

## Why You Feel Sore... Delayed Muscle Soreness and Specificity

By Dr. Don Kirkendall - February 13, 2003  
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Last month I spent a great weekend in Winchester, Va., where I spoke about knee injuries to physical therapy students, then later had the opportunity to watch a local girls team train indoors under the steady hand of James Wood HS coach Mark Pennypacker. After watching an hour of training, Mark asked if I wanted to join in for scrimmage. That was like offering candy to a child. Of course I was going to play. We played three games to 5, and I learned something that night that I've learned time and time again - I learned that pain can be quite instructive.

I stepped on the floor without any warm-up thinking that I would just take it easy and walk through the game with a trap here and a pass there. That plan didn't last 60 seconds. Within minutes, I was bent over, sucking wind and as fatigued as I can remember being in recent history. I know what lactic acid buildup feels like, and I was beyond buildup and approaching overflowing. I was just hoping one of the girls would score so we could take a break.

Finally, a goal is scored and I practically crawled to the water fountain. I know what I did wrong. I stepped onto the field with no warm-up. I asked my body to go from rest to very high intensity activities. The pH from lactate made my legs feel very heavy and tired.

The next morning - Saturday - brings about more pain. It is called Delayed Onset Muscle Soreness. I don't run much anymore due to residual heel pain from a past injury, but I do regularly ride the stationary cycle, so my endurance is not bad. But my legs are really sore -- groan-with-every-movement sore. The front of my lower legs are sore because I haven't recently had to move my foot into all the positions demanded of you on the soccer field. My calf muscles are sore because I haven't sprinted in some time, and they are tired from continued use. My quads and hams are sore from running, from stopping, from kicking and from changing directions. But the most soreness is located in my adductor muscles, the groin muscles. You never know how much you use those muscles until they remind you with soreness the next day.

The reason for the pain is pretty well understood. When muscles develop force while lengthening, a great deal of force is generated and that leads to damage to some muscle cell membranes. Not much has been shown to prevent this soreness (other than regular training), although vitamins C and E seem to help speed up the repair; a welcome addition to some sports drinks.

This pain is evidence of damage and repair of this damage is one of the body's quickest adaptations. An old coaching adage says to get rid of soreness, do what ever it was that made you sore and that is correct. Had I gone out and played Sunday instead of watching the Super Bowl, I wouldn't feel nearly as bad on Monday as I did on Saturday.

You are probably saying that the moaning of an ex-player has little value to you as a current player or coach, but really it does. How many times have you seen teams going through a fairly passive pre-game warm-up? A little ball work, some stretching, maybe a little 5v2 and now it is time for kickoff. You wonder why the first 10-15 minutes of the game just don't seem to be clicking, but after a while things start to look better. The same thing can happen at the start of the second half. Why? The warm-up for the first half wasn't specific to the game? too passive, not enough higher intensity work prior to kickoff. Warm-up is supposed to bring you up to the demands of the game, not just break a sweat. And the second half? The players have just spent the last 15 minutes sitting and listening to first half review and second half plans, then are expected to step right out and play. Not good. The first 15 minutes will be tentative and less cohesive than envisioned, but the next 15 minutes are pretty good.

And the soreness? In order to be prepared to for play, all players need to have gone through lots of changes of direction. Playing 11v11 in practice just is not intense enough. Smaller sided games require more of everything so emphasis should be placed on these games. Straight ahead running trains a player to run straight ahead. Activities suggested by coaches for players should require many changes of direction and agility work, especially as training camp approaches. A player who has run distances preseason will have good endurance, but may well be so sore from soccer training at the start of camp that they have problems processing the coach's lessons and insights. The more agility work that is done, the more prepared for the quick changes of direction required in the game.

From a training theory standpoint, this is called specificity. The more specific the training (and warm-up) is to the activity, the more the adaptations are specific to the demands of competition will be.

These lessons can and should be applied to practices, games and off-season workouts. If you don't properly prepare yourself for the activity, you are not only hurting yourself in the immediate moment, but you're also preparing to put yourself in uncomfortable pain the following day.

Coaches and players spend all week preparing for games, and it is important that proper preparation continues up until the whistle blows.

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