

Muscle soreness and weightlifting ^[1]

Dear Alice,

I am an avid weightlifter. I want to know how to prevent muscle soreness, or flush out the lactic acid from my system. Thank you.

Answer

Dear Reader,

Looking to keep the soreness at bay, eh? Muscle soreness, characterized by pain, tenderness, stiffness, swelling in the muscles, often happens to people who are just beginning to pump iron — but it can also be experienced by seasoned weight training enthusiasts. What's more, having sore muscles isn't only physically uncomfortable, it's also associated with reduced muscle strength and range of motion. It can occur for a number of reasons including overloading the muscles excessively or working the same set of muscles in a new and different way. The good news is that there are ways to decrease and prevent soreness — but, it actually doesn't have to do with flushing lactic acid from your system as your question suggests. Keep reading for more on the causes and potential prevention strategies for muscle soreness.

What exactly causes it? Although at one time lactic acid was believed to be involved in muscle soreness, exercise physiologists no longer believe this is the case. It's now understood that lactic acid is long gone from the muscles before soreness occurs. Other previous hypotheses included tears in the connective tissue, muscle spasms, and over-stretching. Though the exact cause of muscle soreness remains uncertain, evidence suggests that multiple overlapping biochemical and mechanical processes likely contribute. Some of these factors include primary muscle damage during physical activity and then secondary damage caused by a later inflammatory response.

As far as other factors that may contribute (or not) to soreness, the actual movements you engage in during your routine may make a difference. More specifically, eccentric muscle contractions and, to some extent, isometric contractions cause more soreness than concentric contractions. What does this mean? In a concentric contraction, the muscle shortens as it overcomes the resistance, as in an upward curl with a weight. Lowering the weight, as the muscle acts to oppose gravity, lengthens the muscle — resulting in an eccentric contraction. An

isometric movement is one in which the object is too heavy to move, even though muscle force is being applied. High eccentric muscle contractions and doing unfamiliar exercises can create muscle soreness one or two days after a lifting session. On the other hand, concentric contractions, such as those produced during moderate cycling, may be movements to consider as they are associated with less soreness.

In your quest to prevent soreness, you might consider gradually increasing the amount of weight or number of repetitions as you lift. As a baseline, choose a weight that you can properly lift 12 to 15 times in a single set. Proper form includes a full range of motions through the joints, coordinating lifting motions with your breaths, all at a comfortable pace. Going more slowly helps isolate the muscles you're focusing on and alert you when you're fatigued (a good time to stop) or overloaded (which is more likely to cause an injury). To that end, paying attention to pain during and after your workout may also help you differentiate between muscle soreness and a potential injury. It's also a good idea to give yourself time between sets, about one to three minutes, and include warm-up and cool-down exercises (for about 10 to 20 minutes) in addition to your lifting. Cold muscles are more prone to injuries, and some research shows that warming-up can decrease muscle soreness caused by resistance training in the legs and muscle belly (the largest, most central part of the muscle). In addition to warm-ups and cool-downs, post-workout massages have been shown to decrease muscle soreness and improve gait. Massages are thought to also improve blood and lymph circulation, flexibility, and muscle imbalances. Talking to a massage therapist or physical therapist is a good way to learn more.

Eating a healthy snack after exercise can also be a no sweat way to help your muscles recover and to prevent soreness. Try having a carbohydrate and protein-rich snack (e.g., peanut butter on toast, slices of turkey breast or cheese on a bagel, or some milk and a banana) 15 minutes to an hour after your workout has ended. Because muscles can only store about an hour's worth of carbohydrates ^[2] (in the form of glycogen), it's wise to replenish that as soon as possible. The protein can help maintain and rebuild muscle cells, and, depending on how much you're eating, can also be used to increase the size of your muscles. Some research has shown that substances, such as omega-3 fatty acid, antioxidants, and polyphenols (which can all easily be a part of a healthy diet of fruits and vegetables), may help alleviate muscle soreness. If getting these through a balanced diet proves difficult, some are available in the form of dietary supplements. If you're curious about taking any supplements though, it's wise to speak with a health care provider for consultation to determine if they're right for you.

Ultimately, listening to your body's signals and pacing yourself may help keep your muscles comfortable and allow you to keep pumping safely! If you're still pumped for more information, check out the Q&As in the Fitness ^[3] category of the *Go Ask Alice!* Nutrition and Physical Activity ^[4] archives.

Alice!

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