

Empire Fitness would like to thank Mr Ellington Darden of www.Classix.com PhD for the following article

Strength-Training Principles
Revived and rebuilt for the new millennium
by Ellington Darden, PhD

“Confused about how fast or slow to do a repetition? Frustrated about which routine to use? Disturbed about your lack of results? You need a double dose of Dr. Darden's basic medicine: the classic guidelines of the 1970s, revived and rebuilt, for the new millennium.

Think back for a moment on your formal education. Try to recall all your teachers, from kindergarten through high school, and on through college.

How many really great teachers did you have?

If you're like most people, maybe you can name a handful of women and men who had a major influence on your life. I'm fortunate because I've had two handfuls — or ten.

I had a really great teacher in the fourth grade, and three in high school — one of them was my football coach. Then, I had two terrific professors at Baylor University and another three at Florida State University.

That was nine exceptional teachers — each of which took education to an inspirational level for me — until I finished my post-doctoral work at Florida State.

Then, I met Arthur Jones, who was my greatest teacher. As the man behind the Nautilus exercise equipment and training principles, Jones opened doors and pushed me to explore subjects and concepts I would not have traveled into without his help.

Ilanon Moon — A Master Teacher

Besides Arthur Jones' impact on my life, the teacher who had the most influence on my day-to-day behavior was Ilanon Moon. Ilanon, as she preferred to be called, was in charge of teaching English grammar and composition at the high school in Conroe, Texas.

She was always impeccably dressed, usually in bright colors, and her streaked hair had a Hollywood flair to it. While such a look might seem to be a complete mismatch for a small, conservative, East Texas high school, Ilanon counterbalanced her appearance perfectly with inspiring teaching techniques, combined with contagious smiles and laughs.

Since I'm a movie buff, I would portray Ilanon as a younger version of the character played by 70-year-old Ruth Gordon in the classic 1974 hit "Harold and Maude." Rent the movie and you'll understand why Ilanon's teaching was never dull.

Not only were you actively involved in writing and reading in her class, you frequently tried acting and singing. These activities helped Ilanon get across parts of speech, sentence diagramming, and the importance of using action verbs.

And get across successfully to me she did. I apply her basic grammar rules every day — in talking and in writing.

In 1978, when I was at my peak at researching and writing fitness books, I hired Ilanon — who was 80 years of age — to help with the editing process. What a meaningful experience it was to interact once again with a master.

In January of 1980, Ilanon flew to the Nautilus headquarters in Lake Helen, Florida, and spent a week working with me on several projects. In the process, she talked twice with Arthur Jones, who then requested that the Nautilus television department get Ilanon on videotape. The next day, Ilanon and I talked for more than three hours as the video cameras rolled. We discussed many subjects, including exercise, nutrition, world history, great leaders, and, of course, English grammar.

A day later, as I was driving Ilanon to the airport in Daytona Beach, she was already making arrangements to return soon to the Nautilus headquarters. She was one of the few women who was not intimidated by Arthur Jones. In fact, she told me that she had a plan to get Arthur Jones to allow her to take charge of the Nautilus television studios. It seems she'd had experience in the 1940s working with some Hollywood filmmakers, and was certain she could get the Nautilus video people to rally around her leadership. Plus, she'd get her younger sister involved, and this woman was an excellent director.

If anyone could pull off such a challenging task, it would be Ilanon.

Unfortunately, a week later, Ilanon had a gallbladder attack. She was rushed to a Houston hospital for surgery. Something went wrong, and two days later, she died.

What a tragedy.

Those vibrant memories of Ilanon Moon still live within me, as well as the clarity of her teaching techniques that surrounded what she loved best: the English language.

"English," she once declared to me, "is the richest and most varied of all the languages."

I was struggling to find the proper synonym to avoid being repetitious in my writing. I was ready to give up and use the same word again. "No," she said. "Ell, you're just being lazy. There's a perfect word just waiting for you. Your job as an educated writer is to find it. Keep thinking."

Ilanon was right. In five minutes, I had that perfect word.

Back to Basics

Looking back on all my greatest teachers, there was one characteristic that they all had in common. Each one made sure you were well rooted in the basics. That's right, and it didn't matter about the subject: reading, football, nutrition, strength training, or writing.

Concerning the fundamentals of English grammar, I've heard Ilanon Moon say, "The basic rules can be stated on the front and back of one sheet of paper. First and foremost, a student must apply and master those basic rules. But that's not enough. The exceptions to those rules fill more than five hundred pages. Eventually, a writer must study and understand the exceptions. The exceptions add interest, sparkle, and unexpected drama to a page. Effective use of the exceptions separates a good writer from a great writer."

Arthur Jones, in 1974, wrote an article entitled, "All You Need to Know About Strength Training in One Thousand Words." Then, over the next 25 years, he published more than a million words about the basics and the exceptions. He stopped his writing about strength training in December 1997 with his final article for Ironman magazine by concluding, "Enough is enough already."

Enough is enough already may be sufficient, or too much, for Arthur Jones and a few other people. But a million words still does not quench the thirst, at least not for long, of the average trainee, who is not making the gains he had hoped for from his strength training.

It's time to return to the basics of strength training. Perhaps in this discourse you'll be able to pick up a fresh slant on an old principle, or a new twist or two that you haven't heard before. I hope so.

First and Foremost

I've written and talked about the basic principles of strength training hundreds of times over the last 30 years. There continues to be a lot of confusion concerning what to do and what not to do for maximum results. As Ilan Moon would have said, "First and foremost, it's important to master the basics." My observations reveal that many trainees quickly move through the basics so they can plug into all the exceptions, which in their minds mean they are now advanced bodybuilders. Don't make that mistake.

Nothing is more salient than the basics. Regardless of the subject, a comprehensive understanding of the basics of that area will almost guarantee that you'll be well grounded to make maximum gains and progress into the more advanced levels.

My revived-and-rebuilt, new-millennium version of strength-training basics includes nine headings: form, progression, intensity, duration, frequency, order, exercises, recovery, and sleep. Let's take a close look at each one.

Form

In my books and previous discussions of the basics, I've always started with intensity. Intensity, in my mind, was the most important principle. After reexamining all the principles, however, I now believe that form and progression are slightly more critical than intensity.

What do I mean by form?

Form is the style you use to lift and lower a weight. But form is also a lot of little things, such as: what you do with your arms when you're working your legs, what you do with your legs when you're training your upper body, the ability to relax your neck and face, breathing style, and knowing how to focus and isolate specific muscle groups.

Without getting into a discussion of the little things, I would like to say that sloppy lifting and lowering form is the most violated principle of strength training. I've been in thousands of gyms and fitness centers throughout the world. With maybe two exceptions, 99% of the members of those training facilities were exhibiting poor form. The easily observed violation across the board was movement that was too fast. If these members did differently only one thing, their strength-building results would significantly improve. That one thing is to slow down their lifting and lowering speed. Whatever the speed of movement was, make it twice as long. Simple, yes. But very effective.

What's a more specific guideline to follow concerning speed of movement?

Especially for beginners, as well as for trainees whose form needs attention, I recommend a 10-second lifting (positive) speed and a 5-second lowering (negative) speed. Such a speed is similar to Ken Hutchins' SuperSlow® protocol. Ken and I are longtime friends, and I appreciate greatly the work he has done on repetition performance.

Why should you spend a longer time on the positive phase (10 seconds) than the negative phase (5 seconds) of each repetition? Research shows that most of the cheating actions — such as twists, back arches, and slight knee bends that lead to excessive momentum — originate during the positive stroke. Drastically slowing the lifting reduces these cheating actions. Or, if they do occur, they are self-evident and instantly correctable.

With intermediate and advanced trainees, I vary the speeds. In general, the fastest I recommend anyone train is 4-4 (4-second positive and 4-second negative), and the slowest is 10-5. But there are exceptions.

For example, I've had good results with negative-only chins and dips. With additional resistance attached around a trainee's waist, he climbs to the top position of the chin-up or dip, then lowers his body slowly in 8 to 10 seconds. In other words, the negative phase of the exercise is emphasized, and the positive phase is minimized. I also prefer a somewhat faster speed of movement for exercises like wrist curls and calf raises, such as a 2-2 count. And, occasionally, I like to do extremely slow movements (30-second positive and 30-second negative for only one repetition) on a few exercises like the leg extension, pullover, chin-up, and dip.

The most important thing to remember with form, however, is not speed, but the smoothness of each repetition. A deliberate and smooth movement is much more productive than performing repetitions that are laced with jerks, drops, twitches, and bounces. Smooth and slow go together well.

Be Smooth and Eliminate Momentum

The concept behind moving smoothly is to eliminate as much of the momentum as you can from the exercise. Naturally, you have to accelerate to start the movement and decelerate to stop. Doing so requires a change in velocity, and thus involves momentum. The idea is to keep the movements and the turnarounds at both ends smooth and not jerky. This keeps the momentum at a bare minimum.

What's the problem behind having excessive momentum in an exercise?

Momentum usually unloads the resistance from the working muscles and transfers it elsewhere: to your joints, bones, and other muscles. It actually makes an exercise easier, which is what you're trying to do in a weightlifting contest. But in a weightlifting contest, you're demonstrating strength. In a strength-training workout, you're building strength. Building strength efficiently requires harder exercise and less momentum, not easier exercise and more momentum.

Excessive momentum also precipitates injuries. Instead of having only the weight of the implement, say 100 pounds, on the barbell, the momentum involved in fast lifting and lowering can increase the weight of the barbell by three, four, or more times. Instead of having 100 pounds, you temporarily may have 300 to 400 pounds, or more, at some phases of the range of movement. Force can cause injury, and it's to your advantage to keep the force low and — most importantly — under control.

Furthermore, excessive momentum contributes to an unbalanced strength development. Only the middle part of the exercise gets close to the appropriate resistance. The ends of the exercise, the bottom and the top positions, receive either too little or too much resistance. Reducing the momentum by smoothing out the movement applies more full-range resistance to the involved muscles, and thus elicits a more thorough fiber stimulation.

It's definitely to your advantage to perform all your strength-building exercises with a focused eye toward reducing the momentum by the performance of smooth repetitions.

Progression

When I first started to write about strength training in the early 1970s, I recommended that the best progression guideline to follow was 8 to 12 repetitions. I was promoting the 2-4

concept, or 2 seconds on the positive and 4 seconds on the negative. At 6 seconds per repetition, the time of a set would vary between 48 and 72 seconds.

With the incorporation of slower speeds and the emphasis on smoothness, time under contraction during a set can be longer. A repetition sometimes takes as much as 15 seconds. So instead of working with 8 to 12 repetitions like I do when using the 4-4 protocol, I prescribe a guideline of 4 to 6 movements for the slower speeds. For example, using a 10-5 cadence, the time of a set would vary between 60 and 90 seconds. Over the last several years, however, I've found that about 60 seconds of time under contraction seems to produce better results with advanced trainees.

What I tell people today about progression is as follows: using the 10-5 guideline, perform one set of 4 to 6 repetitions. These repetitions require between 60 and 90 seconds. If you cannot do at least 4 repetitions, the weight is too heavy. Reduce it slightly. If you can perform more than 6 repetitions, the weight is too light. Increase the weight at your next workout.

That gradual progression of weight is usually 2-5% of the resistance that you handled successfully for 6 repetitions. Interestingly, a 2% increase seems to produce better results over the long term than does an increase of 5%.

A Two Percent Example

Several years ago, I trained David Hudlow, a 28-year-old athlete, for four consecutive months. David was strong when he started, but much stronger when he finished. He added over 30 pounds of muscle to his body in four months — amazing.

David and I soon found that his body responded best to one set of no more than seven exercises. But here's the interesting thing we determined: 4 repetitions were too few for him, and 6 repetitions were too many. David only grew stronger with 5 repetitions. That's right. Exactly 5 repetitions worked for David Hudlow. (You can learn all about the progress of David Hudlow, including his specific routines, by ordering two special reports called "Upside-Down Bodybuilding." For information, please call 888-231-2727.)

It was meaningful that we had all the latest MedX machines available for our use at the Gainesville Health and Fitness Center. The advantage of using MedX is that you can easily increase or decrease the resistance on the machine by 2-pound increments. MedX was the first machine manufacturer to use a double weight stack, which made these small increases convenient.

Applying precise increments, we were able to make a 2% improvement on every exercise during almost every workout for four straight months. I believe that those small, systematic increments accounted for much of David's phenomenal progress.

Try incorporating the 2% guideline into your progression and see if it doesn't work better for you.

Intensity

Because I now place intensity in the number three spot, behind form and progression, don't take me wrong. I still believe it's plenty important. There are numerous trainees that don't understand that you must train with great intensity to get efficient results.

High-intensity training is a phrase that Arthur Jones and I popularized during the early development of Nautilus equipment. Jones's definition of intensity is brutal and close to what many people would call torture. I wrote about observing such a workout in the December 1996 issue of Ironman.

Generally, high intensity means to continue performing repetitions in proper form until another repetition is not possible. This state is called momentary muscular failure. On the last repetition, at the spot where positive movement comes to a halt, it's to your advantage to continue to hold the resistance in the midrange for another 5 to 10 seconds. With the correct intensity of effort, you just might be able to complete the movement. If so, try another repetition and hold. Such is the nature of high-intensity exercise.

The essence of high-intensity exercise is to always try to do one more repetition. Never stop because you're successful at meeting your guideline number. Consistently attempt one more, and, if successful, try another. Muscular growth stimulation is somehow connected to attempting, and eventually completing, a workload that you have not tried before.

Of course, accomplishing such a workload must take into consideration all those little things that compose your form. It's tempting to initiate cheating techniques that make your exercise easier to do, but less productive. That's where a training partner can help you keep your techniques strict and consistent. Teaming up with a friend will more than likely improve your overall results.

Duration

Slow, smooth, progressive, intense exercise must be relatively brief in duration. I have never seen an athlete — and I've trained some big, strong, lean, and highly conditioned men — who could successfully make it through more than 12 carefully selected exercises at maximum intensity, with minimum rest between. Most of these athletes start fading at exercise six or seven. At eight, they must stop, or even lie down.

Robert Berg, a 38-year-old medical doctor and longtime bodybuilder, is an example of what I'm eluding to. I recently trained Robert in Celebration, Florida, for three months.

At the start of the training, Robert was already in terrific shape. He was 5'9" and weighed 168 pounds, with body fat of 4.5% — which is extremely lean. Plus, Robert was reasonably strong and in a cardiovascular condition that I would classify as right at the top of anyone I've ever dealt with.

From his very first workout, Robert trained in what I'd call an "all-out, balls-to-the-wall style." His concentration, intensity, and time between exercises were all superb. The only thing lacking was his form. The finer details of smooth, slow lifting, however, required Robert only two workouts to master.

Initially, Robert could do more than 12 exercises, and carry all of them to momentary muscular failure. But remember, his form was lacking in detail.

Once he mastered the correct style, 7 exercises were all he could handle. Gradually, within a month, he progressed to 9 exercises — but that was it. Several times we attempted 10 movements, but each time he simply had to stop halfway through the tenth exercise.

Here's the exact workout that Robert did on May 17, 1998. For each exercise, I've noted the type of machine, as well as the resistance and number of repetitions he performed in ideal, smooth, slow form.

Robert Berg's Workout

Leg curls (Nautilus)

- 110 pounds
- 6 reps

Leg extensions (Nautilus)

- 190 pounds
- 6 reps

Leg presses (MedX)

- 260 pounds
- 5 reps

Lateral raises (Nautilus)

- 130 pounds
- 6 reps

Decline presses (MedX)

- 290 pounds
- 5 reps

Torso rows (Nautilus)

- 190 pounds
- 6 reps

Pullovers (Nautilus)

- 200 pounds
- 6 reps

One-repetition dips

- 50 seconds up
- 50 seconds down

One-repetition chin-ups

- 55 seconds up
- 55 seconds down

Robert went through the above workout using excellent form. His effort was the highest possible intensity. Most of the time he failed on the sixth or seventh repetition. Then, with almost no rest, he rushed to the next exercise.

Using several different types of heart rate monitors, I've recorded the heart rates of many athletes during similar workouts. Even though we didn't have Robert hooked up to a monitoring system, I can estimate fairly well the impact of the exercise on his heart rate by observing his breathing rate. During the first exercise, Robert's heart rate rose to 160 beats per minute. It climbed to 180 during leg extensions and peaked out at about 200 on the last repetition of leg presses. After that, it stayed in the "180 beats per minute" range until the last two exercises, one-repetition dips and one-repetition chin-ups, where it inched back to the 190 level.

Robert completed this workout in exactly 20 minutes. You better believe he was exhausted. But the amazing thing about Robert is his recovery ability. Most people would have to lie or sit down for at least 15 minutes. Not Robert. His breathing and pulse rates are almost back to normal in three minutes. At three minutes, he's busily having a snack of 250 calories of carbohydrate-rich foods.

Another interesting thing that Robert practices, which I haven't seen anyone else do, concerns water drinking. I usually have to encourage most people to consume water throughout their routine. I want them to do this after every two exercises. Robert, however, drinks two quarts of water approximately one hour before his workout, and drinks nothing at all while he's training. He says that stopping to drink during a workout breaks his concentration. Robert's concentration during each exercise is by far the best I've ever seen.

Robert is an exceptional trainee. I learned a great deal by working with him for three months. Plus, as I mentioned earlier, he's a medical doctor — specifically, a dermatologist — who will be writing several how-to articles for Classic X readers about the latest anti-aging techniques for men and women. Look for Robert's material soon on the Classic X website.

Back to duration.

Okay, here are the essentials that you need to know about the number of exercises to do in a workout.

Perform one set of no more than 12 exercises in any one training session. (If you only have access to barbells and dumbbells, which are not as efficient at muscle isolation as are most machines, then you can do a few more exercises: perhaps 16-20.) Advanced trainees actually make better progress with fewer exercises. With beginners, I usually start with only one set of six exercises. I add an exercise after each week until they reach a maximum of 12. Doing this usually covers six weeks. Then, I gradually incorporate, as a person's readiness permits, other exercises that are not as essential as the first 12.

Move promptly from one exercise to the next. The idea is to tax your cardiorespiratory system at the same time as you are working your muscles. To do so, you must keep your heart rate in the range of from 60-80% of your maximum heart rate. Most beginners require about 60 seconds between exercises. As they get into better condition, however, this time should decrease: to 50, 40, and 30 seconds. Gradually, if you're motivated, and if you have a training partner to push you, your goal should be 15 seconds between exercises. Or if you're a Robert Berg-type individual, you can even reduce that 15-second goal by running between machines. Don't, however, make your workout a race against the clock. The time between exercises is not nearly as important as the time you spend performing each exercise.

Frequency

How often should you work out for maximum results?

Three non-consecutive, days-per-week workouts have been a staple of my high-intensity guidelines for many years. In other words, a Monday, Wednesday, Friday or Tuesday, Thursday, Saturday schedule is the place to start.

There's definitely a need for regularity in strength training. But there also seems to be a certain irregularity that is helpful. This irregularity hit home with me recently as I reviewed the results from a trainee.

Jeanenne Schindele is one of the women who helped me with the interior design of my new home. At 37 years of age, Jeanenne was a skilled high school and college athlete. Putting her through one workout convinced me that she had high-quality muscle. I predicted she would respond well to a six-week strength-training program.

Normally, in a six-week program, a person trains 18 times. Jeanenne, because of the helter-skelterness of her business style, which involved a lot of long-distance traveling, had only ten workouts in six weeks. And the time of day of her workouts was all over the place: morning, mid-day, and late night. Her consistency was not good. Compared to the consistency of Robert Berg, who was a perfectionist, Jeanenne's workout schedule was atrocious.

At the end of six weeks, when I followed up with after tests and measurements of both Robert and Jeanenne, the results were confounding. Jeanenne, who frequently missed workouts, added six pounds of muscle. Robert, who never missed a workout, gained three pounds of muscle, or half as much as Jeanenne. Yes, I'm aware that's it's difficult to compare two people in training, especially a man to a woman. But since I trained both Robert and Jeanenne on almost the same routines, I'm going to try to explain what I believe happened.

Interesting Comparisons

First, let me say that while Jeanenne doesn't come from a background of 20 years of strength training like Robert does, she has a certain natural athletic ability that she was born with. As a result, she caught on to the smooth, slow style almost as quickly as Robert did. Jeanenne also had slightly better length to her muscle bellies than did Robert, which gave her an edge at building muscle — especially when that was combined with the fact that Robert was much closer to reaching his potential. The closer you get to your potential, the more difficult it becomes.

Worrying can lead to stress, and too much stress in your life can delimit your ability to build muscle.

Robert is a worrier. Things get under his skin. He then has a difficult time getting them out of his mind. Jeanenne, on the other hand, seldom worries, or if she does, she finds solutions. Otherwise, she simply ignores an annoying disturbance.

Then, there's the regularity factor. Looking initially at Robert's and Jeanenne's muscle-building results, I thought to myself, "What would Jeanenne have accomplished if she had been as consistent as Robert? She would have probably gained nine or ten pounds of muscle, instead of six."

I started to explore the idea that maybe some of Jeanenne's great results occurred because of her irregularity, not in spite of it. Jeanenne is a believer in random acts of adventure, especially the unexpected. She dislikes too much planning.

Remembering Casey and Sergio

I remembered back to several champion bodybuilders who made their best results under a similar inconsistent training schedule. Casey Viator, Mr. America of 1971, was one such trainee. So was Arthur Jones. As a result, Casey was on-call 24 hours a day, since Jones often desired to train him at oddball times. Furthermore, Jones never told Casey what exercise he was going to require him to do next. Jones had a plan to his magic, but to Casey it was totally random.

Prior to his winning the Mr. America contest, Casey made dramatic gains on such a schedule.

Sergio Oliva, Mr. Olympia of 1967, 1968, and 1969, was another champion bodybuilder who, under Jones' unique tutorage, made some of the best progress of his life.

Yes, there's something good about inconsistency and irregularity. Arthur Jones stated in his "Bulletin No. 1" that if weeks didn't exist, we'd need to invent them. What he meant was that a seven-day cycle of training always keeps the body in an irregular mode. For example, in the typical three-days-per-week schedule, a first workout is done on Monday. Two days later, a second workout is performed on Wednesday. Then, two days later, a third workout is accomplished on Friday. On Sunday, the system is expecting and is prepared for a fourth workout, but it doesn't come. Instead, it happens a day later, on Monday of the next week — when the body is neither expecting nor prepared for it. Jones reasoned that the body was never quite able to adjust to this irregularity of training.

Of course, Arthur carried the irregularity of training several steps further by varying the workout times and not revealing the exercises to the trainee. And he frequently pulled an unexpected exercise, or cycle of exercises, from some deep reservoir of his mind.

The Importance of Irregularity

I now believe that much of Jeanenne Schindele's results were related to an irregularity of training that was certainly not planned by me, but just happened. Could such a schedule actually be planned? Probably, but some of the effect would be lost in the planning itself.

Looking back on the training of both Robert and Jeanenne, if I could repeat the project again from the start — knowing what I know now about both Robert and Jeanenne — here's what I'd modify. I'd add more inconsistency and irregularity to Robert's routine, and do the opposite with Jeanenne's. I'd add more consistency and regularity to her schedule. The secret would be to change only a small amount at one time. If either recognized what was going on, it wouldn't be nearly as productive.

So both regularity and irregularity are necessary for success in high-intensity exercise. A good training partner can be of great value on the application of this concept. He can be the initiator of a slight change to your routine at an unexpected time.

But for the first six weeks of training, I'd keep your three-days-per-week routine simple and easy to record.

One of the next things you need to understand is that as you get stronger, you make greater demands on your body's recovery ability. To continue to make steady progress, you must do less overall exercise.

Doing Less

Less overall exercise is accomplished in two ways: by reducing the number of workouts per week, and by doing fewer exercises per workout.

Let's say that your progress has come to a halt. You've been training several months, three times per week, and you've been performing one set of 12 different exercises. You're on a plateau, however. Your repetitions will not increase.

Here are my suggestions.

First, reduce your training frequency. But don't drop from three to two days per week. Go down to two-and-one-half days per week. To accomplish this, you must think in two-week segments. This way it becomes easy to manage: you go from six times in two weeks to five times in two weeks. Instead of Monday, Wednesday, Friday, Monday, Wednesday, Friday — the schedule becomes Monday, Thursday, Sunday, Wednesday, Saturday. Then the following two-week segment moves to Tuesday, Friday, Monday, Thursday, Sunday. Simply, get out a blank calendar, allow 72 hours between workouts, and mark your training days.

Second, you're now performing your 12-exercise routine five times in two weeks. As you get stronger, another plateau stands in your pathway. This is the time to do fewer exercises. Instead of 12, try ten — and continue doing ten until you plateau again.

Third, this plateau is a signal that you should reduce your frequency. Go from five times in two weeks to four times in two weeks, which equals twice a week.

Fourth, another plateau calls for fewer exercises. Try eight instead of ten.

Fifth, I've never trained an athlete or advanced bodybuilder — and I've trained some big, strong men — who needed to reduce past the level of three times in two weeks, nor do fewer than five exercises per routine. I suppose there are a few Goliaths somewhere who might thrive on such a schedule. I'd like to hear from you if you think you're in this category, or if you know anyone who is.

Order

The order, or sequence, of your exercise is another consideration. Let's examine the following three sequences for working body parts and decide which one will produce the best strength-training results:

Sequence 1: Popularity listing

- Biceps, triceps, chest, waist, shoulders, back, and legs
- Three days per week

Sequence 2: Larger to smaller

- Legs, back, chest, shoulders, triceps, biceps, and waist
- Three days per week

Sequence 3: Lower/upper body split

- Lower — thighs, calves, and waist
- Upper — chest, back, shoulders, biceps, and triceps
- Three days per week on lower body and three days per week on upper body, or six days per week in total

Now for the Analysis

Sequence 1, popularity listing, is the way most men train. The emphasis is on the show muscles: biceps, triceps, and chest. Recently, the waist has received a lot of attention, so many men often work their waist first. Either way, there are several problems behind such ordering.

First, the arms and chest contain much smaller muscle groups than those of the thighs and hips. Working these smaller muscles first usually leads to a less than all-out effort when you finally get around to exercising your legs last. I've found that it's to your advantage to train your largest, strongest muscle first — when you are the freshest and most motivated. You'll get a better spillover, or indirect effect, from the larger to the smaller muscles than from the smaller to the larger muscles.

Second, your largest, strongest muscles — the gluteals, quadriceps, hamstrings, and erector spinae — form the foundation, or core, of building a great upper body. Evidently, your body only allows a certain degree of disproportionate development. In other words, you can never reach your genetic potential in your upper body by working only your upper body. A certain amount of lower body exercise is required. In fact, frequently concentrating on your lower body is one of the secrets to massive upper body development. Thus, I usually recommend that you exercise your lower body before your upper body.

Sequence 2, larger to smaller, is the best way to sequence your body parts. It probably doesn't make too much difference about the torso ordering: chest before back, back before shoulders, shoulders before chest. They are all approximately the same size. I do, however, like to separate two pulling movements with a pushing exercise, or two pushing exercises with a pulling movement.

Sequence 3, lower/upper body split, and dozens of other ways to divide the body into various routines seems to be the most popular way for advanced bodybuilders to train. Most of these split routines require spending at least twice as much time in the gym as do overall body routines. Split routines soon lead to overtraining and inefficient results.

Years of experience have taught me that the human body operates best as a whole, not as separate parts. Even when you're trying only to work your lower body, you're still involving your upper body to a moderate degree. Your body works best as a whole. For maximum results, train it as a unit and rest it as a unit. It's that simple.

Exercises

In my 1995 book, "Living Longer Stronger," I evaluated 500 different exercises or variations that you could do with barbells, dumbbells, free-weight accessories (benches, racks, and pulleys), and machines. From this listing, I eliminated the overlapping, peripheral, and risky exercises, and thus narrowed the number to the 30 that really work.

You'll notice that, for best results, you need to perform both single-joint and multiple-joint movements. (Please see "Living Longer Stronger" for a complete discussion on how to do all the recommended exercises. You may order a copy by calling 888-231-2727.)

The following 30 exercises, listed according to body part, are the ones you should apply in your strength training:

Thighs and Hips

- 1) Leg extension machine
- 2) Leg curl machine
- 3) Leg press machine
- 4) Squats with barbell

Calves

- 5) Standing calf raise machine
- 6) One-legged calf raises with dumbbell

Shoulders

- 7) Lateral raise machine
- 8) Lateral raises with dumbbells
- 9) Overhead presses with barbell

Back

- 10) Pullover machine
- 11) Straight-armed pullovers with one dumbbell
- 12) Behind-the-neck pulldown machine

Chest

- 13) 10-degree chest machine
- 14) Bench press machine
- 15) Bench presses with barbell

Upper Arms

- 16) Biceps curl machine
- 17) Biceps curls with barbell
- 18) Negative chin-ups
- 19) Triceps extension machine
- 20) Triceps extensions with one dumbbell
- 21) Negative dips

Forearms

- 22) Wrist curls with barbell

Midsection

- 23) Abdominal machine
- 24) Trunk curls
- 25) Rotary torso machine

Lower Back

- 26) Lower back machine
- 27) Prone back raises
- 28) Stiff-legged deadlifts with barbell

Neck

- 29) Four-way neck machine
- 30) Shoulder shrugs with dumbbells

Recovery

I first became acutely aware of the importance of recovery in 1971 after reading about a challenge that Arthur Jones made in Ironman magazine.

Arthur promised he could add 1/2 inch of solid muscle on the arm of any bodybuilder from just one of his Nautilus workouts. He guaranteed his statement by saying he would pay for your round-trip ticket to Florida — if you failed to get the size increase.

Arthur's secret to the success of this promise (and he was successful more than 95% of the time) was not the Nautilus workout by itself. At least 50% of improvement was from the recovery ability replenished by totally resting for three days prior to training.

Arthur literally forced the visiting bodybuilders to rest and relax. He would not allow them to exercise for the initial 72 hours after their arrival. Interestingly, careful before-and-after measurements revealed that most bodybuilders noted a 1/4-inch increase in their arm size from the rest alone.

In other words, Jones knew that an overworked bodybuilder's arms would be stimulated to grow from simply not training. Not training meant additional rest, and additional rest led to a revived recovery ability.

Recovery ability is composed of numerous hormones, chemicals, and actions that occur inside your body. Plenty of things have to happen throughout multiple systems for muscles to grow larger and stronger. All of these happenings depend on chemical conversions. There is a limit, however, to the chemical conversions that your body can make within a given time.

As you become larger and stronger, you make deeper demands on your recovery ability. Your strength potential exceeds your recovery potential by an approximate six-to-one ratio. You simply cannot do, nor stand, more exercise as you get stronger — unless you reduce your intensity, which is a mistake. Your overall exercise has to be reduced.

Many advanced bodybuilders and strength athletes do not understand their limited recovery ability. Instead, they continue to practice with more sets and fewer rest days. Soon, their systems are likely to be overwhelmed to the point of near exhaustion.

Maybe there are a few exceptional athletes who can make positive gains in spite of their weakened recovery abilities. Don't assume that you are one of them.

Keep your body's ability to recover ability rested by training harder and briefer.

Sleep

What's the latest on sleep?

You need an abundance of it to build muscle, and even more if you're trying to build muscle and lose fat at the same time.

The importance of extra sleep and efficient fat loss comes to the foreground each time a group finishes one of my reducing programs. In June 1998, 48 people completed my "A Flat Stomach ASAP" course, under the direction of Tasso Kiriakes at BodeZ Fitness Center in Ormond Beach, Florida. In interviewing the ones that attained the greatest fat loss, I was reinforced once again that extra sleep significantly improves the shrinkage of adipose tissue. But why?

Fat on our bodies is intimately associated with survival. Before the twentieth century, and for thousands of years earlier, fatter people tended to live longer and produce more children than did leaner people.

Many of these people tended to be almost too lean. So a small amount of fat on the body was a safety net of great value. There weren't any morbidly obese people around then like you see today.

Living was hard. Famines and a scarcity of food were frequent occurrences. Almost any type of excessive stress sent a signal to the body to hold onto those life-preserving fat stores. Lack of sleep was certainly one of the primary forms of stress.

I've found that by sending your body a good signal — in the form of additional sleep — tells your system that stress is minimal, which, in turn, facilitates the fat-loss process.

A related survival concept also ties into the muscle-building process. Our hard-living ancestors depended on muscular strength as a primary means of survival. Hard, brief activity produced stronger muscles, and stronger muscles led to success at hunting and in battle. Stronger, larger muscles improved the probability of staying alive. Extra sleep helped replenish recovery ability, which made the muscle-building process more effective.

So, extra sleep is critical for the best-possible results from strength training. How much sleep is actually required for optimum support?

The 90-Minute Cycle

New research shows that the length of sleep is not what causes you to be refreshed as much as the number of sleep cycles you complete. Generally, one sleep cycle lasts an average of 90 minutes. This 90 minutes is composed of 65 minutes of normal sleep, 20 minutes of rapid-eye-movement sleep (in which you dream), and a final five minutes of normal sleep. The middle, rapid-eye-movement phase tends to be shorter during earlier cycles and longer during later ones. But still, each of the cycles tends to remain constant at 90 minutes, or 1-1/2 hours.

If you closely monitor your natural sleeping patterns, you will wake up, on average, after multiples of 1-1/2 hours. You will wake up after 4-1/2 hours, 6 hours, 7-1/2 hours, or 9 hours — but not after 7 or 8 hours, since these numbers are not multiples of 1-1/2 hours. In the period between cycles, you are not actually sleeping. It's sort of a Twilight Zone from which, if you are not disturbed, you progress into another 1-1/2-hour cycle.

Thus, it's important to plan your sleeping around multiples of these 1-1/2-hour cycles.

Most of you are probably getting too little sleep for maximum results from your strength training. Most of you could probably profit by adding one 90-minute cycle to your sleep each night.

Why don't you sleep on it?

A Basic Review

The essentials of strength training can be grouped under nine headings: form, progression, intensity, duration, frequency, order, exercises, recovery, and sleep. An understanding and application of the following rules will help you establish a framework for lifelong success:

- 1) Do each repetition smoothly and slowly.
- 2) Perform 8 to 12 repetitions for the 4-4 speed and 4 to 6 repetitions for 10-5. Either way, a set should take between 60 and 90 seconds. And stronger individuals will probably produce better gains staying closer to 60 seconds.
- 3) Continue each exercise until momentary muscular failure for maximum intensity, which means you're unable to lift the weight in good form.
- 4) Limit a routine to 12 exercises, or fewer, per workout.
- 5) Train three non-consecutive days, or less, per week.
- 6) Work the largest muscles first and the smallest muscles last.
- 7) Select exercises that involve both single-joint and multiple-joint movements.
- 8) Optimize your recovery ability by training less as you get stronger.
- 9) Sleep better each night by concentrating on 90-minute cycles.

Smoother, Harder, Briefer . . . Smarter!

Impressive levels of muscular size and strength require intelligent planning and training. Mastering the above guidelines is a big step in the right direction.

Decide now to exercise smoother, harder, and briefer. You'll increase your results because you'll be training smarter.

Revive, rebuild, and rejuvenate your life faster with these improved strength-training principles. They are your keys to stronger living in the new millennium.

You've got my personal promise!