

# fitness **matters**

VOLUME 14 • ISSUE 4 • SEPTEMBER/OCTOBER 2008 • \$5.00

American College of Sports Medicine  
A Non-Profit Organization

## **DROP AND GIVE ME 20!**

**Exclusive ACE study investigates  
the fitness benefits of popular  
boot camp-style workouts**

# LETTER FROM THE EDITOR

I got a late start on my spring cleaning this year. As I write this letter, August is more than half over and I've spent much of the month clearing out drawers and closets and making countless trips to the Salvation Army to drop off donations. Talk about cleansing—I've reached that point in my life where I actually derive more pleasure from getting rid of stuff than I do from acquiring new things. And, according to at least one recent diet book, clearing out the clutter in my home may offer the added benefit of helping me get rid of extra pounds.

The notion that too much stuff equals too much fat is just one of many novel (and some not-so-novel) ideas presented in a slew of new diet books. This is the time of year when publishers start sending out advance copies of their new releases and the stack on my desk seems to grow daily. Some titles appeal to our belief that other people know the secret to staying slim, such as those who live on Park Avenue or work on Wall Street. Others claim to have found the elusive magic bullet, which is really just a dietary supplement they're selling (because that's where the real money is). And still others revisit familiar territory, such as low-carb, low-fat or good old-fashioned calorie counting.

Given how many diet books have already been published (an Amazon.com search brings up 296,193 titles), how can there possibly be any more to say on the topic? But that may not be the right question. Rather, with so many diet books available, why are so many people still overweight (two out of three American adults at last count)? Perhaps too many of us are relying too heavily on the notion that if we just exercise enough willpower (and religiously follow one of the countless diet plans that claim to melt away the pounds), we'll finally hit our goal weight. In this issue, nutrition columnist Natalie Digate Muth examines the current findings on willpower and reveals the relatively simple changes people can make to finally take control of their weight.

In the meantime, I'll be spending the rest of the month getting rid of even more stuff I don't need, including the books currently cluttering my desk.

Christine Ekeroth

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Subscription price is \$19.95 per year. ISSN 1082-0361

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*ACE FitnessMatters* is published bimonthly by the American Council on Exercise, 4851 Paramount Drive, San Diego, CA 92123.

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## Cover Story

### Drop and Give Me 20! ..... 7

This exclusive ACE study investigates the fitness benefits of popular boot camp-style workouts.



## Inside This Issue

### Nutrition Spotlight: Why Willpower Isn't Always Enough ..... 4

With 40 percent of women and 30 percent of men on a diet at any given time, Americans have long relied on willpower to guide their nutrition choices and weight-loss pursuits. Consequently, when the pounds failed to melt away, many attributed the failure to a lack of willpower. But the latest research suggests that boosting willpower and self-restraint may not be the most productive way to lose weight.



### Keeping Tabs on Sports Injuries ..... 10

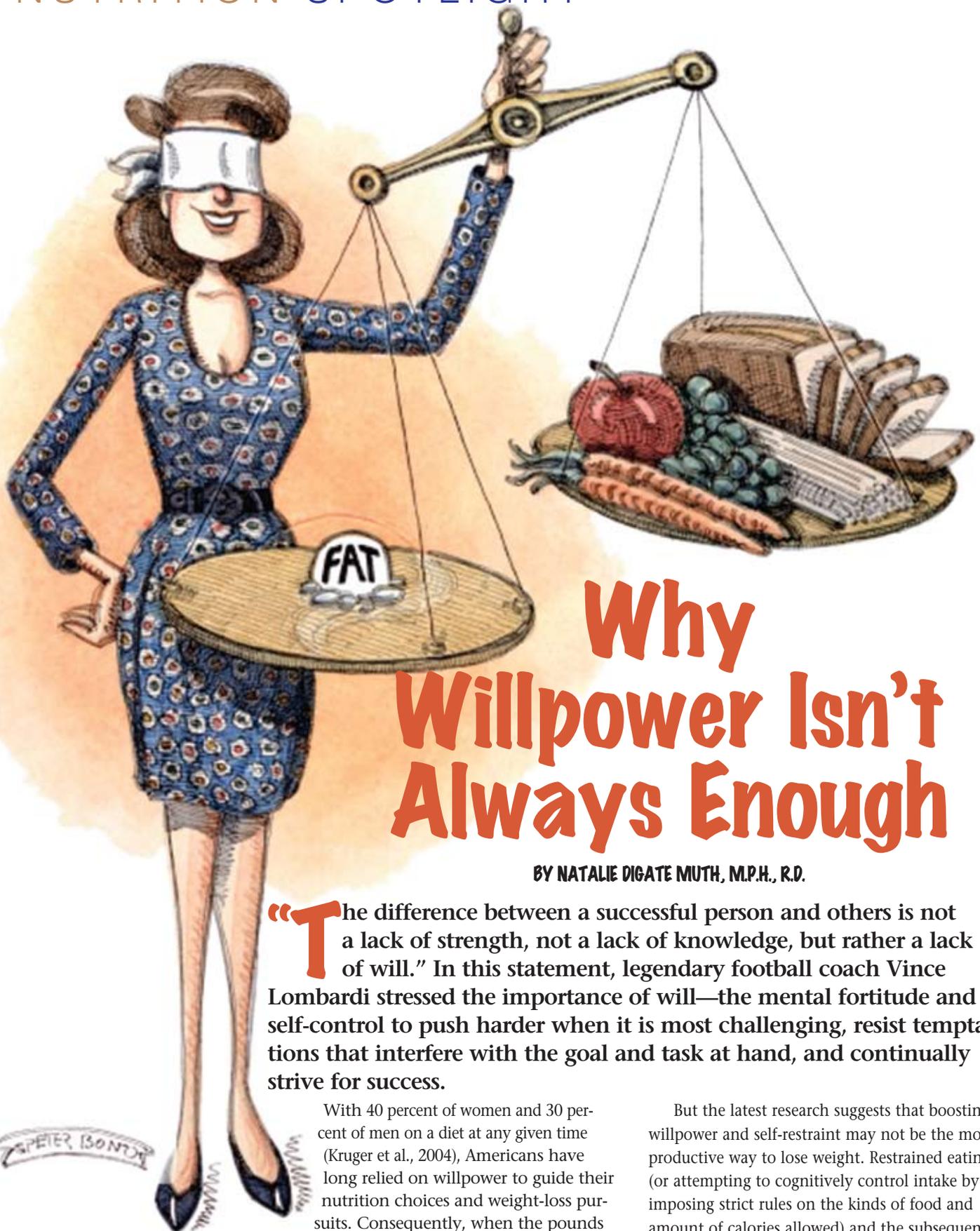
Only in the past 20 years have athletic injuries been systematically tracked, and this absence of hard numbers has many ramifications for injury prevention and treatment, the health of athletes and the allocation of medical funds.

### The Green Gym ..... 12

Every day, countless gym members are walking, running, spinning, dancing and weight lifting—releasing “energy” in the form of burned-up carbohydrates and fat. But what if we could harness the energy of people working out and reconvert it in an ecologically productive manner?



### CEC Quiz ..... 15



# Why Willpower Isn't Always Enough

BY NATALIE DIGATE MUTH, M.P.H., R.D.

**T**he difference between a successful person and others is not a lack of strength, not a lack of knowledge, but rather a lack of will." In this statement, legendary football coach Vince Lombardi stressed the importance of will—the mental fortitude and self-control to push harder when it is most challenging, resist temptations that interfere with the goal and task at hand, and continually strive for success.

With 40 percent of women and 30 percent of men on a diet at any given time (Kruger et al., 2004), Americans have long relied on willpower to guide their nutrition choices and weight-loss pursuits. Consequently, when the pounds failed to melt away, many attributed the failure to a lack of willpower.

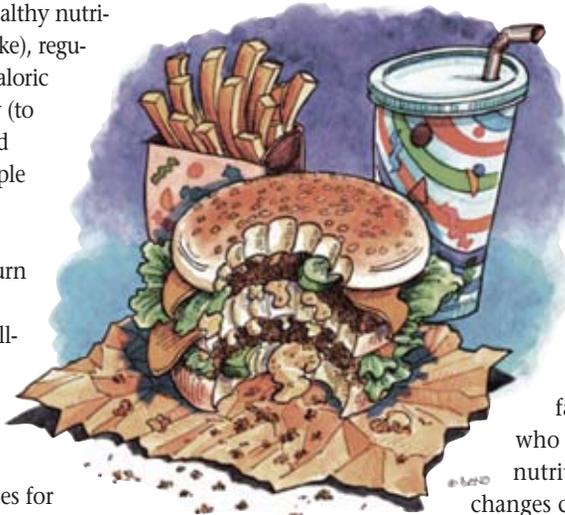
But the latest research suggests that boosting willpower and self-restraint may not be the most productive way to lose weight. Restrained eating (or attempting to cognitively control intake by imposing strict rules on the kinds of food and amount of calories allowed) and the subsequent perceived deprivation has been associated with weight gain rather than the desired weight loss.

Unlike unrestrained eaters who tend to regulate their intake in response to bodily cues of hunger and fullness, food consumption in restrained eaters is dominated by the conflict between two incompatible goals—the goal of eating enjoyment and the goal of eating control. According to the goal conflict theory of hedonic eating put forth by Stroebe and colleagues (2008), exposure to palatable food elicits thoughts about the taste of the food and the pleasure of eating it that trigger the inhibition of the incompatible goal of eating control and shifts attention to the palatable food stimuli. Soon the dieter craves the forbidden food and either eats the food (often in excess) or compensates with increased intake of allowed foods (Markowitz et al., 2008). Either way, caloric intake often exceeds caloric need and leads to the dreaded weight gain rather than weight loss (Markowitz et al., 2008). In the end, a constant reliance on willpower to control dietary intake makes resisting food temptations much more difficult.

## Minimizing Reliance on Willpower with Behavioral Change

While willpower may always play some role in maintaining a healthy weight, people trying to lose weight can diminish the importance of willpower in achieving success by ditching the diet mentality and instead committing to permanent lifestyle changes including balanced and healthy nutrition choices (to control caloric intake), regular physical activity (to maximize caloric expenditure), and behavior therapy (to facilitate adherence to nutrition and activity goals). Of course, most people already know they should eat right and exercise. Here are a few simple behavioral changes that can help turn knowledge into action and at the same time minimize reliance on willpower for weight loss success.

- **Avoid tempting situations** (aka “stimulus control”). Reduce cues for undesirable behavior and increase cues for desirable behavior. For example, keep the junk food out of the pantry and stock up on fruits and vegetables, dissociate from friends and colleagues with destructive eating and exercise habits and attitudes, make an effort to spend more time with active and healthy individuals, and eat small, well-planned meals throughout the day to help avoid a starvation binge or pit stop to the closest vending machine or fast-food restaurant. To reduce psychological cues to eat (such as boredom, habit, stress, etc.) restrict eating to the kitchen or dining-room table.
- **Self-monitor.** One of the strongest predictors of successful and maintained lifestyle change is monitoring dietary intake (Tinker et al., 2007). While it can be tedious to keep a daily food log, this practice is highly effective. For one week maintain a detailed food log listing the type and amount of food eaten, complete with calories, time of intake, hunger ratings, emotions and activities at the time of eating. Also record the



types and amounts of physical activity. Choose one representative day and assess your dietary and exercise quality at [www.mypyramidtracker.gov](http://www.mypyramidtracker.gov). This exercise will help to identify strengths and weaknesses that otherwise may have gone unchecked, and determine where formerly “forbidden” foods might fit in moderation.

- **Set SMART goals.** SMART (specific, measurable, attainable, relevant and time-bound) nutrition and physical-activity goals help set the stage for weight-loss success by transforming vague visions of thinness into a specific plan for a healthier lifestyle. Here’s an example of a SMART goal: “I would like to lose 5 pounds in the next two months. I will do this by exercising for 30 minutes three days per week and limiting dessert to one time each week.” Post visible reminders of your weight, dietary or fitness goals to help make achieving the goals a reality.
- **Practice behavioral substitution.** Many people turn to food when bored or stressed. Before raiding the refrigerator or pantry, ask why you are eating. If it is for any reason other than hunger, vow to substitute alternative behaviors to eating. For example, if you eat when you’re bored, take a 10-minute walk instead.
- **Retrain your brain—and taste buds.** Commit to eating a healthy, well-balanced diet that includes portion-controlled servings of a few of your favorite foods. This way the deprivation and cravings are minimized, and you might be shocked to find that after awhile, the fat- and sugar-filled foods that were once so desirable lose much of their allure. While willpower is a desirable attribute that is important for successful weight loss for many people, endless efforts to exert willpower often lead to feelings of deprivation, bingeing and diet failure. For restrained eaters, and others who rely heavily on willpower to make healthy nutrition and exercise choices, behavioral changes can help put an end to the ruthless cognitive war and allow eating and exercise to be healthful and enjoyable guilt-free daily activities. 

*Natalie Digate Muth, M.P.H., R.D., is a registered dietitian and an ACE-certified Personal Trainer and Group Fitness Instructor. She is currently pursuing a medical doctor degree at the University of North Carolina at Chapel Hill. She is also an ACE Master Trainer and freelance nutrition and fitness author.*

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# DROP AND GIVE ME 20!

## Exclusive ACE study investigates the fitness benefits of popular boot camp–style workouts

By John Porcari, Ph.D., Kirsten Hendrickson, B.S., and Carl Foster, Ph.D., with Mark Anders

**F**itness fads come and go, but boot-camp workouts are still among the most popular.

Back in the spring of 1998, the American Council on Exercise first spotted the rapid growth of instructor-led workouts based loosely on the calisthenics used (like push-ups, squat thrusts, punches, kicks, etc.) to whip new recruits into shape in the U.S. Army’s basic-training program. Ten years later, take a look at the class schedules of gyms and fitness centers across the country and you’ll still find boot camp. According to recent stats from the International Health, Racquet & Sportsclub Association, a trade organization for health clubs, 955 of its 3,306 member clubs offer boot camp–style fitness classes. And it’s not just hot in the gyms. A quick scan of the exercise videos offered on [Amazon.com](http://Amazon.com) yields more than 30 different boot-camp videos.

“There’s a certain element of getting back to the basics and a more functional-training approach,” says ACE’s chief science officer Cedric X. Bryant, Ph.D. “People are looking for different experiences. With boot camps, you’re giving them something outside the traditional club environment.”

Maybe the boot-camp trend is still going strong because it’s not really trendy at all. The workout is simple and not tied to a single piece of equipment. Or maybe it’s the motivating team-oriented atmosphere that’s created as fellow exercisers ‘survive’ the workouts together.

Whatever the reason, boot camp remains wildly popular, yet surprisingly its efficacy has never been formally stud-

ied. “Boot camp is becoming more and more popular in the health club setting so obviously people want to know if they’re really going to get something out of it, and if it’s going to be worth their time,” says Kirsten Hendrickson, a graduate student in exercise and sports science at the University of Wisconsin. “So we decided to take a look at it.”

### THE STUDY

To analyze the health and fitness benefits of boot camp–style workouts, a team of exercise scientists from the University of Wisconsin, La Crosse Exercise and Health Program, led by John Porcari, Ph.D., and Hendrickson, recruited six men and six women ages 19 to 29.

All volunteers were given an exercise test on a motorized treadmill to determine each subject’s maximal heart rate (HR max) and maximal oxygen consumption ( $\dot{V}O_2$  max) to establish a baseline of fitness. Ratings of perceived exertion using the 6–20 Borg Scale, a measure of how hard subjects feel they’re exercising, were also recorded throughout the exercise testing.

Once that baseline was established, the subjects were

invited back into the lab to view a 40-minute recorded boot-camp exercise video. Naturally there are many boot camp–style exercise videos on the market, so researchers reviewed a wide range of titles, eventually settling on *The Method: Cardio Boot Camp with Tracey Mallett*. “We chose that DVD because it has a good

### HOW DOES BOOT CAMP COMPARE TO OTHER WROKOUTS?

	%HRmax	% $\dot{V}O_2$ max	kcal/min
Boot Camp	81	62	7.5
Cardio-kick boxing	86	70	8.1
Spinning	89	75	9.6
Aerobic Dance	85	71	9.7
Curves	75	60	6.4
Power Yoga	62	46	5.9
Advanced Pilates	62	43	5.6

blend of aerobic movements and strength moves that you'd picture military guys doing at boot camp," notes Porcari. "Plus we wanted to pick one where people were taxed pretty hard because that's what you picture when you think of boot camp."

The study volunteers were given a copy of the DVD to take home and practice until they felt familiar enough with the choreography to be able to follow along easily with the workout. At that point, they were asked to return to the lab for testing. Each subject was then outfitted with the Cosmed portable analyzer, a backpack and facemask apparatus that measures oxygen consumption and caloric burn. Heart rate and perceived exertion were also tracked every three minutes throughout the 40-minute workout.

## THE RESULTS

After analyzing the data, researchers found that the average exerciser burns approximately 9.8 calories per minute during a typical boot-camp workout, which equals nearly 400 calories during the entire 40-minute boot-camp video studied (Table 1).

"The biggest benefit is you're burning an average of 600 calories per hour," says Porcari. "That's obviously going to help with weight loss, but you're also getting the muscle-building benefit from pushups, arm curls and squat thrusts that you wouldn't get just from going out for a fast walk or jog."

According to recommendations set by the American College of Sports Medicine (ACSM), to enhance cardio-respiratory endurance individuals need to exercise at 70 percent to 94 percent of HR max and 50 percent to 85 percent of  $\dot{V}O_2$  max. Based upon the data collected in this study, subjects were exercising well within those recommended intensity levels. "On average, people were working at 77 percent of heart-rate max, which is considered moderate intensity, but it also gets as high as 91 percent, meaning, all these boot-camp workouts have peaks and valleys," Porcari explains. Figures 1 and 2 offer a visual representation of how heart rate and oxygen consumption varied by the minute as the test subjects followed the video from high-intensity moves like kicking and punching, down to low-intensity moves with the dumbbells, and back up again to high-intensity moves.

"These workouts are designed to be cyclical like that," he explains. "Boot camp is a good form of interval training because you get periods of high intensity interspersed with moves that tend to be lower in aerobic intensity but they serve a whole different purpose—to build muscle strength."

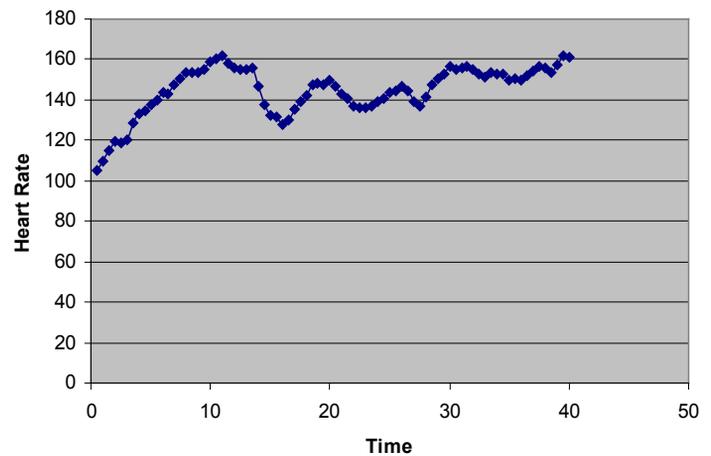
*Continued on page 16*

**BOOT CAMP WORKOUT  
FOLLOWS ON PAGES 8 & 9**

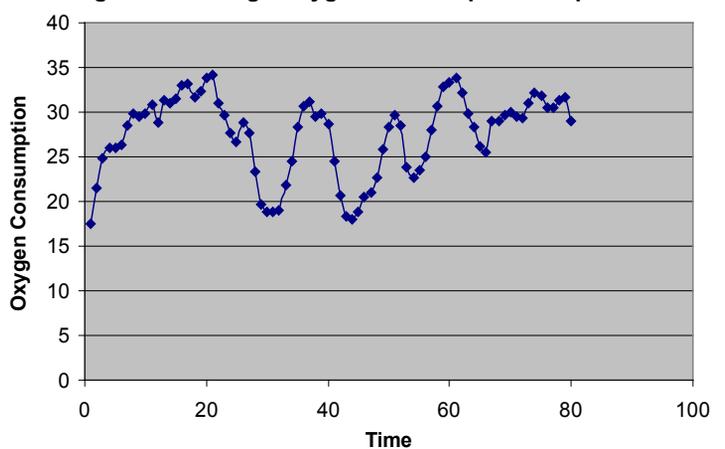
**Table 1**  
**Physiological Results From the Boot-camp Workout**

	Males (n=6)	Females (n=6)	Overall (n=12)
Average HR	138±14.9	152±10.1	145±12.5
% HRmax	73±11.8	81±14.3	77±12.8
Highest HR	167±18.9	174±9.9	171±15.2
%HRmax	88±11.5	93±5.9	91±7.7
Average $\dot{V}O_2$	29.2±6.73	25.9±4.24	27.6±6.90
% $\dot{V}O_2$ max	62±10.9	62±4.24	62±8.9
Highest $\dot{V}O_2$	37.4±2.66	34.6±6.38	36.0±4.57
% $\dot{V}O_2$ max	80±12.4	83±6.3	82±8.38
Average RPE	13.3±1.4	13.5±1.4	13.4±1.4
Highest RPE	14.8±1.3	14.9±1.4	14.9±1.4
Average Kcal/min	12.0±2.50	7.5±1.92	9.8±2.11
Highest Kcal/min	15.3±2.46	9.9±1.82	12.6±3.10
Total Average Kcal (40 min)	480±102	300±74	392±96

**Figure 1. Average Heart-rate Response**



**Figure 2. Average Oxygen Consumption Response**



This study was funded solely by the American Council on Exercise (ACE) and conducted by John P. Porcari, Ph.D., Kirsten Hendrickson, B.S., and Carl Foster, Ph.D., at the La Crosse Exercise and Health Program of the University of Wisconsin, La Crosse.

# THE WORKOUT



## 1. Military Press with Reverse Lunge

Works glutes, hamstrings, quads and deltoids  
(Use 5- to 8-pound dumbbells)

- Start with your legs together, elbows bent and palms facing forward.
- Step back with your left foot in to a lunge position as you press your hands overhead. Then step your left leg back to join the right leg as you lower your arms. Alternate legs and do 10 repetitions with each leg.



## 2. Side Kick to Plié Squat

Works glutes, quads, hamstrings and abs

- Start with your legs shoulder-width apart, turned out at the hips, with both knees bent and your hands by the face in a fighting stance.
- The left foot joins the right foot as you twist the hips slightly to the left. Internally rotate the right leg at the hip and kick the leg out to hip-height. As the leg comes down, step the left leg out into a plié squat. Do 10 reps then repeat on the opposite side.



## \*CARDIO INTERVAL

### 3. Shoot the Hoop

Works quads, hamstrings, calves and abs

- Stand tall, knees slightly bent and arms by your side.
- Jump up and reach your arms overhead as if you were shooting a basketball. Then crouch down while bending your knees to touch the floor. Do as many reps as you can in 60 seconds while maintaining correct form.



### 4. Plié with Reverse Fly

Works posterior deltoids and rhomboids  
(Use 3- to 5-pound dumbbells)

- Start with your legs in a wide stance and turned out at the hips with the toes pointing out to the corners of the room. Lean forward slightly from the hips and position your arms in front of you, palms facing each other and your elbows slightly bent as if you are hugging a large ball.
- Bend both knees and lower into a plié as you draw the shoulder blades together and move the arms to the side of the body at shoulder-height. Return to the starting position and; do 15 repetitions.



The following boot-camp workout is based on the moves found in Tracey Mallett's exercise DVD, *The Method: Cardio Boot Camp*, which University of Wisconsin, La Crosse, researchers used in this study. For this workout, you'll need a pair of 3- to 8-pound dumbbells. Do one set of each of these moves in the order shown here, then repeat the circuit two more times. And don't forget to add a gradual warm-up (light jogging, jumping jacks, etc.) and finish up with a cool-down and some whole-body stretches.

**\*CARDIO INTERVAL**

**5. Speed Skate with Oblique Twist**

*Works quads, hamstrings, glutes, calves and obliques*

- A. Stand with your feet together, knees slightly bent and arms by your side.
- B. Jump up and land on the right leg in a squat with your knee over your toes as you swing the left leg behind your body, twisting your torso and arms to the right side. Repeat with the other leg; continue alternating legs and do as many reps as you can in 60 seconds while maintaining correct form.



**6. Knee Repeater**

*Works glutes, hamstrings, quads and abs*

- A. Start with your right leg behind the body in a deep lunge position and your hands extended forward, level with your ears.
- B. Contract the abdominals and draw your right knee in toward the chest as you bend your elbows and draw them in to touch your knee. Repeat this movement, keeping the supporting leg bent. Do 15 to 20 repetitions and then repeat with the other leg.



**7. Classic Push-ups**

*Works deltoids, pecs, triceps and core*

- A. Get into plank position with your hands positioned on the floor directly beneath your shoulders. Inhale as you bend your elbows, then exhale and extend the arms. Try not to sink in between the shoulder blades. Draw your shoulder blades down towards the pelvis and away from your ears. Do 10 to 15 repetitions.



# Keeping Tabs on Sports Injuries

By Jim Gerard

**W**hile medical science has made great strides in diagnostic, surgical and rehab treatments for athletic injuries, it is being handicapped by a fundamental problem: Nobody really knows exactly how many athletes are being injured, why and in what ways. In fact, only in the past 20 years have athletic injuries been systematically tracked at all. The unavailability of reliable data is disconcerting considering that:



- ✦ **One** in **five** emergency room visits—or **3.65 million** emergency room visits per year—are the result of participation in sports, recreation or exercise.
- ✦ Approximately **715,000** sports and recreation injuries occur each year in school settings, while high school athletes alone account for an estimated **two million** injuries, **500,000** doctor visits and **30,000** hospitalizations annually.
- ✦ Injuries to children younger than **15**, involving **29** popular sports, cost the U.S. public more than **\$49 billion** in medical costs per year. (More than **\$1 billion** of this sum results from the **100,000** to **300,000** ACL injuries a year.)\*

\*Statistics compiled from the Centers for Disease Control and the Consumer Products Safety Commission.

Despite the increasing incidence of athletic injuries, especially to teen girls, the tracking of the prevalence, frequency and sport-specific associations of these injuries is not only incomprehensive but employs a divergence of methodologies that makes it, well, not very scientific.

This absence of hard numbers has many ramifications for injury prevention and treatment, the health of athletes and the allocation of medical funds. As Michael Sokolove wrote in a recent *The New York Times Magazine* story, “Comprehensive statistics on total sports injuries are in short supply. The NCAA compiles the best numbers, but even these are based on just a sampling of colleges and universities. For younger athletes, the numbers are less specific and less reliable. Some studies have measured sports

injuries by emergency-room visits, which usually follow traumatic events like broken bones. ACL and other soft-tissue injuries often do not lead to an E.R. visit; the initial examination typically occurs at the office of a pediatrician or an orthopedic surgeon. Studies of U.S. high-school athletics indicate that, when it comes to raw numbers, boys suffer more sports injuries. But the picture is confounded by football and the fact that boys still represent a greater percentage of high-school athletes.”

Dr. Tim Hewitt, director of the Sports Medicine Biodynamics Center at Cincinnati Children’s Hospital Medical Center’s Human Performance Laboratory and leader of one of the country’s only large-scale injury studies, agrees with Sokolove. “The NCAA system [the ISS for Injury



Emergency Room database, can count the number of injuries, but their tallying is far from perfect. Each injury gets assigned a code that might tell us that a certain injury is a knee injury, but doesn't specify what part of the knee—cartilage, ACL—was injured or its severity.”

Compounding the problem is the issue of relative numbers. Simply counting injuries doesn't tell science much; they need to know how many injuries occurred per the population of each hospital that reported the injury (otherwise known as “exposures”). As Hewitt says, “A lot of epidemiological data from emergency rooms and sports injury clinics is either gross estimates or plain inaccurate.”

As an example, he cites two studies. The first measured injuries to two groups of Italian male amateur soccer players. One group did wobble-board training prior to their season and the other didn't. After the season, they totaled the number of ACL injuries and concluded that the group that did the wobble-board

training was seven times less likely to have ACL injuries. Their error, Hewitt says, is that the researchers just counted the number of injured footballers who came to one particular hospital. “They didn't know how many injured players went to other hospitals.”

A second study, conducted in 2005, revealed that young women athletes tear their ACL at a rate five times higher than males. But, Hewitt says, “The rate not only has to be the number of athletes injured compared to the number who competed—that is, the prevalence of injuries—but also of the number of exposures—games played, practices played—plus the total hours of exposure by each athlete. However, as Yard says, “Such a comprehensive methodology would be ideal, but coaches can't watch every single player 100 percent of the time.”

Another factor leading to inadequate injury reporting is that not all injuries are reported. Many injuries (such as kneecap pain) often don't require a hospital visit and

primary care doctors may not report them.

The discrepancies in methods lead to disparities in results. Hewitt's studies show that more athletes are injured in practice (greater cumulative time playing), while Yard's suggest that more are injured in competition (greater intensity and illegal fouls).

## So Many Injuries, So Little Money With Which to Track Them

The main reason for the lack of comprehensive injury statistics is the sheer expense of their maintenance. “Money is a big factor,” Yard says. (In fact, economic considerations recently led the NCAA to spin off its Injury Surveillance System to the Datalys Center for Sports Injury Research and Prevention, a private nonprofit company. Datalys told *ACE FitnessMatters* that they have yet to begun their initial study.)

Hewitt is fortunate to have raised “millions” from the National Institutes of Health, National Football League charities and other sources for his program for athletes ages eight to 22. Toward a goal of total accuracy, he has instituted a two-stage system. First, thousands of athletes are brought into the lab for biomechanical and epidemiological studies. A 10-camera system with force plates in the floor records them running, jumping and cutting. Virtual models of the athletes' bodies are created that measure movements, force on the joints and related data.

During the athletic seasons, Hewitt sends researchers to follow these athletes in performance. The trackers file Internet reports on the nature of the sports played, the number of athletes playing in games and practices, and the number of exposures by every athlete at that school every day—and, of course, the number and type of injuries. Then he sends medically trained “cross checkers” to verify the initial findings.

After the season, when the injury reports are compiled, they're compared to the computer models, which leads Hewitt and his team to examine, say, what motion patterns lead athletes to tear their ACLs and

**A second study, conducted in 2005, revealed that young women athletes tear their ACL at a rate five times higher than males.**

Surveillance System] is considered state of the art,” he explains, “but they only track some sports and only higher division schools.”

Currently, the only major study of high school injuries is the National High School Sports Related Injury Surveillance Study, conducted by the Center for Injury Research and Policy at Nationwide Children's Hospital in Columbus, Ohio. This study, funded by the Centers for Disease Control and the National Athletic Trainers Association, collects information on nine sports from just 100 high schools across the country, and is only the second large study of high school injuries ever conducted. However, Ellen Yard, M.P.H., a research associate at Nationwide, concedes that while “our main mission as a pediatric hospital is to reduce the incidence of injuries in teens,” most of the injuries they track are of “a non-catastrophic nature.”

## What Injuries Should be Tracked and How?

Beyond the paucity of large-scale studies lies the problem of methodologies, which, Hewitt says, are lacking in scientific rigor. “Some institutions, such as the National

*Continued on page 16*



# The Green Gym

By Jim Gerard

One definition of a gym is a place where we go to get healthier. But what if we took an imaginative leap and considered gyms not as facilities where people go to get energized but places where people go to waste energy—and reconvert it in an ecologically productive manner.

After all, in the course of a day hundreds, if not thousands, of gym members are walking, running, spinning, dancing and weight lifting—releasing “energy” in the form of burned-up carbohydrates and fat. Where does that energy go? Essentially, it dissipates into the air.

Ronald Geyer, assistant professor of industrial ecology at the University of California Santa Barbara, hypothesizes, “Wouldn’t it be more efficient if someone could harness the energy of people working out? If they could use bikes, rowing machines and treadmills to power lights and fans?”

This may sound like some quaintly anachronistic “world of the future” exhibit from 1939, but a few people actually are doing it, including personal trainer Adam Boesel, owner of Total Body Turnaround: A Green Microgym in Portland, Ore. ([www.nwtrainer.com](http://www.nwtrainer.com)). Boesel’s 1,000-square-foot “little gym that could,” with its combination of solar and human power, is almost completely self-sustaining.

## Gym of the Future?

Boesel’s equipment relies on little electricity; in fact, it usually creates a power surplus. His spin bikes are hooked up to DC generators that produce electricity, which in turn is directed into a 12-volt battery bank. This bank can power TV sets, stereos, lights and ceiling fans. His treadmills also are self-powered. (They have no motors.) Boesel and his clients use a portable, free-motion cable machine for weight training. “Each piece of equipment in my gym is used for a variety of purposes and is extremely energy efficient,” Boesel says. He admits to using electric heat, but the lighting is mostly of the high-efficiency, LED variety.

Boesel stocks his club almost exclusively with refurbished or used equipment, including high-performance road and mountain bikes made of bamboo. And in his “spa” area, Boesel uses on-demand hot-water heaters (the tanks only heat the water when it is used) and environmentally sensitive solvents. The beauty part is that Boesel’s solar panels and electricity-generating equipment is hooked up to the local power grid, so if gym members run up a surplus of energy, he can sell it back.

The reason why innovations such as Boesel’s are important is that, like most of our buildings, gyms can be less than healthy places—if not for the individual members, then certainly for the environment. Most consume large quantities of electricity and water and use building materials, solvents and fitness equipment that often contain unhealthy, even toxic, substances.

Christa Plaza, an architect with Essenza Architecture in Boulder, Colo., says, “U.S. health clubs are the least green in the world, due to the fact that coal and oil have been very easy for the U.S. to obtain in the last half century. Now that these resources are depleting, we’re looking for alternative energy sources.” She goes on to say that, “The average health club could improve their energy efficiency and water usage by at least 30 percent. This would not only be great for the environment, it would be better for the clubs’ cash flow.”



## A Green Gym Checklist

After speaking with a number of leading health-club architects, we’ve compiled a comprehensive checklist of all the features necessary to create a green gym:

- building materials that reduce indoor air pollution
- light-saving switches that adjust to either the relative occupancy of the club or the amount of daylight at any given time
- low-flow plumbing fixtures
- solar heating for pools
- salt-water pools (they require less chlorine)
- solar panels for the hot-water system
- heat-recovering pool dehumidifiers
- water-conserving showers
- high-performance glass
- cold-water laundry systems
- high-extraction washers that reduce drying time (and thus save energy)
- bicycle parking that encourages members to leave their gas-guzzling cars at home
- bamboo floors
- recycled rubber floors
- efficient storm water management
- landscape design that supports irrigation efficiency
- paints and adhesives with low VOCs (volatile organic compounds that are emitted from these substances’ gases, some of which cause short- and long-term health problems)
- ceiling fans
- use of recycled materials and durable, recyclable equipment

*Continued on page 14*

In the view of experts, many health clubs adhere to an outdated, but heretofore successful business model that eschews concern for the environment—even when jettisoning it in favor of a “greener” approach could result in higher profits. It is up to clubs to reconcile the healthy activity going on inside their buildings with the less salubrious effects they have on the environment.

This is a conundrum that Boesel and other people across the disciplines of architecture, environmental science, exercise product manufacturing and personal training are attempting to solve. They are taking the first steps toward the creation of an ideal, “green” gym.

## How to Build an Eco-gym

From talking to experts in these fields, it is clear that the proliferation of eco-gyms will not happen overnight. For one thing, according to Geyer, “It’s so much harder to retrofit environmental concerns into an existing system—that is, to ‘green’ a building that’s already in existence. It’s much easier to start from scratch.”

To do so, the health club owner, together with his or her architect, would have to consider such elemental factors as geography (the climate zone), the placement and orientation of the building (to maximize the amount of natural light), and the direction of the wind (to maximize natural air flows and minimize air conditioning, a huge energy drain).

The gym’s interior would feature fluorescent and LED (light-emitting diode) lighting, rather than incandescent, and use non-toxic, eco-friendly solvents, flooring and equipment.

Moreover, the proprietors would have to examine not only the environmental impact of its own operations, but also those of its supply chain, from first- and second-tier suppliers all the way back to the original materials used—what Geyer calls the “life-cycle perspective.”

The biggest challenge for large clubs would remain overconsumption of energy. However, as Boesel has shown, solutions—however outlandish they may seem initially—are well within our imaginative reach. Moreover, a combination of city, state and federal “green” incentives, such as tax credits for solar power

installation, can reinforce the gym owner’s commitment to the environment.

Issues of scale remain; Boesel admits that he is able to attain this high level of environmental correctness because his gym is small, with only 30 members. But he sees no reason why gyms and studios of all sizes can’t implement at least some of his practices.

## Harnessing Human Power

His optimism is reflected by the innovations occurring in places ranging from Rotterdam, where the Sustainable Dance Club turns night clubbers’ dance steps into energy, to Hong Kong, where California Fitness, a gym started by French inventor Lucien Gambarota and American entrepreneur Doug Woodring, features a 13-step cycling and cross-training machine program called “Powered by YOU,” in which the energy burned off by exercisers is diverted and converted to power lighting fixtures, while excess energy is stored in a battery. (By contrast, a standard stationary bike only uses about 10 percent of its electricity to operate the machine, while 90 percent, in the form of heat, is wasted.)

Stephen J. Tharrett, who tracks gyms around the world as president of Club Industry Consultant in Dallas, says that there’s no reason why large health club chains can’t implement such a program.

They could start by buying their treadmills from a manufacturer such as Woodway, in Waukesha, Wisc. ([www.woodway.com](http://www.woodway.com)). Eric Weber, Woodway’s director of sales and marketing, claims that their non-motorized models—which are used by many professional sports teams and celebrities—“don’t consume any more electricity than a light bulb.”

Recycling is another way to enhance the greening of a gym. Some American club operators are catching on by using recycled materials for renovations, such as flooring made from second-use rubber or carpeting and shower panels created from soda bottles. Tharrett adds, “Many club operators around the country are using environmentally friendly cleaning products, sustainable materials such as bamboo in group exercise floors, and cork—a renewable substance—in massage and spa rooms.”

**Solutions—  
however outlandish  
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Boesel adds that the concept of green fitness can be made literal by exercising outdoors, in nature, using portable equipment or even one’s own body weight.

Although Americans lag behind Europe and South America’s eco-sensitive gyms, Hervey Lavoie, president of the architectural firm Ohlson Lavoie Collaborative in Denver, foresees an accelerated increase in environmental concerns, driven by consumer awareness of healthy building, increased media promotion of sustainable design, more rigid building codes and improved technologies. Not to mention \$130-a-barrel oil. “Within three to four years, the economic payback for going green will make it worthwhile for gym owners to do so.”

Geyer thinks that gyms could benefit financially by using “greening” as a marketing tool, and they could even use energy-savings as a fitness motivator. “Machines could have a data log that converts each member’s workout into energy units. They would be told how many kilowatt hours they generated, and the gym could offer prizes to the members who saved the most energy.”

This socially conscious approach to working out is a far cry from “go for the burn,” but in an age where fossil fuel consumption may be destroying the planet, maybe that’s not such a bad thing. 



# ACE FITNESSMATTERS CEC QUIZ

September/October 2008

To earn 0.1 continuing education credits (CECs), you must carefully read this issue of *ACE FitnessMatters*, answer the 10 questions below, achieve a passing score (a minimum of 70 percent), and complete and return the credit verification form below, confirming that you have read the materials and achieved a minimum passing score. In a hurry? Take the quiz online at [www.acefitness.org/fmquiz](http://www.acefitness.org/fmquiz) for instant access to CECs.

Circle the single best answer for each of the following questions.

- It is estimated that \_\_\_\_\_ percent of women and \_\_\_\_\_ percent of men in the U.S. are on a diet at any given time.
  - 20, 10
  - 40, 30
  - 50, 25
  - 60, 20
- Which of the following is NOT one of the reported benefits of most boot-camp workouts?
  - Improves fine motor skills
  - Increases total-body muscle strength
  - Helps control body weight
  - Enhances aerobic capacity through high-intensity intervals
- Which of the following is NOT an example of a SMART goal?
  - I am going to train four days per week so I can run a 5K three months from now.
  - I want to lose 5 pounds in the next five weeks by doing 30-minute workouts three days per week and limiting dessert to three days per week.
  - I'm going to exercise as much as possible so I can look great for my husband.
  - Within one year, I want to lose 20 pounds by using my treadmill for 40 minutes three to five days per week and by eating fewer empty-calorie foods.
- According to ACE-sponsored research, the average exerciser can expect to burn about \_\_\_\_\_ per hour during a typical boot-camp workout.
  - 300
  - 400
  - 500
  - 600
- Which of the following is NOT a benefit of better sports-injury tracking?
  - Identifying athletes at high-risk of injury and tailoring training programs to decrease risk
  - Inducing changes in sporting rules and equipment
  - More accurately directing where to invest money in the prevention of injuries
  - Reducing health-care costs and liabilities of sports teams
- Environmental experts suggest that the average health club has the ability to improve its energy efficiency and water usage by at least \_\_\_\_\_.
  - 10 percent
  - 30 percent
  - 50 percent
  - 70 percent
- One of the strongest predictors of successful lifestyle and weight-management change is \_\_\_\_\_.
  - High levels of willpower
  - Health-related motivating factors
  - Monitoring dietary intake
  - High degree of self-efficacy
- The primary reason there is a lack of reliable data on athletic injuries is because \_\_\_\_\_.
  - Researchers aren't sure where to target their research.
  - All injuries are reported, making the data impossible to decipher.
  - Too many studies with different methodologies are being conducted at the same time.
  - There isn't enough funding to conduct rigorous, well-designed studies.
- Which of the following would NOT be considered a component of a "green" health club?
  - Hot-water laundry systems
  - LED lighting
  - Bamboo floors
  - Ceiling fans
- Of the more than 18 million visits Americans make to emergency rooms each year, \_\_\_\_\_ are the result of participation in sports, recreation or exercise.
  - 5 percent
  - 10 percent
  - 20 percent
  - 30 percent

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FM

# Keeping Tabs on Sports Injuries

Continued from page 11

what predisposing factors cause an athlete to fracture his tibia.

Yard's system foregoes the "Matrix"-like machinery; it simply employs field reporters armed with specific metric criteria for injuries. "It has to require medical attention, the player has to have missed at least one day of competition or practice due to it, and the injury had to occur during a school-sanctioned practice and competition. We also collect info on every concussion."

## Tracking Injuries to Help Prevent Injuries

The benefits to athletes of these tracking systems are manifold. Hewitt says that his database can identify an athlete who is at moderately or very high risk for a certain type of injury and tailor training to help him or her decrease that risk. His lab has published more than 100 studies, and among their most important findings is that

female athletes when running are predisposed to push their knee inward, toward the midline of their body. This enabled the lab to accurately predict 80 percent of female athletes who subsequently suffered such injuries. Just as important, this epidemiological research helped secure NIH funding for the lab.

More accurate injury data can also induce changes in sporting rules and equipment. For example, biomechanical studies cut in half the number of neck and spine injuries in college football (by far the most injury-riddled sport) by eliminating spear tackling (hitting opponents with the top of the head).

Yard says that in response to epidemiological injury data her group performed, high school football officials were discouraged from moving back the kickoff line (which would have led to more injuries). And injury tracking has led sports officials to mandate more protective equipment, such as football helmets that absorb energy, and mouth guards and eye goggles in women's lacrosse.

Yard maintains that more accurate injury information will "help us direct where we put our money for prevention. If the data is inaccurate, you might invest time and money in studying less frequent or relatively minor injuries instead of critical injuries that require immediate attention. Solid epidemiological data can give scientists ideas about the underlying mechanisms of problems and accurately direct them toward proper research and resource allocation.

While researchers leading current studies claim that their systems are getting ever-more accurate, they concede that more can be done. "We need to expand the number of sports and the number of schools participating in our studies," says Yard.

This, like many things, is a matter of money. For now, the hope is that the few rigorous studies that are currently underway can persuade funding sources that there are few matters more worthy than the health and safety of our young people. 

## Drop and Give Me 20!

Continued from page 7

### THE BOTTOM LINE

Boot camp is an excellent way to enhance aerobic capacity and help control body weight. "I think it's a great workout with great variety," says Porcari. "It's a good combination of aerobic exercise and muscle conditioning and it's much more of a total-body workout than just going out for a run or bicycle ride."

But remember, not all boot-camp workouts are created equal, he warns. Some are heavy on cardio, while others emphasize martial arts-inspired movements or basic strength-training exercises. For best results, our researchers recommend picking a well-balanced program with equal helpings of aerobic movements and calisthenics. However, if you're looking to improve in a particular area, you might consider looking for a boot-camp class or video that caters to your particular fitness weaknesses. For example, if you'd prefer build more upper-body strength and endurance, consider picking one with more push-ups, squat thrusts and similar moves.

"If people are looking for something that's fun and variable that will increase their adherence to an exercise program, and, most importantly, burn a lot of calories," says Hendrickson, "boot camp would be a really great option." 



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