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**S**wimmers often stretch with the idea that they will increase muscle flexibility, reduce the risk of musculoskeletal injury and improve performance. Stretching – especially shoulder stretching – is well accepted by swimmers, and advocated by authorities in the swimming community.

There is little evidence to support the relationship between muscle stretching and a reduction in injury, however. Studies have found that stretching just prior to exercise actually can decrease muscle strength, reduce power output and hinder balance performance.

Most contemporary research indicates that the better approach for swimmers is twofold: 1) an active warm-up of the shoulders just prior to a workout, and 2) periodic stretches for shoulder muscles either several hours before or several hours after a workout.

Incorrect stretching to increase joint flexibility just prior to swimming may make the shoulder less stable, increasing the chance of injury. Because it is made up of four joints that allow multiple planes of motion, the shoulder is inherently unstable. Shoulder stability is provided in two ways – by dynamic stabilizers, which are predominantly muscles, and by static stabilizers, which include cartilage, ligaments and capsules. Jeopardizing the integrity of the static stabilizers may result in shoulder pain.

Recent research suggests that extraordinary shoulder flexibility is not necessary to achieve a fast, efficient stroke anyway. Elite level competitive swimmers are naturally flexible. Because of this inherent looseness, swimmers should preserve the overall stability of the shoulder instead of trying to be more flexible. <<<

STABILITY  
IS THE KEY

## Warm-Ups and Stretches for Competitive Swimmers

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By George T. Edelman >>> photos by Amy Malinky



### WHAT NOT TO DO

Swimmers traditionally use stretches that target the static stabilizers. Some swimmers also incorporate a pre-race ritual similar to a ballistic windmill motion, in which one arm is going in the direction of the clock and the other arm is going counterclockwise.

Other pre-race rituals include clapping hands in front of the trunk similar to horizontal adduction and then clapping the hands behind the back in a horizontal abduction motion. Many of these traditional stretches and pre-race rituals have the potential to contribute to instability. The first series of photographs illustrate five common stretches that are no longer recommended for the shoulders.

Pink MM, Edelman GT, Mark R, Rodeo SA: Applied Biomechanics of Swimming. In Magee DJ, Manske R, Zachazewski JE, Quillen WS (editors): Athletic and Sport Issues in Musculoskeletal Rehabilitation, St. Louis, Elsevier, 2010 (in press).





## ACTIVE WARM-UPS

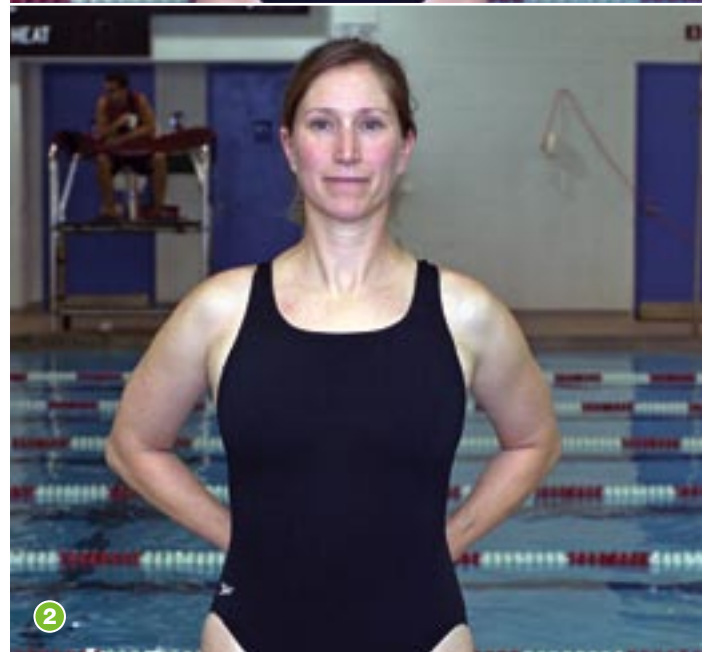
Warm-ups are good for swimmers; they are essential to prepare the body for exercise, and produce short-term and long-term enhancements in power, agility, strength, muscle endurance and anaerobic capacity.

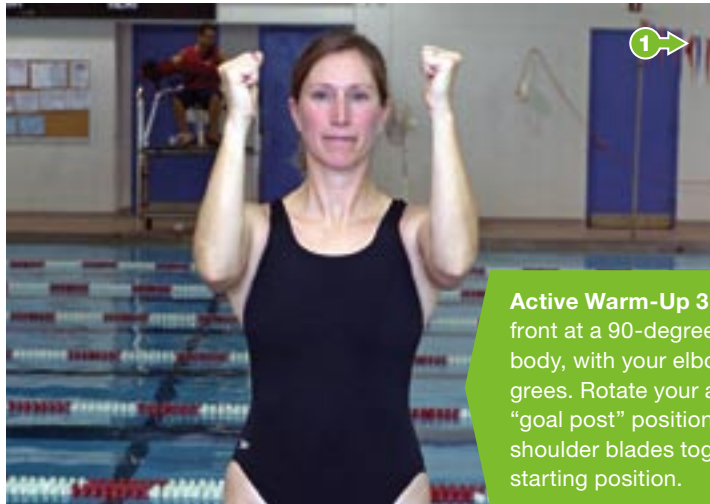
This series of photographs illustrates an active on-deck shoulder warm-up routine that I developed for USA Swimming. Use the warm-ups before workouts and competition. Move at a steady pace for each warm-up and avoid ballistic-type motions. Don't expect to feel much tension (as you did with the old improper stretches) – the objective is to warm up the muscle and connective tissue prior to exercise, not to stretch it. The order of the five warm-ups is designed to sequentially warm up the tissues in increasingly elevated positions. For each warm-up, perform two sets of 15 repetitions each.

**Active Warm-Up 1:** Place your arms by your sides with your elbows bent to 90 degrees. Externally rotate your arms as far back as you can without straining. Then return to your starting position. As you rotate, pinch your shoulder blades together.

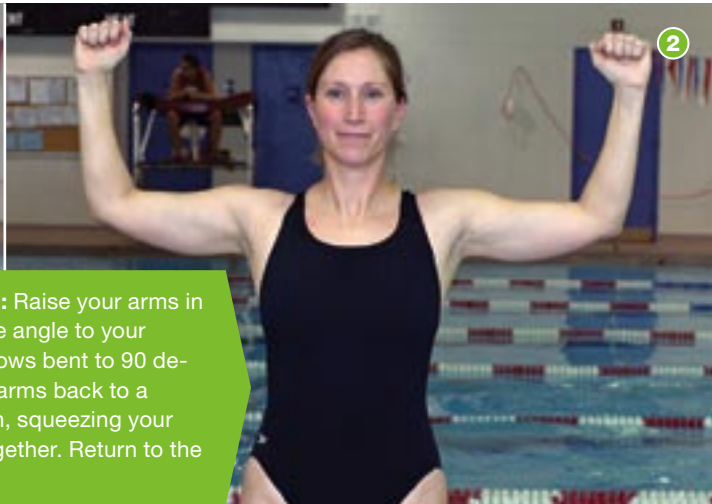


**Active Warm-Up 2:** Place the backs of your hands on your back at the belt line and bring your elbows forward to start. Rotate your elbows back, squeezing your elbows and shoulder blades together. Return to the start position.





**Active Warm-Up 3:** Raise your arms in front at a 90-degree angle to your body, with your elbows bent to 90 degrees. Rotate your arms back to a “goal post” position, squeezing your shoulder blades together. Return to the starting position.



**Active Warm-Up 4:** Raise your arms by your side at a 90-degree angle to your body, with your elbows bent forward to 90 degrees. Rotate your arms up to the “goal post” position. Return to the starting position.



**Active Warm-Up 5:** Raise your arms above your head in a tight streamline, as you would come off the wall from a turn. Drop your elbows into your “back pockets,” while squeezing your shoulder blades together and keeping your hands up. Return to the streamline position.



## When Is Stretching Recommended?

Despite the evidence that pre-exercise stretching can be detrimental, shoulder stretching does have a place in the swimmer's training routine. But it is important for stretches to target muscle tissue and not jeopardize the static stabilizing components of the shoulder joint. There are four muscle groups that swimmers should target: 1) upper trapezius, 2) levator scapulae, 3) pectoralis major and minor, and 4) the latissimus dorsi. In swimmers, these muscles tend to shorten during extensive training and need to be stretched.

Timing is important. Swimmers should stretch these muscles at a time unrelated to workouts and competition. Instead, stretch several hours prior to getting in the water, several hours after practice or on lighter training days when the muscles are not fatigued. These photos illustrate three stretches that together target all four muscle groups. Hold each stretch for 30 seconds. Repeat three times each on alternating sides. Do the stretches five times a week.



### Recommended Stretch 1: Door Frame Stretch for the Pectoral Group

Stand next to a doorway (or another vertical surface such as a post) with your forearm on the doorframe. Bend your elbow 60 to 90 degrees. Step through the door. You should feel a good stretch along the front of your chest, not in the shoulder joint. If you are stretching your right shoulder, step through with your right leg. You may vary the angle of your arm depending on which fibers of the pectoral group you want to stretch. Use a combination of angles in your stretching routine to incorporate the different fibers.



### Recommended Stretch 2: Two-Part Latissimus Dorsi Stretch

Arch your back up like an angry cat to round out your spine. Keep your back rounded and drop your rear to your heels. Reach out with your hands and then reach to a side to specify the stretch and address each of the latissimus dorsi.



### Recommended Stretch 3: Upper Trapezius/Levator Scapulae Stretch

Sit on a chair and grasp the seat with your hand on the side of the tightness. Place your other hand on your head as shown in the photograph. Pull down gently, and diagonally to the other side. Two versions of this stretch are shown. The first is to turn your nose toward your armpit and gently pull down. The second is to look straight ahead and gently pull down.

To read the full text of Edelman's article, "An Active Shoulder Warm-Up for the Competitive Swimmer," with all research references, go to [usaswimming.org](http://usaswimming.org) and search for the article by title.



#### Bios



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**Age:** 43

**Fact:** Edelman is a physical therapist and Masters swimmer from Dover, Del. He is a member of the USA Swimming Sports Medicine and Science and High Performance networks; and an adjunct professor in the University of Delaware physical therapy program. George has worked with athletes from USA Swimming, U.S. Figure Skating and the LPGA. He and Gorman own Edelman Spine and Orthopaedic Physical Therapy, LLC. [esopt.com](http://esopt.com)



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