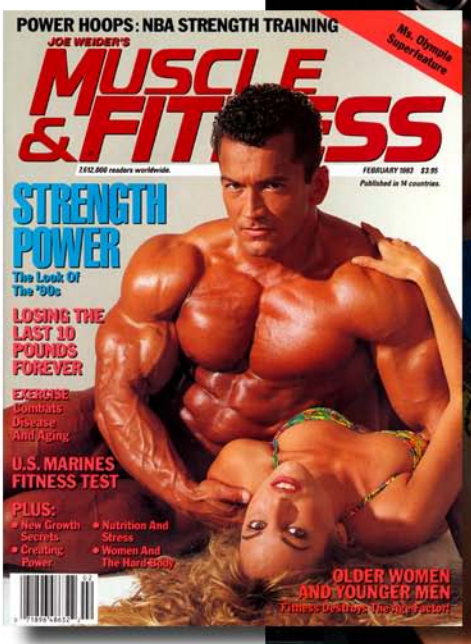

POWER HOOPS: NBA STRENGTH TRAINING
Mr. Olympia Superfeature
JOE WEIDER'S
MUSCLE & FITNESS
2 MILLION readers worldwide.
FEBRUARY 1993 $3.95
Published in 14 countries.
STRENGTH POWER
The Look Of The '90s
LOSING THE LAST 10 POUNDS FOREVER
EXERCISE Combats Disease And Aging
U.S. MARINES FITNESS TEST
PLUS:
• New Growth Secrets
• Creating Power
• Nutrition And Stress
• Women And The Hard Body
OLDER WOMEN AND YOUNGER MEN
Fitness Destroys The Age Factor!

YOU DON'T

A

B

KNOW SQUAT!

From The Front

A

POWER SQUAT: Gordon Kernes demonstrates the power squat, the undisputed king of combination exercises. Sticking the butt out and keeping the back arched and the whole body tight are the keys to the starting position (A). Maintaining that orientation, stopping when the tops of the thighs are parallel to the deck, and avoiding any bouncing at the bottom (B) are keys to getting the most muscle development for this movement. This variation of the squat allows use of the heaviest weights and develops the adductors, glutes, hamstrings and spinal erectors as well as the quads.

Wise up. Done right, it's the best combination exercise of all...

By Mark Saracino, DC

YOU KNOW DON'T SQUAT!

The benefits of the squat are so great that this exercise should be done consistently throughout our lives. Just think of how many stairs we climb, how often we get out of bed, stand up and walk.

Doing squats not only strengthens muscles but also adds stability to the knees and ankles and helps prevent low-back injury.

Squatting combines two exercises in one — the most beneficial combination exercise a lifter can perform — and develops the hips and quadriceps simultaneously. Squats utilize more muscle groups and weight-bearing joints than any other movement. Whether you're a fitness enthusiast, a professional athlete or in rehabilitation, you can benefit from squats.

DO YOU KNOW SQUAT?

In different ways and in varying degrees, squat exercises affect development of the primary muscles (glutes and quadriceps) and secondary muscles that stabilize joints (erector spinae, adductors and hamstrings).

An understanding of the muscles, joints, ranges of motion and level of concentration is essential to performing a comfortable and safe squat. With a keen awareness of muscle action one can actually *feel* different muscles moving bones (isotonic contraction) or holding bones tightly (isometric).

The muscles parallel to the spine, the erector spinae group, are responsible for keeping the trunk erect. They secure the forward low-back curve. If these secondary isometric muscles are weak or if technique is lacking, the low-back curve will straighten or reverse, overstretching the area and injuring the low-back joints.

The most obvious primary muscle group is the quadriceps. The gluteus maximii are primary isotonic muscles because they pull the thighs backward. The thigh adductors are secondary isometric muscles, which pull the thigh toward the midline of the body. They stabilize the knees.

The hamstrings perform varying amounts of isometric and isotonic contractions, depending on the technique. They flex the calf, while squatting controls the position of the lower half of the sacrum. When the bottom of the sacrum moves forward, it contracts isotonically, whereby its isometric function stabilizes the pelvis mostly when the trunk tilts forward.

Let's examine the joints involved. The fifth lumbar vertebra articulates with the sacrum on a surface area no larger than two thumbnails — not much bone surface to steer the entire top half of the body onto the sacrum. Because of this, we must protect these delicate joints and their overlying muscles at all times, especially while squatting. The curve in the low back should be forward and

SQUAT FOR SIZE: Bodybuilders perform squats with a closer stance (C), a variation to develop the classic teardrop shape with a wide, flaring outer sweep. The heels are relatively close together, even touching at times, and are elevated on a block with the toes pointing slightly outward. With a moderate forward trunk tilt (D), the squat depth is on the shallow side. Note the position of the trunk and line of the back from start to finish.

arched to prevent microtrauma, so the erector spinae should remain the same length throughout the range of motion. The hips operate best when their bone-on-bone contact area is greatest. For this to occur, the legs must be rotated outward approximately 45 degrees each.

NO KNEE-JERK REACTIONS, PLEASE!

How many times in sports have we heard "Keep the knee moving forward over the ball of the foot"? The knees were not made to rotate, but merely to flex. Leg rotation should be performed at the hip joint, not the knees. Since squatting requires tremendous knee flexion, the knee must comfortably move over the ball of the foot.

The knee has two gears made of cartilage that are flat on the bottom (to articulate with the top of the calf bone) and concave on the top (to meet with the rounded distal aspects of the femur). Knee injuries often occur when the ligaments that hold these flat gears stable on the top of the shinbone become lax. (Small variations may not feel painful initially.)

If squats are performed incorrectly, the cartilage support ligaments may destabilize and endanger the knee. Unfortunately, loosening these ligaments is often not painful, so you get no warning. For example, years of pain-free Olympic squatting often reveal flattened and/or fractured meniscuses in the back of the knee because of the tremendous depth competitors must attain in competition.

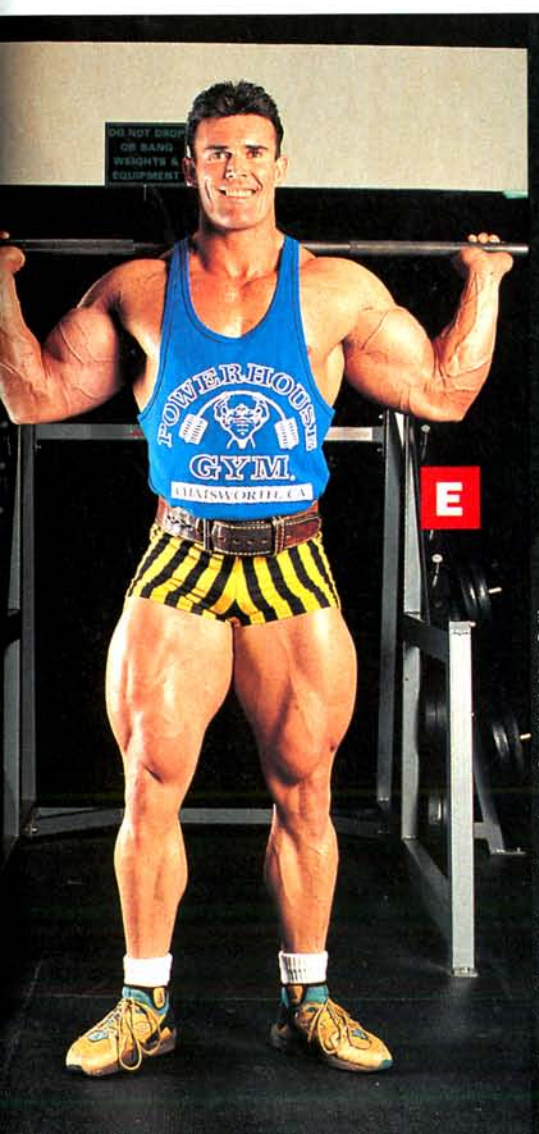
The ankle bone, which allows the foot to flex and extend, moves forward and backward. The talus is smaller in the front than in the rear so that when it flexes the calf (such as in the bottom of the squat), it moves backward toward the Achilles tendon — or gets smashed. Excessive ankle flexion should be avoided.

SQUATTING SAFELY & EFFECTIVELY

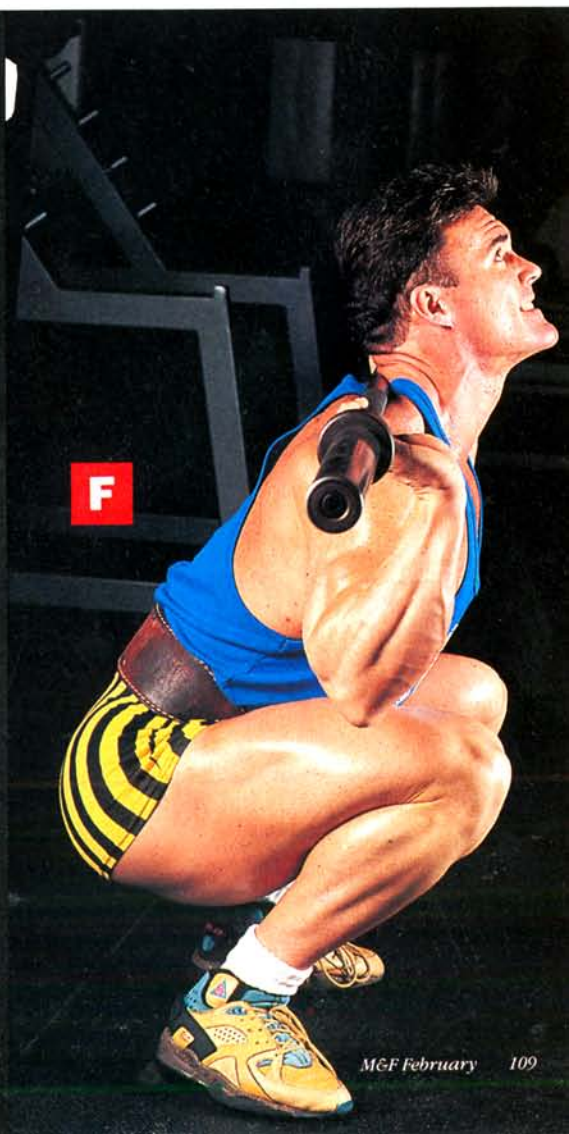
Many people don't perform squats because of low-back, knee or ankle pain. Let's put our understanding of the muscles and the joints together and try to make this often-dreaded exercise more comfortable.

What you need to keep in mind are: The lower back will most likely become injured if its forward curve flattens or reverses, so the hips must maintain as much contact with the thighbone as possible. Knees should travel without lateral deviation over the balls of the feet and ankles with just the right amount of flexion to prevent the ankle bone from smashing. Good hamstring flexibility, especially at the bottom of the squat, is essential also. This allows the pelvis to maintain its forward tilt, which will help preserve the forward curve in the low back.

(Continued on page 206)



E



F

OLYMPIC FORM: In what the author refers to as the Olympic-style squat, the toes are angled outward approximately 45 degrees and the heels are roughly shoulder width apart (E). At the bottom of the range of motion (F), the lumbar lordosis is reversed. With the feet pointing outward, the hip joint does not impede the lower range of motion.

Photos by Ralph DeHaan at Powerhouse Gym, Northridge, Calif.

at this time. Lastly, one certainly needs to keep in mind that no bodyfat will be lost if more calories are consumed than the body uses, since the extra calories, be they from protein, carbohydrate or fat, will be stored as *fat*.

While the findings above are complex, I present them to demonstrate the complex interaction between diet and exercise in achieving lower levels of bodyfat and enhanced muscle mass! □

Douglas M. Crist, PhD, a research physiologist, details his scientific training and dietary methods in his manual Growth Hormone Synergism, *available for $39.95 ppd (U.S.) from DMC Health Sciences, PO Box 23190, Albuquerque, NM 87192-1190 USA.*

SQUATS

(Continued from page 109)

Let's look at three different squat techniques:

Power squats. If you have ever seen a power squat performed properly, you know it can look unnatural. (Photo A: power squatting creates the most unnatural starting posture because the low back has an accentuated lordosis and the trunk is tilted forward excessively. Photo B: trunk flexion is accentuated, but safer with the maintenance of the low-back curve.)

The feet are placed wider than shoulder width and the toes are nearly parallel. This wide stance involves the abductor groups.

In powerlifting competitions the squat depth must be no less than 1 inch below parallel. That is, the hips must drop 1 inch lower than the knees.

Although the lifter's trunk is tilted forward excessively, the low-back curve is preserved even at the bottom. The erector spinae group must be tightened to maintain the forward lordosis. The glutes are exercised evenly compared to bodybuilding squats, which work only their inside aspects.

The great distance that the feet are separated forces the abductors to become elongated in the starting position and worked throughout the power squat.

In power squatting the hamstrings are worked more than in bodybuilding squats. The first-time power squatter is often amazed at how much abductor and hamstring involvement is required. (The hamstrings work mostly through the middle and end ranges of motion because of the excessive forward trunk tilt.)

Powerlifters seldom vary their routines. Their main emphasis is to develop maximum strength gains, and they often stress their joints excessively. The paraspinals must be strong isotonically and isometrically before being sub-

jected to high tonnage, otherwise, the trunk may collapse forward, tearing the muscles in the low back.

I'll never forget how John Vernacchio, a two-time World All-Around Masters Lifting Champion, taught me how to power squat by yelling, "Arch your back, stick your butt out!"

Bodybuilding Squats. What bodybuilders want from squats are large, well-defined quadriceps and "teardrops" formed outside of the thighs just above the knee. (Photo D: note how the outside of the thigh bulges — the squat depth is shallow with moderate trunk flexion.) This creates the appearance of a large muscle and shapes the midline portions of the gluteus maximus instead of thickening them because a good amount of stretch occurs where the glute originates along the sacrum.

Start with heels together, or up to 15 inches apart, and elevated on a board with the toes pointing outward. (Photo C: the front starting position in bodybuilding squats is the most natural of the three.)

The lumbar lordosis is maintained throughout the top and middle ranges of motion, but becomes flattened toward the bottom. With a moderate forward trunk tilt throughout, the squat is lowered to a shallow depth.

One disadvantage of performing bodybuilding squats is that the low back becomes unstable toward the bottom of the range of motion because the pelvis extends and flattens or reverses the low-back curve. Those first trying this technique sometimes complain of hip tightness and/or pain because the head of the femur doesn't articulate well with the hip socket at the bottom of the movement.

The knees, too, are at a disadvantage toward the end of the range of motion because the hip joints push the femurs outward, twisting the knee. And sometimes the kneecaps themselves are pulled outward. This in turn makes the kneecap ride along the outside aspect of its bony groove, creating abnormal wear. Also, the heels must be elevated on a board because ankle pain can result from excessive calf flexion.

Olympic squats. Because a special platform is required to do them, Olympic squats are the least performed squat in gyms. As Dominic DiSanto, a 64-year old Masters Olympic Champion, once said, "These squats are for a different animal."

The objective is to attain strength at the deepest squat position. The amount of training required to develop the timing and coordination for the snatch and clean and jerk is so great that one must exercise with high reps and sets. The more you perfect the Olympic squat, the more weight you'll be able to successfully pull off the floor and catch above the chest and hold overhead during the clean and jerk. Like an accomplished piano player who must practice scales hours each day, an Olympic lifter, even while warming up, must maintain near perfect form with every rep.

Olympic lifting requires timing, conditioning and flexibility, with toes angled outward approximately 45 degrees each, and heels at about shoulder width. (Photo E: note the outward angulation of the feet and the closeness of the heels during Olympic squatting.) At the very bottom of the range of motion the lordosis reverses. (Photo F: the lumbar lordosis is reversed at the bottom of the range of motion with knee flexion at its greatest.) The feet are acutely angled outward so that the hip joint doesn't impede the lowest possible descent — sometimes as far as the rear end being 2 inches from the platform.

Olympic squats are both beneficial and detrimental to the knee joints. Although no lateral displacement or twisting is placed upon the knees, they are forced to flex excessively. Conversely, deep knee bends (without weight) done with the Olympic technique will increase the knees' range of motion.

At first, do Olympic squats under the

guidance of an Olympic lifter or exercise physiologist, then gradually work up to a lower depth to increase knee flexibility.

THE TOUGHEST & BEST EXERCISE

No other exercise in the gym requires more attention than squatting because of the large number of muscles and joints involved. The best teachers for squat exercises are bodybuilders who have been comfortably performing squats for a number of years or power and Olympic competitors who have been in regional competition.

A word about wraps and belts: Ideally an exercise that works muscles and joints does not predispose them to injury. Unfortunately, this is not the case for weightlifters, who place their bodies through extreme stresses. Therefore, a lumbar belt is necessary. Adjust it tightly during the squat but *loosen* it between sets. This reduces the intra-abdominal pressure and pressure on the heart. Knee wraps (this applies mostly to powerlifters) must be pulled over the kneecap. Stretch the wrap forward and backward (not side to side) while applying it to the sides of the knee, which need the most support.

Power squatting is so strenuous that even after the last rep one can lose concentration and hyperextend his or her knee walking the weight back to the rack. Olympic lifters often hyperflex their knees because of the tremendous depths they attain, so their knee wraps should stabilize the front of the knees, not the sides.

Choosing the appropriate squat exercise can minimize the risk of injury and increase a lifter's comfort level.

Your goal in the beginning should be to develop perfect technique (the best foundation for any exercise), not maximum tonnage. Gradually prepare the muscles and makes the knees flexible before loading on the big plates. Then, start light power squats while continuing to use the Olympic technique as a warm-up. [If you have back or knee problems, check with your doctor before beginning a squat program.]

I asked bodybuilder Mark Mitchell the other day which exercise he would choose if he had to perform only one lift for the rest of his life. He responded: "I'd love for it to be a chest exercise, but I have to admit that squatting is the toughest and best all-around — and the most dreaded." ☐

Mark Saracino, DC, is a chiropractic neurologist who practices in Valley Forge, Pennsylvania. An orthopedic consultant to the Valley Forge Lifting Club and a board member of The Pennsylvania Academy of Ballet, he may be contacted at 522 Valley Forge Plaza, King of Prussia, PA 19406. (215) 337-3335.