



Here's To Your Health

A Phoenix Fire Department Health Center Publication

www.phoenix.gov/fire/wellness.html

All About the Workout Edition!

January 2007

No Weights, No Problem!

Few believe it, but you don't need barbells, dumbbells, or machines to build muscle; in fact, weight-training equipment often inhibits the process. That's because it requires you to be in a specific location, which might explain why more people consider themselves runners than lifters. After all, running is the most accessible form of exercise -- anywhere you go, there's your gym. But learn a little bit about physics and the same can hold true for your muscle workout.

Consider the pull up: It's the standard by which all body-weight exercises are measured. And even the most hard-core lifters will agree that there's no better muscle builder for the upper body -- with or without weights. The reason for its effectiveness: It takes full advantage of the scientific laws of motion and leverage, placing your body in a position that forces your back and arms to lift your entire body weight. Call it applied science at its finest.

Now imagine if all body-weight exercises were as challenging as the pull-up. You'd be able to build muscle anywhere, anytime -- at home, on the road, or even in a public park. Physical science makes it possible. So with that said . . . the Five Laws of Body-Weight Training.

Law #1: The longer your body, the weaker you become.

The science: By increasing the distance between the point of force (your target muscles) and the end of the object you're trying to lift (your body), you decrease your mechanical advantage. Think of it this way: An empty barbell is easy to lift off the floor if you grab it in the middle. But try moving a few inches in one direction and it instantly seems heavier -- even though its weight hasn't changed. The same is true of your body: Lengthen it and every exercise you do becomes harder.

Apply it: Raise your hands above your head -- so your arms are straight and in line with your body -- during a lunge, squat, crunch, or sit-up. If that's too hard, split the distance by placing your hands behind your head.

Law #2: The farther you move, the more muscle you work.

The science: In physics, "mechanical work" is equal to force (or weight) times distance. And since your muscles and bones function together as simple machines -- they form class 1, 2, and 3 levers -- the same formula applies to your body. It's the most basic of principles: Do more work, build more muscle. Of course, in a weight-free workout, you can't increase force (unless you gain weight). But you can boost your work output by moving a greater distance during each repetition.

Apply it: Each of the following three methods increases the distance your body has to travel from start to finish, increasing not only the total amount of work you do, but also the amount of work you do in the most challenging portion of the exercise.

Hard: Move the floor farther away. For many body-weight exercises -- lunges, pushups, sit-ups -- your range of motion ends at the floor. The solution: Try placing your front or back foot on a step when doing lunges; position your hands on books or your feet on a chair when doing pushups; and place a rolled-up towel under the arch in your lower back when doing sit-ups.

OK, the New Year is here. It's time to kick start the exercise routine. If you're having trouble getting back into the gym, here are some excellent exercises that don't require any weights. So get up and get going!



Inverted Row
Sit under a Smith machine or squat rack with your legs straight and a bar set a few inches higher than arm's length. Grab the bar overhand, hands shoulder-width apart. Keeping your body straight, pull your chest to the bar. Pause, then lower yourself.



T Pushup
Lower your body as you would in a normal pushup, but as you push yourself up, lift one hand toward the ceiling and rotate your torso and hips in the same direction until you're facing sideways. Return to the starting position and repeat with your other arm. Keep your core tight & don't let your hips sag.



Bulgarian Split Squat

Stand with your right foot on a chair behind you, and your arms hanging at your sides. Keeping your torso upright, lower your body until your left thigh is at least parallel to the floor. Pause, then push yourself back up.

Single-Leg Deadlift

Stand on your left foot with your right foot raised behind you, arms down in front of you. Allow your torso to lean slightly forward as you lower your body straight down until your hands touch the floor. Pause, then push back up to the starting position.



Harder: Add on a quarter. From the starting position of a pushup, squat, or lunge, lower yourself into the down position. But instead of pushing your body all the way up, raise it only a quarter of the way. Then lower yourself again before pushing your body all the way up. That counts as one repetition.

Hardest: Try mini-repetitions. Instead of pushing your body all the way up from the down position, do five smaller reps in which you raise and lower your body about an inch each time. After the fifth mini-repetition, push yourself up till your arms are straight. That counts as one repetition.

Law #3: As elastic energy decreases, muscle involvement increases.

The science: When you lower your body during any exercise, you build up "elastic energy" in your muscles. Just like in a coiled spring, that elasticity allows you to "bounce" back to the starting position, reducing the work your muscles have to do. Eliminate the bounce and you'll force your body to recruit more muscle fibers to get you moving again. How? Pause for 4 seconds in the down position of an exercise. That's the amount of time it takes to discharge all the elastic energy of a muscle.

Apply it: Use the 4-second pause in any exercise. And give yourself an extra challenge by adding an explosive component, forcefully pushing your body off the floor -- into the air as high as you can -- during a pushup, lunge, or squat. Because you're generating maximum force without any help from elastic energy, you'll activate the greatest number of muscle fibers possible.

Law #4: Moving in two directions is better than moving in one.

The science: Human movement occurs on three different geometric planes:

- * the sagittal plane, for front-to-back and up-and-down movements
- * the frontal plane, for side-to-side movements
- * the transverse plane, for rotational movements

Most weight-lifting movements -- the bench press, squat, curl, lunge, and chin-up, to name a few -- are performed on the sagittal plane; the balance of exercises -- for instance, the lateral lunge and side bend -- occur almost entirely on the frontal plane. This means that most men rarely train their bodies on the transverse plane, despite using rotation constantly in everyday life, as well as in every sport. Case in point: walking. It's subtle, but your hips rotate with every step; in fact, watch a sprinter from behind and you'll see that his hips rotate almost 90 degrees. By adding a rotational component to any exercise, you'll automatically work more muscle -- since you'll fully engage your core, as well as the original target muscles -- and simultaneously build a better-performing body.

Apply it: Simply twist your torso to the right or left in exercises such as the lunge, sit-up, and pushup. You can also rotate your hips during movements such as the reverse crunch.

Law #5: The less contact your body has with the floor, the more your muscles must compensate.

The science: The smaller the percentage of an object's surface area that's touching a solid base, the less stable that object is. That's why SUVs are prone to rolling, and tall transmission towers need guy wires. Fortunately, humans have a built-in stabilization system: muscles. And by forcing that internal support system to kick in -- by making your body less stable -- you'll make any exercise harder, while activating dozens more muscles.

Apply it: Hold one foot in the air during virtually any exercise, including pushups, squats, and deadlifts. You can also do pushups on your fingertips or your fists.

Source: Cameron McGarr, C.S.C.S., *Who Needs a Gym? 5 Ways to Get Stronger Without Lifting a Weight*, Men'sHealth.com.

Firefighters Face Increased Risk for Certain Cancers

CINCINNATI—University of Cincinnati (UC) environmental health researchers have determined that firefighters are significantly more likely to develop four different types of cancer than workers in other fields.

Their findings suggest that the protective equipment firefighters have used in the past didn't do a good job in protecting them against cancer-causing agents they encounter in their profession, the researchers say.

The researchers found, for example, that firefighters are twice as likely to develop testicular cancer and have significantly higher rates of non-Hodgkin's lymphoma and prostate cancer than non-firefighters. The researchers also confirmed previous findings that firefighters are at greater risk for multiple myeloma.

Grace LeMasters, PhD, Ash Genaidy, PhD, and James Lockey, MD, report these findings in the November edition of the *Journal of Occupational and Environmental Medicine*. The UC-led research is the largest comprehensive study to date investigating cancer risk associated with working as a firefighter.

"We believe there's a direct correlation between the chemical exposures firefighters experience on the job and their increased risk for cancer," says LeMasters, professor of epidemiology and biostatistics at UC.

Firefighters are exposed to many compounds designated as carcinogens by the International Agency for Research on Cancer (IARC)—including benzene, diesel engine exhaust, chloroform, soot, styrene and formaldehyde, LeMasters explains. These substances can be inhaled or absorbed through the skin and occur both at the scene of a fire and in the firehouse, where idling diesel fire trucks produce diesel exhaust.

"Firefighters work in an inherently dangerous occupation on a daily basis," LeMasters adds. "As public servants, they need—and deserve—additional protective measures that will ensure they aren't at an increased cancer risk."

The UC-led team analyzed information on 110,000 firefighters, most of them full-time, white male workers, from 32 previously published scientific studies to determine the comprehensive health effects and correlating cancer risks of their profession.

Risk for 20 different cancers was classified into three categories—probable, possible or not likely—patterned after the IARC's risk-assessment model.

UC epidemiologists found that half the studied cancers—including testicular, prostate, skin, brain, rectum, stomach and colon cancer, non-Hodgkin's lymphoma, multiple myeloma and malignant melanoma—were associated with firefighting to varying levels of increased risk.

"There's a critical and immediate need for additional protective equipment to help firefighters avoid inhalation and skin exposures to known and suspected occupational carcinogens," says Lockey, professor of environmental health and pulmonary medicine at UC. "In addition, firefighters should meticulously wash their entire body to remove soot and other residues from fires to avoid skin exposure."

The research was supported in part by a grant from the Ohio Bureau of Workers Compensation. Study collaborators include UC's Paul Succop, PhD, James Deddens, PhD and Kari Dunning, PhD, as well as Tarek Sobeih, MD, PhD, of Cairo University, and Heriberto Barrera-Viruet, PhD, of the Interamerican University of Puerto Rico.

Source: Amanda Harper, Firefighters Face Increased Risk for Certain Cancers, <http://healthnews.uc.edu/news>, 11/10/06.

What can you do?

Wear your SCBA! Trash fires, car fires, dumpster fires, house fires (wood soot is a Class A carcinogen), overhaul...

Wash your turnouts! Turnouts exposed to a fire are loaded with carcinogens and you are being exposed to them.

Bathe! Get and keep soot off your largest organ...your skin.

Minimize your exposure to exhaust fumes! Don't let the truck idle in the bay for long periods.

Don't miss your physical!

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