

# Evolutionary Fitness

Arthur De Vany, Ph.D.

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## Introduction

This is a sketch of the ideas that are developed more fully in the book. The health and fitness strategies developed fully in the book are based on a few key ideas:

1. The human mind and body are non-linear dynamic systems poised in a far-from-equilibrium attractor. Health, fitness and diet are dynamic concepts. Linear, static thinking (counting calories consumed and expended) is completely inadequate for devising effective strategies for health and fitness.
2. Human form and energy metabolism are adaptations to the evolutionary environment. Virtually all of our human and prehuman ancestors lived as hunter-gatherers in an environment dominated by Ice Ages.
3. Insulin resistance spares glucose for the brain and was an essential adaptation to the glucose scarcity during the Ice Ages. In a modern world abundant in cheap and readily available carbohydrate, insulin resistance sets us up for hyperinsulemia (chronically elevated insulin) which is a major factor in almost all modern diseases.
4. Hyperinsulemia and hypoexertion (wasting away of the lean mass of the body through inactivity) are the most important health risks (the National Institutes of Health) in Western cultures.
5. A conservative and effective strategy for attaining superior health and fitness is to counter hyperinsulemia and hypoexertion by incorporating diet and activity patterns from our evolutionary past.
6. An evolutionary diet is not a "diet". In the conventional meaning, being on a "diet" implies that you are restricting calories (as in a prescription) and eating in a habitual manner. Evolutionary eating is not a diet, but a natural way of eating. Properly considered, the purpose of a diet is to provide nutrition and maintain health, not to lose weight.
7. In the *Evolutionary Fitness Diet* you consume abundant simple, fresh plant foods rich in minerals, flavonoids, phenols, and phytochemicals, substances that coevolved over millenia with humans and that no manufactured drugs or substances could reproduce with present technology. The low carbohydrate and near zero raw glucose content of the diet, combined with the natural antioxidants provide protection from glucose-mediated oxidative damage to body proteins; the advanced glycation end products that accelerate aging and the stiffness caused by cross-linked proteins in connective tissues.

8. You do not eat in a habitual and highly regulated way; indeed, variation in foods and caloric intake is an essential element of natural eating. Your food is high in protein (by modern standards, but moderate in terms of the protein intakes of hunter-gatherers), moderate in fat (but balanced in Omega 3 and 6 composition), and low in carbohydrate. It contains no grains, milk, beans or processed foods. There is no caloric restriction because you eat only nutritionally dense, low calorie food and your appetite is reset to become a healthy guide to your nutritional needs.
9. An evolutionary activity pattern is mixed and varied. It contains brief, intermittent episodes of highly intense physical action mixed with languid periods and play. Healthy activities mimic the patterns of wild animals and contain elements of chaos and order. Power laws that are typical of self-organized, far-from-equilibrium, dynamic systems, describe such patterns.
10. Power law training, which is developed in the book, mimics the ancestral activity pattern and promotes hormone drives that counter hyperinsulemia and build lean body mass.
11. Most fitness programs, whether aerobics or weight training, are too unvaried and routine; they result in overtraining, depletion of the body's antioxidant stores, compromised immunity, and are a chronic load on the body. They take too much time and are ineffective. Dieting has a 95% failure rate wastes lean body mass, and is unhealthful.
12. The evolutionary fitness diet and exercise program is very effective, takes little time, and is fun. It is the right way to feed and care for your hunter-gatherer body and mind.

## **Human Evolution**

The story of human evolution is one of adaptation in a patchy and dangerous environment. We are generalists, not specialists, and that is why we are adaptive two-legged omnivores with broad territorial range, small stomachs and big brains. Humans embarked on a risky strategy for survival: we “chose” to live by our wits by exploiting a wide territory and many foods along with opportunistic capture of high nutrient, but fugitive and random, food sources. We lived virtually all of the 3 or so million years of human and prehuman history as scavengers or hunter-gatherers. Exploiting our generalist niche led to the elegant evolutionary design of the human body and mind. In order to exploit a patchy environment with plentiful low-grade nutrients and scarce and variable high value nutrients, the human mind

had to become clever. We became adaptive opportunists. The human body had to solve the energy storage problem. Given a random food supply and variable energy expenditure, our metabolism is evolved to solve a complex stochastic energy management problem.

Many of the characteristics of our metabolism derive from the evolved solutions to the energy flow problem. We clearly are designed to live at an energy surplus, not at the balance preached by modern, steady state models of fitness. I won't go into that here, but it is enough to say that, given random energy intake and expenditure, a precise matching of the two is impossible and matching on average would guarantee an early death. One answer to achieving stochastic energy balance is male/female pairing. Another is the ability to carry high-density nutrients in our hands so that nourishment can be taken to safer grounds and given to mates. Yet another answer is our ability to store energy as fat, along with the appetite to rapidly gorge fat-laden meat and bone marrow. Our metabolism can turn against us when calorically rich, but nutritionally depleted, food is all around us and available at little expenditure of energy.

Life in a patchy resource environment requires the capability to perform a wide variety of activities. Clearly, the body's design tells us that extreme exertion of brief duration was an important human attribute, essential for our survival and evolution. Our upright, bipedal posture gives us the mobility to cover the range required of an omnivorous generalist. A large brain is required for hominids to cover the widest range known to any animal species. High value nutrients are essential to the energy-demanding brain and small stomach required for high mobility in a patchy savanna where high value nutrients are variable and fugitive. Our muscle fiber composition reveals that we are adapted to extreme intensity of effort. And the energy sources of these fibers shows that the highly intense activities through which our ancestors "earned a living" were of short duration (anaerobic metabolism came before aerobic metabolism, which was grafted on later and the quickly exhausted fast twitch fibers are likely to be the most primitive of our sources of movement). Our ability to sweat, our relative hairlessness, our upright and, hence, cool posture, our mobility, as well as our temperature regulation and appetite mechanisms are designed to solve the problem of keeping an energy-hungry, but delicate, brain alive in an energetic body capable of high mobility and peak energy bursts.

## **Evolutionary Design**

Evolutionarily elegant design economizes on processes and energy. As a consequence many structures and processes serve dual functions. Evolved design resulted also in many compromises. These dual and compromised designs, which

are reliable at the high and variable energy flows of our active ancestors, go awry at the low energy flux typical of a modern, sedentary individual. Many of the metabolic disorders—obesity, carbohydrate intolerance, diabetes—which we see today, are a result of these design compromises. These "Western Diseases" are rare among hunter-gatherers and were not part of the human ancestral experience. They reflect an adaptation of the human body, which was designed for high-energy expenditure and variable diet and activity patterns, to modern life.

Because human metabolism is conditional on activity patterns, diet alone is not sufficient to control body composition and obesity. The body "reads" its food intake and hormone messengers in the context of its activity patterns, so the message contained in a biochemical messenger is decoded through the dynamic patterns of our actions. This is why inactivity and food deprivation are so counterproductive in controlling obesity. It is also why sedentism and its associated low energy flux produce overeating.

The essence of human beings is that they are complex, adaptive and self-organized systems. Adaptation is the essential human characteristic and movement is the canonical form of its expression. Self-organization is anchored by reference to a dynamic body image, which lets there be a self to serve as the fixed point from which the world is perceived. Inactivity not only changes the human body; it alters the very structure of our perception and understanding. Sedentary life weakens body image, which is the reference of an organized and autonomous self. The result of inactivity is a lack of purpose and will. It takes good dynamics to produce a coherent, self-organized individual and actions that are metabolically challenging produce a good body image that anchors a strong and convergent dynamics. The brain is adapted to action and its structure and health depend on movement. Long ago, Darwin noted that the brains of wild animals were larger and heavier than the brains of domesticated animals.

## **Metabolic Revolutions**

Two metabolic revolutions shaped the evolution of Homo sapiens. One important revolution was when archaic Homo sapiens adapted to the glaciations and made the transition from hunter-gatherer to big game hunter. This was 100,000 years ago. This revolution supplied the dense, high quality nutrients and lipids that let the brain expand. Brain size expanded rapidly during the past 250,000 years, more rapidly than in the preceding 2 million years. Brain expansion was preceded by an expansion in body size, so much so that archaic humans show bodies with fully modern features. They seem to have been at least as large as the latest generation of well-fed Americans and far more powerfully built. It is significant that the

development of the magnificent human body preceded the evolution of the human brain. Such a brain could not live and would have no purpose but for the supremely adaptive human body whose actions and perceptions it integrates.

The second metabolic revolution, and arguably the most important revolution in the history of *Homo sapiens*, was the agricultural revolution beginning about 10,000 years ago in Asia and near the Mediterranean. Agriculture came later to Europe, perhaps only 6,000 or 2,000 years ago. Great Britain was still making its transition to agriculture at the time Caesar's army entered around 100 BC. The paleoanthropological evidence shows that with the agricultural revolution there was a decline in stature, cranial capacity, and muscularity, along with a general decline in health and nutrition. (How do they know our preagricultural ancestors were muscular? The bones are thick and dense and the points where muscles were attached are robust.) This metabolic revolution substituted routinized, repetitive work of grinding intensity and a diet of low variety and protein content for the metabolically varied physical activities of hunting and gathering and the enormous variety of food and high protein content of hunter-gatherer diets. Within a few thousand years much of humanity had come to rely on a few starchy crops for the overwhelming bulk of their calories. The repetitive work of agriculture and grain processing left their mark in the high incidence of arthritis that is found in the skeletons of our agriculturist ancestors.

Even today, most of the third world lives on a few starchy crops and they exhibit the damage that a high carbohydrate diet with too little fresh plant and animal foods can inflict. Those people who populate the areas where agriculture began earliest show what is called a Mediterranean physical type characterized, according to Webster, as medium or short stature, slender build and small heads. Third world children, living in rural, agricultural areas, live almost entirely on grains. They rarely eat fresh fruit or vegetables and eat meat even less often. They achieve less stature and test performance than urban children and suffer skeletal and dental deficiencies. It is easy to tell from the skeletons of our ancestors whether they were agriculturists or hunter-gatherers. The agriculturists have bad teeth, bone lesions, small and underdeveloped skeletons and small craniums compared to hunter-gatherers.

The important metabolic revolutions to follow agriculture were the industrial and information revolutions. These energy-conserving revolutions lowered the level and variety of the metabolic challenges we face still more. The industrial revolution introduced milling of grains, a major factor in elevating the starch content of grain-based foods with a consequent rise in their insulin-elevating effect on human metabolism. In addition, the mineral and phytochemical content of grain-based foods were dramatically reduced.

Our ancestors are us. It was only 10,000 years ago that agriculture changed the

human lifeway from hunting and gathering to settled agriculture. And the dramatic decline in human energy expenditure of the industrial age occurred no more than 200 years ago. The information and television age is no more than two decades old. In this brief time span evolution has made few, if any, changes in what we inherited from the prior 3 million years.

## **Fitness in a Modern World**

The adaptive and variable energy demands of our ancestral existence are gone. We live a low energy flux and metabolically unvaried existence in bodies designed for another lifeway. We are hunter/gatherers in pin-stripe suits, living a sedentary life and it is killing us in ways our ancestors never experienced. Virtually all the degenerative diseases—atherosclerosis, diabetes, high blood pressure, osteoporosis, declining muscle mass—of modern civilization are unheard of among hunter-gatherers and were not part of our ancestral experience. Most modern fitness prescriptions are static and agricultural. These programs model the body as a machine, not as an adaptive organism. Consequently, they prescribe a regime in which the body is under-fed and over-trained. They are not based on adaptation, but on steady state analysis. These models assume the body is a linear process that maintains a steady state. In fact, all bodily processes are highly non-linear and these non-linearities must be exploited in any effective fitness program. The key to exploiting the highly non-linear and dynamic adaptive metabolic processes of the human body is to achieve the right mixture of intensity and variety of activities.

Here is an example of the Zen-like twists that adaptive, non-linear systems like human metabolism follow that confound mechanistic thinking. The body uses fat in the aerobic (ST and lower IT) zone. So, linear thinking suggests that to burn fat you should operate in that zone. It would not surprise someone trained to understand the adaptive capabilities of the human body that if you burn more fat the body will find a way to produce more. And this is just what happens when you energy flows over the aerobic pathway—your body releases hormone messengers that signal higher fat production.

You do burn a higher proportion of calories as fat in the aerobic zone, but that is no reason to stay there. You burn more calories and more fat in total when you train at high intensity. And you do not open the metabolic pathways that cause your body to make more fat. Energy that flows over the anaerobic pathway signals your body to make more muscle and to burn fat.

You incur an oxygen debt that raises metabolism for days after a high intensity session. Above all, you bring adaptations that burn fat. As the body remodels in response to the adaptive challenge presented by a brief, high-intensity session, it

preferentially burns fat. In addition, you put on lean muscle mass that burns energy continuously. From 60 to 70 per cent of the energy you burn is at your basal metabolic rate. If you gain lean muscle mass you raise your basal metabolic rate and, thus, burn more energy 24 hours a day.

Mechanistic prescriptions fail because they do not present the metabolic challenges and variety of the ancestral environment for which our bodies are designed. If your personal trainer is working you out three days a week, doing three sets of the same exercises, or, worse, 5 or even 6 days a week, find another trainer. Working out 5 or 6 days a week doing many sets of exercises per body part and spending over an hour per workout imposes a chronic load on the body for which it is poorly designed to adapt. You are flooding your body with hormones that consume lean body mass. These hormones also preferentially consume fast twitch muscle, the very substance you are after for strength, lean mass, and vitality. You are draining your adaptive capacity so that you cannot build, or even keep up with the load. Worse still, you are compromising your immune system. Virtually all the body's adaptive mechanisms are designed to deal with acute, not chronic, stresses. Exercise should mimic the activities of our ancestral existence; we are adaptive organisms that thrive on variety, not machines designed for high volume routine.

## **The Evolutionary Model**

The evolutionary model combines activities of varying intensity to mimic our ancestral hunter-gatherer existence. The key is to hit the right balance of intensity and variety. You have to live in the fast twitch (FT) muscle fiber zone where your metabolic rate is many times your basal metabolism for intermittent, brief intervals. Most sedentary individuals live entirely in the ST region and never achieve the metabolic peaks that are essential to adaptation. Grim aerobicizers and high volume weight trainers live in the slow twitch (ST) and intermediate twitch (IT) muscle fiber zone and do way too much work.

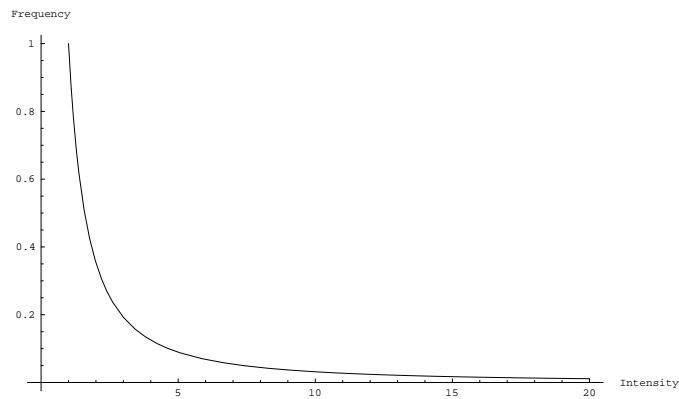
The evolutionary model of a healthy lifestyle is to combine brief, but intense, work outs in a gym (the FT zone) with a wide variety of activities that mix intensity and duration randomly (mixing the IT and ST zones with brief spurts into the FT zone). Roller blading, bicycling, walking, sprinting, tennis, basketball, power walking, hitting softballs and so on are the sorts of activities that mix IT and ST fibers with intermittent FT action.

Activities are spaced randomly according to a power law distribution which not only fits the hunter-gather activity rhythms but also virtually every process in a healthy human being—healthy heart beats, brain waves, cellular ion channel pulses, and the coordination dynamics of movement all have the distinctive sig-



nature of self-similarity and power law variation. It is when these patterns show too much regularity that organization and coordination break down; for example, epileptics show too much, not too little, regularity in their brain waves. Heart attacks are the result of too much regularity in contractions that leads to a loss of coordination and seizure.

A power law looks like this:



Frequency is on the left hand axis and intensity is on the right. Think of this graph as showing what percentage of a day you spend at different metabolic levels. Measure intensity by METs, the multiple by which your activity exceeds your basal metabolism. Most individuals spend nearly all their time at an exertion level that is just above their basal metabolism; roughly 90% of their day is spent between 1 and 2 METs. Most of the frequency of Office Worker is located at the low intensity activities and there is little mass at the higher intensities. Unlike a "nor-

mal” distribution, there is a good deal of mass at the far right tail in a power law, where extreme activities are located. The evidence indicates this kind of intensity-frequency mix was typical of our ancestors. The far right tail, at the intensity extremes and with brief duration, is the FT zone. The middle zone is the IT and ST zone and the peak at the left is the ST zone. Our ancestors got more rest, were on average more active, and engaged in highly intense activities to a much greater extent than we.

You need to live intermittently and briefly in the FT zone to live according to our ancestral lifeway. You also need to get plentiful rest. One of the worst features of modern life is its compression in the variability of our activities—both the right hand and left-hand tails are compressed relative to the variation in a power law. When the ends of the activity distribution are compressed to the middle, our activities fall within a narrow frequency band. A compressed distribution is a chronic stressor, we get neither enough playful, intense activity nor enough rest. Animals in the wild move according to power laws. Think of a lion or jaguar. They are muscular and lean and spend long periods in languid rest and brief, highly intense periods in the hunt.

## **Fitness from Chaos: Power Law Training**

Why is a power law a good model of adaptive training? A power law describes a statistical distribution of intensity and frequency of action that is characteristic of a complex adaptive system functioning at maximum efficiency. Power law variation represents a balance of order and variability that is representative of self-organized, adaptive systems. All humans are self-organized dynamic systems. Systems that live in the critical region between order and chaos display power law behavior.

How do you train according to a power law? A power law of the form

$$Intensity = Frequency^{-\beta}$$

gives the right balance of structure and novelty. The music of Bach and Mozart contains the mixture of structure and novelty characteristic of power laws. The power law is a statistical distribution, meaning it describes probabilities, not certainties. Hence, randomization is an essential element of power law training. But, so is pattern. Your activities cannot be randomized excessively, or they lose pattern and drift without memory. There will be some drift in frequency so that there will be time periods when you will not do high intensity workouts for two or more weeks (periodization falls out of the power law naturally). At other times, you may have 2 or 3 high intensity sessions in a row. The real point is to embrace randomness and variety within the context of structured repetitiveness. Good intuitive

models of power law variation are the movements of the wild lion or the music of Bach or Mozart.

NBA basketball is an example of power law variation. Pro basketball is not an aerobic sport, it actually is an anaerobic sport full of power moves, quick bursts, sprints, and leaps mixed in with half time rest, quarter breaks, pauses, free throws, time outs, and bench time. What NBA players have is the ability to use these brief intervals to quickly recover their phosphate energy stores (they use the alactic pathway discussed below). NBA athletes and NFL defensive backs provide evidence that power law training makes you powerful and lean. NBA players are the leanest and most powerful in any professional sport (their body fat is around 5 to 7 percent). NFL defensive backs and running backs come close (around 8 percent body fat). Like NBA players, NFL defensive and running backs do burst/rest moves through out the game, randomly timed, with a duration and intensity pattern that looks like a power law (patterns are not bunched up around a mean, they are spread over all scales and with the characteristic power law shape shown in the graph above).

A power law distribution of activities means the intensity, spacing, duration and volume of training are variable in order to present a constant novelty in metabolic challenges while retaining enough structure and repetitiveness to maximize adaptive capability. When you train like a hunter, you follow a power law distribution of intensity and frequency. You distribute activities so that you hit highly intense metabolic peaks briefly and intermittently. This is the FT fiber region. You also scale intensity within a set.

## **Fast Twitch Threshold Sets**

In order to hit all the fibers and scale intensity according to a power law, I do supersets of ascending weight and descending repetitions. The sequence is intended to move up the energy and muscle fiber hierarchy, recruiting successively more muscle fibers and different fiber types until all but the FT fibers drop out. This exploits the "size principal" which says that the threshold of intensity needed to fire the muscles increases with the size of the motorneuron. The FT fibers have the largest motorneurons and, therefore, require the highest intensity to fire. Power law training exploits this feature.

You apply the technology by doing supersets of ascending intensity to force the ST and then the IT fibers to drop out until only the FT fibers are left. I begin a set with a fairly light weight, lifting and lowering the weight slowly to prefatigue the ST fibers. Do this for 15 repetitions. Then, taking only enough time to increase the weight, do 8 to 10 more repetitions at a faster speed. Increase the weight one

more time and do 4 to 6 repetitions at high, but controlled speed. I also slightly increase the speed within each set of repetitions, aiming at the FT fibers near the end of each stage.

I pause between stages of the superset just long enough to change the weights and this 10 to 20 seconds is enough to regenerate the ATP and PCr to do the next set. By the third phase, the lactic acid is burning, but it will quickly be taken up because I don't do any more of that exercise and move on to something completely different. (This is an advanced technique. It takes conditioning and a tolerance for lactic acid to get to this stage. To begin, do only two stages of the superset, aiming for 12 and 7 reps. Then move on.) I may aim at 15 reps, 8 reps, 4 reps in each phase of the superset, but no one is counting; it is always the acid burn that tells me when to stop, not some preset target of reps.

After I devised this technology, I went from 11 percent to 6 percent body fat. I work out in a very sophisticated gym that is full of body builders, many of whom are famous, but no one in the gym is more symmetrical or has a denser and more cut musculature than I. It isn't genetic, it is the power law technology and the evolutionary diet, along with the muscle maturity that comes with years of exercise. The technology promotes hormone drives that make you lean and strong, and keep you young. You must work major muscle groups in every work out and not waste time on "show" muscles. Small muscles, like biceps, do not promote hormone drive which is the primary objective of any workout. Upper and lower back, shoulder girdle, chest, and leg work are the foundation of a symmetrical, powerful and lean body. They promote GH release, increase the insulin sensitivity of the muscle, and down regulate insulin levels. DO NOT ingest "gainer" drinks after a workout; they quench the GH response and promote excessive insulin levels which puts on fat, raises blood pressure, compromises immunity, and sets you up for insulin resistance—the precursor to the Western Disease.

## **Ultimate Power: Alactic Training**

Another variation in the power law technology I use in my training is designed to work what is called the alactic energy pathway. This training exploits power law variation as well but it works farther into the far right tail of the power curve, well up the intensity scale into the FT fiber region. In this region, the duration of effort must be extremely short, on the order of a few seconds and milliseconds. Here, you imagine an ancestor like *Homo erectus* running on the grassy savanna to a patch of trees to escape one of the formidable predators that roamed over Africa 2 million years ago. Ancestral humans had the ability to sprint at high speed as well as the endurance to trek over long distances efficiently. Indians used to run down

horses over a period of a week, or kept wild turkeys from resting on tree branches until they dropped with exhaustion; they were able to catch deer by sprinting to intercept its escape path (the deer escape in a characteristic curve which the hunter knew and intercepted). The alactic pathway is what supplies this energy in the first few seconds of the sprint; it is the engine for the "fight or flight" response that permits us to make our quickest and most powerful moves. Sprinting is an alactic exercise: it promotes high levels of lactic acid which stimulates growth hormone release (this is the reason sprinters tend to be muscular and lean).

The alactic pathway is called that because it relies on the high-energy phosphates stored in our muscles whose metabolism is rapid and does not produce lactic acid. Hence, it is a-lactic. The muscles contain enough phosphates (PCr and ATP) to generate extremely high force for up to 3 seconds. During that time the movement is powered primarily by FT fiber. Beyond that time you begin to use muscle glycogen and produce lactic acid. Those extreme physical feats you hear about—mothers lifting cars off their children and so on—draw on this high-energy pathway. At peak intensity, some athletes may generate up to 7,000 or 8,000 watts. This power is generated in very brief episodes; for example, in a high jump a power of 4,000 watts is produced in 0.02 seconds. For duration exceeding a minute, only elite, highly trained athletes can produce a rate of 350 watts no more than 4 or 5 minutes. Beyond a second or two at high power levels, lactate begins to accumulate and limit performance. These data fit a power law perfectly in the way power declines with duration (see the power curve above). They are further support for the power law training techniques developed in my book.

I do sets that I call 1/5s or "one, fives" because that describes how to do them. I do one repetition, then put the weight down for 5 seconds. Then do another rep and put the weight down another 5 seconds. Then do another set, and so on for a sequence of about 4 to 8 repetitions. That's it, then move on to the next exercise. What you have done is to achieve between 4 and 8 high quality repetitions without building lactate. The 5-second pause between reps is enough to regenerate the muscle phosphates if you are in reasonable shape. Up to 10 seconds pause is appropriate until you have acquired the ability to recover quickly. You can use reasonably heavy weight without the risk that goes with doing multiple repetitions with heavy weights.

Alactic training is much safer and more productive of strength than training to full failure. The reason is simple; doing multiple repetitions builds lactic acid that limits your power and ability to handle heavy weight. By doing just 1 rep and resting 5 seconds you retain nearly all of your muscle power. This lets you handle heavier weight and do quality movements. You never force yourself to work to failure, as many muscle magazines and training authorities seem to recommend. There is no danger because you use a weight that is below your maximum and do

not try to force a depleted muscle through another repetition. There is no straining to try to do that "last rep". An example of an alactic workout.

The theory that the "last rep" is the best one is wrong in my opinion. You have little strength left by then because the high-energy phosphates are gone and the lactic acid limits your strength. This means that the reps leading up to that last rep must use a weight well below what will tax your muscle when it is at full strength. Multiple reps build endurance, not power. Your endurance is developed by the ascending sets discussed above. Also, much of what passes for endurance is actually the ability to recover quickly from peak effort (this is the kind of endurance NBA players have). By doing a sequence of 4 to 8 or more 1 reps with 5 seconds in between, you train your recovery ability so that you restore power quickly. Because phosphate replenishment uses the aerobic pathway, and uses fat preferentially over carbohydrate, you indirectly develop your aerobic capacity and burn fat as well when you do alactic training.

## **Power Walking**

Our ancestors walked a lot carrying heavy weight in order to move camp and bring back as much of the kill as they could. Power walking, laden with real weight on the order of 35 to 100 pounds, is an effective modern version of what our ancestors did. Power walking with back pack or scuba diving weights around the waist dramatically increases the intensity and effectiveness of walking. And it is about as effective as jogging for aerobic capacity, without the pounding and damage. It is what women among hunter-gatherers do when they gather. For example, Kung San women typically carry an infant on a seven-mile trip foraging for plant foods and return with a 35-pound load. They only do this 2 or 3 times a week for they live in a kind of natural affluence where food is readily available. Males among hunter-gatherers do not carry the large game our ancestors did and are not a good model of power walking for modern males.

Consider this instead as a model. A historical source reports that 5 Indian braves drove 5 bison into a pit. After they killed these 2000-pound bison, they pulled them out of a pit more than 10 feet deep, lined them up and skinned and butchered them. Then, they carried as much as they could back to camp to get others to return for the rest. I think that is a wonderful model of fitness, combining speed, power, strength, stamina and courage. You can be sure this successful hunt was followed by plenty of rest and play and feasting. This model is what I seek to emulate.

## Personalizing Your Training

Everyone has to adapt their own workouts and activity patterns to their own capacities and intentions. If evolution teaches us anything it is that we are all different even though we share a large set of common attributes and metabolic processes. For most people, a move from mechanistic training to adaptive training would consist primarily of cutting back on the number of sets and how often they work out. This is combined with a pushing up of the pace and intensity and cutting way back on the number of sets and length of the workout.

The sophisticated variations on the power law that I use are not required and are there when you gain condition and strength. A brisk and intense workout that leaves you feeling challenged in each exercise, whatever your personal level of fitness, is what we are after. One upper and one lower body workout per week, of no more than 40 minutes duration, and one all around workout per week of completely different exercises is a good model to begin with. The all around workout should be focused on symmetry and grace and the more intense workouts on the large muscles.

## Symmetry

Symmetry is crucial for it is a reliable evolutionary clue to health and, hence, it is something we find attractive. Tumors and pathologies produce gross asymmetries and our love of symmetry reflects the reproductive success of our ancestors who were sensitive to these clues. Stay away from biceps and triceps stuff, they make you lose symmetry. Women are turned off by a lack of symmetry. Men whose arms, traps, or lats (the most overworked muscles in most gyms) are out of balance with the rest of their body don't look good. Both men and women see this because it relates to ancient wisdom: non-symmetrical people are not as healthy or as functionally capable in the ancestral habitat where maintaining life was a difficult task.

Work on calves, traps, neck and back. You look taller, another reliable evolutionary clue that women use to find good genes, if you move more mass to the neck and shoulder girdle and to the calves. And you will be more balanced and powerful. A thick trunk is another evolutionary clue. It is a signal that suggests pregnancy in the female and pathology in the male. I strive for the X-LOOK—a symmetrical balance of mass in the shoulder girdle, upper (not lower) chest and back, the calves and lower quads. This requires strict form so that you do not use your trunk to heave weights ("Cheating" on curls, for example, is mostly a middle trunk exercise and a stressor to your lower back. You should only do one or two

sets of curls a week, focusing on concentration curls to peak the bicep.). If you work out like a grunt, heaving and cheating on reps, you will look like a grunt.

## **Intensity and Brevity**

Power law training requires intense but brief workouts and long intervals between sessions. Intensity and brevity are the keys to promoting the hormone drives that are essential to adaptation. So important are these drives that one could say they are the real objective of the workout. A workout that is over long depletes the adaptive hormones and causes a surge in destructive hormones.

The open intervals between high intensity sessions are filled with activity of intermediate and low intensity, with a spurt into the FT zone. These activities include roller blading, hiking with one of my grandchildren in a back carrier, or walking and sprinting in deep sand at the beach, riding my motorcycle on back canyon roads and high mountain dirt trails (wind chill is a very effective device for shedding fat), shooting baskets, and so on. This is not a frenetic schedule, filled with mandatory exercise. It is playful and fun, not work.

Variation in weight, repetitions, and speed is consistent with power law training because there is no characteristic scale in a power law. Power law activities exhibit self-similarity at all scales. This means for speed, weight, and duration. My workouts are randomly timed; they may fall on two consecutive days, though this would be rare. At the other extreme, they may be a week apart. I aim for one upper and one lower body high intensity work out per week along with one easier, all round work out. Sometimes, I feel like more and may do up to 4 workouts of varying intensity during a week. Often only one or two workouts fill out the week. An average workout is 25 minutes. No workout is more than 40 minutes; most are shorter. I often finish my whole workout while other people are still doing sets on a machine or a body part. I never leave the gym tired, just relaxed and feeling good.

## **The Philosophy of Evolutionary Fitness**

If you think about the challenges our ancestors faced it will help you realize that what some fitness and motivational experts see as motivational problems are actually evolved adaptations. Recognition and acceptance go a long way toward helping you make healthy changes.

The fact that you are alive is a remarkable thing. The odds against it are great. The genes you carry contain information from a continuous strand of surviving organisms that extends 2 billion years back in time. You are an improbable event and your existence is testimony to the toughness and adaptiveness of the ancestral line



from which you come. You are a survivor, well equipped to live and be successful in the world for which your body and mind are adapted. Recognize, however, that the world for which your genes encode a successful design is not today's world; it is the world of some 10,000 to 40,000 years ago.

Your brain and body "expect" you to live as a hunter-gatherer. They are highly adaptive by design, for that is the key requirement of our ancestral lifeway. But, a natural life is one of movement and action, of challenge and response, of variety and adaptation. Your brain still "sees" sensory inputs as though you are a hunter-gatherer and, at the instinctual level, directs your actions according to what spells adaptive success in the environment of your ancestors. (Example: you freeze before a large audience because your ancestors increased their odds of surviving when exposed on open ground by freezing to escape detection.) If you accept that some parts of this metaphor are true of you, you will be more relaxed and less apt to punish yourself for things you do, or don't do (like get out and move around).

Laziness and over-eating are adaptations that let your ancestors pass their genes down to you. These labels place over-critical value judgements on what are evolved adaptations. Energy was a precious resource in the ancestral environment, and it still is in the third world where people barely get enough to eat. What we call laziness is an adaptive, instinctual behavior that kept our ancestors from wasting precious energy in a world where high-energy expenditure was required for food. Because the agricultural revolution dramatically lowered the price of carbohydrate, we have abundant and cheap food energy available at nearly zero energy expenditure. Because cheap carbohydrate is all around us, the caloric return to our food-seeking energy expenditures is so high now that we have to find ways to expend energy in healthful ways. Evolutionary training "tricks" the brain into thinking it is still 40,000 BC and resets your metabolism as well.

Variety and play are the essential human attributes. By keeping your work outs brief and exhilarating you won't get bored. By adding lots of outdoor activity and play, you will enjoy the power and fitness you gain. If you start a new sport, or pick up one long neglected as you begin evolutionary training, you will see how the power you gain improves your play. The feedback between the training and your new power in the sport will be habit forming. (The evolutionary basis of sport seems clear. For example, the number of players in most popular team sports today is about equal to the number of prime age males that would be alive in a typical Paleolithic band of hunter-gatherers.)

So, train outdoors often and in preference to any other sort of training. The gym is essential to build and retain healthy muscle mass, flexibility and strength. But, the gym is cognitively sterile. Don't walk on a treadmill, get outside and walk over uneven terrain. Hike with a heavy pack, sprint now and then when you take a walk. Play tag with your kids.

Don't set goals. Most of the goals we seek in fitness or appearance spelled health and success in the ancestral habitat; some of these adaptations retain their value, but many do not. What you think of as goals are actually strategies your genes have for getting you to act in ways that propagate your genes to the next generation. The goals you are likely to choose are not functional and relate primarily to appearance (how else can you explain plastic surgery, which reduces or risks functional capabilities, other than as an attempt to achieve the appearance that spelled youth and fertility or good genes in the ancestral habitat?).

You will say you want to lose  $x$  pounds, but you really want to lose fat not lean body mass. You actually want to gain lean body mass. Goals that relate primarily to appearance are not deep enough to sustain you. They do not relate to function and process. Goals set you up for failure. If you don't achieve them, you will become impatient and quit. In trying to speed your progress you will work out too often and imitate the people in the gym around you who do too many sets and do body builder exercises that are not productive.

Don't over-train. I fail to see how anyone can train 5 or 6 days a week in the gym and for hours at a time. That is factory or agricultural work, not anything human beings were evolved to do. And the paradox is that you will gain less strength and fitness if you overtrain. And you will join the thousands who quit out of sheer boredom.

You can't control the outcome, only the process. Be concerned only with where you want to go, not with getting there. Most of all, learn to enjoy the process not the outcome. Variety is essential to unlocking the dynamics from unhealthy patterns. You must have enough variation in your life to move the dynamics to better attractors. And you cannot reflect on your habits and ruts if you are inactive because it takes new challenges to reveal the disfunction of existing habits.

Modern life is cognitively deprived. Imagine the information processing capabilities that were exploited by an ancestor foraging for food alone, or with a small band on open Savanna. Alert to every clue that indicates the presence of game, plants, and predators, aware of self, wind direction, the habits of animals, and with intimate knowledge of the land, trusting and depending on long-evolved instincts and other members of the band, adapting to rapidly changing circumstances, a foraging human in the Paleolithic would appear to us to have extrasensory perception. This is the setting for which your mind is evolved.

Modern life leaves our minds restless and under utilized because we are confined, inactive, and comfortable. That is why we restlessly seek stimulation and sensory satisfaction. Some find it in entertainment (an industry that could not exist but for the extraordinarily stimulating environment of our ancestors) in the form of television, movies, or novels. Others seek it in simulated adventure like mountain climbing or dangerous sports (like me). We cannot be satisfied with more and

more, because we are evolved for another lifeway in which material goods do not matter. The result is that we are deeply unsatisfied with modern life and don't know why.

Just accept that what you are doing is what your body and mind were made to do and that this more active and metabolically challenging, but playful and fun, lifestyle is how it is going to be from now on. Your form will remodel to fulfill the functional demands you place on your body. Learn to be a good animal.

## **Lean Body Mass and Health**

Intermittent, intense and brief workouts build muscle mass that burns energy continuously. They promote hormone drives that keep you young. They switch the body's metabolic pathways so that food goes to muscle and organ mass and not to fat. The intensity is the key to reaching the fast twitch fibers of the muscles, which are the key fibers to staying young. A primary indicator of aging is loss of fast twitch muscle fiber. Retaining your metabolic headroom through intense, brief and variable training promotes retention of lean body mass, organ and brain mass—you stay younger and smarter than joggers and dieters who lose muscle, organ and brain mass. Aerobic exercise of long duration and moderate intensity isn't the answer. It promotes free radical damage through the oxidation of fat and when it is done often enough and at low intensity, it catabolizes muscle mass. There is a suspiciously high rate of cancer among marathoners. Lean body mass is the primary indicator of health status. Death is universal among persons who lose 40 per cent of their lean body mass. Lean body mass is the most accurate predictor of survival time for victims of starvation, trauma, infection, AIDS and other acute diseases, regardless of the nature of the disease. So powerful a predictor of health status is the rate of loss of lean body mass that it seems to be part of the process of dying. Rapid protein wastage is a mediator, not just an indicator of death.

Dieters beware. Rapid weight loss wastes lean body mass. Starvation studies show that brain mass may decline as much as 3 to 5 per cent with food deprivation. Other organs lose far more mass. A pigeon lost 93 per cent of its fat tissue, but 45 per cent of its heart, 42 per cent of its skeletal muscle and 71 per cent of its spleen on a starvation diet. Brain scans of anorexics reveal that they have shriveled brains. People who eat only once a day waste lean body mass all day. They are awash in catabolic hormones that use lean body mass to try to keep their brain alive on the glucose it requires. When they finally eat, they eat so much they get a surge of insulin that packs the energy in the food away in fat. Over time, their body composition changes—they come to have this small body inside a relatively inert shell of fat. They look large, but the active part of them is small.

Don't keep track of your total weight; keep track of your lean body mass. Your lean body mass is the real, metabolically active, you. It is the tissue that allows you to function and think and live. If you gain lean body mass, you lose fat and you keep it off because your metabolic rate rises. Everyone should keep track of his or her lean body mass to monitor his or her health status.

Aging is a slow form of lean body mass loss. What we call aging is sedentary aging and carbohydrate abuse. The accumulation of damage from hypoexertion and hyperinsulemia over a longer time scale is what aging is in Western countries.

Adults lose about 5 per cent of their lean body mass per decade after they enter their thirties. Most of the muscle they lose is FT fiber, for they cease by some age to live in the FT region. They settle into the ST region and, consequently, as they age their muscle fibers atrophy. The 40 per cent rule may hold here too. Progressive aging and deterioration resulting in a 40 per cent loss of lean body mass may be a precursor or mediator of the dying process. The aging just die over a longer time scale than do acutely ill individuals.

## **The Evolutionary Fitness Diet**

Evolutionary Fitness eating is simple, but it isn't everything. One must consider food intake in the context of activity patterns. You are an open energy system—energy flows through your metabolic pathways out into the environment around you. You must attain a rate of energy flow or flux that is more characteristic of ancestral patterns so that appetite becomes a reliable clue to food intake. A higher rate of flux will also be a key to directing nutrients to muscle, bone, brain, and organ tissue rather than to fat. Here are some keys to Evolutionary eating that are balanced against the practical reality that we live in the 21 century rather than in 40,000 BC. I do not try to eat like a Paleolithic ancestor, but I do use the insights of the scientific literature on the Paleolithic diet to guide my food choices and eating patterns. I also pay close attention to the scientific literature on nutrition and exercise; but, I use evolutionary reasoning to interpret this literature because it is full of contradictions.

Homo sapiens is an omnivore; your diet must contain an ample variety of fresh plant foods and lots of amino acids and essential lipids. The only universal characteristic of ancestral and living hunter-gatherer diets is the almost complete absence of grains and simple carbohydrates. There were no simple carbohydrates like sugar and pasta in the evolutionary past. The Ice Ages were times of protein plenty and scarce fat and carbohydrate. Fruits were tough and fibrous, not the refined, sweet stuff we have today. The closest thing to a simple carbohydrate was honey that was rare and guarded by wild bees. There were no grain or cereal sources of carbohy-

drates in the ancestral diet. Hunter-gatherer diets contain an enormous variety of plant foods and are high in protein (the median is about 35 per cent of calories from protein). Human metabolism cannot handle protein levels above 35 per cent over a long term. Cofactors, in the form of fat or carbohydrate, are required in order to utilize protein. So, variety and quality are the key objectives of the Evolutionary Fitness Diet.

Live at high-energy flux and eat randomly, varying food intake to the scale of activities. This includes the odd brief fast, as though hunting is lean. The body regulates food intake naturally when you live at the high-energy flux of an evolutionary trainer. It is when we are sedentary and live at low energy flux that our appetite mechanisms fail to match energy intake to expenditure (the evidence shows that infants regulate energy intake precisely and children only lose this ability when they become sedentary).

Animals confined to feeding pens or cages eat more than they expend in energy. That is how cattle are fattened for slaughter. Humans who live at low energy flux because they are sedentary and inactive will over eat, just like cattle in a feeding pen. Even though they are free to move about and are not caged, their metabolism is trapped in a feeding pen mode. It's another one of those evolutionary paradoxes. When we are inactive, we trigger an eating response and eat more than we expend in energy. The basis of this may lie in an adaptation that would let our ancestors recover from the intense activities of the hunt by eating beyond their energy requirements when they rest in order to rebuild tissue and energy stores. The ability to eat beyond energy needs would be essential to the survival of any organism that lived in the world of our ancestors with its variable energy expenditure and intake.

The answer is clear: live as though you are a free-ranging, adaptive human being, not like some animal being fattened in a pen for the kill. It is hopeless to try to attain the precisely balanced intake and expenditure of calories preached by diet promoters. And it is impossible to do if you are sedentary for you trigger this evolved over eating adaptation.

Our ancestors were better nourished than all but a few of us because they ate low calorie, nutritionally dense foods, all fresh and uncontaminated, and they ate in large quantities to fulfill their high energy needs. Dieters who face calorically rich foods with low nutrient content and who eat in small quantities face a real risk of malnutrition. If they are sedentary the risk is even higher because they must restrict food intake so severely.

I am more concerned with energy expenditure than intake, for it is energy expenditure that determines energy flux and appetite. High-energy flux brings our appetite control mechanisms into the ancestral range where they were evolved to operate.

Live as though you are in the world that existed before the invention of agri-

culture. There was no grain or cereal or manufactured food in the ancestral environment. Our ancestors ate fresh fruits and vegetables and meat. They got no milk beyond the age of 4. They ate no cereals and consumed no vegetable oils. Their diets were not particularly low on fats; indeed, for a few million years prehuman hominids may have lived on the fatty bone marrow and brains of scavenged kills more than on fresh meat. Even when they became premier big game hunters, humans preferred the fatty cuts of meat because the wild animals they hunted were very lean. Modern meat contains around 33% fat as opposed to 4% fat in wild game. And, there is a higher proportion of saturated to unsaturated fat in grain-fattened meat. Consequently, even a diet moderate in fat, say 40%, is high in saturated fat when it is composed of modern meats. In addition, most individuals who eat moderate or high amounts of fat get it from fast foods and bakery products and eat few vegetables or fruits. The fat in modern grain-fed animals and in fried foods and baked goods is heavily weighted in Omega 6 fatty acids relative to Omega 3 acids and contains large amounts of hydrogenated fatty acids. Taken together, this imbalance of Omega 6 to Omega 3 fatty acids and the novel fat molecules that result from hydrogenation can play havoc with cell membrane health and function. Remember, your brain, nervous system and vascular system are comprised primarily of membranes; any dysfunction in these critical areas can be devastating.

A preference for fat was adaptive in the ancestral habitat, but is maladaptive in a modern world awash in abundant sources of fat. Nonetheless, fat intake is essential. Our brains use glucose for energy (and hence our preference for sweets) but are made of lipids. Some of these essential brain lipids can be gotten only from animal fat. The problem is to balance fat requirements against its over-abundance in the American diet and to achieve the desired fatty acid profile which is more heavily weighted to saturated fats in the American diet than the Paleolithic diet. A similar point can be made for minerals: calcium, potassium, and magnesium are too low relative to sodium in the American diet and are far from the Paleolithic ratios.

Seeds did not become a major component of the diet until about 14,000 years ago. Vegetable oils are a completely novel substance in the evolution of human eating. The processed oils now recommended so heavily by nutritionists are no more than a few decades old. Processing and hydrogenation alter the shape of the fatty acids and these altered shapes play havoc in the cell membrane function. They are readily oxidized to form free radical chain reactions that damage body tissue. Fat imposes a load on the body's antioxidant defenses. People who eat modern sources of fat and few vegetables tend to be deficient in antioxidants which may put them at risk to cardiovascular disease and cancer (oxidative stress appears to play a role in both diseases).

The intolerance that many people show to grains, eggs, milk and seafood can,

in part, is explained by how recently they entered the human diet. Many of us are poorly adapted to these foods, particularly if we are from a culture that began to rely on agriculture or dairying recently. We are not adapted because gene frequencies have not settled to the range where such individuals become rare in the population. That will happen only after enough time has passed for the lactose- and grain-intolerant among us to leave fewer children to carry our genes into the future than those who can eat the stuff.

The other trigger to food intolerance is through the mechanism of molecular mimicry. Milk and grains contain proteins that were foreign to human metabolism until some 10,000 years ago. The space of proteins is vast, on the order of  $20^{200}$  proteins can be formed from the 20 amino acids. The immune system must recognize self- from non-self and proteins that are foreign from those that are not. Some of the proteins in milk and grains mimic those found in pathogens and trigger an immune response. Others increase the permeability of the human gut and thus permit undigested protein remnants to pass into the intestines and blood stream where they may trigger an immune response. The rising incidence of autoimmune diseases such as lupus, multiple sclerosis, and arthritis is another indicator that there is a mismatch between a human metabolism of ancient origin and modern food.

Epidemic carbohydrate intolerance is another clue that we are not yet adapted to a post-agricultural, post-industrial, information age diet. Epidemiological evidence suggests that the populations most at risk are those groups that adopted agriculture recently: Eskimo, Pima, Navajo, African-Americans, Asian-Americans, and Northern Europeans. To emphasize once more, a universal in the omnivorous human eating record as reflected in hunter gatherer diets and in the ancestral diet is the absence of simple- and grain- or cereal-based carbohydrate. The conventional wisdom and diet advice of the experts that you should eat grain- or cereal-based carbohydrate flies in the face of the evolutionary record. You should get your carbohydrate from fresh vegetables, which are also the major source of minerals, flavonoids, and phytochemicals in your diet.

Stay cool and expose your skin to fresh air and sunlight. Don't be warm and cozy all the time. End your shower with a cool rinse over your legs. Wear as little as you can tolerate for your workouts. If you can't stay warm working out, you aren't going at it at a high enough pace. (Carrying a trendy water bottle slows you down too and ties up equipment for others.) Expose your skin to fresh air by wearing shorts in cold weather to hike. Bare your arms to the air and the sun, but be sensible about the amount and intensity of the exposure.

Vitamin D deficiencies are common, particularly in cold climates. Children are particularly vulnerable, as are African-Americans (dark skin produces less Vitamin D than a light skin) and the elderly. The new practice of wearing sun blocks and covering the skin increases the likelihood of Vitamin D deficiency, with a conse-

quent risk for bone density. Life is full of these trade-offs—preserve your skin, risk your skeleton. You can change the terms of the trade-off by eating the Evolutionary Fitness diet which is high in calcium from dark, leafy vegetables and bones.

Eat when hungry. For me, that is at about 3 times a day, often more, but sometimes less. Eating once a day degrades lean body mass and reduces your metabolism. Your lean body disintegrates and your fat mass increases. Nobody who wants to be lean and healthy should eat only once a day. On the other hand, eating should not be too regular. Energy intake must be varied and there should be long intervals between your evening meal and breakfast. Compress your caloric intake into a 6 or 8 hour window every now and then. This mimics the Paleolithic alteration between feast and famine days. But, there are even more important reasons to do this.

Research (and my experience) suggest that a compressed eating window, with no reduction in caloric content, can provide the low body fat and life extension benefits of caloric deprivation, the only known intervention shown reliably to extend life. Why caloric deprivation extends life is not known, but one reason may be that the calorie-deprived rats are compared to ad libitum fed rats and both are caged. In other words, the other rats with whom the calorie-restricted are compared are pigging out. Another reason may be that caloric deprivation activates a moderate adrenal response and helps to retain an adaptive response to stress. But, that can be achieved by eating in a narrow time window, with a relatively long fast over night. The night fast also promotes growth hormone, a known factor in staying lean and retaining muscle, neural, and cardiovascular mass.

Three square meals a day will make you fat. Foods eaten every day can become toxic. Variety and quality are the essentials of a healthy diet.

Take antioxidants. Our food sources of minerals and antioxidants are not as rich as those of the ancient past. Free radical oxidation of body tissues is one of the primary aging mechanisms. Scavenge these free radicals with antioxidants and with the natural phytochemical antioxidants abundant in fresh vegetables and fruits.

The beauty of the 40,000 BC eating model is that you eat no canned, frozen, packaged, or manufactured food. Your diet consists of fresh fruits and vegetables, eaten raw whenever possible, and lean meat. I do not eat raw meat because I no longer trust our food supply. The model offers a conservative strategy for ridding your diet of empty calories while it guides your food choices to highly nutritious foods. You don't have to read labels because nothing you buy to eat comes with a label (nature doesn't do this). Some latitude is necessary (I do not believe in rigid rules for anything anyway), but the 40,000 BC model is always guiding your choices.



## Conclusion

Does evolutionary training work? Power law variation and intermittence are the right features of human activity. There is a growing body of evidence of the effects of anaerobic activities on body composition, lean body mass and insulin sensitivity.

Does evolutionary eating work? The natural diet and high nutrient density of the Evolutionary Fitness diet along with virtually no simple carbohydrates makes you so lean that blood lipid levels improve dramatically. The high phytochemical and antioxidant content of the Evolutionary Diet protects blood vessels and all body tissues from oxidative damage. The metabolically expensive muscle tissue that Evolutionary Fitness creates burns blood fats and elevates insulin sensitivity. Heightened insulin sensitivity means that food does not elevate blood insulin, which shuts down fat burning. Consequently, energy flows to muscle, organs, nerves and not to fat. My blood profile is in the "no risk" category for cardiovascular disease. My insulin, the aging hormone, is so low it is below the confidence interval of the lab. And the infrequent, high intensity work of Evolutionary Fitness gives my heart enormous "head room" which is essential to its ability to adapt to stress and retain its healthful chaos.

Evolutionary Fitness is the only model of fitness that is based on adaptive systems theory and evolutionary reasoning. Power law training is the right technology for the human body. It works so well you will feel like you are cheating. The body is a decentralized, dynamic object; it quickly turns off to an over-arching, central controller brain dictating its moves and energy sources. I cover this in my "Mind as Movement" sections in the book. Among many other reasons, it is this crucial feature of body/mind integration that makes the other diet and fitness formulas fail; they are examples of the Soviet, command and control approach to health and fitness and they fail miserably. Their followers grind sets in the gym, pedal their stationary bikes for hours, or jog the healthy variation out of their hearts. This "top down" command and control approach breaks the mind/body unity and is doomed to failure. Followers of such systems don't have fun and turn the healthy stress of exercise into distress and even disease.

The path to fitness is indirect and non-linear; grim determination and Soviet-style overtraining won't get you there. Episodic, intense, brief sessions that are fun and end on a note of success (a marker of adaptation) rather than grinding routine and fatigue (markers of failure and non-adaptation) are the keys to success. None of these systems produce the muscularity, power, leanness or symmetry that you get from Evolutionary Fitness.

Less is more. You cannot load a stressful diet and fitness program that is predicated on undereating and overtraining (and virtually all of the calorie counting aerobics-based programs are of this type) onto a busy professional life. You can do

Evolutionary Fitness and still have a successful and productive life without the risk of poor nutrition and over training. Power law training is so productive you will spend very little time in the gym, usually from 1 to 2 hours a week. The intensity of training like an adaptive hunter is exhilarating and the brevity leaves you feeling fresh. You gain time for work and play. You also gain toughness and energetic plasticity that leaves you poised for the many adaptive challenges that life brings.

In short, live, eat, work and play like it is 40,000 BC while you enjoy what the modern world has to offer. Take care of that hunter-gatherer mind and body that you carry in that pinstriped suit.