.

Conclusion

One can facilitate AA actions simply by consuming foods rich in omega-6 oils and AA such as meat, eggs, and dairy products. However, the conversion of omega-6 oils (linoleic acid) into their more active gamma linoleic acid form, from which arachidonic acid is derived, is often inhibited as a result of various metabolic factors, including high blood sugar, zinc deficiencies, vitamin deficiencies, and aging. Supplementing the diet with dietary sources rich in gamma linoleic acid, such as primrose oil or black currant oil, can help to bypass this weak enzymatic process.

AA biosynthesis can also be suppressed through the use of oils rich in dietary omega-3, including flaxseed, hemp, and fish oils. Thus, to establish anabolic potential, it is important to maintain a high ratio of omega-6 to omega-3 EFAs.

Most people are deficient in omega-3 oils. Therefore, the high 5-to-1 ratio of omega-6 to omega-3 does not necessarily apply to "meat and potatoes" types. Beef eaters may need to supplement their diets with

food–based diets. Omega-3 oils protect against AA overexpression that can lead to chronic inflammation and may result in disease and muscle wasting.

5

GROWTH HORMONE

Known as "the hormone of youth," a most potent anabolic and fat-burning agent, growth hormone (GH) is the subject of much scientific research. The secretion of GH is controlled by many variables such as food intake, exercise, sleep, and stress, and by factors such as age, body mass, and gender. Most importantly, the secretion of growth hormone is profoundly affected by circadian rhythm. As you'll soon learn, daily cycles involving hunger, physical stress, and deep sleep can upregulate the release of GH.

GH blood levels are characterized by large pulses followed by very low-level pulses. The largest pulse occurs during deep sleep. GH secretion may be adversely affected by poor eating habits, sleep deprivation, chronic stress, low thyroid activity, and certain drugs. A GH deficiency can lead to abnormal body fat, a decrease in exercise endurance, poor health, reduced bone mineral density, impaired lipid metabolism, stunted growth, and accelerated aging. Manipulating certain daily feeding and sleeping cycles and incorporating special training routines may significantly enhance the actions of GH.

GROWTH HORMONE AND THE SLEEP-WAKE CYCLE

Growth hormone reaches its peak level during deep sleep. To understand how sleep helps induce GH's maximum impact, it is essential to understand the basics of the sleep-wake cycle.

The sleep cycle consists of two distinct sleep stages: rapid eye movement (REM) sleep and non-REM sleep. Non-REM sleep can be further divided into light and deep sleep. Deep, non-REM sleep can be discerned by a high-amplitude low-frequency delta wave. This is why deep, non-REM sleep is called slow-wave sleep (SWS).

The difference in several characteristics divides the sleep-wake cycle into three stages: non-REM sleep, REM sleep, and wakefulness. Sleep is generally evaluated according to two criteria: (1) timing and (2) amount. Sleep is controlled by neuropeptides and hormones that are regulated by the hypothalamus-pituitary-adrenal axis. Neuropeptides and hormones that regulate sleep, wakefulness, feeding cycles, and stress all play a part in a feedback control that regulates GH secretion through stimulation and inhibition.

GROWTH HORMONE BASICS

Growth hormone (GH, somatotropin) is a polypeptide hormone consisting of 191 amino acids in humans. It is secreted by somatotropic cells in the anterior pituitary. The main effects of GH are stimulation of bone growth, anabolic effect in the muscles, conservation of protein and carbohydrates, and mobilization of fat for energy (lipolysis).

The effects of GH are partially mediated by somatomedins, of which the most important are the insulinlike growth factors IGF_1 and IGF_2. Plasma IGF_1 content primarily originates in the liver and kidneys; however, IGF_1 somatomedins are secreted locally by several other tissues. As noted, secretion of GH from the anterior pituitary is pulsatile: The secretion bursts are followed by nearly undetectable levels of plasma GH.

Females have higher plasma levels of GH than do males, who have fewer GH pulses, but male GH pulses are of higher amplitude. Growth hormone secretion is controlled by an inner circadian rhythm. Growth hormone secretion starts to decline during the fourth decade of life. It is important to note that aging diminishes GH secretion during the day first, while the sleep-associated GH pulse persists longer. Thus, any method that can help increase GH release during the day may have a profound antiaging effect.

REGULATION OF GROWTH HORMONE SECRETION

The release of GH is regulated by stimulating and inhibitory agents.

Growth hormone releasing hormone (GHRH), which stimulates GH secretion, is a peptide-stimulating hormone. Its synthesis is stimulated by cellular factor cAMP, and its secretion increases when the GH plasma level drops.

Somatostatin (somatotropin release inhibiting factor [SRIF]) is a peptide that inhibits GH secretion. Somatostatin is widely distributed in the body. The local release of somatostatin may protect the body from overexpression of GH, which could lead to cancer or growth of internal organs.

GHRH-DOPAMINE FOR POTENCY AND GROWTH

GHRH and dopamine couple to protect male virility and to maintain growth potential. GHRH cells have dopamine as a cotransmitter. Dopamine inhibits thyroid-stimulating hormone (TSH) and prolactin, thus protecting the body from overexpression of the female lactating hormone prolactin, which antagonizes male sex hormones and can cause feminization of the male body. High prolactin and TSH are antianabolic. Therefore, GHRH, dopamine, and GH play a critical role in regulating potency, virility, male physical characteristics, and overall growth.

AUTOREGULATION OF GROWTH HORMONE (NEGATIVE FEEDBACK LOOPS)

Growth hormone (GH) regulates its own blood level through a negative feedback mechanism. Plasma levels of GH regulate the activity of somatostatin and GHRH cells. An elevated level of GH increases somatostatin release and decreases GHRH release. Conversely, a low level of GH decreases somatostatin and increases GHRH levels. As noted, GH levels are mediated indirectly by insulinlike growth factor (IGFs), neuropeptides, and adrenal and steroid hormones. Nevertheless, this autonegative feedback control of the GH-GHRH-somatostatin axis generates a rhythmic alternation between high and low GH levels.

DEEP SLEEP, NAPS, AND GROWTH HORMONE

Growth hormone-releasing hormone (GHRH) and deep sleep affect one another dramatically. High levels of GHRH can increase the amount of deep sleep a person experiences, and low levels can impair slow-wave sleep (SWS), thus shortening sleep time. Interestingly, the amount of GHRH mRNA could be highest in the morning, particularly for people who suffer from insomnia or those who retire late. Thus, for some people, skipping morning sleep impairs GH secretion. For both of these groups, an afternoon nap is highly recommended. The body compensates for lack of deep sleep by inducing it more quickly during the afternoon siesta.

GH SECRETAGOGUES (GHS)

GH secretagogues (GHSs) are a class of oligopeptides and nonpeptide compounds, which are potent stimulators of GH release. GHS compounds facilitate sleep. In young adults, IGF_1 levels increase as a result of GHS administration. There is great interest in synthetic GHS as a possible remedy for age-related GH deficiency.

It is commonly believed that certain amino acids such as arginine, ornithine, and tryptophan may help increase GH release. However, no conclusive evidence exists that supplementation of free-form amino acids

at bedtime helps increase GH activity. The effectiveness of many GH secretagogue products is in serious doubt, but some products may have genuine stimulating effects on GH release during SWS sleep. Unfortunately, because of the possibility of misuse by some segments of the population, these products are illegal in most states. Nonetheless, GH release is effectively stimulated by other peptides. These stimulating agents are natural compounds that regulate feeding cycles and hunger sensation. Galanin and neuropeptide Y are likely most profound stimulators of GH release. Both neuropeptides that originally regulate feeding cycles can assist in muscle and strength gain.

FEEDING CYCLES AND GROWTH HORMONE

Food intake is an important influencing factor in growth rate and body composition. Mammalian feedings and overall energy balance are controlled by an innate biological mechanism that involves the regulation of hormones and feeding-related sensations such as hunger, aggression, and satiety. Animals and human beings eat to satisfy their immediate energy and nutritional needs. Regulation of food intake involves the sensation of external environmental factors such as food availability, danger, and temperature. Under certain conditions such as lack of food or the presence of danger, human survival depends on the ability to endure by sustaining life through minimal food intake and periods of overeating to allow energy and nutrients to be anabolically stored in anticipation of high energy demand.

Animal and human feeding cycles are therefore primarily controlled by a survival-related mechanism. As noted, when facing catabolic inducing conditions such as fasting, undereating, or intense physical stress, the body's survival mechanism is triggered. This activates powerful anabolic stimulating factors for compensation and adaptation. The brain plays a key role in regulating feeding cycles and growth. Experiments conducted in the 1940s showed that certain lesions in the hypothalamus reduce feeding, whereas other lesions induce overeating. Those conclusions led to the hypothesis that different areas in the hypothalamus are programmed to control feeding cycles based on periodic undereating and overeating through sensations of hunger and satiety.

Recent biological techniques reveal a more sophisticated neural control of feeding and energy balance. A large number of neuropeptides were

found to exert either stimulatory or inhibitory effects on feeding, growth, and overall energy expenditure.

NEUROPEPTIDE Y AND GALANIN—NEUROPEPTIDES THAT INDUCE HUNGER AND GROWTH

Feeding cycles are controlled by hypothalamic neurons. The hypothalamic feeding control receives stimulatory or inhibitory signals by neuropeptides and hormones. These signals are part of a survival mechanism that interacts with external environmental conditions. For instance, a lack of food increases hunger, stimulating peptides and hormones such as neuropeptide Y, galanin, and cortisol.

Conversely, when a full meal is consumed, hunger-inhibiting agents such as leptin and insulin normally signal the brain to sense satiety and reduce feeding. As you'll learn later on, this primal feeding mechanism is more than often interrupted by poor eating habits. Most modern diets that are based on a few meals per day disturb the body's ability to efficiently control healthy feeding cycles through primal sensations of hunger and satiety. When eating under constant stress, the body is overwhelmed by the adverse effects of the stress hormone cortisol.

Cortisol, a hunger-stimulating agent, opposes insulin and leptin inhibitory signals in the brain, thereby causing chronic hunger that often leads to compulsive bingeing and weight gain. Cycling between periods of action and relaxation and between periods of undereating and overeating helps minimize stress-related cortisol impact when eating.

The survival-related feeding mechanism controls various biological functions. In addition to stimulating or inhibiting the amount of food eaten, neuropeptides help regulate eating behavior. Neuropeptide Y induces a preference for carbohydrates, whereas galanin induces a preference for fat. Neuropeptides that regulate feeding may also exert signals that promote anabolism or catabolism. Neuropeptide Y and galanin induce a general anabolic state by stimulating GH release, thus improving energy balance and accelerating lipolysis (fat burning). Conversely, a chronic high plasma level of cortisol may adversely affect growth while increasing lipogenesis (fat gain).

HUNGER AND GROWTH

Neuropeptide Y is a 36-amino acid peptide found in the central nervous system and the gastrointestinal tract. In addition to its effect on feeding and energy balance, neuropeptide Y has been implicated in the regulation of reproduction, growth hormone secretion, cardiovascular function, anxiety, memory and the regulation of circadian rhythms.

Galanin is a 30-amino acid peptide. It is present in the gastrointestinal tract and widely in the central nervous system, where it participates in numerous brain functions such as feeding, memory, and hormone release. Both neuropeptide Y and galanin are believed to increase GH secretion by inhibiting somatostatin release, thus indirectly increasing GHRH secretion. Both galanin and neuropeptide Y inhibit noradrenergic cells in the locus coeruleus norandren region of the brain, thus further accelerating the inhibitory effect on somatostatin. (As noted, noradrenergic cells promote somatostatin release, thus inhibiting GH secretion during the day.)

In summary, the hunger-neuropeptide-growth hormone axis may play a significant role in regulating feeding and overall growth. All the above information clearly indicates that the hunger sensation, with its related neuropeptide Y and galanin, helps increase GH release during the day. As noted, human feeding cycles are controlled by a primal survival mechanism that helps sustain life under tough external conditions such as lack of food or intense physical stress with high energy demand. Therefore, undereating and hunger activate a powerful anabolic stimulation via growth hormone release, thus accelerating fat burning while sparing protein and carbohydrates.

Eating at night while relaxing finalizes the daily feeding cycle. Keeping a steady, daily sleep-wake cycle and avoiding sleep deprivation help maximize the impact of GH on the body during deep sleep. Overall, maintaining sleeping and feeding cycles that involve periods of hunger and physical stress (i.e., exercise) followed by periods of nourishment, satiety and relaxation, combined with sufficient amounts of sleep, will help maximize growth hormone's anabolic and rejuvenating actions on the body.

Growth hormone has a profound affinity for bone and connective tissue buildup. Athletes, bodybuilders, and martial artists often suffer from injuries resulting from weak tendons or low bone density. Bones and

connective tissue play a critical role in effective muscular development. Growth hormone helps facilitate the repair of muscle fibers and tendons and the mineralization of bones. Insufficient growth hormone release impairs overall muscle and strength gain.

6

INSULINLIKE GROWTH FACTOR$_1$

Insulinlike growth factor$_1$ (IGF$_1$) is regarded as a powerful anabolic stimulator that has the fastest and most immediate growth impact on muscle tissue. IGF$_1$ is a single-chain polypeptide. Like its name, IGF$_1$ has an insulinlike short-term metabolic effect and growth factorlike long-term effects on cell proliferation and differentiation.

The IGF$_1$ receptor (IGF-1R) is structurally similar to the insulin receptor. Both have a cell's surface receptor with intrinsic tyrosine kinase-related activities. The tyrosine kinase domains of IGF$_1$ and insulin receptors possess similar structure and actions. Despite the high degree of homology, experimental evidence suggests that the two receptors have distinct biological roles. The insulin receptor is known to be a key regulator of glucose transport and biosynthesis of glycogen and fat, whereas the IGF$_1$ receptor is a potent regulator of cell growth and differentiation. Note that insulin can have an anabolic effect on muscle cells. Under specific metabolic conditions involving certain feeding cycles and a state of high insulin sensitivity, insulin can have a potent growth impact. However, unlike IGF$_1$, insulin's anabolic activities may involve fat gain.

IGF_1 AND MUSCULAR DEVELOPMENT

Insulinlike growth factors (IGFs) stimulate skeletal muscle growth and differentiation through a cascade of cellular events. IGF's receptor is a transmembrane tyrosine kinase widely expressed in muscle tissue as well as other tissue and cell types. Activation of the receptor results from the binding of growth factor ligands IGF_1 and IGF_2 (IGF_2 has a lower affinity than IGF_1 and is therefore considered less potent). IGF_1's complex of actions involve interactions with stress-activated proteins such as heat shock proteins or stress-activated protein kinases (SAPKs), which together help in muscular reaction to induced physical stress (i.e., maintenance, repair, growth, differentiation). IGF_1 also plays an important role in enhancing the expression of contractible proteins such as actin and myosin, thus helping increase muscle strength.

The binding of IGF_1 to its cell's surface receptor stimulates tyrosine kinase activities which, in turn, induce a cascade of phosphorylation events that interact with cytoplasmic proteins such as phosphatidyl inositol-3 kinase (PI3K). PI3K's activation then leads to the functional effects of IGF_1 such as enhanced glucose transport, enhanced myocyte contractibility, and inhibition of programmed cells' death (apoptosis).

IGF_1 AND MUSCULAR DIFFERENTIATION

Skeletal muscular differentiation is a process that involves a molecular mechanism that switches the cellular anabolic program from proliferation (increasing the number of cells) to differentiation (the conversion of precursor cells to muscle cells). Intensive studies have led to the discovery of transcriptional agents that play a pivotal role during differentiation. One of these muscle growth and differentiation agents consists of a family of proteins called myogenic regulatory factors (MRFs)—in particular, the protein myogenin. Myogenin is expressed exclusively in skeletal muscles. IGF_1 stimulates muscle differentiation and growth by the induction of myogenin mRNA as well as other growth-promoting protein kinases via the activation of PI3K.

IGF's growth stimulation works in different intracellular signaling pathways. One of them is the mitogen-activated protein kinase. As noted previously, mitogen-activated protein kinase may be activated by

proinflammatory prostaglandins. The activation of this protein may be responsible for the mitogenic growth impact of IGF_1 and proinflammatory agents during and after intense physical exercise.

IGF_1 AND PHYSICAL STRESS: HEAT SHOCK PROTEINS (HSPS)

IGF_1 upregulates the actions of the stress proteins heat shock protein 27 (HSP-27) and stress-activated protein kinase 2 (SAPK2). Heat shock proteins have been some of the most well-preserved proteins throughout evolution. Under severe physiological stress, these proteins fulfill essential functions in cells, protecting them from irreversible damage. HSP-27 has been involved in thermotolerance, differentiation, and proliferation. Most importantly, HSP-27 helps protect muscle structural integrity, thus helping strengthen muscle response to stress and accelerating recuperation.

Overall, IGF_1 induces a potent anabolic state in muscles, especially during intense physical stress. Interacting with stress-activated proteins, proinflammatory prostaglandins, cytokines, and other stress-related growth promoters such as nitric oxide and cellular factor cAMP, IGF_1 is likely the most immediately active and most compelling growth factor that effectively helps protect muscles from stress-related fatal damage while stimulating growth, differentiation, and increase in muscle strength.

All the information above applies to normal conditions. Under normal conditions, IGF_1 and its mediators help protect the body, in particular the muscles from damage, and enhances adaptation of muscles to stress via growth and strengthening. However, overexpression of IGFs and stress-activated protein may lead to uncontrolled proliferation of cells and cancer.

As potent as it is, injections of IGF_1 IV can be fatal. However, other, natural methods that enhance the actions of growth hormone and its somatomedins (IGFs) could be most effective in establishing a potent anabolic state, enhancing the immune system and helping to slow the aging process.

Natural Methods to Enhance IGF_1 actions

- Periodic fasting, undereating, and exercise may help stimulate IGF_1 and may help increase IGF_1 receptors in muscles.
- Postexercise carb consumption is recommended for maximizing IGF_1 anabolic actions.
- Complete nutritional meals and a sufficient supply of calories are necessary for overall growth.
- Minimizing carb consumption to one meal per day, preferably postexercise, as well as increasing consumption of omega-3 essential fatty acids, may help protect against insulin resistance and thereby enhance IGF_1 anabolic actions.

7

The Anabolic Cycle: Timing is Everything

The Amount of Time Required for Muscle Gain

Professional athletes, bodybuilders, powerlifters, and veteran martial artists know that real gains in muscle and strength require time. While fat burning is a process that can be initiated instantly through diet and exercise, muscular growth is a slower event that takes place in a wavelike manner. Understanding and applying these principles is crucial for effective muscular development.

An anabolic event occurs in two critical stages. The first stage is growth stimulation, and the second is growth activation. The first stage, growth stimulation, involves the actions of hormones and compounds that stimulate growth, including the peptide-stimulating hormones (LH, GHRH), adrenal hormones, cellular factor cAMP, and prostaglandins.

The second stage, growth activation, is also the concluding stage that facilitates actual muscle gain. This stage involves the actions of anabolic hormones, including steroids and growth hormone that were previously stimulated by the first stage of the anabolic cycle. The amount of time it takes to complete both stages of the anabolic cycle is the amount of time required for effective muscle gain.

Muscle gain occurs under the following three conditions:

1. The anabolic actions of complex hormones that include steroids, GH, thyroid, and insulin.

2. Complete and sufficient nutrition that includes all essential proteins, fatty acids, vitamins, minerals, and antioxidants. Carbs should also be regarded as both anabolic and anticatabolic food for muscles.

3. Energy. High cellular energy is required for the repair and buildup of muscle tissue.

If one of the above conditions is compromised, whether it's a hormonal deficiency, insufficient nutrition, or low cellular energy (due to low thyroid or insulin resistance), growth may be severely impaired.

GROWTH: TIMING IS EVERYTHING

Muscular development is part of a primal survival mechanism that originally helped animals and human beings adapt to physical stress and hardship. Each of us carries an inner code that governs our reactions to environmental changes. Most primitive, single-cell organisms such as amoebae or bacteria respond to changes in their external environment such as changes in temperature or food availability. More advanced multicellular living organisms such as animals and human beings must also respond to changes in their environment to stay alive.

Human survival depends on an elaborate network of cellular communication. Different signaling agents require different threshold times to induce their related actions. The duration over which signaling agent actions occur varies. Some actions, such as those of prostaglandins, take a fraction of a second, whereas others, such as steroid actions, last hours or even days. In other words, growth agents have either an

immediate or a delayed impact on the body. Understanding this fact is critical for ultimately inducing muscle gain.

SHORT AND LONG ANABOLIC IMPACTS

The different time periods required for various hormonal impact on the body is the factor that dictates the manner through which growth occurs. Learning the time-impact factor can help you take advantage of the anabolic cycle to induce effective muscle gain.

As mentioned, hormones and their actions have a short or a long-lasting impact on the body. Interestingly, those hormones that have a short effect are often capable of generating an immediate impact on the body. On the other hand, hormones that have a long-lasting anabolic impact often deliver it in a delayed manner.

Short, instant impacts on the body are generated by adrenal hormones, insulin, and stimulating hormones such as ACTH, LH, and GHRH, whereas long-lasting but delayed impacts are generated by steroid hormones. The actions of cellular factor cAMP and prostaglandins depend on their related inducers (adrenal hormones and EFA, respectively). In other words, the impact of cAMP clearly depends on adrenal actions. Because adrenal actions are immediate and short, so are cAMPs. However, physiologic conditions such as fasting and exercise prolong adrenal actions and their related cAMP impact.

Finally, even though the impact of prostaglandins occurs in a split second, the accumulating effect of EFA on prostaglandin production can facilitate long-lasting prostaglandin actions.

To prevent any confusion, here is a brief summary:

Adrenal hormones, peptide stimulating hormones, cAMP, and prostaglandins have an immediate and short impact that can last seconds to minutes to hours. Nonetheless, that impact could be prolonged under certain physiological conditions including fasting and exercise.

Steroid hormones have a delayed yet profound impact that can last for hours or even days.

MANIPULATING THE ANABOLIC CYCLE

Why People Fail to Gain Muscle

The immediate but short-lived actions of stimulating hormones lead to the conclusion that the first stimulating stage of the anabolic cycle is fast but short and fragile. On the other hand, the delayed but long-lasting actions of steroid hormones lead to the conclusion that while the second stage is slow, it can persist for days. Most importantly, you can also see how the long and profound anabolic actions of steroid hormones clearly depend on a preliminary short but fragile stimulating effect.

Many athletes fail to fully activate the first stage of the anabolic cycle. This preliminary stimulatory stage is quite unstable and can be abandoned as soon as it begins.

Bodybuilders and athletes who have poor eating habits and follow incorrect exercise routines miss the opportunity to establish a strong growth stimuli. As a result, they are unable to reach the second conclusive stage of the anabolic cycle, and they fail to gain the muscle and strength they desire.

The use of anabolic drugs is a way to bypass the first stimulating stage of the anabolic cycle. However, every shortcut has its price. The dark side of anabolic drug use is well known and well documented. Aside from shutting off the body's own production of anabolic hormones, anabolic drugs can adversely affect blood pressure, liver cholesterol, and lipid metabolism, and can cause overexpression of aromatase (estrogenic effect), hair loss, acne, growth of internal organs (such as abnormal growth of heart or intestines, which may lead to cardiovascular problems or overgrown "big guts," respectively) and cancer. Following the anabolic cycle naturally with no shortcuts may be a slower process but much more effective in the long run.

EXERCISE AND REST

Chronic activation of hormones such as adrenals or stress-related

peptide-stimulating hormones seem to adversely empty all available hormonal reserves and lead to adrenal exhaustion or hormonal insufficiency. Such conditions may severely compromise the body's reaction to stress, diminish thyroid hormone functions, suppress libido, and impair growth.

Cycling between periods of action and rest is therefore necessary to effectively reach anabolic states. Length of training (volume) and exercise intensity are both important factors in inducing growth stimulation. Nevertheless, periodic rest and relaxation intervals are as important as workout sessions. Although exercise activates the first stage of the anabolic cycle, rest combined with proper nutrition closes the cycle and activates the final second stage, which facilitates the actual growth. As noted previously, one of the most important anabolic effects occurs during deep sleep, when growth hormone release reaches its peak level.

How to Take Advantage of The Anabolic Cycle

You can practically activate the first growth-stimulating stage of the anabolic cycle through undereating and exercise. Fasting and physical stress induce adrenal actions that activate cellular factor cAMP. Adrenal hormone actions coupled with the cAMP effect on peptide-stimulating hormones and GH release during the day grant overall anabolic stimulation with a bonus of fat burning.

An excellent recommendation is to minimize carb consumption during the day. Doing so prevents long-lasting daily insulin spikes that may suppress the preliminary growth-stimulating process. Insulin antagonizes adrenal-cAMP actions and is therefore likely to suppress their initial growth-stimulating effect. However, as you'll see later on, insulin has a profound anabolic effect during the following second stage of the anabolic cycle. Therefore, ingestion of carbs after exercise or during the evening meal can help finalize some critical anabolic actions that require insulin interference to be fully effective.

For muscle gain, it is critically important to induce the first stimulating stage. Undereating combined with periodic short, intense training sessions is probably the most efficient method of enforcing this short-

lived, fragile stage of the anabolic cycle. Failing to establish a strong anabolic stimulating effect may significantly reduce your opportunity to establish a potent anabolic state.

Overeating at night, while maintaining a high nutritional state that includes the correct EFA ratio, sufficient complete protein supply, and enough carbs or fat to grant maximum cellular energy yield and insulin support, helps facilitate the second, and final, anabolic state. Note that the above growth cycle can take a couple of days. The practical method of inducing the two critical stages of the anabolic cycle day in and day out, stimulating and facilitating anabolic states, is a most efficient way to increase the probability of muscle and strength gain. However, like any other biological process, the anabolic cycle benefits from practical adjustments.

Stated simply, people have different metabolic demands and therefore require specific dietary and exercise modifications that help satisfy their unique needs. Since we've already covered the role of EFAs in regulating growth, let me mention again that both omega-6 and omega-3 fatty acids are necessary for the completion of the anabolic process, however, with different ratios adjusted according to a person's individual needs.

While arachidonic acid helps in signaling growth stimulation through proinflammatory prostaglandins and cytokines, during exercise omega-3 long-chain fatty acids DHA and EPA help stabilize insulin and reduce liver and blood cholesterol, thus improving fat utilization and steroid hormone synthesis. Most importantly, omega-3 oils and their active derivatives help balance the actions of AA, thus protecting the body from chronic overmanifestation of AA that may lead to chronic inflammation that can further lead to muscle waste.

People who use steroids or other anabolic drugs may need to increase their consumption of omega-3 oil to help protect the body from fatty liver disease or cancer. However, overconsumption of omega-3 to omega-6 (which seldom happens because most people suffer from omega-3 deficiencies) may adversely affect fat loss and growth. Therefore, it is important to maintain the correct ratio of omega-6 to omega-3.

EAT TO GROW

Bodybuilders and athletes should consider meat and eggs to be the most anabolic foods. Arachidonic acid, which is abundant in meat and eggs, helps to induce initial anabolic stimulation. Meat is also rich in mitochondria, which contain all the essential nutrients for muscle tissue. Vegetarians or vegans may live longer with a reduced risk of cardiovascular disease, but they may also compromise their ability to naturally increase muscle mass. It is a known fact among nutrition experts that vegetarianism may adversely compromise sexual desire and potency.

However, by incorporating certain food combinations, including certain beans and nuts, vegetarians may reclaim their virility and potency and assume anabolic potential. Nuts, especially almonds, have been considered an aphrodisiac food from the time of antiquity. With their superior nutritional content, almonds should be regarded as one of the most potent anabolic-supporting foods. Certain kinds of vegetarianism, such as lacto vegetarianism, can be a very effective diet. Dairy products such as whey ricotta cheese made from goat, sheep, or buffalo milk, are excellent sources of protein rich in branch chain amino acids. Whey protein, when processed correctly, is often an excellent additional protein as well.

CONCLUSIONS: THE ANABOLIC CYCLE

- The first stage of the anabolic cycle's effect is immediate but short and unstable.
- The second stage of the anabolic cycle's effect is delayed but can persist steadily for days.
- The body has limited peptide-stimulating and adrenal hormone reserves. Chronic activation of these hormones, such as from overtraining, can result in adrenal exhaustion, hormone insufficiency, and the body's impaired ability to cope with stress or induce growth.
- Undereating combined with exercise is the best way to lengthen and stabilize the short and unstable stimulating effect of the anabolic

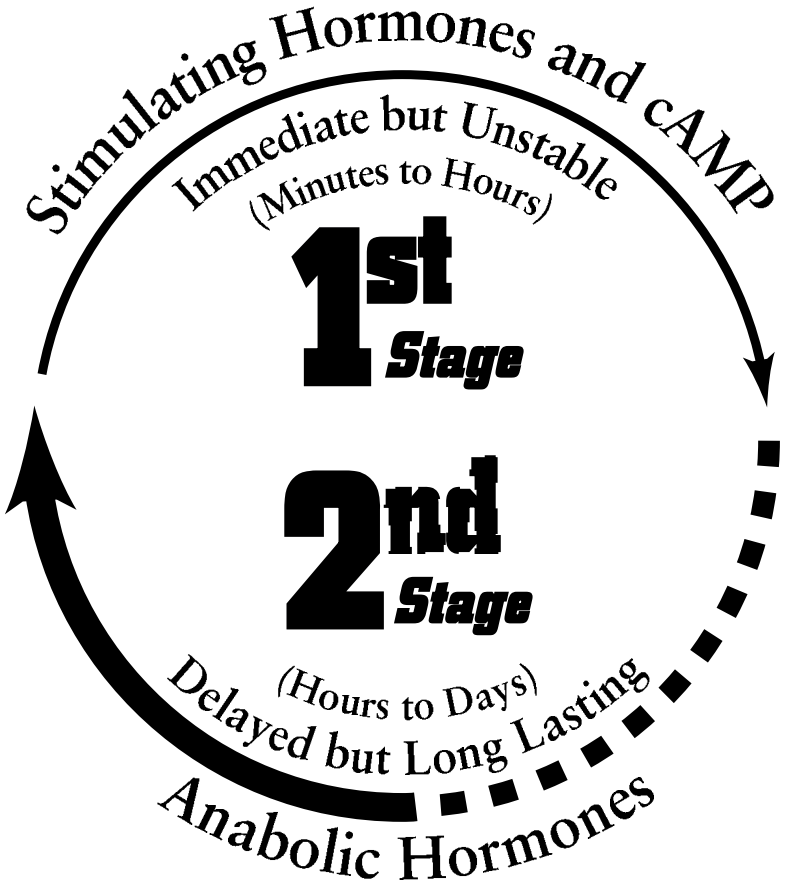
cycle's first stage.

- Overeating while maintaining a high nutritional state, including the correct ratio of EFAs, complete protein, and sufficient carbs and fat help facilitate the anabolic cycle's second and final stage.

- Both omega-6 and omega-3 are necessary for the completion of the anabolic cycle. Omega-6 is primarily a Stage I preliminary growth-stimulating agent. Omega-3, primarily a Stage II agent, is an anti-inflammatory that helps the body recuperate and build tissue.

- Both exercise and rest sessions are necessary for inducing a maximum anabolic state.

THE ANABOLIC CYCLE



8

SUPER MUSCLE

How to Develop Muscle with Superior Biological Capabilities

Building muscle demands skill, immense discipline, and experience, not to mention knowledge, instinct, logic, and probably even a degree of obsessiveness. Deep commitment to endure pain in order to achieve the goal of physical excellence is one quality that has characterized athletes, martial artists, and warriors for thousands of years.

Obsessiveness, however, can sometimes mean adhering to rigid routines that adversely affect performance. People who obsessively engage in long, exhausting exercise routines in an attempt to gain muscle mass often find themselves losing muscle instead. When this occurs, obviously something is very wrong.

An athlete who wants to discover why this approach doesn't work must understand the real effects of various training methods on muscle gain. Exercise and rest intervals have distinct stimulating or inhibitory effects on growth. The following pages reveal facts about muscle gain and address questions that are often overlooked. Finally, they may shed some light on whether it is possible to develop a super muscle fiber that can outperform any other type of muscle fiber.

Size and Power

Muscle size is only one of many factors that affect muscle performance. In fact, big, heavy muscle mass sometimes compromises performance, such as in long-distance runners or sprinters.

Muscle gain is likely part of a primal survival mechanism that helps the body improve muscle strength via adaptation to stress. Survival is the most dominant driving force of life. The body will initiate any process it needs for physical survival, including muscle gain or even muscle waste. Survival depends on performance, and performance depends on more than just muscle size. From a survival point of view, what really counts is power.

Power is a term that is often confused with strength. While we admire strength and size, we sometimes fail to understand that muscle size has little relation to muscle power. Power is the sum total of all force-generating performance capabilities, including strength, velocity, speed, endurance, and elasticity. In other words, muscle power is defined as the balance between all its related performance capabilities:

- Strength—Resistance to weight load
- Velocity—Explosive impact (acceleration of force)
- Speed—Rhythm of repetitive moves per time (slow to fast)
- Endurance—Resistance to fatigue
- Elasticity—Stretched muscle resistance to breakdown (muscle resistance to tearing and injury)

All the above factors comprise muscle power, although they may seem contradictory. For example, speed seems to antagonize strength, and strength seems to antagonize endurance. Nevertheless, the rules of survival dictate priorities. For instance, if one needs to be light and mighty to survive, the body will develop lean muscles with high speed and velocity's explosive impact such as with lightweight boxers.

Muscle and strength gain require special exercise routines that maximize resistance and minimize endurance. Indeed, the common

opinion among bodybuilders is that aerobics as a training method may inhibit or slow muscle gain. Moreover, anecdotal evidence suggests that muscle mass and strength gain require intense resistance exercise with a load of about 80 to 90 percent maximum voluntary contraction to be effective. For the purpose of strength and mass gain, performing sets of 5 to 10 repetitions is recommended.

In fact, it has been suggested that even one super-heavy rep would be enough to stimulate muscle growth. However, because performance involves more than muscle mass and strength, and because strength-specific training may compromise other performance capabilities such as speed and endurance, one may wonder whether the typical strength-resistance training routines are effective enough to maximize performance. That question raises an issue of utmost importance for competitive athletes, martial artists, and bodybuilders who seriously wish to build a powerful body with superior performance capabilities.

Fast-Twitch and Slow-Twitch Muscles

Muscle fiber types are often classified as slow-twitch or fast-twitch. Fast-twitch fiber can generate more force, velocity, and speed than can slow fiber. Muscles with a high percentage of fast-twitch fibers are generally stronger and faster than muscles consisting of mostly slow-twitch fiber. Most importantly, a fast-twitch fiber is capable of gaining more mass than a slow fiber.

For that reason, bodybuilders are usually interested in developing muscle with a high percentage of fast-twitch fiber to maximize muscle mass and strength gain. Considering all the advantages of fast-twitch fiber muscle, you might think that it is indeed superior to the slow-fiber type. Well, think again. From a biological point of view, slow-twitch fiber, also known as red fiber, can potentially outperform fast muscle fiber in several ways:

- Slow fibers are more resistant to fatigue.
- Slow fibers, with their higher mitochondrial content (up to 20 percent), have superior metabolic capability to utilize energy from fat fuel.

- Slow fibers have a high collagen content and are therefore more elastic and resistant to wear and tear.

- An increase in slow muscle fiber enhances vascularity and improves blood circulation as well as oxygenation.

- Finally, recent studies and experiments suggest that, from an evolutionary perspective, slow-twitch fiber Type I is more developed and advanced than fast-twitch fiber Type II.

Studies on muscle atrophy discovered that muscle retardation caused by prolonged misuse or injury involves the conversion of the more developed slow fiber type into a more primitive type, the fast fiber. Surprise! As controversial as it may seem, from an evolutionary standpoint, developing big muscles high in fast-twitch fiber may in fact be regarded as a sign of a biological setback.

In a related matter, survival depends on energy utilization. As noted, slow fiber, with its higher mitochondrial content, is much more efficient in converting fat to energy, a fact that contributes to a massive superiority in overall energy production, protection from insulin resistance, and increase in fat mobilization to energy (fat loss).

Nonetheless, fast fibers still can outperform slow fibers in strength, velocity, and speed. Human beings and animals need all physical performance capabilities including strength, speed, velocity, and endurance to survive. Simply stated, both fast-twitch and slow-twitch fiber types are critically important for both short and prolonged actions.

Just when you believe you have a clear understanding of muscle fibers types, you will be confused all over again when you consider performance. Both speed and strength training target fast-twitch fiber. However, speed antagonizes strength, and vice versa. A race horse is built differently than a working horse; the same difference applies to athletes who train for speed versus those who train for strength. Most training methods today specifically target strength, speed, or endurance, given that strength compromises endurance, endurance may compromise speed, and speed may compromise strength.

Considering all the above contradictions and variations, one may wonder whether it is possible to develop a super muscle that possesses all

performance capabilities in one—muscle with superior strength, speed, velocity, and endurance capabilities, a super muscle with superior utilization and generation of energy.

DEVELOPING SUPER MUSCLES

The question of whether it is possible to build super muscle leads directly to the issue of muscle performance. When muscle superiority is the goal, maximum performance is the way. Muscular performance depends on two critical factors: (1) muscle composition and (2) nerve-to-muscle stimulation. More specifically, the type of muscle fiber and the intensity of neural stimulation dictate muscle performance and its potential for growth.

Muscle Wiring

To possess all high-performance capabilities, a muscle must be composed of superior muscle fiber with superior neural wiring. The nervous system controls skeletal muscle through a network of neurons that are connected to muscle fibers via special junctions. A nerve can activate few or many fibers with either light or intense stimulation.

A nerve-to-muscle complex is called a motor unit. Motor units can intermingle to facilitate compound muscle movement. All voluntary muscle actions originate in the brain. The more efficiently the body is wired, the more intense the nervous stimulation can be, and the faster and more intensely the muscle can respond. Therefore, the definition of any super muscle clearly depends on its neural wiring.

Considering that muscular development involves an increase in nerve-to-muscle connections, a process called innervation, the more wired the muscle is, the stronger and faster it performs. Moreover, the more intense the stimuli, the more anabolic the result. In fact, muscles that are wired with myelated neurons (the ones surrounded by myelin sheaths, which are isolated and can generate stronger neuro signals) are also muscles that have improved power and growth potential.

If there is indeed a super muscle, then it should have superior wiring,

superior performance capabilities, and superior potential to utilize energy. As to whether all this is possible—most definitely yes.

It has been suggested that repetitive, intense, stimulation signals to a muscle will likely trigger improved muscle to nerve response via innervation. As noted, innervation is a process that increases or intensifies neural connections to muscle cells. It has also been suggested that this process by itself can significantly improve muscle strength or speed even without any change in muscle mass. However, different actions require different stimuli with possibly different specific neural adaptation.

Therefore, to have superior performance capabilities, the muscle needs to be superwired with a network of neural junctions that can help generate all specific performance qualities, including strength, speed, velocity, and endurance.

Muscle innervation can be improved through a special, repetitive complex of stimulatory signals by incorporating strength, speed, velocity, and endurance exercise in a single workout, and preferably, all in one giant superset!

This is a very intense and demanding training method. However, to be effective, this grueling combination of strength, speed, velocity, and endurance in a single workout must be repeated a few times each week. The repetitive complex of stimuli forces the muscles to adapt by increasing all the various neuron power outlets and thereby improving strength, speed, velocity, and endurance.

The benefits can be astonishing. For instance, a long-distance runner with an inability to develop speed may be able to improve sprinting capability without compromising overall endurance, consequently being able to break his or her own time record by facilitating a better sprint toward the finish line.

Martial artists and boxers who already incorporate speed, velocity, and endurance in training may be able to gain additional strength on top of all this, and thereby improve power punches, push-pull movements, and overall resistance to fatigue under intense physical stress.

Muscle neural wiring is only one part of what defines a super muscle.

We still need to cover the most elemental unit upon which the super muscle is composed. This most basic elemental unit is the super muscle fiber.

Super Muscle Fiber

Muscular development involves the conversion of one fiber type to another. It is generally accepted that short, intense resistance exercise routines are likely to increase the conversion of slow-twitch Type I fibers into fast-twitch Type II fibers. Conversely, long, repetitive, low-impact training routines are likely to increase the conversion of fast-twitch fiber types into slower ones.

The conversion of muscle fiber types from slow to fast, and vice versa, serves an obvious biological purpose. Stated simply, the body adapts to the most intense or long-lasting stimuli by changing the composition of its muscle fibers accordingly. Moreover, muscular development occurs instantly. When stimulated by the neurotransmitter acetylcholine, the muscle reverses its electrical charge and establishes a cellular state called action potential. This process involves a cascade of events including the induction of ion channels, thereby activating certain proteins and catalyzing enzymes that initiate muscle contraction and signal growth potential.

Much is still unknown about exactly how muscular development occurs. Nevertheless, based on studies of animals and humans, researchers suggest that muscular development most likely has to do with repetitive stimulation and actions that encode gene transcription, which signals protein synthesis and growth, presumably via calcium channel activation. Every moment of action may start a process that, with a repetitive, amplifying effect, can lead to muscle transformation.

Considering that fast fibers have short endurance, whereas slow fibers are weak and slow, you might wonder what muscular development really means. Can you ever be in a win-win situation in which you gain both strength and endurance?

Because human survival depends primarily on all performance capabilities, including strength, speed, and endurance, it is reasonable to assume that there is a biological mechanism within us that is pre-

programmed to facilitate better survival skills by maximizing overall power impact and by improving strength, speed, and endurance capabilities. Evidence suggests that there is indeed a biological mechanism that may develop a superior muscle fiber that can outperform any other muscle fiber type.

The so-called super muscle fiber carries all possible performance-related advantages. Scientists have already found a kind of super muscle fiber high in mitochondrial enzymes and glycolytic enzymes, a combination that can afford superiority in both prolonged aerobic and in short, intense, anaerobic exercise. Nevertheless, super muscle fibers might be classified as part of the family of fast Type II fibers, albeit with superior endurance capabilities similar to those of slow Type I fibers. That classification, however, may be misleading. The unique structure and biological functions of the super fibers should make them a distinct family of muscle fiber type with distinct cellular composition and ultrasuperior performance capabilities.

The percentage of super fibers in an average modern human muscle is almost negligible. Current isolation and specially targeted training methods based on endurance, speed, or strength probably fail to trigger the biological mechanism that improves overall power impact, thereby diminishing the chance of developing super muscle fibers.

Our ancestors most likely carried significantly higher percentages of superior muscle fibers than we do today. Ancient human beings were engaged in daily physical activities that required speed, endurance, and strength—all of which are required for human survival.

How to Develop Super Muscle Fiber

To develop super muscle fibers, you will need to adjust your workout routines to incorporate special superset exercise units that include strength, speed, velocity, and endurance all in one. For instance, you can incorporate a giant superset unit that consists of clean presses, heavy bag punching, chin-ups, dead lifts, sprint intervals, one-legged jumps, and military drop sets followed by post-exhaustion slo-mo and explosive punches. Minimize rest time between sets. If you are a martial artist, opt to incorporate repetitive sets of both strength and explosive training into your routines, such as with shoulder press drop sets followed immediately by a set of slow-motion and fast, explosive punches.

Slow-motion moves such as in Tai Chi or Qigong can efficiently increase power-punch-explosive impact. The slow moves signal strength stimuli, whereas the fast moves signal speed and velocity-related stimuli. In combination, slow and fast actions will signal the muscle to improve overall speed, explosives, and power impact.

Boxers and martial artists often lack the ability to generate a knockout punch. The training method above may help them develop super muscle fibers with improved neural wiring that may increase both explosive velocity and overall power punch impact.

This is an extreme training method that, if overdone, may lead to the adverse effects of overtraining, so remember: never overtrain! Start by incorporating one super muscle workout per week in your regular training routine, and build up gradually. Adjust the workout according to your specific priorities, with the goal of strengthening weaknesses while integrating strength, speed, velocity, and endurance. Be patient. The biological threshold time to adapt can last up to a few weeks. Finally, remember good nutrition. Recovery meals consisting mostly of high-quality protein and carbs are recommended to facilitate fast recuperation, inhibit muscle breakdown, and maximize growth potential.

MUSCLE SHIFTING: IMPROVING BODY PROPORTION

An athlete's failure to reach maximum, peak performance is sometimes the result of dysfunctional body proportion. When the body's natural symmetry is interrupted due to incorrect training, injuries, or aging, some body parts can grow disproportionately to others. As a result, the oversized body parts assume most of the body's workload, leaving the undeveloped parts prone to further inactivity and resulting degradation. If uncorrected, unbalanced body proportions may lead to a vicious cycle in which the strong body part gets stronger and larger while the weak body part gets weaker and smaller.

Unfortunately, this problem is often overlooked. Large-chested men often do multiple sets of bench presses while chronically neglecting their legs. There are also those "two-dimensional athletes" who work only on

the body parts they see in the mirror, meaning the front of the body only. Two-dimensional people often carry a big chest and biceps but have a flat back and buttocks.

Typical workout routines may not be sufficient to reverse body deformations and establish new body proportions. However, there is a process that can force the body to redesign itself and create new, improved body proportions with overall superior performance capabilities. This process is called *muscle shifting*. To understand how it is possible to improve body proportion, you will need to acquaint yourself with the biological mechanism that regulates muscle gain and muscle waste.

Muscle Gain versus Muscle Waste

Muscle gain is a process by which muscle adds more protein to its mass than it loses. Gain and loss of muscle protein is part of a regulatory mechanism that helps the body constantly maintain homeostasis of its protein pool. Protein is needed for numerous critical metabolic functions, including the formation of antibodies, production of enzymes and hormones, and the repair of old and broken tissue. For this reason, maintaining a protein pool is of the utmost importance for survival.

Skeletal muscles serve as the body's exclusive protein storage organs. Proteins are synthesized or degraded according to the body's specific needs. For instance, injuries, disease, or prolonged starvation increases the body's demand for protein and therefore these are often associated with protein degradation and muscle wasting.

A healthy, 160-pound male has a daily protein turnover of about 280-300 grams. Protein turnover is a term that describes the total amount of protein that is consumed and utilized for anabolic and catabolic purposes. Muscle gain clearly depends on the rate of protein turnover, in particular on the rate of protein synthesis and protein degradation. In fact, any process that induces muscle gain also involves a surplus of protein synthesis on protein breakdown.

Real muscle mass gain clearly depends on two critically important processes. The first promotes a gain in muscle protein, and the second inhibits muscle waste. Anything that helps inhibit muscle waste effectively promotes muscle gain, a fact often overlooked.

Because carbohydrates and insulin are considered "bad guys," athletes and bodybuilders tend to restrict carb consumption, not realizing that by doing so they severely compromise their opportunity to effectively build muscle. Insulin, among other functions, is an anticatabolic hormone that inhibits muscle breakdown. That's why it is so important to incorporate small recovery meals that contain protein and carbs after exercise. The anticatabolic anti-muscle-waste effect of insulin also explains why a state of insulin resistance or diabetes is often associated with muscle waste.

Other factors that help prevent muscle waste do so through various actions, including exercise, inhibition of stress hormones, and the ingestion of dietary protein, especially branch chain amino acids. The amino acid leucine has a profound inhibitory effect on muscle protein degradation. This is also true of the actions of anabolic agents such as growth hormone, testosterone, IGF_1 and its related heat-shock protein 27, all of which increase muscle protein conservation, thereby inhibiting muscle waste.

Incorporating special dietary and training methods that reduce stress can effectively suppress cortisol's catabolic effect on muscle protein. Relaxation and proper rest intervals are as important as exercise, and avoiding overtraining is the most important of all. Overtraining often leads to stagnation, plateau, and loss of muscle tissue.

Let Your Body Redesign Itself

Most protein synthesis originates from endogenous sources, not from dietary sources. This suggests that muscle gain is actually a process of recycling in which the body converts endogenous protein into new muscle fibers. It also leads to the startling conclusion that the body can, in fact, redesign itself.

Under certain conditions involving nutritional and physical stress, the body would try to improve performance capabilities by changing its muscular proportions via strengthening of active muscles and attenuating less active muscles A process exists that can shift protein from less active muscles to more active muscles, thereby creating a more functional body proportion. Recycling old tissue into new tissue is also a natural method that helps maintain tissue integrity and may slow age-related wear and tear.

How can you signal your body to redesign itself? You can do it by alternating between days of low protein consumption and days of high protein consumption. This dietary method, combined with special exercise that targets and prioritizes certain muscles, is likely to trigger the recycling process that shifts protein from one muscle to another, thereby helping design new body proportions.

Muscle Shifting

Recent experimental evidence demonstrates that a low-protein diet with sufficient calories triggers a mechanism that inhibits active muscle protein breakdown. That mechanism presumably helps the body survive under conditions of low protein ingestion by sparing active muscle's protein from degradation. It is possible, then, that a temporary low-protein diet combined with exercise may force the body to mobilize protein from less active muscles to more active muscles, thus sparing the more active muscles while using the less active ones as an endogenous source of protein.

That process would redesign the body to achieve more functional body proportions. If you want to improve your body proportions, you may find this method well worth trying. Note that exercise routines that incorporate special strength, speed, or endurance training are necessary for the induction of body transformation according to your specific needs.

Muscle shifting is a new term derived from an old concept. The idea of shifting muscles is based on the body's tendency to improve its performance capabilities by strengthening those muscles responsible for actions that occur most often and most intensely.

In practical terms, a person may be able to shift muscles by establishing special workout sessions five to six times per week that incorporate exercises prioritizing certain body parts (those that need extra strengthening) while maintaining other body parts (those that are either overgrown or relatively overpowering and need to be reduced in size). One can do that by increasing the frequency and intensity of the exercise to targeted body parts, while maintaining lower frequency of exercise to nontargeted body parts.

As noted, cycling between days of low and high protein consumption may help the body redesign itself. Low-protein days are likely to trigger the mechanism that inhibits active muscle breakdown, thereby forcing the body to dig into its protein pool from less active muscles, shifting protein from the less active to the more active muscles. This process maintains and increases the size of active muscles while decreasing the size of less active muscles.

Finally, on high-protein days, the body is likely to take advantage of the increase in protein utilization potential (due to the preceding low-protein days) and therefore maximize protein assimilation. This can result in increased muscle mass. Muscle shifting—the process that facilitates protein shifting from one muscle to another—may help individuals correct body proportion and symmetry, thereby improving both aesthetics and performance.

FOOD FOR MUSCLES

Instant muscle gain is the promise upon which many successful bodybuilding ad campaigns are based. Companies that sell nutritional supplements and powdered food products often promise quick fixes to those who use their products, clearly taking advantage of people's willingness to believe the unbelievable. Consequently, tons of powdered protein and "miracle pills" are purchased and consumed daily by people hoping for immediate muscle gain.

These protein powders and dry pet food are packed in very similar containers. However, cats and dogs alike hate the smell and taste of human powdered food, probably because of its strong chemical odor, artificial additives, and sweeteners. Regardless of whether protein powder products are graded below the nutritional standards suitable for animal consumption, muscular development is an issue that goes far beyond just pumping iron and shoving protein. In fact, incorrect pumping and cheap-quality protein may adversely affect overall metabolism and impair muscle gain.

Muscle Nourishment

The principle of muscle nourishment is based on complete nutrition in sufficient amounts. In other words, all essential nutrients—including vitamins, minerals, antioxidants, probiotics, EFAs, essential proteins, carbs, and fibers—must be consumed in sufficient amounts to afford a complete recuperation and muscular development.

Carbs, even though they are not technically essential, should be regarded as conditionally essential food for muscles because of their profound anticatabolic effect on muscle breakdown as well as the enhancement of insulin anabolic actions on postexercise muscles. Proteins should always come from whole food sources. Animal and marine foods, including dairy and eggs, are the best sources of complete protein. Dairy foods, particularly whey products such as ricotta cheese and whey protein powders, are rich in branch chain amino acids, which help inhibit muscle protein breakdown.

It is also critically important to ingest sufficient amounts of protein. Protein deficiencies force the body to break down muscle protein for other metabolic purposes, thereby causing muscle waste. Branch chain amino acids, especially the protein leucine, inhibit this catabolic process.

Just as important as proteins are essential fatty acids, whose anabolic actions are major contributors to exercise and postexercise-related growth.

Finally, vitamins, minerals, and antioxidants are critically needed to catalyze all cellular functions and prevent a metabolic breakdown. Athletes and bodybuilders may need to consume more nutritional supplements than people who don't work out as much to satisfy their active body's increased need for all the above essential nutrients.

Postexercise Recovery Meals

Postexercise recovery meals serve two major functions:

1. They facilitate actual growth by finalizing the actions of all anabolic agents, including growth hormone, IGF_1, testosterone, and insulin.

2. They prevent muscle breakdown, thereby enhancing recuperation and maximizing growth potential.

Recovery meals should consist of light protein (15–30 grams) and carbs (5–10 grams) so as to not tax the body through digestive stress. The purpose of recovery meals is to nourish the starving muscles with small amounts of nutrients, just enough to do the job. Recovery meals should therefore be carefully designed. Protein should be derived from high-quality, minimally processed sources. To further enhance muscle nourishment, taking branch chain amino acids is highly recommended to prevent muscle protein degradation and muscle waste.

Practical Tips

- Overprocessed protein powders may cause an imbalance in certain amino acids. The body translates such imbalances as protein deficiencies or surpluses, thereby forcing the breakdown of "extra" amino acids, a process that can lead to metabolic toxicity and may result in overall muscle wasting.

- As noted, ingestion of postexercise carbs facilitates insulin actions that are critically important for maximizing growth. Carbs should be derived from starch or from fructose-free sweeteners such as rice or maple syrup to maximize glucose utilization.

- Minerals, especially calcium, magnesium, potassium and zinc, as well as trace minerals such as chromium, molybdenum, and selenium, are highly recommended as postexercise nutritional aids. Minerals are necessary for all metabolic pathways and stress management. Minerals can be quickly depleted during physical activity. A postexercise mineral deficiency can lead to muscle cramps, headaches, and symptoms that resemble those of overtraining, including insomnia, nervousness, and exhaustion. Ideally, minerals should be part of every recovery meal; do not overlook their importance.

- Minimize alcohol and all artificial ingredients, including sweeteners, preservatives, and food chemicals such as food

Practical Tips (continued)

coloring and sulfites. All of these place immense metabolic stress on the liver. An overwhelmed liver may compromise some of its critically important functions, including fat and glucose utilization, as well as the metabolism of steroid hormone derivatives. This can then lead to impaired energy utilization, insulin resistance, and estrogenic reactions that can cause feminization in men, fat gain, and impaired growth.

- Make all your meals, including your recovery meals, appealing and tasty. Research has suggested that taste and aroma may increase the assimilation of nutrients and one's sense of overall well-being. People who work hard to gain muscle are wise to cultivate their sense of taste. Your body, your mind, and your tastebuds all deserve full compensation for your hard work.

- People can opt to have light protein and a small amount of carbs just before a workout. A preworkout meal should be designed to give the body just enough energy to begin the workout. Preworkout meals should work upon the same principles as a car or truck ignition. For instance, low-glycemic fruits such as berries, nonfat yogurt, or even a small piece of ginger candy, are a good kick start for your engine.

Carb Loading for Strength, Fat Loading for Endurance

You may be able to improve strength, speed, and endurance capabilities by following special dietary cycles that involve days of high carbs (carb loading) and days of high fat (fat loading). Incorporating these dietary cycles with special training routines that involve intense endurance and resistance exercise (such as sprint intervals and giant resistance supersets) are very likely to force your body to adapt to prolonged and intense physical stress by increasing both glycolytic and mitochondrial enzyme production, thereby enhancing both carb and fat utilization for energy.

Repetitive dietary cycles based on pumping and depleting carbs force the body to improve utilization of carbs for energy, especially during prolonged nonaerobic (resistance) exercise. In fact, carb depletion followed by carb loading is a well-established traditional method of increasing glycogen reserves in trained muscles. Nevertheless, it is important to note that it is the fast-twitch fibers that have a greater affinity for building glycogen reserves for carb utilization as energy for nonaerobic resistance exercise.

On the other hand, it is the slow-twitch fibers, with their larger mitochondrial capacity, that have a greater affinity for fat utilization for prolonged aerobic endurance training. Repeating patterns of feeding cycles that involve carb-loading days followed by fat-loading days would force the body to improve carb and fat utilization by increasing both glycogen reserves and mitochondrial capacity, with their respective enzymes.

For athletic purposes, it is important to distinguish between the effects of carb fuel and fat fuel on muscle performance. Carbs should be regarded mainly as food for fast fiber's nonaerobic actions, thereby enhancing strength, speed, and velocity, whereas fat should be regarded mostly as food for slow fiber's aerobic actions, thereby enhancing prolonged resistance to fatigue (endurance).

Incorporating high carbs and high fat days with special training routines may well help improve all performance capabilities (strength, speed, and endurance) as well as increase glycogen reserves and mitochondrial size for superior energy utilization. Note that days of high carbs should be low in fat, whereas days of high fat should be low in carbs. That way, one can enhance the effect of pumping and depleting.

Finally, prolonged repetitive patterns of feeding can significantly affect the body's adaptation to the most dominant food group. For instance, people who live primarily in freezing arctic climates and consume fatty marine foods are better adapted to fat utilization then are people who live in warm climates and subsist on plant food and little fat. On the other hand, warm-climate people are probably better adapted to carb utilization. It follows, then, that prolonged high-fat or high-carb diets may distinctively affect muscle development via adaptation.

The best dietary sources of carbohydrates are grains, plants, and roots. The best dietary sources of fats—in particular omega 6, omega 3, and omega 9—oils are nuts, seeds, olive oil, and marine food.

Improvements in both aerobic and nonaerobic performance capabilities may be associated with an increased number of super muscle fiber types. Repetitive cycles of carb loading and fat loading over prolonged periods, combined with intense aerobic and nonaerobic training routines, are likely to force the body to increase development of super muscle fiber types with improved aerobic and nonaerobic performance capabilities.

- Part III -

Fat Loss

Most people in the United States are overweight. Although fat loss is currently a popular subject of magazines and self-help books, it is not a simple one to fully understand. Most traditional fat-loss programs fail. People who do lose weight while following these programs often gain back all the weight they lose, and usually more in the long run. Many fail in their weight-loss efforts because the diets are too restrictive or because they reach a stagnation point after which they can't lose any more weight.

People often confuse weight loss with fat loss, but the two are very different processes. Fat loss is the process that leads to weight loss, and not the other way around. More people today than ever before suffer from myriad problems related to excessive body fat, including sluggish metabolism, insulin resistance, high cholesterol, and impaired performance.

Of special concern is stubborn fat, the tenacious fat tissue known to be almost impossible to get rid of. Stubborn fat generally resists fat-burning actions and can't be removed even by hard diet and exercise routines. Stubborn fat gain is a modern problem of almost epidemic proportions. Both men and women of all age groups suffer from the inability to lose stubborn fat, primarily because they have limited information about it and are therefore poorly equipped to tackle the problem.

The subject of fat loss gets even more complicated for athletes and bodybuilders. In spite of hard training and strict diet routines, many active individuals still battle excess fat. Eager to be lean 'n' mean or at the top of one's sport, competitive and highly active men and women resort to extreme diets and training methods that often leave them with a low basal metabolic rate, fatigue, and loss of strength, not to mention the inability to stay lean.

With the continued lack of definitive guidelines for weight loss, confusion exists as to how to most effectively lose body fat. However, the only way to effectively address the issue, including the elimination of stubborn fat, is first to understand the biological basics of fat metabolism—how and why fat gain or fat loss occurs. When you understand the biological basics of fat metabolism, you realize that fat tissue serves functions besides simply providing a storage area for energy. Fat tissue serves distinct purposes that give it reasons to accumulate, protecting the body from the adverse effects of certain metabolic problems by inducing fat gain.

The biological principle of fat loss is very simple: Removing the responsibilities of fat tissue removes the reason for its existence. By so doing, one can lose body fat with astonishing efficiency and, most importantly, can stay lean while not giving the body a reason to gain rebound fat in the future.

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THE BIOLOGICAL PRINCIPLES OF FAT LOSS

Fat loss is part of a biological process that forces the body to break storage fat and release fatty acid for energy. But as simple as it may sound, fat burning isn't just about burning fat tissue. In fact, the burning of fat, in particular stubborn fat, first requires the elimination of the metabolic problems that initially cause fat gain. If not resolved, certain metabolic impairments such as high toxicity or insulin resistance, may give fat tissue a reason to accumulate and to resist elimination. Adipose fat tissue serves some biological purposes beyond simple energy reserve storage. The body gains or loses fat as part of a regulatory mechanism that helps protect the body from three major problems:

1. The accumulation of toxins that can damage vital organs.

2. The accumulation of lipids and cholesterol that can lead to insulin resistance and diabetes.

3. Declining estrogen levels (especially for women) that can lead to an array of metabolic problems, including loss of bone mass, cognitive difficulties, impaired sexual performance, and reproductive aging.

In other words, fat gain can be regarded as a desperate attempt by the body to protect itself from high toxin levels, insulin resistance, and low estrogen levels. Therefore any method that will help eliminate the three problems cited above would likely remove some of the major biological reasons for fat gain and therefore facilitate effective fat loss.

CARB AND CALORIE RESTRICTIONS

As noted, fat gain and fat loss are dictated by certain biological principles. Most current diets are based on two major premises: (1) restriction of calories and (2) restriction of carbs. By restricting calories, the body consumes less energy than it spends; therefore it is forced to burn stored fat to provide the required missing energy. By restricting carbs, the body is forced to burn fat instead. Additionally, carb restrictions minimize insulin's inhibitory effects on fat burning.

However, in spite of the convincing logic behind these premises, most diets fail in the long run. Evidently, both calorie restrictions and carb restrictions aren't sufficient to sustain fat loss. Something else must be going on. Consider, for example, that for thousands of years, people living in China, Tibet, and Africa have followed diets traditionally based on grains and roots. In spite of consuming high-carb meals, these people are remarkably lean and healthy. Consider also those are people who traditionally consume huge quantities of food, such as the nomadic Arab tribes in the North African and Middle Eastern deserts. These people are famous for their huge feasts, yet their bodies look rock-hard.

Conversely, chronic restrictions of calories and carbs may adversely affect thyroid, growth hormone, and steroid hormone actions, leading to an overall sluggish metabolism. However, if done periodically rather than chronically, restricting calories and carbs is sometimes a very effective method for helping people lose body fat. Chronic calorie and carb restrictions adversely affect fat loss. Effective fat loss and the ability to remain lean require further investigation into the various biological functions for which fat is responsible, and a practical method for removing these biological functions from fat tissue. When fat is deprived of its active role, it loses its biological function and, like any other organ, it degrades and deteriorates.

Similarly to muscle, fat can be either built or destroyed, depending on biological priorities. The body's survival depends on its tendency to develop active tissue and degrade inactive tissue. The same is true of fat tissue. Deprive fat of its active role, and it breaks down and shrinks.

ELIMINATING FAT'S REASONS TO EXIST

Eliminating the reasons for the existence of fat is a mission that, at first glance, looks impossible. A certain amount of body fat is necessary for survival, and therefore the idea of completely eliminating body fat is implausible. Nevertheless, by eliminating the reasons for fat accumulation, a person may be able to effectively reduce body fat to a minimum biological set point at which the body still performs at its best. To attempt to eliminate the reasons for fat gain, we must first understand the two distinct types of fat tissue: subcutaneous and visceral.

Subcutaneous and Visceral Fat

One of the main reasons for confusion about fat loss is that many people aren't aware that there are two kinds of fat tissue in the body, each with a distinct sensitivity to fat breakdown (lipolysis). These two distinct fat tissues are *subcutaneous fat*, which lies under the skin, and *visceral fat*, which is internal.

Subcutaneous fat tends to be insulin sensitive and therefore more resistant to fat burning, whereas visceral fat is more insulin resistant and has a higher affinity for adrenal fat-burning stimulation than subcutaneous fat. Nonetheless, each type of fat tissue works together to balance the breakdown of the other.

The greater the amount of visceral fat, the more it releases fatty acids and the more resistant to fat burning subcutaneous fat is. Because of its fast reaction to adrenal stimulation followed by fat tissue breakdown and the release of fatty acids to the liver, visceral fat is presumably most dangerous to individuals who are prone to heart disease and diabetes. High visceral fat and its related flux of released fatty acids may cause fatty liver (hepatic hyperlipidemia) and consequent insulin resistance.

The accumulation of visceral fat is often associated with the formation of stubborn fat under the skin. In an attempt to balance visceral fat's high release of fatty acids to the liver, the subcutaneous fat tends to be more resistance to fat burning and in turn becomes stubborn.

Delayed Fat Loss

Another reason for confusion about fat loss is so-called delayed fat loss. People who suffer from an accumulation of excessive visceral fat often don't notice any noticeable reduction of subcutaneous fat under the skin, in spite of following hard diet and exercise routines. The reason is that visceral fat responds first to the fat-burning stimulation of diet and exercise, whereas subcutaneous fat has a delayed reaction. People who have excessive visceral fat need to burn it first before they will notice any change in the fat under the skin. Bodybuilders and others who want to achieve greater leanness and definition must be aware that the higher a person's percentage of visceral fat, the longer it takes to notice a change in body composition and overall body definition.

Fat Tissue Functions

Researchers believe that fat metabolism is controlled by a primal biological feedback mechanism that helps human beings survive in extreme conditions such as starvation, very cold climates, or exposure to prolonged and intense physical stress. They have also suggested that body fat may protect the body from the adverse effects of insulin resistance and diabetes, overall toxicity, and declining estrogen. Additionally, the body may be programmed to protect itself from the adverse effects of chronic overfeeding or underfeeding by regulating the rate of fat breakdown or fat gain accordingly.

This survival-like control mechanism is constantly influenced by the body's ability to utilize fat and produce energy. The greater the body's ability to utilize fat and energy, the lower the levels of plasma, liver lipids, and cholesterol are and the more likely fat is to be mobilized for energy. The lesser the body's ability to utilize fat and energy, the more likely lipids and cholesterol are to accumulate, and the more resistant fat tissue may be to fat burning.

High fat utilization and high energy expenditure are the key principles of effective fat loss. Let's see how increased fat utilization and high energy turnover can help eliminate the metabolic problems that initially cause fat gain, such as insulin resistance or overall toxicity.

Insulin Resistance

Insulin resistance is a metabolic state that caused by the accumulation of high lipids and cholesterol in the liver and plasma. Hyperlipidemia and fatty liver decrease fat and glucose utilization, thereby establishing a state of insulin resistance. The body tries to protect itself from insulin resistance by inducing fat gain in a desperate attempt to prevent further accumulation of fatty acids in the blood, liver, and other tissues. In other words, fat gain protects the body from insulin resistance, and vice versa.

As absurd as it may seem, excessive fat breakdown, in particular the breakdown of visceral fat, may lead to overaccumulation of lipids in the plasma and liver, thereby causing a state of insulin resistance. Excessive visceral fat may cause insulin resistance that, as noted, may further inhibit fat loss and promote the formation of stubborn fat.

Overall Toxicity

Besides protecting the body from insulin resistance, fat gain serves other purposes, such as protecting the body from the accumulation of toxins. Fat tissue stores toxins and protects vital organs from damage. Any process that detoxifies the body is likely to eliminate the reason for fat accumulation and to accelerate fat burning.

The primal biological principles of fat loss are:

1. Increased fat utilization,

2. Increased energy turnover, and

3. Increased overall detoxification.

Let's examine how the above principles translate into actual fat loss and, in particular, the loss of stubborn fat.

Biological Principle 1: Increased Fat Utilization

Most fat utilization occurs in the cell mitochondria. The greater the number of mitochondrial enzymes, the more efficient fat utilization is. Because muscle is the largest mitochondria-containing tissue, muscle composition directly affects fat utilization. Certain muscle fiber types have superior fat-utilization capabilities over other muscle fiber types.

Slow muscle fiber types as well as super muscle fiber types (see "Super Muscle Fiber" in Chapter 8, "Super Muscle") can metabolize fat more efficiently than fast fibers, because of their larger mitochondrial size. For increased fat utilization, protection from diabetes, and enhanced fat loss, special training routines that help develop muscles with greater metabolic capacity for utilizing fat fuel are highly recommended. Incorporating endurance training with strength and speed exercise in a workout routine may help develop muscle fibers with superior performance capabilities and increased capacity to utilize fat.

Biological Principle 2: Increased Energy Turnover

Energy turnover describes the overall energy that the body consumes, utilizes, and spends. High energy turnover is a state in which the body's overall metabolic rate is high (high energy expenditure and high food consumption). Cellular high-energy turnover is also an indication of high fuel utilization. When energy turnover is high, utilization of carbs and fat increases, thus preventing insulin resistance and the accumulation of lipids and cholesterol in the blood and tissue. This metabolic state could be established by incorporating intervals of physical training and rest periods with feeding cycles that supply all essential nutrients and calories needed to fuel the highly pumped metabolic machine.

Periodic overeating may help increase the body's basal metabolic rate, thus helping facilitate a state of high energy turnover. However, overeating should be fully controlled and alternated with periodic undereating to prevent a state of chronic overfeeding that can eventually lead to fat gain.

Finally, high-energy turnover is a metabolic state that can be easily manipulated to encourage weight loss. Alternating between days of high carbs and low carbs, as well as days of undereating and days of overeating, induces temporary states of low insulin impact and negative energy balance, respectively, while preventing the overall metabolic rate from falling. These temporary states of low insulin and negative energy balance in a highly energized body can help induce effective fat loss.

Overtraining and insufficient nutrition may initially cause weight loss, but in the long run, a metabolic decline may result, causing rebound fat gain.

Biological Principle 3: Increased Overall Detoxification

The most effective way to purge the body of toxins naturally is to fast or undereat. Digestive stress robs the body of vital energy that could otherwise be used for other metabolic purposes. Additionally, when food consumption is minimized, more energy is shifted toward cleansing. Another bonus of undereating is that less food means reduced exposure to dietary toxins.

Be aware that effective detoxification increases the release of toxins into the bloodstream and may cause a temporary elevation of toxin levels in the blood. Whenever you detox, it is important to supplement and nourish with antioxidants to help protect the body from the oxidative stress of free radicals and neutralize harmful substances. Antioxidants are naturally found in fruits, vegetables, roots, seeds, nuts, mushrooms, bran, and sulfur-containing foods such as broccoli, cauliflower, eggs, and whey protein.

Fat loss also releases toxins into the bloodstream. Toxins may then accumulate in the liver, kidneys, joints, and other tissues. Extreme fat loss

methods, including crash diets, can cause an overwhelming increase in blood toxin levels and force the body to induce fat gain to desperately reabsorb the released toxins. Gradual fat loss is best because this helps you avoid overtoxicity and rebound fat gain.

Any metabolic process that increases toxicity may inhibit fat loss. Food chemicals, pesticides, plastic derivatives such as from polluted water or food, excessive alcohol consumption, and chronic constipation may all significantly increase toxin levels and overwhelm the liver's ability to detoxify. A stressed liver is often associated with increased estrogenic activity and stubborn fat gain.

Understanding the biological principles of fat loss can be of great practical help for people who want to lose fat and stay lean. However, there are additional biological functions of fat tissue that affect fat loss and are worthy of our attention.

Regulation of Body Fat

Scientists suggest that fat tissue may function as a regulator of body fat percentage and may help suppress excessive fat gain, particularly in obese people. Body fat is regulated by insulin sensitivity, with insulin tending to inhibit fat burning. Beyond a certain set point of body fat gain, the body may be forced to induce a state of insulin resistance to swiftly suppress any additional fat gain.

When insulin-resistant adipocyte fat cells resist insulin fat burning inhibitory action, they break triglycerides ester storage and mobilize fatty acids to the blood. However, this alleged fat breakdown comes at a price: These fatty acids can't be oxidized for energy because fat utilization is suppressed though lipid and cholesterol accumulation in the liver and circulatory system. That process can create a vicious cycle leading to diabetes and cardiovascular disease, two conditions often associated with obesity.

L-Carnitine Deficiency and Overconsumption of Carbs

Some people develop insulin resistance because of a deficiency in the amino acid L-carnitine and its related enzymes. A deficiency in L-carnitine sometimes causes accumulation of unoxidized fatty acids that decrease insulin sensitivity. Therefore, eating foods rich in L-carnitine, such as meat and eggs, or supplementing with L-carnitine and Lysine, an L-carnitine precursor, may support fat utilization and facilitate efficient fat loss.

Overconsumption of processed and simple carbs may adversely affect insulin receptor sensitivity, thereby leading to high insulin levels, a condition known as hyperinsulinemia. Chronic insulin stimulation from causes such as frequent carb consumption during the day may increase insulin resistance toward the end of the day. Minimizing carb consumption to one meal per day, as well as alternating between days of low carbs and days of moderate carbs, may help stabilize insulin sensitivity and afford effective fat loss.

Fat Loss and Exposure to Cold Temperatures

Fat metabolism may be affected by exposure to cold temperatures, a factor that can be manipulated to accelerate fat loss. When exposed to extremely cold temperatures, the body increases its energy expenditure, which translates into body heat. This increase in energy production is mediated by uncoupling proteins, which are found in the inner mitochondrial membranes. Uncoupling proteins generate their actions by transferring anions (negatively charged particles) through mitochondrial membranes. The uncoupling protein's actions create a proton infusion that bypasses energy utilization as adenosine triphosphate (ATP), thus inducing what is considered a waste of energy in the form of heat (a thermogenic effect).

Through their actions, uncoupling proteins reduce the cellular level of ATP and thereby create negative cellular energy balance that forces the

body to increase cellular energy production to compensate for the wasted energy. Additionally, a cellular negative energy balance promotes cellular factor cAMP and inhibits insulin.

A person can take advantage of UCP activity through exposure to cold, such as by taking cold showers. The recommended method is to alternate the water temperature between warm and cold and to finish with a cold rinse. Exposing the body to extreme cold has been used traditionally in Europe and Russia. Rubbing snow on the body and jumping into icy rivers are still considered effective methods of improving circulation and overall health.

For the purpose of losing fat, temporary exposure to extremely cold temperatures increases the actions of uncoupling proteins, thereby increasing body heat as well as the rate of fatty acid mobilization and fat loss.

Human Adaptation to Cold Climates and Stubborn Fat Gain

Some individuals are naturally inclined to gain stubborn fat because of a genetic predisposition to high visceral fat. Inuits, Aleutians, and Native North Americans may possess a genetic code that helps their bodies survive in the extremely cold Arctic climate. Having to survive under such environmentally tough conditions, the body must constantly mobilize fatty acids as fuel for energy and heat production. Therefore, people who live in these extremely cold climates may be more prone to high visceral fat, insulin resistance, and stubborn fat gain.

This assumption is based on current genetic discoveries that suggest an evolutionary theory based on the formation of different human body types via adaptation to different climates. Generally, people who live in hot weather are more inclined and biologically suited to eat plant foods such as vegetables, fruits, and grains and are therefore more insulin sensitive.

People who live in cold climates fare better by eating flesh and fat but may be inherently inclined to an insulin-resistant metabolic state that permits a constant influx of fatty acids to the liver as fuel to keep the

body warm. It is currently fashionable to present Inuits as paragons of health. Unfortunately, as healthy as they may be in their native environment, they suffer from myriad blood sugar and vascular problems as soon as they begin to follow a typical modern Western diet.

People who are genetically predisposed to survive well in cold weather may have a tendency to insulin resistance and stubborn fat gain. Inuits, some Native Americans, and perhaps even some Latino people who are of part Indian and part Spanish descent may need a special, modified diet based on low-glycemic meals. They may need to be physically active, thus creating a state of increased energy expenditure that mimics the way their bodies are originally destined to function. Periodic undereating and a steady exercise routine incorporating both aerobic exercise and resistance are highly recommended.

Stress and Stubborn Fat

Fat loss is a process that depends almost exclusively on adrenal hormone actions. Apparently, it is the balance between beta and alpha adreno-receptors that dictates whether fat tissue is responsive to fat-burning stimulation. Generally, fat tissue with high affinity to beta receptors is more reactive to adrenalin fat-burning stimulation than is fat tissue with a high number of alpha receptors. In fact, alpha-2 receptors inhibit fat burning because of their suppressive effect on the enzyme adenylate cyclase and its related cellular factor, cAMP.

The binding of adrenal hormones to their various receptors creates distinctly different effects on stress reactions and overall fat burning. Adrenal binding to beta-2 receptors activates an intramembrane G protein to stimulate the synthesis of cellular factor cAMP, which induces fat burning by activating hormone-sensitive lipase. Fat-tissue breakdown requires the actions of hormone-sensitive lipase; otherwise, fat burning is inhibited. In contrast, the binding of adrenal hormones to alpha-2 receptors activates intramembrane G1, which has an inhibitory effect on cAMP, thus suppressing hormone-sensitive lipase and overall fat burning. There are also alpha-1 adrenoreceptors. The alpha-1 adrenoreceptor may mediate muscle fueling during physical activity.

Beta-3 receptors are the subject of current research because of their direct response to the neurotransmitter acetylcholine, which facilitates

muscle contraction. Nevertheless, beta-3 receptors are considered fat-burning stimulators. Adrenal hormones (catecholamines) are released largely as a fight-or-flight response to stress. The effects of stress on adipose fat tissue and the liver cause a release of fatty acids and glucose as fuel. In skeletal muscles, adrenal stimulation causes the breakdown of glycogen reserves to provide immediate fuel for swift reactions.

During stress, adrenal hormones accelerate the heart rate to increase blood flow. They also enhance breathing and overall detoxification by relaxing blood vessels in the nasal passages and gastrointestinal tract. In the short run, adrenal hormones help the body react to immediate danger or stress by facilitating fat burning for immediate fuel utilization, enhancing oxygenation, and eliminating toxins. In the long run, however, adrenal hormones may have other metabolic functions that appear contradictory and confusing.

All adrenoreceptors compete for the same adrenal hormones. Because the ratio of beta- to alpha-adrenoreceptors dictates stimulatory or inhibitory adrenal effects, both stimulatory and inhibitory adrenal actions may serve different biological purposes. A high affinity of a tissue to the inhibitory effect of alpha-2 adrenoreceptors may be part of a biological defense mechanism that protects the body against stress-related adrenal overexcitatory impact.

Overexcitatory impact, which occurs during chronic stress or constant exposure to danger, sometimes leads to panic attacks or adrenal exhaustion, and finally to overall metabolic breakdown. If insufficient rest has accompanied the chronic stress, the result may be formation of tissue such as stubborn fat, which typically expresses a high ratio of alpha- to beta-adrenoreceptors and is less responsive to adrenal stimulation. Relaxation methods, sufficient rest, and avoiding overtraining can help manage stress and protect against adrenal exhaustion.

Let stress work for you rather than against you. Short-term, controlled exposure to stress is stimulatory and most effective toward fat loss, whereas chronic or prolonged stress has adverse effects. In other words, short, intense workout sessions with sufficient rest yield better results than do protracted workout routines six or seven days a week.

The body adapts to the type of stimulation it experiences most frequently. It follows, then, that the body may adapt to chronic stress by reversing tissue sensitivity to adrenostimulatory reactions to stress, thereby protecting the body from exhaustion. Adaptation to chronic stress may cause fat tissue to be less reactive to fat breakdown and therefore more stubborn. This long-term adaptation to chronic stress may be partially responsible for age-related stubborn fat gain.

Lipolysis: The Chemistry of Fat Burning

Lipolysis is the release and mobilization of fatty acids from adipose fat tissue so they can be used as fuel. In this simple process, fatty acids attached to glycerol are hydrolytically removed. Fatty acids, in addition to being mobilized for fuel, act as precursors for the synthesis of ketone bodies, such as during prolonged starvation. Additionally, lipolysis occurs in muscle tissue and in the liver, where small amounts of fatty acids are stored to produce cellular energy.

The process of fat-burning occurs in three stages:

1. Hormonal simulation,
2. Mobilization of fatty acids to the mitochondria for energy utilization, and
3. Fat metabolites signal the body whether to keep mobilizing fat for energy or stop the fat-burning process.

Low-Carb Ketogenic Diets

Ketogenic diets are based on carb deprivation, and the motivating idea is to create a metabolic state in which the body is forced to increase production of ketone bodies because of increased demand for fatty acid oxidation. In early stages of the diet, the lack of dietary carbs and low insulin increases the mobilization of fatty acids for fuel and increases liver synthesis of ketone bodies in the form of acetoacetate, 3-

hydroxybutyrate and acetone. Ketones serve as fuel for peripheral tissue and spares protein breakdown. Promoters of ketogenic diets promise maximum fat loss when ketosis is induced.

What is great in theory, however, does not always work in reality. Ketogenic diets are doomed to fail. People who experience prolonged carb restriction reach a point of stagnation beyond which they cannot lose any more body fat. Moreover, they may suffer metabolic decline and gain back all the weight they initially lost, but this time the weight gain includes a higher percentage of body fat. The reason the ketogenic diet fails is simple: During ketosis, blood pH declines as the body's acidity rises. Desperate to reduce acidity, the body secretes insulin, thus inhibiting lipolysis and halting ketosis, with its acidic effect.

Ketone bodies are acid fat metabolites. The body tries to get rid of these through the lungs and the kidneys, via exhalation and the urine, respectively. However, when the body reaches ketosis, it secretes insulin to prevent further acidosis. Insulin inhibits lipolysis and therefore decreases mobilization of fatty acids to the liver. When fat loss is suppressed, the synthesis of the liver's ketone bodies decreases, and the body's pH rises. Ketosis inhibits fat loss and increases insulin levels, and ketogenic the diet's quest of reaching ketosis clearly fails to maximize fat loss.

Chronic carb restrictions may adversely reduce cellular adenosine triphosphate, thus impairing thyroid hormone activation—that is, conversion of T4 to the active form, T3. Low thyroid activity often causes an overall metabolic decline, with impaired muscle fuel utilization, lack of strength, sensitivity to cold, and fat gain. Low-carb ketogenic diets are very popular these days. People who suffer from insulin resistance may benefit from low-carb diets adjusted to their individual needs. Nevertheless, the desire to reach a metabolic state of ketosis-related fat loss, such as in high-fat, no-carb ketogenic diets is misleading and ill advised.

Insulin and Fat Gain

Insulin stimulates fat gain, increasing the net uptake of fatty acids into adipocytes. Insulin is considered the major antilipolytic (anti-fat-burning hormone). In fact, insulin has a profoundly inhibitory effect on biological processes necessary for fat burning. The many inhibitory mechanisms by which insulin inhibits lipolysis aren't fully understood.

Insulin stimulates the enzyme phosphodiesterase 3, which degrades and decreases cellular factor cAMP in fat cells. As noted, cAMP is critical for lipolysis, and suppressing cAMP inhibits fat burning.

Insulin desensitizes beta-adrenoreceptors by inducing translocation of beta-adrenoreceptors to intracellular space that reduces lipolytic sensitivity to adrenal hormones. Insulin inhibits the fat-burning hormone sensitive lipase by enhancing its dephosphorylation.

Fat-Burning Hormones

Adrenal hormones are the most important stimulators of lipolysis. Adipocyte fat cells have three different beta-adrenoreceptors (beta-1, -2, and -3) and alpha-2 adrenoreceptors. While beta-2 and beta-3 receptors stimulate fat burning, alpha-2 and beta-1 receptors may actually inhibit fat breakdown. Adrenal hormones stimulate fat burning or lipolysis by binding to beta receptors that are coupled to G-sensitive protein. Activated Gs protein catalyzes the formation of cAMP. cAMP activates protein kinase A, which then finally phosphorylates and activates hormone-sensitive lipase, thus inducing lipolysis. Other fat-burning hormones also have a cAMP lipolytic impact on fat cells.

Hormones such as thyroid-stimulating hormone, glucagons,

Fat-Burning Hormones (continued)

hunger-related cholecystokinin and parathyroid hormone are all stimulators of lipolysis via cAMP activation, but their effects are minor compared to those of the adrenal hormones. The main physiological factors that increase lipolysis are fasting, undereating, and exercise. Each of these physiological factors involves the stimulatory effect of adrenal hormones and the activation of cellular factor cAMP.

ELIMINATING FAT'S REASONS TO EXIST—PRACTICAL TIPS

- Establishing temporary states of negative energy balance (i.e., when more energy is spent than is consumed) through periodic undereating and exercise, eliminates the reason for fat to serve as storage for energy and instead forces it to break down into fuel for energy.

- Removing toxins from the body through periodic fasting or undereating helps eliminate the reason for fat to serve as a storage for toxins, thereby preventing fat gain while practically supporting fat loss.

- Natural methods that increase the body's capacity to utilize fat for energy, such as by incorporating endurance and strength training in workout routines, protects the body against accumulation of serum lipids as well as insulin resistance.

- Avoiding consumption of estrogenic substances such as petroleum-based food chemicals, pesticides, and fertilizers, as well as overconsumption of alcohol helps prevent overestrogenic activity.

- Avoiding chronic calorie restrictions and crash diets helps prevent a sudden elevation of toxin levels as well as preventing estrogen decline in women.

- Avoid ketogenic diets that involve chronic carb restrictions to prevent fat gain rebound as well as low thyroid, sluggish metabolism, and impaired performance.

- Body exposure to extreme cold temperatures such as by taking cold showers or swimming in cold water triggers an increase in the actions of uncoupling proteins, thereby increasing body heat as well as accelerating the rate of fatty acids mobilization for energy and overall fat loss.

- Avoid exposure to chronic stress such as from overtraining, lack of relaxation, and insufficient rest to prevent adaptation of the body to chronic stress, which may result in decreased sensitivity to adrenal fat burning actions and a resultant formation of stubborn fat tissue.

- Part IV -

Muscle Gain and Fat Loss Conclusions

10

Insulin's Essential Role in Muscle Gain and Fat Loss

Insulin is probably the most misunderstood hormone in the body. Insulin's actions are often claimed to be the main culprit for the current epidemic of weight gain. But what many people fail to realize is that, despite its reputation as a fat loss inhibitor, insulin's biological functions are critically important for muscle gain as well as for fat loss. Nevertheless, many people still choose to follow low-carb diets, hoping to minimize insulin activity by chronically restricting carb consumption and thereby forcing the body to burn fat. Low-carb diets, with their extreme restrictions, often lead people to frustration, but seldom to long-term leanness. In the long run, most people on low-carb diets gain more weight than they initially lose.

Insulin and IGF_1

Insulin plays a critical role in promoting the actions of insulinlike growth factor 1 (IGF_1), which facilitates muscle development. Insulin and IGF_1 are peptide hormones with almost identical molecular

structures. The difference between them is that insulin can promote fat gain, whereas IGF_1 stimulates fat loss. Both IGF_1 and insulin are potent anabolic agents that can transfer amino acids into cells, thus stimulating DNA synthesis and growth.

In addition to the similarity between insulin and IGF_1, a collaborative mechanism exists between these two hormones. Metabolically, insulin promotes IGF_1 actions in the body. To be fully effective, IGF_1 requires insulin interference. In fact, insulin stimulates IGF_1 secretion by the liver. Additionally, growth hormone, which stimulates IGF_1, is largely ineffective without the influence of insulin, which may explain why diabetes is often associated with low levels of IGF_1 and depressed growth. Insulin and IGF_1 work together, however, in a way that may seem contradictory or confusing. In the short run, serum IGF_1 levels increase when insulin levels decrease. Moreover, IGF_1 receptors in muscle cells increase significantly during periodic fasting.

Lack of food followed by low insulin levels may force the body to increase the number of IGF_1 receptors in muscles to maximize performance under conditions of minimal food intake. Researchers believe that the ratio of IGF_1 receptors to insulin could be an indicator of metabolic efficiency. Obese people often demonstrate a lower ratio of GH and IGF_1 to insulin. However, as mentioned previously, both GH and IGF_1 actions can be fully effective only when insulin levels increase, such as when carbs are consumed.

To take full advantage of this complicated way in which insulin affects IGF_1, periodic fasting or undereating is recommended in addition to exercise. "Training on empty" enhances the signal to increase both growth hormone and IGF_1 receptors in the muscles. Then, to induce the effective actions of growth hormone and IGF_1, one should have recovery meals immediately after exercise that include protein and carbs, as well as nourish the muscles with full meals that contain all essential nutrients in sufficient amounts.

So as not to compromise the anabolic actions of growth hormone and IGF_1s, both of which profoundly affect muscle growth and fat loss, one should avoid chronic carb restrictions. Incorporating periodic cycles of undereating and exercise as well as providing the muscles with complete nutritional meals while avoiding chronic carb restrictions may initially help increase the number of growth hormone and IGF_1 receptors in the muscles as well as enhance their resulting actions.

INSULIN AND THYROID HORMONE

Insulin promotes thyroid activity in various ways. Thyroid hormones, particularly T3, play a critical role in energy utilization and body heat regulation. The thyroid hormone's actions are also vitally important for potency, virility, muscle growth, and fat loss. Low thyroid activity may severely impair overall metabolism as well as decrease both mental and physical capacity. Thyroid activity is determined by cellular energy levels, and when cellular energy is low, levels of adenosine triphosphate (ATP) decrease and the conversion of T4 to its active T3 form is severely inhibited. Insulin, which primarily increases cellular energy molecules (ATP) levels, is necessary for fully activating the thyroid hormone T3.

Thyroid hormone activity may be enhanced by the enzyme nitric oxide synthase, which is stimulated by insulin. Nitric oxide synthase is responsible for the production of nitric oxide, which plays an important role in the regulation of vasodilatation, sexual performance, potency, and growth. Therefore, insulin sensitivity and carb ingestion are essentially needed for proper thyroid functioning, thereby supporting virility, growth, and fat metabolism.

Chronic suppression of insulin due to chronic carb restriction may cause chronic elevation of the thyroid-stimulating hormone (TsH). Chronic overexpression of thyroid-stimulating hormone may lead to desensitization of the thyroid's receptors, a condition that may further suppress thyroid hormone synthesis and lead to declined sluggish metabolism. And as if this weren't bad enough, chronically high levels of thyroid-stimulating hormone are associated with increased levels of prolactin, the female lactation hormone. In men, prolactin production can cause profoundly feminizing effects, the least serious of which is overall fat gain.

Insulin's actions are also necessary for thyroid production. Thyroid hormone synthesis is an intense biochemical process that involves iodinization via brutal oxidative reactions catalyzed by the molecule NADPH. NADPH is a product of glucose metabolism in the so-called pentose phosphate pathway, which is an essential metabolic process derived from insulin-related glucose utilization. High thyroid hormones have a steroidlike activity, in particular, mediating the hormone actions of other anabolic steroids. This leads to the following conclusions:

- Insulin interference is critical for effective thyroid hormone activity, thereby potentially enhancing growth and fat loss.

- Chronic carb and calorie restrictions may impair thyroid function and overall metabolism.

- Insulin sensitivity is paramount for thyroid hormone synthesis via the pentose phosphate pathway.

In summary, by supporting thyroid hormone actions, insulin proves to be a fat-burning enhancer and growth promoter.

INSULIN AND THE PENTOSE PHOSPHATE PATHWAY

The pentose phosphate pathway is an essential insulin-related process that utilizes glucose for various critically important metabolic functions affecting muscle gain and fat loss. Impaired glucose utilization due to insulin resistance or the accumulation of serum lipids may adversely affect the pentose phosphate pathway, with devastating effects on overall metabolism.

The pentose phosphate pathway is primarily an anabolic pathway. It utilizes glucose to synthesize the five-carbon sugar pentose, which plays an essential role in cell membrane, nucleic acid, and steroid hormone biosynthesis. The pentose phosphate pathway is responsible for the utilization of large amounts of the essential energy molecule NADPH. NADPH is required for the synthesis of cell nucleus material, including DNA and RNA. This energy molecule is also vitally required for the enhancement of the body's self-defense against DNA damage, as well as protection from oxidant radicals and toxins. NADPH is necessary for the recycling of the body's most powerful immune protector, the antioxidant peptide glutathione enzyme, which protects the body from overall oxidative stress.

Glutathione enzymes are responsible for protecting nucleic acids from damage, a fact that is of utmost importance because it directly relates to cancer prevention and antiaging. The importance of the pentose phosphate pathway is often overlooked. Biologically, it serves critical

purposes, including the oxidation of glucose to energy. Nonetheless, the primary functions of this pathway are as follows:

- To generate the energy molecule NADPH for steroid hormone biosynthesis as well as to facilitate antioxidant reactions.
- To provide ribose 5 phosphate for the synthesis of nucleotides and the nucleic acids DNA and RNA.
- To regenerate glucose from pentose.

Certain organs such as the liver, adipose tissue, and the adrenal cortex contain high levels of PPP enzymes. In fact, 30 percent of glucose oxidation in the liver occurs via the pentose phosphate pathway.

In summary, insulin sensitivity is required for proper glucose utilization and the full activation of its related pentose phosphate pathway. Any intervention in pentose phosphate activity may adversely affect the body's ability to handle increased oxidative stress such as that from intense or prolonged exercise. Additionally, through its mediating actions, insulin helps protect the body from genetic damage, thus enhancing immunity and promoting an overall antiaging effect.

Methods that may help protect against insulin resistance including daily detoxification, minimizing carb consumption to no more than one meal per day, and minimizing simple sugars (particularly fructose) are all beneficially important because of their enhancing effect on glucose utilization and the pentose phosphate pathway. The foods richest in pentose and PPP enzymes are legumes, particularly mung beans. Animal foods, especially meat and liver, are abundant in dietary pentose, which initially stimulates PPP activity.

Finally, crash diets, prolonged fasting, starvation, and chronic carb restrictions may compromise the pentose phosphate pathway's anabolic actions, forcing it to oxidize glucose into energy instead. As long as the body is insulin-sensitive and sufficiently nourished, it will induce proper glucose utilization and its related pentose phosphate pathway.

However, as noted, prolonged restrictions of carbs and calories may waste PPP actions to utilizing energy, compensating for the lack of

dietary carbs and calories. Nevertheless, frequent and overconsumption of carbs may be as bad as carb restriction, and sometimes worse. Eating too many carb-containing meals during the day may lead to insulin insensitivity, a condition that may adversely inhibit the pentose phosphate pathway and all its related actions.

11

The Single Biological Principle of Muscle Gain and Fat Loss

Muscle gain and fat loss are compelling subjects that are pertinent to almost every aspect of life. In spite of overwhelming information about these subjects, including numerous scientific studies and anecdotal cases, the biological mechanisms that induce muscle gain and fat loss are quite simple.

The purpose of this book is to shed new light on the distinct ways in which muscle and fat tissues operate and to assist people in making responsible decisions about how to effectively improve their body composition and overall performance. As controversial as it may seem, all the information available on muscle gain and fat loss eventually leads to the conclusion that there is a single, overriding biological principle that governs whether or not muscle gain and fat loss will occur. The benefits of understanding this principle go far beyond just gaining muscle or losing fat. Following this principle can help improve all performance capabilities and enhance all metabolic functions.

The biological principle of muscle gain and fat loss is based on functionality alone. The body tends to develop or degrade tissues according to the tissue's level of activity or functionality. It is well known that muscle development depends on muscle activity. Incorporating strength, speed, and endurance exercise through a steady training routine helps develop muscle with superior performance and metabolic capabilities.

The same principles apply to fat tissues. Give fat tissue a reason to function, and it will increase its size. The four major biological functions of fat tissues are (1) energy storage, (2) toxin storage, (3) protection against insulin resistance, and (4) protection against estrogen decline in females. Eliminating the functions of fat tissue also eliminates the reasons for its existence.

Maintaining a high metabolic rate through exercise and sufficient nutrition, detoxing through periodic fasting or undereating, maintaining insulin sensitivity through exercise or by minimizing the frequency of carb meals to one meal per day and finally—particularly for women—avoiding crash or starvation diets, are all ways that are likely to encourage loss of body fat by eliminating the reason for fat to exist.

We can conclude that both muscle gain and fat loss are based upon a single biological principle.

Maximize Muscle Functions While Minimizing Fat Functions

As simple as it may seem, this principle applies to a vast complex of essential metabolic activities. In fact, by incorporating practical methods that maximize muscle functionality while eliminating the functions of fat tissue, one will gain muscle while losing fat and at the same time will benefit from other critical metabolic functions such as increasing insulin sensitivity, supporting hormonal balance, reducing lipid and cholesterol levels, and enhancing the utilization of fat and carb fuel for energy.

The suggestion that both muscle and fat tissue serves biological purposes in addition to their traditional functions as a vehicle for motion or storage for energy is quite revolutionary. The application of this idea

further intensifies with the fact that both muscle and fat tissues affect each other's functions. For instance, highly developed muscle with superior capacity to utilize fat and carbs for energy helps reduce serum lipids and cholesterol while protecting against insulin resistance.

Therefore, a well-developed muscle would help promote fat loss by taking functions away from fat tissues and thereby eliminating the reason for their existence. On the other hand, excessive accumulation of body fat may adversely affect maximum muscular development because of its often-related slowed and sluggish metabolism. Additionally, fat gain and its heavier body weight may compromise muscle functionality, decreasing speed and endurance capabilities.

By following only one solid biological principle, you can enjoy numerous life benefits. The dramatic result of your following this principle will be the development of a leaner, more powerful body with well-defined and superior metabolic capabilities.

The mechanism to improve body performance is already within you. Take advantage of it to transform yourself. Become a super you.

FINAL NOTE

The one biological principle of muscle gain and fat loss is based on subprinciples that specifically address their respective various biological functions, such as enhancing hormonal impact, increasing fat and carb utilization, or developing muscles with superior metabolic capabilities. For the purpose of clarity, it is important to understand that principles and subprinciples are the constant, absolute, and unchangeable pillars upon which all practical methods should be applied.

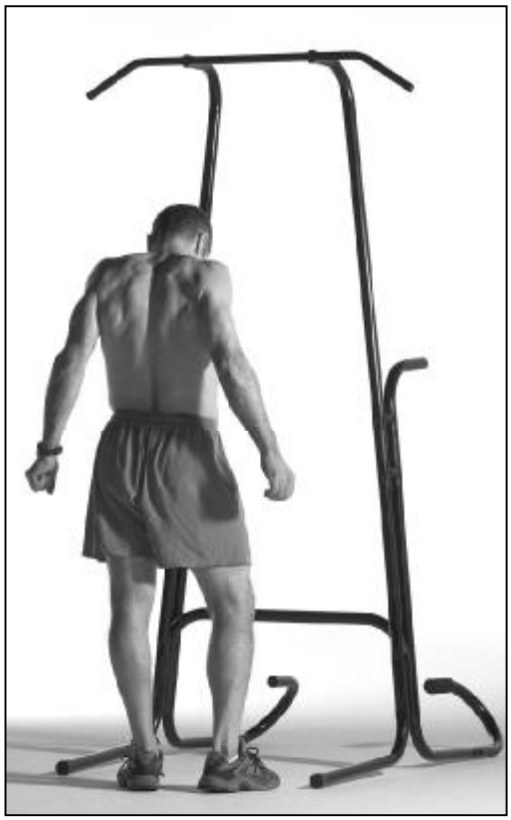
All biological principles are based on the concept of survival. The assumption that survival hierarchically forms the pyramid of life is philosophical, yet it is the only assumption that makes biological sense. This assumption is based on the belief that survival is the ultimate reason behind all the numerous biological actions that create life, including muscle development and fat loss. In times of confusion about how to develop muscle and lose fat, the reason these things happen is often overlooked. The goal of this book is to address the purpose behind the actions. Human intelligence and instincts are based on reason and logic.

Regardless of whether you believe that life serves a purpose or not, your body operates in ways that always make biological sense.

About the Author

Ori Hofmekler is a modern Renaissance man whose life has been driven by two passions: art and sports. Hofmekler's formative experience as a young man with the Israeli Special Forces, prompted a lifetime's interest in diets and fitness regimes that would optimize his physical and mental performance.

After the army, Ori attended the Bezalel Academy of Art and the Hebrew University, where he studied art and philosophy and received a degree in Human Sciences.



A world-renowned painter, best known for his controversial political satire, Ori's work has been featured in magazines worldwide, including *Time, Newsweek, Rolling Stone, People, The New Republic* as well as *Penthouse* where he was a monthly columnist for 17 years and Health Editor from 1998–2000. Ori has published two books of political art, Hofmekler's People, and Hofmekler's Gallery.

As founder, Editor-In-Chief, and Publisher of Mind & Muscle POWER, a national men's health and fitness magazine, Ori introduced his Warrior Diet to the public in a monthly column—to immediate acclaim from readers and professionals in the health industry alike.

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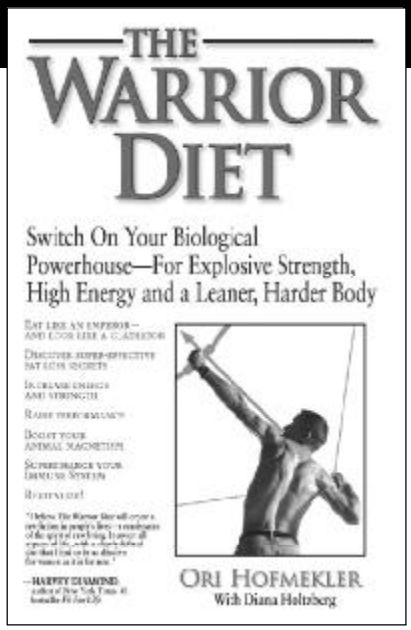

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After the army, Ori attended the Bezalel Academy of Art and the Hebrew University, where he studied art and philosophy and received a degree in Human Sciences.

A world-renowned painter, best known for his controversial political satire, Ori's work has been featured in magazines worldwide, including *Time, Newsweek, Rolling Stone, People, The New Republic* as well as *Penthouse* where he was a monthly columnist for 17 years and Health Editor from 1998–2000. Ori has published two books of political art, *Hofmekler's People,* and *Hofmekler's Gallery.*

As founder, Editor-In-Chief, and Publisher of *Mind & Muscle Power*, a national men's health and fitness magazine, Ori introduced his Warrior Diet to the public in a monthly column—to immediate acclaim from readers and professionals in the health industry alike.

"I believe *The Warrior Diet* will create a revolution in people's lives—a renaissance of the spirit of raw living. It covers all aspects of life… with a clearly defined diet that I find to be as effective for women as it is for men."

—Harvey Diamond, author of world bestseller *Fit For Life*

"Rare in books about foods, there is wisdom in the pages of *The Warrior Diet* ...Ori knows the techniques, but he shows you a possibility—a platform for living your life as well...*The Warrior Diet* is a book that talks to all of you—the whole person hidden inside."

—Udo Erasmus, author of *Fats That Heal, Fats That Kill*

Warrior Diet HIGHLIGHTS

Chapter One: The Warrior Instinct

- Developing the "Warrior Instinct" for higher energy and optimal performance.
- Becoming the hunter, not the prey—to own the edge in the game of life.
- Moving from diet-scavenger to diet-predator—for greater health and well being.

Chapter Two: The Warrior Cycle

- Understanding the Cycle of Materialism and Dematerialism—how to turn material into energy.
- How undereating can jump-start healing.
- Mastering the art of controlled fasting for a high-yield metabolism.

Chapter Three: The Undereating Phase

- What you can and can't eat during the day—for true health.
- The nature and benefits of controlled fasting.
- How to feed your brain.
- How to accelerate fat loss.
- How to increase growth hormone (GH) for powerful fat burning.
- How to move from a "materialistic metabolism" to an "energetic metabolism."
- Three awesome properties of the Undereating Phase.
- Manipulating your hormones to reach maximum metabolic efficiency.

Chapter Four: What To Consume During the Undereating Phase

- The vital importance of raw foods—and the best fruits and vegetables to eat.
- Enzyme-loading for anti-aging.
- The essential function of probiotics.
- Why minerals are the most important supplements.
- The best vitamins, antioxidants, herbs, and brain boosters.
- The empty-stomach factor for natural brain boosting.
- The principles of proper protein utilization .
- Creating the correct power-cocktail for maximum vitality and strength.
- How not to suffer from allergies, inflammation, water retention, gas, and other digestive disorders.
- Why protein powders can be superfoods—or a nutritional gun to your head.
- The role of carbohydrates during the Undereating Phase—what you can and can't eat.
- Going from deep-cleanse detox to a fat-burning army-of-one.

Chapter Five: The Overeating Phase

- How to consume all the food you want—without gaining a smidgen of body fat.
- The Overeating Principles and the three rules of eating.
- How to accelerate your anabolism for tissue repair and building muscles.
- The science of controlled overeating—exploring the advantages of overeating.
- How to make bingeing your happy slave.
- When it's safe to eat carbs if you want to drop fat.
- The crucial importance of subtle taste—how to beat the craving for fast-food meals.
- The golden rules of overeating…the secret to instinctively eating the right amount, and knowing when to stop eating—every time.

Chapter Six: The Main Meal: Food Preparations For the Overeating Phase

- The health advantages of eating cooked, warm food.
- How to make vegetables both delicious and nutritious.
- Why soups and stews are your often-ignored nutritional powerpacks
- The sexual advantage you get from meat, poultry, and fish.
- How vegetarians can safeguard against deficiency dangers.
- The "gladiator" protein—that's also a potent aphrodisiac.
- The ancient—and best—way to prepare beef, fish, and fowl.
- How to avoid protein allergies.
- The true skinny on oil and fat use.
- Discover nature's natural fat-smasher…
- How to lose weight with nuts and seeds.
- The "greatest nut" (and secret cancer-killer)
- Peanuts—the good, the bad, and the ugly news.
- Knowing your carbs—optimal preparation strategies.
- When to eat carbs for optimal fat loss.
- Why wheat is the least desirable grain.
- When it's safe to indulge in a sweet dessert.
- How to eliminate yeast infections.
- Understanding the secret pitfalls of the glycemic index.
- The very real dangers of salt restriction—and the best salts to consume.
- The most allergenic foods—how to avoid sensitivities and allergies.
- What is not allowed on the Warrior Diet…what absolutely does not work, never has, and never will.

Chapter Seven: Stubborn Fat

- The three major problems of stubborn fat.
- What causes stubborn fat.
- The six things you can do now to avoid stubborn fat.
- Effective natural stubborn fat busters
- Why the liver is a key organ in the battle against stubborn fat.
- The best liver detoxifiers.
- Discover the amazing African herb that's simultaneously an aphrodisiac, a potency weapon and a fat burner.

Chapter Eight: The Warrior Diet Versus Other Diets

- The Warrior Diet versus the perils of frequent-feeding.
- Top-selling diets, and how they differ from the Warrior Diet.
- The All-American (Junk Food) Diet, or ultimate "scavenger diet."
- The American "Health Food" diets.
- The high-carbohydrate, low-fat, low-protein diets.
- The Zone (40/30/30).
- The high-protein, low- or no-carbohydrates diets.
- The holistic diets.

Chapter Nine: Lessons from History

- Why 135 lb. Latin warriors were able to conquer the world.
- The Greco-Roman Warrior Cycle—extremes of deprivation and compensation.
- The functional applications of the Warrior Diet.
- How to live like a warrior in the twenty-first century—and perform at your best physically and mentally.
- Carbs as brain-fuel, as magnificent stress-blocker and anti-aging fuel.
- Carbs, the tax-free fuel—and muscle-saving, secret angel.
- Why in-shape, superactive, ancient warriors needed their carbs.
- Recognizing your individual carbo-needs.

Chapter Ten: The Warrior Diet Idea

- The Warrior Diet as a way of life—the different ways of cycling the Warrior Diet.
- Alternating between the Sympathetic and Parasympathetic Nervous System for maximum metabolic efficiency.
- How to avoid sudden weight gain.
- Why endurance athletes love to stretch their glycogen.
- The dangerous myth of fat storage—why any bulge is a bad bulge.
- The real secret of accelerating muscle growth without gaining fat.
- How to raise the bar of personal freedom using the principles of the Warrior Diet—moving from self-imposed misery to self-directed pleasure.
- The Aggressive Instinct—the positive side of aggression.
- The first and best defense against radioactive, environmental toxins.
- The Warrior Diet as first defense against prostate-related problems.
- Natural supplements to help alleviate prostate enlargement related symptoms.

Chapter Eleven: Q & A

- Does exercise influence when and how much you eat?
- How to wean kids off sweets and fast food.
- The Warrior Diet for young adults.
- How to handle social and business meals while on the Warrior Diet.
- What to do with all this new energy?
- The best enzymes to take—and when.

Chapter Twelve: The Warrior Workout

- How to gain real functional strength.
- How to be lean 'n' mean your whole life, with short, sharp, intense workouts.
- Prioritizing back and joint strength—for essential survival.
- The real factors that determine strength.
- High-velocity exercises—forcing a high-yield partnership between body and instinct.
- How to be tougher than you ever imagined.
- The best and most efficient methods to boost your metabolism and burn fat.
- Gaining the power to endure and conquer extended stress.
- Maintaining the "kick ass" mindset.
- The art of peaking your hormones.
- Preworkout and recovery meals to minimize catabolism, replenish muscles, and accelerate anabolism.
- Proper breathing to reduce acid-stress, muscle fatigue, stiffness, and exhaustion.
- The prime function of the abdominals—triggering maximum contraction.
- The best way to work the obliques.
- Legs—activating the joints and maximizing the three factors of strength.
- How to avoid tendon injuries.
- Dead Lifts—how to best activate the most important compound muscle groups and tendons.
- Maximizing waist and back strength.
- When and how to incorporate high-velocity exercises.
- Clean and Press—the single exercise-of-choice for an effective full-body workout.
- The Warrior aerobic goals and the Warrior aerobic principles.
- Why you need to do aerobics before resistance training.
- The three factors that affect aerobics.
- Accelerating the effect of controlled-fatigue training.
- How the Warrior Workout helps trigger your Warrior Instinct.
- Tips for best results when exercising on an empty stomach.
- Women's different needs and different priorities.
- Building strong, lean, and functional legs without using weights.

Chapter Thirteen: Warrior Meals and Recipes

- Meat Dishes—combining pleasure with health.
- Meat dishes for rapid weight loss.
- Eggs—as high-protein or high-carbohydrate meals.
- Soups—as appetizers and as the basis for a whole meal.
- The great alternatives to sugar-loaded, high-fat, commercial "treats."
- How to avoid the sugar-rush and still feel satisfied.

Chapter Fourteen: Sex Drive, Potency and Animal Magnetism

- Sex, power, and instincts—sex drive and potency as indicators of health and power.
- Potency and diet—the correlation between diet, exercise, and hormonal balance.
- Common medications that can cause impotency—if not coma and death.
- Natural methods to enhance potency.
- Which diets, drugs and life-factors affect testosterone production, sex drive and libido.
- The Warrior Diet's "instinctual living program" for improving potency.
- The best natural aphrodisiacs and how they can help.

Chapter Fifteen: Women on The Warrior Diet

- How and why The Warrior Diet can work as well for women as men.
- The modern conspiracy against women's bodies.
- Detoxification for rejuvenating all body tissues.
- The power of positive bingeing.
- How The Warrior Diet may help with female stubborn fat.

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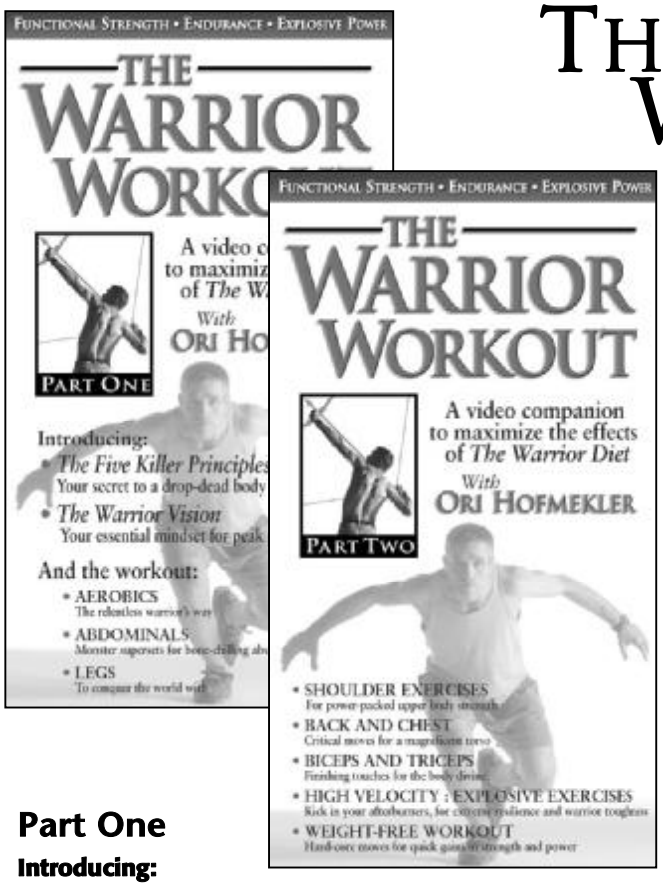

The Warrior Workout

With Ori Hofmekler

A video companion to maximize the effects of *The Warrior Diet*

Warrior Workout Videos

With Ori Hofmekler

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Part One

Introducing:

- ***The Five Killer Principles*—and the secret to a drop-dead body**
- ***The Warrior Vision*—your essential mindset for peak performance**

and the workout—unique, intense, supremely rewarding:

- **AEROBICS—the relentless warrior's way**
- **ABDOMINALS—monster supersets for bone-chilling abs**
- **LEGS—to conquer the world with**

Part Two

Unique, rewarding, incredibly intense, monster supersets:

- **SHOULDER EXERCISES—for power-packed upper body strength**
- **BACK AND CHEST—critical moves for a magnificent torso**
- **BICEPS AND TRICEPS—finishing touches for the body divine**
- **HIGH VELOCITY : EXPLOSIVE EXERCISES—Kick in your afterburners, for extreme resilience and warrior toughness**
- **WEIGHT-FREE WORKOUT—Hard-core moves for quick gains in strength and powe**

Trigger Your Warrior Instinct!

There's a reason why the 137 lb. Roman warrior was able to dominate his 185 lb.-plus Barbarian foe time and time again. Lean, mean, and ripped-to-the-bone, the ancient Roman—and ancient Greek— had an animalistic intensity and brute toughness that defied belief.

In his breakthrough book, **The Warrior Diet, Ori Hofmekler** revealed the secret to these ancient warriors' formidable power—a secret that let them tap into the raw power of instinctual living and unleash **tremendous** energy.

Now, in **The Warrior Workout**, Ori Hofmekler gives us the rest of the picture. To survive victorious, the warrior learned how to run roughshod over excess baggage of any kind—be it fat, fear or fatigue.

The Warrior Workout trains you in that ancient mindset of stop-at-nothing toughness. **The Warrior Workout** gives you the formula to trigger this warrior instinct—a potent, fat-burning force that stokes your energy, ratchets up your stamina and builds steel-cable muscle.

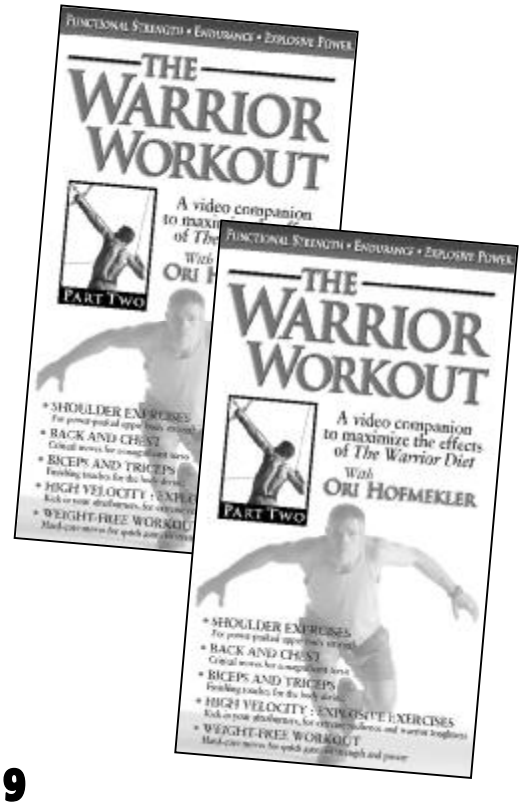
Praise for *The Warrior Workout* Videos

"Being a world class fighter, I can appreciate Ori's dedication and painstaking research in designing such a useful method of training. Ori and I share the same beliefs in functional strength training. Whether you are a novice or an elite athlete, the *Warrior Workout* videos are designed to guide you step by step to achieve your next level of physical and mental conditioning. It is inspiring to find someone who understands the true nature of a warrior's workout." **—John R. Salgado, World Champion Shuai-Chiao (Chinese Wrestling), World Champion Taiji Push-Hands**

"The Warrior Workout videos are now a part of my fitness library.
I believe Ori Hofmekler is right on target in his teaching of "functional strength". Using our basic instincts to train is what fitness should be about. If you are serious about being in your best physical shape, forget about "froo-froo" aerobics classes and less than optimal resistance
training regimens. Train like a warrior. Tune your body in to its primal motivation for strength, then follow Ori's lead toward a stronger, healthier, and more vibrant you." **—Laura Moore, Science writer, Penthouse Magazine, IronMan Magazine, Radio Talk Show Host "The Health Nuts", Body of the Month for IronMan Mag. Sept 2001**

"*The Warrior Workout* videos are a superb illustration of the power of the Warrior workout routine. They demonstrate the movements and skills necessary to rapidly carve the fat off your body and reveal lasting stone carved muscles." **—Carlon M. Colker, M.D., F.A.C.N., author *The Greenwich Diet*, CEO and Medical Director, Peak Wellness, Inc., President and Founder, Peak Wellness Foundation**

"Ori Hofmekler has his finger on a deep, ancient and very visceral pulse—one that too many of us have all but forgotten. Part warrior-athlete, part philosopher-romantic, Ori not only reminds us what this innate, instinctive rhythm is all about, he also shows us how to detect and rekindle it in our own bodies. His *Warrior Workout* video program challenges and guides each of us to fully reclaim for ourselves the strength, sinew, energy and spirit that humans have always been meant to possess." **—Pilar Gerasimo, Editor in Chief, Experience Life Magazine**



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- **How to take advantage of controlled fatigue—and bust through to a new dimension of physical fitness**
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- **How to pack greater gains into less time**
- **How the little-known secret of antagonistic-muscle synergy can turn a mediocre workout into a high-octane power-fest**
- **How to build a strong, lean body without using weights.**

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The Russian Kettlebell Challenge—Xtreme Fitness for Hard Living Comrades

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Running Time: 32 minutes
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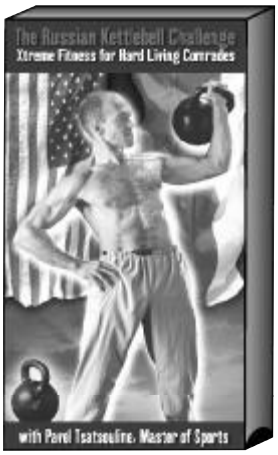

Both the Soviet Special Forces and numerous world-champion Soviet Olympic athletes used the ancient Russian Kettlebells as their secret weapon for xtreme fitness. Thanks to the kettlebell's astonishing ability to turbocharge physical performance, these Soviet supermen creamed their opponents time-and-time again, with inhuman displays of raw power and explosive strength.

Now, former Spetznaz trainer, international fitness author and nationally-ranked kettlebell lifter, Pavel Tsatsouline, delivers this secret Soviet weapon into your own hands. You NEVER have to be second best again! Here is the first-ever complete kettlebell training program—for Western shock-attack athletes who refuse to be denied—and who'd rather be dead than number two.

- **Get really, really nasty—with a commando's wiry strength, the explosive agility of a tiger and the stamina of a world-class ironman**
- **Own the single best conditioning tool for killer sports like kickboxing, wrestling, and football**
- **Watch in amazement as high-rep kettlebells let you hack the fat off your meat—without the dishonor of aerobics and dieting**
- **Kick your fighting system into warp speed—with high-rep snatches and clean-and-jerks**

- **Develop steel tendons and ligaments—with a whiplash power to match**
- **Effortlessly absorb ballistic shocks—and laugh as you shrug off the hardest hits your opponent can muster**
- **Go ape on your enemies—with gorilla shoulders and tree-swinging traps**

PRAISE FOR *THE RUSSIAN KETTLEBELL CHALLENGE*

"In ***The Russian Kettlebell Challenge***, Pavel Tsatsouline presents a masterful treatise on a superb old-time training tool and the unique exercises that yielded true strength and endurance to the rugged pioneers of the iron game. Proven infinitely more efficient than any fancy modern exercise apparatus, the kettlebell via Pavel's recommendations is adaptable to numerous high and low rep schemes to offer any strength athlete, bodybuilder, martial artist, or sports competitor a superior training regimen. As a former International General Secretary of the International All-Round Weightlifting Association, I not only urge all athletes to study Mr. Tsatsouline's book and try these wonderful all-round kettlebell movements, but plan to recommend that many kettlebell lifts again become part of our competitions!"**—John McKean, current IAWA world and national middleweight champion**

"Kettlebells are unsurpassed as a medium for increasing strength and explosive power. Thanks to Pavel Tsatsouline, I have now rewritten my training program to include kettlebell training, for athletes of all disciplines from Professional Football to Olympic sprinters."**—Coach John Davies**

"Everybody with an interest in the serious matter of body regulation over a lifetime should commit themselves to Pavel's genre of knowledge and his distinct techniques of writing. Any one of the dozens of suggestions you hit upon will pay for the *Russian Kettlebell Challenge* hundreds of times."**—Len Schwartz, author of *Heavyhands: the Ultimate Exercise System* and *The Heavyhands Walking Book!***

Here's what you'll discover, when you possess your own copy of Pavel Tsatsouline's *The Russian Kettlebell Challenge—Xtreme Fitness for Hard Living Comrades*

The Russian Kettlebell Challenge—

Xtreme Fitness for Hard Living Comrades

Book By Pavel Tsatsouline Paperback 170 pages ***#B15 $34.95***

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SECTION ONE

The History of the Russian Kettlebell—How and Why a Low-Tech Ball of Iron Became the National Choice for Super-Tech Results

Vodka, pickle juice, kettlebell lifting, and other Russian pastimes

'The working class sport'

Finally: Xtreme all around fitness!
Why Soviet science considers kettlebells to be one of the best tools for all around physical development….

Kettlebells in the Red Army
The Red Army catches on….every Russian military unit equipped with K-bells….the perfect physical conditioning for military personnel….the vital combination of strength and endurance….*Girevoy sport* delivers unparalleled cardio benefits….why *Spetznaz* personnel owe much of their wiry strength, explosive agility, and stamina to kettlebells….

SECTION TWO

Special Applications—How The Russian Kettlebell Can Dramatically Enhance Your Chosen Endeavor

Kettlebells for combat sports
Russian wrestlers do lion's share of conditioning with kettlebells…. Why KB one arm snatches work better than Hindu squats….KB's strengthen respiratory muscles…. boxers appreciate newfound ability to keep on punching….KB's reduce shoulder injuries….develop the ability to absorb ballistic shocks….build serious tendons and ligaments in wrists, elbows, shoulders, and back—with power to match….why kettlebell drills are better than plyometrics as a tool for developing power….KB's the tool of choice for rough sports.

Why Russian lifters train with kettlebells
Famous Soviet weightlifters start Olympic careers with KB's…. Olympic weightlifters add KB's for spectacular gains in shoulder and hip flexibility…. for developing quickness…. overhead kettlebell squats unmatchable in promoting hip and lower back flexibility for powerlifters.

Get huge with kettlebells—if you wish
Why the *girya* is superior to the dumbbell or barbell, for arm and chest training….how to gain muscle size doing KB C&J's…. repetition one arm snatches for bulking up your back, shoulders, and biceps…. Incorporating KB's into drop sets—for greater mass and vascularity.

Kettlebells for arm-wrestlers
World champion arm wrestler gives KB's two thumbs up….why the kettlebell is one of the best grip and forearm developers in existence….

Getting younger and healthier with kettlebells
The amazing health benefits of KB training…. Doctor Krayevskiy's 20-year age-reversal…. successful rehabilitation of hopeless back injuries with kettlebells…. Valentin Dikul—from broken back to All Time Historic Deadlift of 460kg, thanks to KB's….why KB's can be highly beneficial for your joints.

How kettlebells melt fat and build a powerful heart—without the dishonor of dieting and aerobics
Spectacular fat loss….enhanced metabolism…. increased growth hormone….a remarkable decrease in heart rates….

SECTION THREE

Doing It—Kettlebell Techniques and Programs for Xtreme Fitness

Why Kettlebells?
The many reasons to choose K-bells over mainstream equipment and methods…. KBs suitable for men and women young and old…. perfect for military, law enforcement and athletic teams….*Giryas*—a 'working class' answer to weightlifting and plyometrics promoting shoulder and hip flexibility….best bet for building best-at-show muscles….highly effective for strengthening the connective tissues….fixing bad backs….cheap and virtually indestructible….promotes genuine 'all-around fitness'—strength, explosiveness, flexibility, endurance, and fat loss.

The program minimum

The Russian Kettlebell Challenge workout: the program-maximum
Pavel's own free style program….the top ten Russian Kettlebell Challenge training guidelines….how often and how long to train…. The secret key to successful frequent training….THE most effective tool of strength development….difficulty and intensity variation….how to add *Power to the People!* and other drills to your kettlebell regimen

The kettlebell drills: *Explode!*
- **Swing/snatch pull**
- **Clean**—The key to efficient and painless shock absorption…. making the clean tougher….the pure evil of the two K-bells clean….seated hang cleans, for gorilla traps and shoulders….
- **Snatch**—The one-arm snatch—Tsar of kettlebell lifts
- **Under the leg pass**—A favorite of the Russian military—great for the midsection.
- **Jerk, Clean & Jerk**
- **Jump shrug**

The kettlebell drills: *Grind!*
- **Military press**—How to add and maximize tension for greater power….One hundred ways to cook the military press...The negative press….the 'powerlifter's secret weapon for maximal results in your lifts….why to lift what you can't lift…. the graduated press…. how to get more out of a 'light' weight…. the two-kettlebells press….technique for building strength and muscle mass….the 'waiter press' for strict and perfect pressing skill….
- **Floor pullover and press**
- **Good morning stretch**—Favored by Russian weightlifters, for spectacular hamstring flexibility and hip strength.
- **Windmill**—An unreal drill for a powerful and flexible waist, back, and hips.
- **Side press**—A potent mix of the windmill and the military press—"one of the best builders of the shoulders and upper back."
- **Bent press**—A favorite lift of Eugene Sandow's—and The Evil One…. why the best-built men in history have been bent pressers….leads to proficiency in all other lifts….how to simultaneously use every muscle in your body…. A Brazilian Jiu Jitsu champion's personal kettlebell program

SECTION FOUR

Classic Kettlebell Programs from Mother Russia:

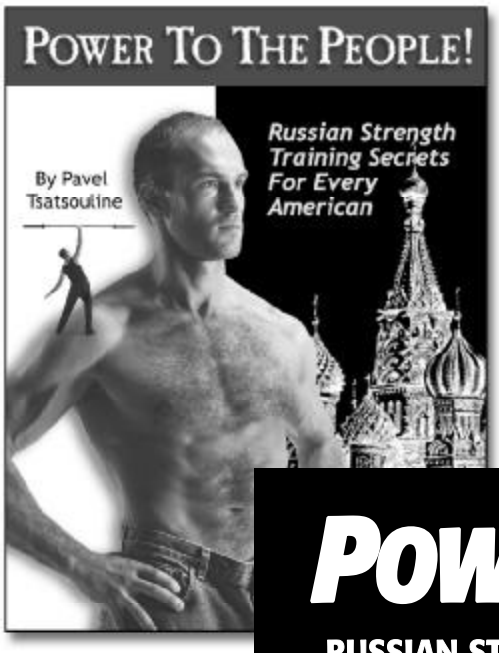
The official Soviet weightlifting textbook *girevoy sport* system of training

The *Weightlifting Yearbook girevoy sport* programs

Three official armed forces *girevoy sport* programs

Group training with kettlebells—Red Army style

Xtreme kettlebell training—Russian Navy SEAL style
Performing snatches and other explosive kettlebell drills under water….pseudo-isokinetic resistance…. how to make your muscle fibers blast into action faster than ever….



"Power to the People! is absolute dynamite. If there was only one book I could recommend to help you reach your ultimate physical potential, this would be it."

–Jim Wright, Ph.D., Science Editor, Flex Magazine, Weider Group

POWER TO THE PEOPLE!

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By Pavel Tsatsouline

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How would you like to own a world class body–whatever your present condition– by doing only two exercises, for twenty minutes a day?" A body so lean, ripped and powerful looking, you won't believe your own reflection when you catch yourself in the mirror.

And what if you could do it without a single supplement, without having to waste your time at a gym and with only a 150 bucks of simple equipment?

And how about not only being stronger than you've ever been in your life, but having higher energy and better performance in whatever you do?

How would you like to have an instant download of the world's absolutely most effective strength secrets? To possess exactly the same knowledge that created world-champion athletes–and the strongest bodies of their generation?"

Pavel Tsatsouline's *Power to the People!– Russian Strength Training Secrets for Every American* delivers all of this and more.

As Senior Science Editor for Joe Weider's *Flex* magazine, Jim Wright is recognized as one of the world's premier authorities on strength training. Here's more of what he had to say:

"Whether you're young or old, a beginner or an elite athlete, training in your room or in the most high tech facility, if there was only one book I could recommend to help you reach your ultimate physical potential, this would be it.

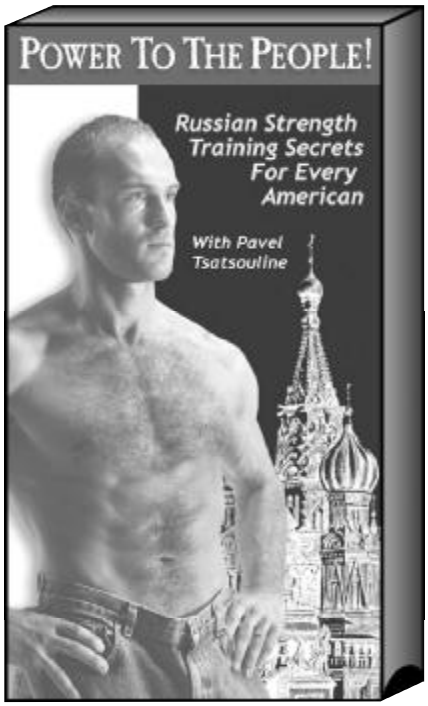
Simple, concise and truly reader friendly, this amazing book contains it all—everything you need to know—what exercises (only two!), how to do them (unique detailed information you'll find nowhere else), and why.

Follow its advice and, believe it or not, you'll be stronger and more injury-resistant immediately. I guarantee it. I only wish I'd had a book like this when I first began training.

Follow this program for three months and you'll not only be amazed but hooked. It is the ultimate program for "Everyman" AND Woman! I thought I knew a lot with a Ph.D. and 40 years of training experience...but I learned a lot and it's improved my training significantly."

And how about this from World Masters Powerlifting champion and Parrillo Performance Press editor, Marty Gallagher:

"Pavel Tsatsouline has burst onto the American health and fitness scene like a Russian cyclone. He razes the sacred temples of fitness complacency and smugness with his revolutionary concepts and ideas. If you want a new and innovative approach to the age old dilemma of physical transformation, you've struck the mother-lode."



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POWER TO THE PEOPLE

By Pavel Tsatsouline

Video, Running time: 47 min

$29.95 #V102

Now, It's Yours for the Taking: Irresistible Strength and a Body-to-Die-For

Turn on Pavel's Power to the People! video and watch in amazement as you rapidly increase your strength by 20, 30, even 50 percent—often in one session!

You may, or may not, want to startle your friends, excite your lovers, scare your enemies and paralyze your neighbors with envy, but believe me, it's gonna happen when you easily absorb Pavel's breakthrough strength secrets.

Of course, what's most important is how you're gonna feel about yourself. Get real! Toss out your lame rationalizations and pathetic excuses. Stop behaving like a spoilt brat about your infantile levels of strength. Stop hating yourself for banging your head against phony training plateaus. Now you can smash through the glass ceiling of your ignorance and burst into the higher reaches of maximum performance.

Let's face it—it's a delicious feeling to be as strong as a panther—confident, sure-of-yourself, genuinely attractive, a SPECIMEN, THE GENUINE ARTICLE, stalking the streets with evident power and natural grace.

I don't care who you are or what you are, I promise you: grab Pavel's Power to the People! video IMMEDIATELY, plug yourself in—and I MEAN, PLUG YOURSELF IN—do what it says, and you won't believe the new you.

Whatever your current workout program, just download Pavel's strength techniques for an immediate improvement in your results.

- Achieve super-strength without training to muscle failure or exhaustion
- Know the secret of hacking into your 'muscle software' to magnify power and muscle
- Get super strong without putting on an ounce of weight
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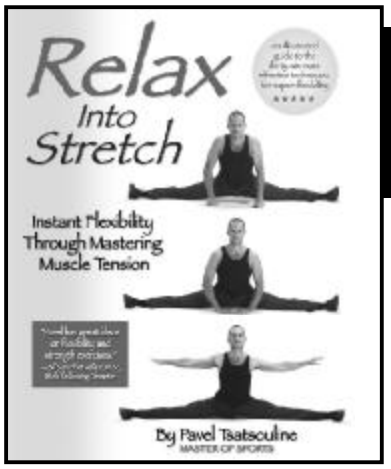

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Relax into Stretch

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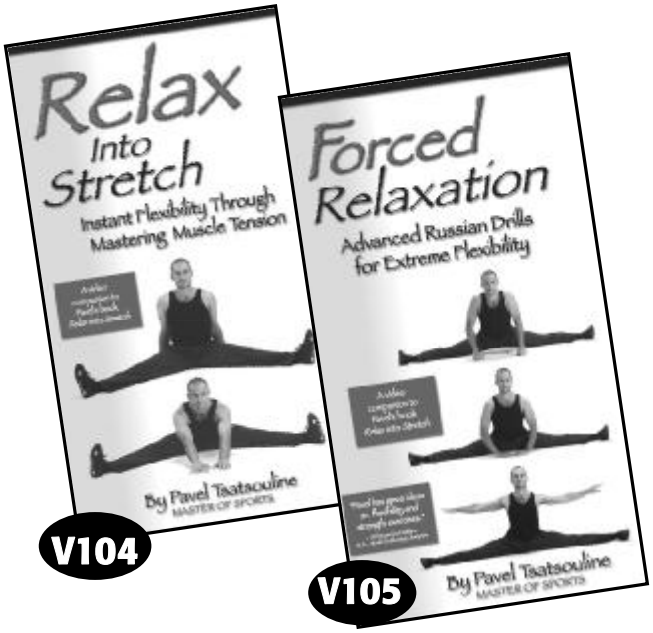

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By Pavel Tsatsouline

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