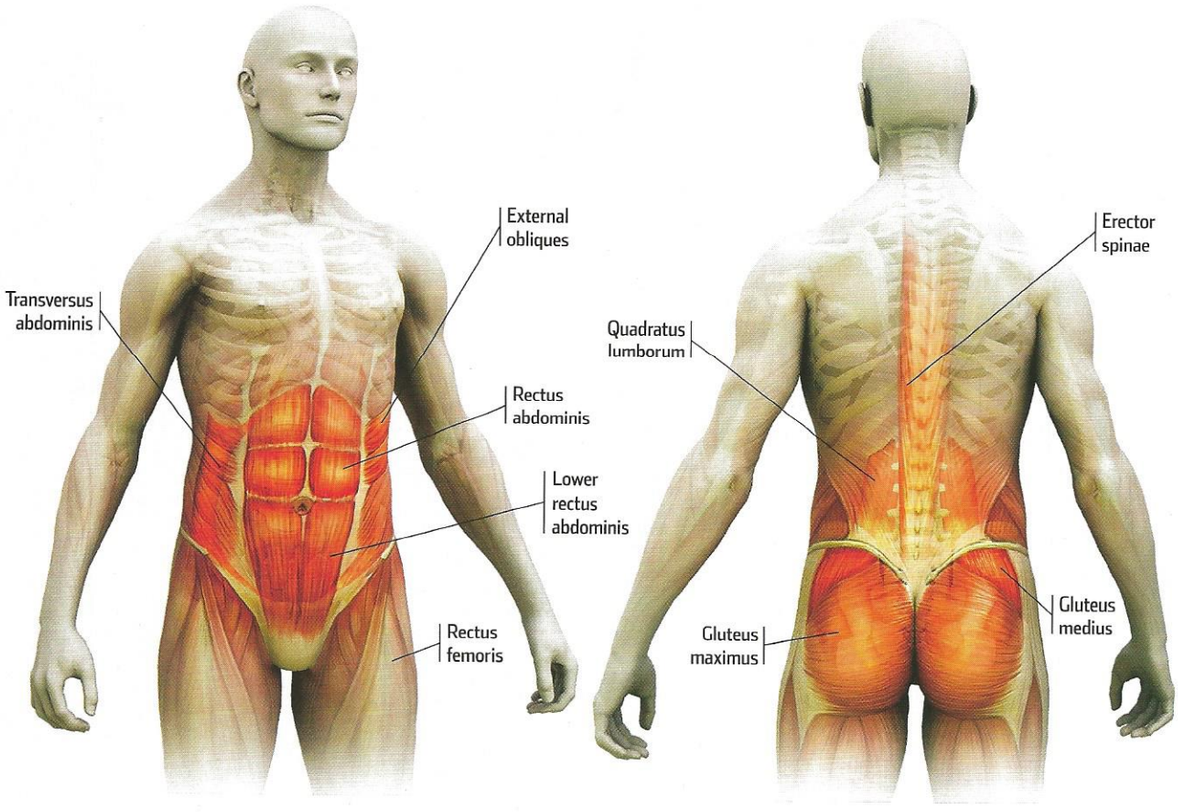
A GENERATION AGO, YOU'D BE HARD-PRESSED TO FIND ELITE RUNNERS paying attention to their abs. Today, it's practically mandatory. "Our coaches drill the importance of core conditioning into our heads," says world champion hurdler Lolo Jones. "We're at it all the time." ■ That's because scientists and coaches now know that you can't run your best without a strong core, the muscles in your abdominals, lower back, and glutes. They provide the stability, power, and endurance that runners need for powering up hills, sprinting to the finish, and maintaining efficient form mile after mile. "When your core is strong, everything else will follow," says Greg McMillan, a running coach in Flagstaff,

CENTER OF ATTENTION

A close look at the muscle groups that make up your core

A **STRONG CORE** plays a critical role in your best running performances. And it's not just one ab muscle that's hard at work, says Tim Hilden, a physical therapist, athletic trainer, and exercise physiologist specializing in running mechanics at the Boulder Center for Sports Medicine in Colorado. "Running requires the coordinated effort of multiple muscles of the stomach, lower back, and hips, all working to create a stable pelvis," he says. "These muscles anchor your whole body when you run, and you can't make a strong push without them." Here are key core muscles you need to run.



ILLUSTRATIONS BY **JOHN MACNEILL**

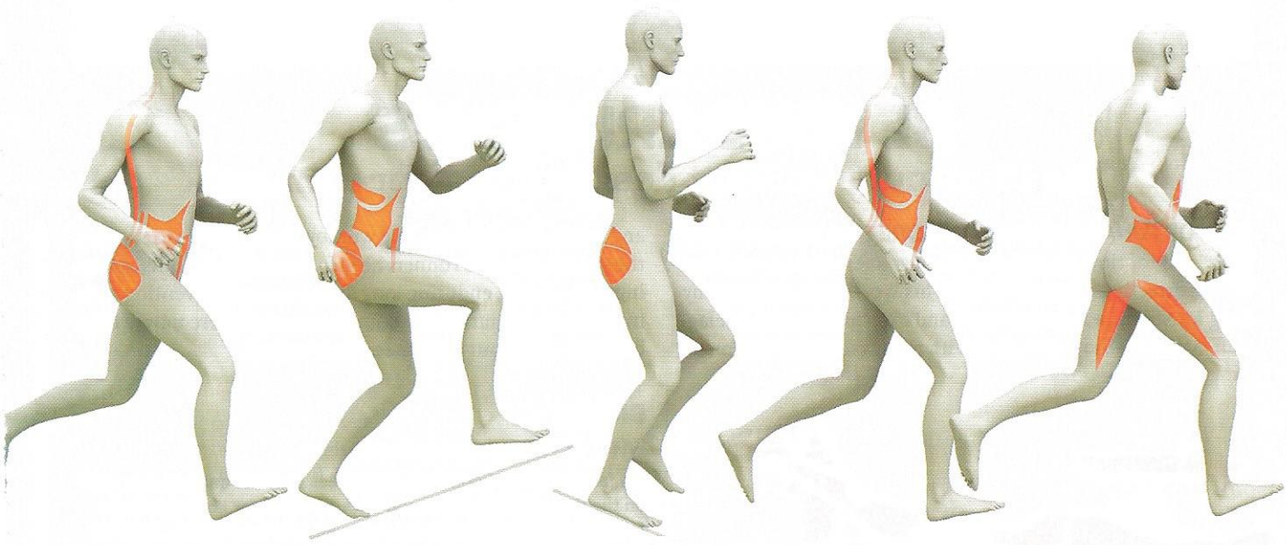
Arizona, who has worked with scores of elite and recreational runners. "It's the foundation for all of your movement, no matter what level of running you're doing."

The key is to train your core like a specialist. Experts have mapped out precisely how the movements of running draw on the strength and stability of the glutes, obliques, and ab muscles that lie deep beneath the six-pack. They've learned how essential it is for runners to engage these muscles to finish fast, reduce pain, and hang tough on long runs. Best of all, they've tailored workouts to help them do that.

All runners—from those rehabbing injuries to elites gunning for PRs—can benefit from this detailed approach. "When all the muscles involved in running are supported, and the muscles in the hips and trunk work together, you don't get as many injuries and can enjoy running more," says Phil Wharton, a musculoskeletal therapist and co-owner of Wharton Performance Group in New York and the Wharton Health Experience in Flagstaff.

Quality core work isn't easy. But it doesn't require more than 15 minutes a few times a week—an investment that will pay dividends on the road. Just ask Lolo Jones. Even in the off-season, she's working her core three times a week so that when she races, she'll have the stamina to retain her status as America's top hurdler. "When my core strength is at its peak," says Jones, "I can run more efficiently and maintain that extra edge." →

Here's how your core works for you on the road



SPEED

As you extend your stride or quicken the rate of your leg and foot turnover when you're trying to pick up your pace, the lower abs—including the transversus and rectus abdominis—and lower back are called into action. The stronger and more stable these muscles are, the more force and speed you can generate as you push off the ground.

UPHILLS

The glutes and lower abs support the pelvis, which connects to the leg muscles needed to get uphill. If the core is strong, the legs will have a stable plane to push from, for a more powerful ascent. When you swing your leg forward, the hip-flexor muscles, such as the rectus femoris, pull on the pelvis. As you push off the ground, the glutes and hamstrings are engaged.

DOWNHILLS

When you're flying down a slope, you need strong gluteal muscles to help absorb the impact and counter the momentum of the forward motion. As fun as it may be to zoom down, without the core strength to control your movement, your quads and knee joints bear the extra pounding of your body weight, which can lead to fatigue, pain, and even injury.

ENDURANCE

As you're nearing the end of a race, a solid core helps you maintain proper form and run efficiently, even through fatigue. With strong lower abs and lower-back muscles, such as the erector spinae, it's easier to stay upright. If your core is weak, you may end up shuffling, slouching, and putting too much stress on your hips, knees, and shins.

LATERAL MOVEMENT

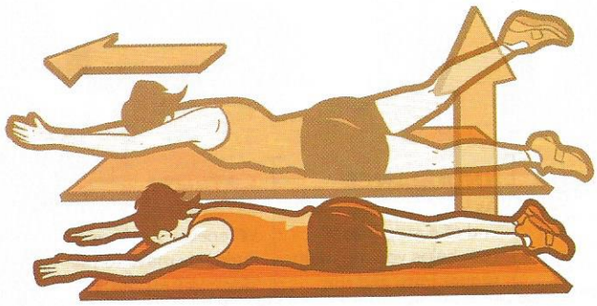
Whenever you have to suddenly move to the side—to turn the corner on a track, dodge a pothole, or navigate undulating terrain—the obliques provide stability and help keep you upright. If your core is weak, then you may end up leaning into the movement, which can put excess weight and strain on the joints in your legs and feet.

BACK STORY
The bridge strengthens muscles that support the spine.

BEYOND CRUNCHES

The 15-minute workout designed just for runners

FORTUNATELY, QUALITY CORE work doesn't require a lot of time or equipment—just a few key moves done correctly and consistently. This workout is designed by Greg McMillan, a running coach and exercise scientist in Flagstaff, Arizona, who has worked with many recreational runners and world-class athletes. The workout is devised to strengthen the specific muscles runners need for bounding up hills, sprinting to the finish, enduring long distances, and preventing common running injuries. Try doing two sets of these moves right before or after your run, three times a week.



SUPERMAN

WHAT IT HITS **transversus abdominis (deep abs) and erector spinae (lower back)**

Start facedown on the floor, with your arms and legs extended out front. Raise your head, your left arm, and right leg about five inches off the floor. Hold for three counts, then lower. Repeat with your right arm and left leg. Do up to 10 reps on each side.

KEEP IT HONEST Don't raise your shoulders too much.

MAKE IT HARDER Lift both arms and legs at the same time.

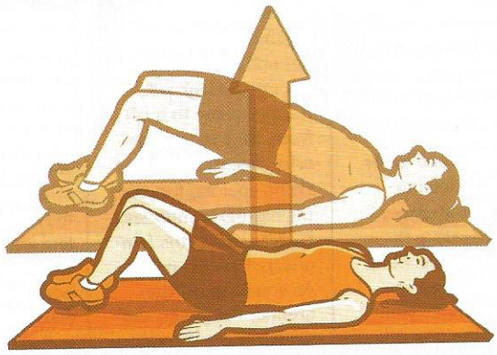
BRIDGE

WHAT IT HITS **glutes and hamstrings**

Lie faceup on the floor, with your knees bent 90 degrees, your feet on the floor. Lift your hips and back off the floor until your body forms a straight line from your shoulders to your knees. Hold for five to 10 seconds. Lower to the floor and repeat 10 to 12 times.

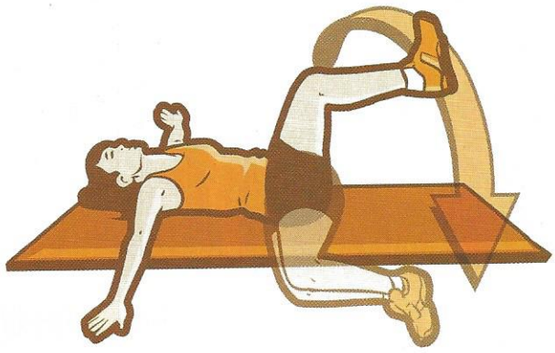
KEEP IT HONEST Squeeze your glutes at the top of the movement, and don't let your spine sag.

MAKE IT HARDER Straighten one leg once your hips are lifted.



STYLIST: ANJALI RAJAMAHENDRAN; HAIR+MAKEUP: SACHA HARFORD/THE ARTIST LOFT; CLOTHING AND SHOES: ASICS

EXERCISE ILLUSTRATIONS BY **SUPERCORN**



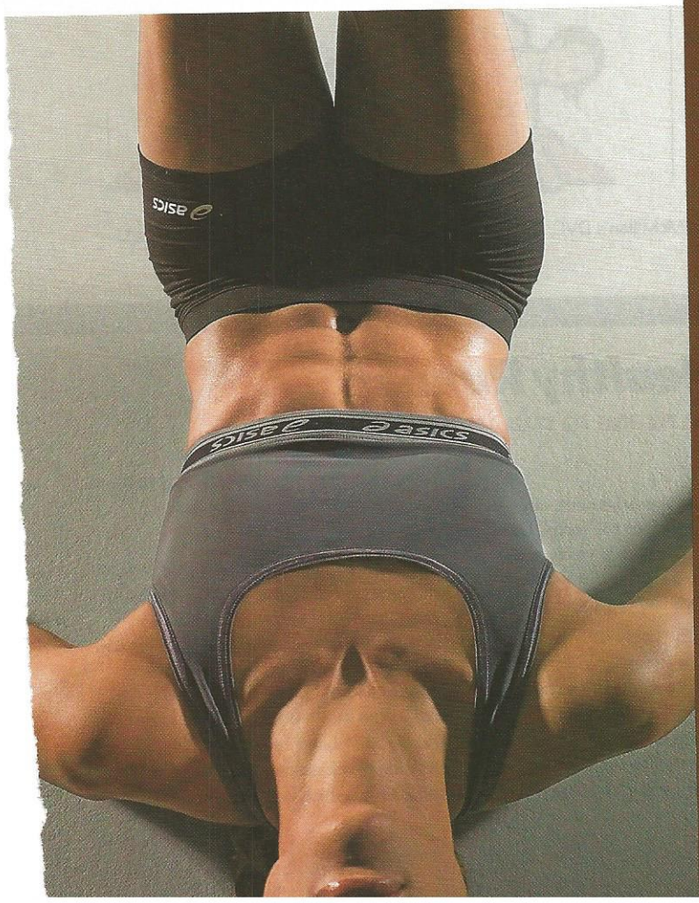
METRONOME

WHAT IT HITS obliques

Lie faceup on the floor with your knees bent and raised over your hips, with your ankles parallel to the ground, your feet lifted, and your arms extended outward. Rotate your legs to the left side, bringing your knees as close to the floor as possible without touching. Return to the center, then move your knees to the right side. Do 10 to 12 reps on each side.

KEEP IT HONEST Make sure not to swing your hips or use momentum; start the movement from your core and continue to move slowly from side to side.

MAKE IT HARDER Keep your legs straight.



All the Right Moves

Make a few quick fixes, and see the payoff on the run

THE MISTAKE
YOU'RE DOING THE WRONG EXERCISES

"The biggest mistake that runners tend to make is to take strength-training moves like crunches straight from the fitness industry," says Greg McMillan, a running coach based in Flagstaff, Arizona. For most runners, standard crunches aren't helpful because they don't work the deep core muscles that provide stability to run mile after mile.

THE FIX Do workouts that hit the muscles and movements that runners need. Try exercises like the side plank or plank lift (see page 58) that strengthen the obliques, located on the sides of the trunk, and the transverse abs, the deep core muscles that wrap around the trunk like a corset. These muscles stabilize the core, help counter rotation, and minimize wasteful movement so that you run more efficiently.

THE MISTAKE
YOU'RE A CREATURE OF HABIT

Even if you've moved beyond crunches, you may have slipped into a routine. "You need to constantly challenge your muscles to get results," says running coach Sam Murphy, coauthor of *Running Well*.

THE FIX Mix it up. Fine-tune your workout to make it more difficult. Try balancing on one leg or changing your arm position. At the gym, use devices like stability balls or balance discs, unstable platforms that force your core muscles to work harder to keep you steady. And as a rule, McMillan says, change your routine around every six weeks or so.

THE MISTAKE
YOU WHIP THROUGH YOUR WORKOUTS

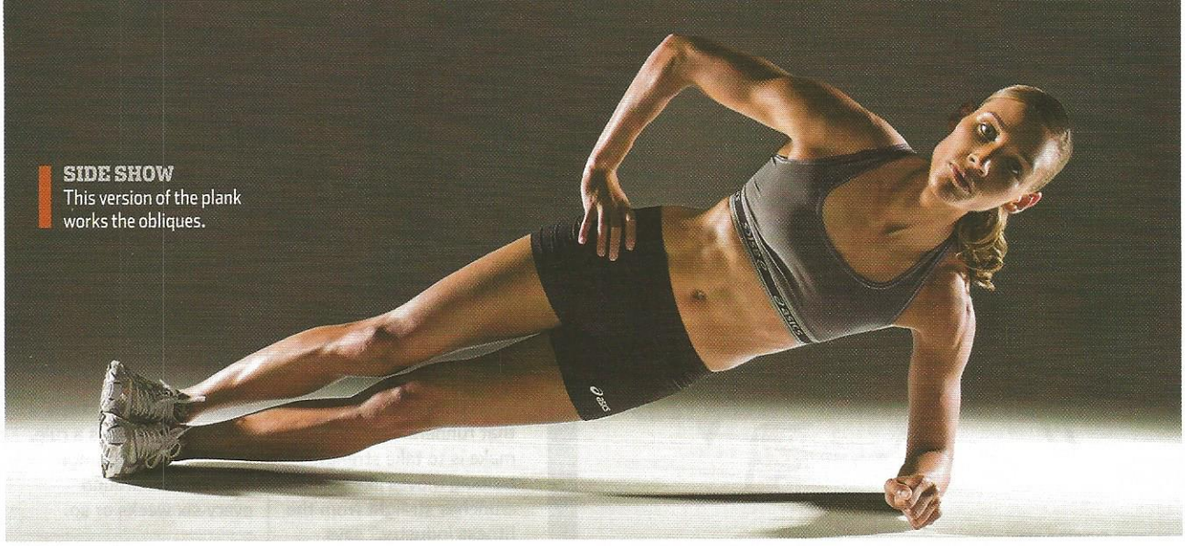
If you're flying through moves, you're using momentum, not muscles.

THE FIX Slow it down. Exercises like the plank, which require holding one position for 10 to 60 seconds, force you to work your muscles continuously. Even in exercises that involve repetitions, make steady, not rapid-fire, movements. "It takes intention," says well-known musculoskeletal therapist Phil Wharton. "Don't rush through them, and make sure you're doing them properly."

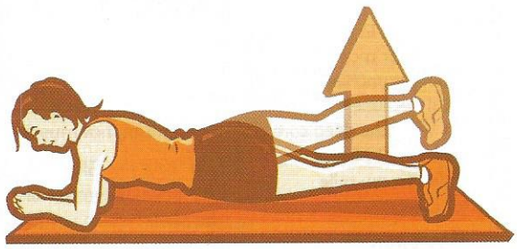
THE MISTAKE
YOU IGNORE WHAT YOU DON'T SEE

Runners often have weak backs because they just forget about them, says Paul Frediani, a USA Triathlon coach in New York City. "But when you're running, especially for a long time, those muscles in the lower back and along the spine are crucial for providing stability and support."

THE FIX Include at least one exercise that hits the lower back and glutes in each workout. Moves like the bridge and superman (opposite page), build muscles that support and protect the spine. →



SIDE SHOW
This version of the plank works the obliques.



PLANK LIFT

WHAT IT HITS transversus abdominis and lower back

Begin facedown on the floor, propped up on your forearms, with knees and feet together. With your elbows under your shoulders, lift your torso, legs, and hips in a straight line from head to heels. Hold for 10 seconds. Raise your right leg a few inches, keeping the rest of the body still. Lower and repeat with your left leg.

KEEP IT HONEST Pull in your belly and don't let your hips sag.

MAKE IT HARDER Extend the time of the exercise. Each time you lift your leg, hold it for 15 to 20 seconds.

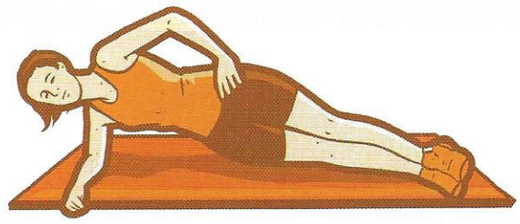
SIDE PLANK

WHAT IT HITS obliques, transversus abdominis, lower back, hips, and glutes

Lie on your right side, supporting your upper body on your right forearm, with your left arm at your left side. Lift your hips and, keeping your body weight supported on the forearm and the side of the right foot, extend your left arm above your shoulder. Hold this position for 10 to 30 seconds. Switch sides and repeat.

KEEP IT HONEST Keep your hips up; don't let them sag.

MAKE IT HARDER Support your upper body with your right hand, instead of your forearm.



Find more core moves at **runnersworld.com/abs** and on Greg McMillan's DVD, *Runner's Core Routine* ($30, mcmillanrunning.com).

Hard Core, Healthy Runner

Prehab your problem areas to run injury-free

YOUR CORE IS LIKE A POWER plant. If it's not strong, "your running mechanics can decay," says Tim Hilden, a physical therapist, athletic trainer, and exercise physiologist, specializing in running mechanics at the Boulder Center for Sports Medicine in Colorado. "You'll see too much unwanted movement, which decreases performance or sets you up for injury." Here are three areas that can become injured as a result of a weak core.

LOWER BACK

As your legs pound the pavement, your vertebrae absorb much of the force. That shock worsens if your core is weak, which will produce lower-back pain. Build those muscles with moves like the superman.

HAMSTRINGS

When your core isn't stable, your hamstrings often have to work extra hard, says Marcus O' Sullivan, track coach for Villanova University. The added work can leave them shorter, tighter, and more vulnerable to injury. To strengthen them, as well as your glutes, try exercises like bridges, lunges, and squats.

KNEES

Without a stable core, you can't control the movement of your torso as well, and you risk putting excess force on your joints each time your foot lands. This can lead to pain under the knee (known as "runner's knee"), patellar tendinitis (a sharp pain in the bottom of the knee), and iliotibial-band tendinitis. The plank and side plank strengthen the transversus abdominis, which help steady the core. RW